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EDITORIAL

Dear friends

This is a proud moment for all of us as the 20th volume of The Orthopaedic Journal of MP Chapter has been published this year. The journal in its transit of 20 years saw a lots of ups and downs before it was accepted in its current format and is being liked by all of you.

The journal started several years back with Dr. P K Rai, Bhopal as the first editor. He remained editor for 7 years with upto the 7th volume being published. Later he was also elected as President of IOA MP Chapter, nominated as Chairman Ethics committee of IOA and also conducted the prestigious IOA National conference at Bhopal. He handed over his charge of Editor to Prof. H K T Raza, HOD Orthopaedics, Govt, Medical College, Jabalpur, MP and published Volume 8 and 9 of the journal. This was the era when Madhyapradesh and Chhattisgarh both states were combined together as one state and one association. Prof. Dr. HKT Raza later also took charges of Hon. Secretary, IOA, President IOA, President APOA, Secretary Bone and Joint Decade of India and President Social Orthopaedics Association of India.

I took over charges as editor from Prof. HKT Raza in the year 2000 having been trained in publication of the journal as an associate editor for the 9th volume. In the long 7 years and as editor for 3 terms the journal was printed every year twice till 2007 and volume 16 no 2 publication when I had to undertake more important responsibilities till later in 2012 when I was re-nominated as Editor (4th term) and I am presenting this journal in its present format to you, A journal indexed with an ISSN Print number 2320-6993 since Vol. 19 no.1 2013 to this issue. The journal is peer reviewed and is in the process of applying for an e-ISSN.

In these 20 years there have been major advancements in technology, knowledge as well as the state and art of Orthopaedic practice. Along with this there has been a major shift in the desire of orthopaedic surgeons who are now doing meticulous record keeping, having long follow-ups and are sending them as record for evidence based management protocols.

I welcome you all on this historic moment to submit your authentic work to the journal with confidence.

Prof. Dr. Alok C. Agrawal
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ORTHOPAEDIC JOURNAL OF M.P. CHAPTER
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CONTENTS

DO WE USE ANTIBIOTICS RATIONALLY?

Agrawal M.*

Agrawal A.C.**

Orthopaedic surgery with its recent advancements relies largely on the availability of modern antibiotics. Joint replacements now are considered not only in absolute infection free indications but the indications in post infective cases which started initially from 10 infection free years, then 5 infection free years , then 2 infection free years then 6 months of infection free period and now they are being considered for only a negative CRP and normal ESR. Antimicrobials are considered as the greatest discovery of the twentieth century. In the pre-antibiotic era, infectious diseases accounted for significant morbidity and mortality and invasive medical procedures were fraught with the risk of infection. All this changed with the use of antimicrobial agents. But the miracle seems to be short lived. Irresponsible and erratic use of these life-saving instruments has resulted in the development of drug resistance in many organisms and deaths due to hospital-acquired infections is on the rise. It appears that our complacency is leading us into bigger problems in the millennium that has just dawned.[1]

The first antimicrobials were discovered in the mid-20's and many new molecules were discovered between 1960 and 1980. This 'golden era of antibiotics' saw a dramatic fall in the mortality from infections. Since the 80's, not many new class of molecules have been discovered and the funding into antimicrobial research is on the decline and now deaths due to resistant infections is slowly increasing; in the U.S., mortality due to nosocomial infections is now 4 times that due to road traffic accidents. The question is as to why do doctors over-prescribe antibiotics?

1. **Is it lack of confidence:** While it is very easy to scribble a prescription, it takes a fair amount of courage to avoid unnecessary prescriptions. Inability to make a fairly accurate clinical diagnosis is one of the most common causes for over-drugging. Inability to convince the patient about the nature and simplicity of the illness and about the non-requirement of antibacterials is another reason. Some doctors may harbour a notion that it is better to give "something powerful" for every patient so as to achieve "dramatic" results (Shot Gun therapy). But the fact remains that most patients do not demand any particular prescription from their doctor and many are indeed happy if they are explained about their problem and prescribed as less drugs as possible. Fear of law-suits for 'negligence' ('act of omission') and hence 'defensive' practice may also be another reason.
2. **Peer pressure:** Some doctors may have a fear that if they do not prescribe, their 'next door' colleague may prescribe these 'powerful' drugs and get all the credit for 'curing' the patient. To avoid this 'loss of practice' they tend to prescribe these 'powerful' remedies. This is another face of 'defensive' practice.
3. **Patient pressure:** Rarely, however, one may come across patients, some of them with half-knowledge, who insist on a prescription for antibacterials so as to "get better at the earliest" (because they are "very busy and have no time to lie down in bed") or to "avoid any hassles", particularly in cases of children

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and the elderly. Although in such situations it is the duty of the doctor to resist any such pressures, some doctors may yield to these pressures, often to appease the patients and to 'save' their practice.

4. **Company pressure:** With hundreds of pharmaceutical companies and thousands of medical representatives, it is natural to come under some pressure for prescribing these drugs, which earn handsome profits for the drug industry. ("Volume building products, Sir", the representative would tell us). With competition hotting up, the companies seem to mislead the doctors about the indications, suppress the facts on adverse effects and hide the facts on cost of therapy. Recently there is a dangerous trend of 'combining' antibacterials and marketing them for imaginary diseases. Many of the so called 'newer' antibiotics (which are in fact nothing more than modifications of existing molecules) are priced exorbitantly (even hundred times more than their older congeners) without offering any benefits over the older, time tested drugs. But it has become rather fashionable to prescribe these drugs, with many doctors feeling that 'costlier must be better'.[2]

RATIONAL USE OF ANTIBIOTICS

Antibiotics are the most important weapons in our hands. Each one of them have been invented after spending considerable amount of time, energy and money. Therefore, we cannot afford to lose them. We must exercise considerable restraint in prescribing antibacterials and restrict the use of antibacterials to only certain definite indications.

Indications for antibacterial therapy:

1. **Definitive therapy:** This is for proven bacterial infections. Antibiotics (read antibacterials) are drugs to tackle bacteria and hence should be restricted for the treatment of bacterial infections only.
2. **Empirical therapy:** Empirical antibacterial therapy should be restricted to critical cases, when time is inadequate for identification and isolation of the bacteria and reasonably strong doubt of bacterial infection exists: septicemic shock/ sepsis syndrome, immunocompromised patients with severe systemic infection, hectic temperature, neutrophilic leukocytosis, raised ESR etc. In such situations, drugs that cover the most probable infective agent/s should be used.
3. **Prophylactic therapy:** Antimicrobial prophylaxis is administered in orthopaedic patients with implant surgery or Joint replacements and the drug of choice remains first generation cephalosporin Cefazolin 1 gm ideally 30 minutes prior to the incision. The dose may be repeated 8 hourly but never beyond 24 hours.[3]

Some of the factors to be considered prior to starting antibiotics are as follows:

Type of infection: Infections can be localised or extensive; mild or severe; superficial or deep seated; acute, sub acute or chronic and extracellular or intracellular. For extensive, severe, deep seated, chronic and intracellular infections, higher and more frequent dose, longer duration of therapy, combinations, lipophilic drugs may have to be used.

Culture and antibiotic Sensitivity: Ideal management of any significant bacterial infection requires culture and sensitivity study of the specimen. If the situation permits, antibacterials can be started only after the sensitivity report is available. Narrow spectrum, least toxic, easy to administer and cheapest of the effective drugs should be chosen. If the patient is responding to the drug that has already been started, it should not be changed even if the in vitro report suggests otherwise.[4]

Source of infection: Community acquired infections are less likely to be resistant whereas hospital acquired infections are likely to be resistant and more difficult to treat (e.g. Pseudomonas, MRSA etc.).

Host factors: Age of the patient, immune status, pregnancy and lactation, associated conditions like renal failure, hepatic failure,

epilepsy etc. should be considered in choosing the antibacterial agent.

Age:

Infants: Chloramphenicol (Can cause grey baby syndrome) and sulfa (Can cause kernicterus) are contraindicated.

Below the age of 8 years: Tetracyclines are contraindicated because they are known to discolour the teeth.

Below the age of 18 years: All fluoroquinolones are contraindicated because they are known to cause arthropathy by damaging the growing cartilage.

Elderly: In the Elderly, achlorhydria may affect absorption of antibacterial agents. Drug elimination is slower, requiring dose adjustments. Ototoxicity of aminoglycosides may be increased in the aged.

Compromised immune status:

In patients with extremes of age, HIV infection, diabetes mellitus, neutropenia, splenectomy, using corticosteroids or immunosuppressants, patients with cancers / blood dyscrasias, Only bactericidal drugs should be used. And it is indeed debatable whether antibacterials should be used to treat infections like aspiration pneumonia, UTI, catheter infections, infections through life support systems, pressure sores etc. in patients who are terminally ill (brain dead, patients with massive stroke, terminal cancers, advanced age, terminal AIDS etc.).[5]

Pregnancy:

Drugs with known toxicity or un-established safety like tetracyclines, quinolones, streptomycin, erythromycin estolate and clarithromycin are contraindicated in all trimesters and sulfa, nitrofurantoin and chloramphenicol are contraindicated in the last trimester. Drugs with limited data on safety like aminoglycosides, azithromycin, clindamycin, vancomycin, metronidazole, trimethoprim, rifampicin and pyrazinamide should be used with caution when benefits overweigh the risks. Penicillins, cephalosporins, INH and ethambutol are safe in pregnancy. In lactating mothers sulfa, tetracyclines, metronidazole, nitrofurantoin and quinolones are contraindicated.

Renal failure:

Tetracyclines are absolutely contraindicated; aminoglycosides, cephalosporins, fluoroquinolones and sulfa are relatively contraindicated; and penicillins, macrolides, vancomycin, metronidazole, INH, ethambutol and rifampicin are relatively safe. It is better to avoid combinations of cephalosporins and aminoglycosides in these patients because both these classes of drugs can cause nephrotoxicity.

Hepatic failure:

No drugs are absolutely contraindicated; chloramphenicol, erythromycin estolate, fluoroquinolones, pyrazinamide, rifampicin, INH and metronidazole are relatively contraindicated and penicillins, cephalosporins, ethambutol and aminoglycosides are safe.

Drug Factors

1. **Hypersensitivity:** If the patient has prior history of hypersensitivity the concerned antibacterial agent should be avoided. It is therefore important to elicit this history in all patients.
2. **Adverse reactions:** Certain adverse reactions warrant discontinuation of therapy and the doctor should adequately educate the patients on these adverse effects.
3. **Interactions:** Interactions with food and other concomitant drugs should be considered before instituting antibacterial therapy so as to maximize efficacy and minimize toxicity.
4. **Cost:** Lastly, but not the least, the cost of therapy should be considered in choosing the antibacterial agent and in a developing country like India with limited spending on healthcare, this does assume significance. It should always be remembered that just because a particular drug is expensive, it need not be superior to the cheaper ones. For

example, cheaper drugs like doxycycline or co-trimoxazole would be as effective as the costlier clarithromycin or cephalosporin in the management of LRTI

Combinations: Judicious and intelligent combination of different antibiotics can be very useful in treating certain difficult infections and in preventing or overpowering resistance. On the other hand irrational and unnecessary combinations can add to the cost and adverse effects and help in the development of drug resistance.

Antibacterial combinations can be useful in the following situations:[7]

1. **To sharpen the effect:** Synergistic combination of two static drugs - e.g. Combination of Trimethoprim and Sulfamethoxazole - Co-Trimoxazole
2. **Treatment of infections with multiple organisms:** Mixed infections in lung abscess, peritonitis, soiled wounds etc., naturally require multiple antibiotics for complete clearance of the infection - Penicillins (for gram positive and certain anaerobes) + Aminoglycosides (for gram negative); metronidazole for bacteroides etc.
3. **To prevent resistance:** Use of combinations is a well known method of preventing drug resistance. The classic example is the antitubercular therapy.
4. **To overcome resistance:** Combination of specific drugs can be useful in overcoming the resistant infections. Examples include Penicillins + b lactamase inhibitors/b lactamase resistant penicillins for S. aureus; Penicillins/cephalosporins + aminoglycosides for Pseudomonas etc.

The following combinations are irrational, not useful or even harmful:

1. Combinations of bactericidal with bacteristatic drugs (e.g. Penicillins with tetracyclines);
2. Combinations of drugs with similar toxicity (e.g. chloramphenicol and sulfa)
3. Combining drugs for non-existing 'mixed infections' (e.g. tablets of ciprofloxacin + metronidazole/tinidazole).

Response to treatment: It depends on the nature and sensitivity of the agent, specificity of the drug, bio-availability and dosage. Longer the doubling time of the organism, longer the time it takes to respond. Thus a Streptococcal pneumonia can respond within 24-48 hours, but tuberculosis may take 2-8 weeks to respond. One should have the patience to wait for the adequate period before changing the drug (e.g. S. pneumoniae infections - 24-48 hours; E. coli - 24-48 hours; S. typhi - 4-7 days; M. tuberculosis - 2-8 weeks etc.). Drugs should be changed midway only when there is absolutely no response or there is no expected response and the sensitivity report also suggests resistance.

RESISTANCE TO ANTIMICROBIAL AGENTS

Resistance to antimicrobial agents is one of the greatest problems faced by the medical community. These powerful weapons, developed by spending millions of dollars and years of dedicated research, have been rendered less effective or totally ineffective only because of our own negligence and complacence. This is indeed frustrating.The following table provides on overview of some of the recent examples of resistance to antimicrobials:

Organism	Resistance
Gram Positive cocci	Methicillin resistant Staph. aureus and coagulase negative Staphylocci, penicillin resistant Pneumococci, macrolide resistant Streptococci, vancomycin resistant Enterococci.
Gram negative cocci	Penicillin, quinolone resistant gonococci.
Gram negative bacilli	Enterobacteriaccae resistant to B lactams and B lactamase inhibitors, multi drug resistant pathogens include Shigella, E. Coli, Salmonella.
Acid fast bacilli	Multi drug resistant M. tuberculosis.

FACTORS CONTRIBUTING TO ANTIMICROBIAL RESISTANCE

Antimicrobial resistance, initially a problem in hospitals and developing countries, today affects the world at large. The reasons for resistance are many. The WHO reports that the antimicrobial agents are used by too many people to treat the wrong kind of infection in the wrong dosage and for the wrong period of time in both industrialized and developing countries. Increase in poverty, overcrowded living areas, crowded day care centers have all contributed in spreading the resistant bacterial infection. The tremendous increase in the size of the high risk populations because of immune-compromise, the increased frequency of invasive medical interventions and prolonged survival of patients with chronic debilitating disease have amplified the problem.

Resistance to antimicrobial agents can be due to various mechanisms:

1. Inability of the drug to reach the organisms
2. Inactivation of the drug
3. Alteration in the target

Resistance may be acquired by mutation and passed onto the next generations. It may also be acquired by horizontal transfer from a donor cell by transformation, transduction or conjugation.

Control of use of antimicrobial agents: The following methods can be used to control the use of antimicrobial agents in hospitals: Education programmes like staff conferences, lectures and audiovisual programmes; availability of clinical pharmacist consultants; control of contact between pharmaceutical representatives and staff physicians and of various sponsorships from companies; restriction of hospital formulary to minimum number of agents needed for most effective therapy; availability of diagnostic microbiology laboratory sensitivity tests and appropriate selection of sensitivity tests for organism and site; automatic stop orders for specific high-cost agents and written justification for high-cost agents etc.

In the current Orthopaedic Practice several routes of antibiotic treatment exist. Oral antibiotics are still the most commonly used. Intravenous application may be required for more serious infections that do not respond to oral antibiotics. Local delivery of antibiotics also can be beneficial. Polymethyl methacrylate (PMMA) beads impregnated with heat-stable antibiotics (tobramycin, vancomycin, and gentamicin) have been used since the early 1970s. A 2- to 3-cm area around each bead has a high concentration of antibiotic. With tobramycin and vancomycin, the peak concentration of antibiotic delivered to local tissue occurs on the first day and lasts for only approximately 1 week. This local delivery system avoids systemic toxicity; however, it requires removal (usually surgical) within 4 weeks. A more attractive biodegradable system is the collagen-gentamicin sponge, which obviates the need for surgical removal and delivers higher concentrations of antibiotics than PMMA beads. It has been suggested that antibiotic release by this method may be complete within 4 days. Lactic acid polymerase may be the next step in local biodegradable antibiotic delivery systems. This system delivers a high concentration of quinolines (bactericidals for probable pathogens of chronic osteomyelitis) for 60 days, with a peak release of antibiotics at day 15. An additional method of local antibiotic delivery is that of mixing autogenous iliac crest bone graft with piperacillin or vancomycin. Antibiotics must be chosen carefully. For example, heat-stable antibiotics are required for PMMA applications; quinolones have shown detrimental effects on chondrocytes and fracture healing; and tobramycin at intermediate levels of concentration (400 µg/mL) can decrease cell replication. In general, vancomycin is less toxic to osteoblasts at high local concentrations than other aminoglycosides and rifampin and the quinolones should not be administered when bone regeneration is an issue. An infectious disease consult can help guide the appropriate antibiotic in each patient and can be especially useful with the ever-changing microbial picture. Even though many surgical techniques have been described for the treatment of osteomyelitis, prevention is still the best course, and adherence to the basic principles of treatment of infections helps achieve success.

ACUTE SEPTIC ARTHRITIS

Empirical Antimicrobial Therapy

PATHOGEN	EMPIRICAL ANTIMICROBIAL
Gram-positive cocci in clusters with MRSA risk factor or β-lactam allergy	Vancomycin 15 mg/kg IV q12h
Gram-positive cocci in clusters, no MRSA risk factors	Nafcillin or oxacillin 2 g IV q4h
Gram-positive cocci, no MRSA risk factors	Cefazolin 2 g IV q8h
Gram-positive cocci in chains (streptococci presumed)	Penicillin G 12-18 MU/d or ampicillin 2 g IV q4h
Gram-negative cocci (presumptive Neisseria)	Ceftriaxone 1-2 g IV/IM q12-24h or cefotaxime 2 g IV q8h
Gram-negative rods	Ceftazidime 2 g IV q 8 hr or cefepime 2 g IV q 8 hr
Negative Gram stain, previously healthy, no MRSA risk factors	Cefazolin 2 g IV q8h
Negative Gram stain, health-care associated or other MRSA risk factors	Vancomycin 15 mg/kg IV q12h plus ceftazidime 2 g IV q8h, cefepime 2 g IV q8h or piperacillin/tazobactam 4.5 g IV q6h
Human, dog, or cat bite	Ampicillin sulbactam 1.5-3 g IV q4h

Risk factors for methicillin-resistant Staphylococcus aureus: recent hospitalization or nursing home admission, hemodialysis, diabetes, intravenous drug use, recent antibiotic exposure, recent incarceration, recent skin or soft tissue infection in patient or close contact. Community-acquired MRSA often occurs without preexisting risk factors.

Pathogen-Directed Antimicrobial Therapy

PATHOGEN	ANTIMICROBIAL THERAPY
Staphylococcus aureus (methicillin sensitive)	Nafcillin or oxacillin 2 g IV q4h × 3 wkCefazolin 2 g IV q8h × 3 wk
	Vancomycin 15 mg/kg IV q12h × 3 wk
Staphylococcus aureus (methicillin resistant or type I penicillin allergy)	
Streptococcus including penicillin-sensitive S. pneumoniae [MIC < 4 mg/L])	Penicillin G 12-18 MU IV qd divided dose or ampicillin 2 g IV q4h × 2 wk
S. pneumoniae (penicillin-resistant)	Ceftriaxone 1-2 g IV q12h or cefotaxime 2 g IV q8h if susceptible, or vancomycin 15 mg/kg IV q12h × 2 wk
Enteric gram-negative bacilli	Ceftriaxone 1-2 g IV q12h or cefotaxime 2 g IV q8h × 3 wk
Gram-negative bacilli (Pseudomonas aeruginosa)	Ceftazidime 2 g IV q8h or cefepime 2 g IV q8h, plus gentamicin or tobramycin 5 mg/kg IV q24h × 3 wk
Gram-negative bacilli	Ciprofloxacin 400 mg IV q8-12h or 750 mg PO q12h or levofloxacin 750 mg IV or 750 mg PO qd × 3 wk
Polymicrobial	Ampicillin/sulbactam 1.5-3 g IV q4h × 3 wkClindamycin 600 mg IV q6-8h × 3 wk plus ciprofloxacin 400 mg IV or 750 mg PO q12h or levofloxacin 750 mg IV or 750 mg PO qd × 3 wk
Gram-positive etiology and type I penicillin allergy	Vancomycin 15 mg/kg IV q12h × 3 wk

MIC, minimal inhibitory concentration.

CONCLUSION

As it is clear, most of the orthopaedic surgeons are not aware of the principles governing use of antibiotics. It is extremely important to teach them the details and precautions in the use of antibiotics so as to avoid empirical use of antibiotics and prevent the development of microbiological resistance.

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ELASTIC INTRA-MEDULLARY NAILING FOR LONG BONE FRACTURE FIXATION IN PAEDIATRIC AGE GROUP (5-12 YEARS)

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ABSTRACT

Background: Most paediatric long bone fractures are being treated conservatively since years. Operative stabilisation becomes necessary when reduction or stabilisation of fracture fails with conservative treatment. The previous methods of operative stabilisation were associated with various complications. Introduction of titanium elastic nail has overcome these drawbacks, maintained satisfactory reduction and allowed early joint mobilisation.

Method: This study was to asses outcome of displaced long bone fracture treated with TENS in paediatric (5 to 12year) age group. We have studied 25 children of diaphysial long bone fractures, treated with closed reduction and TENS with an average follow up of 1 year.

Result: In our study all fractures united in an average 8.1 weeks, complications seen in 3 patients (transient limb length discrepancy in 2 patients, pain at insertion site in 1 patient).

Conclusion : TENS is a safer & easier method with excellent results and fewer complications.

INTRODUCTION

Paediatric long bone fractures are very common, which are treated with conservative methods usually, but fracture shaft of femur and other long bone fractures in older children, with excessive overriding, angulations and malrotation require treatment method to be re-considered.[7] Children of less than 5 yrs of age have great potential of healing so fracture heals rapidly and angulations correct gradually by itself. In older children apart from decrease potential of healing, they have tendency of loss of reduction, mal-union, and joint stiffness, when treated conservatively. Treatment method is also influenced by the type of injury, associated injuries, location and type of fracture. These situations require operative interventions which are external fixation, compression plating, rigid nailing and elastic nailing. These procedures have their own complications like pin tract infection, open reduction, infection secondary procedure of implant removal, physeal injury with growth arrest etc. Ideally, fixation of diaphyseal long bone fractures should produce an "internal splint" that shares load, maintains reduction till hard callus formation, and in children should not endanger the growth areas or blood supply. These goals can be achieved with 'Titanium Elastic Nailing' (TENS) which is also known as 'Elastic Stable Intramedullary Nailing '(ESIN), has become the choice of stabilization in paediatric long bone fractures. TENS provides stable reduction and early joint mobilisation, so as to prevent joint stiffness without affecting the physis. The present study is aimed at the evaluation of outcome of intramedullay fixation with TENS, as well as technical aspects of nailing procedure in children with long bone fractures.

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MATERIALS & METHODS

We have studied 25 children prospectively with long bone diaphyseal fractures, conducted at tertiary care centre in the department of orthopaedics, MGM medical college Indore from July 2011 to October 2013. All children between 5-12 years of age with diaphyseal fractures of long bone meeting the inclusion and the exclusion criteria (as given below), are subject of study. The radiographs were being taken at and patients were evaluated clinically for ROM, deformity, shortening, fracture union and hardware related complications de?ned intervals.

Inclusion criteria: 1. 5-12 years of age, 2. Diaphyseal fractures and Metaphyseal fractures of femur, 3. Closed or Gustilo-Anderson type 1 open fractures only.

Exclusion criteria: (1)Grossly comminuted or multifragmentary fractures, (2)Gustilo-Anderson type 2 or more open fractures, (3) Pathological fracture

PRINCIPLE AND TECHNIQUE

TENS works on principle of three point fixation. The symmetrical elastic construct formed by 2 nails, counteracts the translational, bending, axial and rotational forces, which try to deform the fracture.[6, 9] For fracture of long bone we use 2 nails for each bone except for radius- ulna in which usually we use one nail for each bone. The end of nail is tapered, bevelled and curved, which make insertion of nail and negotiation through fracture become easier. The nails are available in various sizes from 2mm to 4mm and are colour coded according to size. Diameter of nail should be 40% of canal diameter at isthmus, except in radius-ulna in which it is 60% of canal diameter.[6] We pre-bend the nail before insertion, so as to make curvature of nail 3 times the canal diameter.[6] It increases stability and helps in achieving three point fixation. The apex of curvature of nail should lie over fracture site. To spare the physis the entry should be made away from physis[6] this procedure requires c- arm and fracture table for fracture shaft of femur.

Entry points for different bones are as follow[6]

Fracture humerus- we have done antegrade nailing with entry point just distal to physis from lateral aspect. Entry points of both nails were on lateral side, but one nail pre-countered in C-shaped while another in S-shape to engage opposite cortex at lower end. (Fig. 1)

Fracture shaft femur- we do retrograde nailing, with entry 2.5 cm proximal to physis. 2nails of same size, one from medial side and one from lateral side, were used. (Fig. 2)

Fracture tibia- antegrade or retrograde nailing with entry point just 2 cm away from physis, one from medial side and one from lateral side (Fig.3)

Fracture radius - retrograde nailing with entry point just lateral to Lister tubercle. (Fig. 4)

Fracture ulna- antegrade nailing with entry point just distal to physis (Fig. 5)

Statistics- We have studied 25 children, in which 17 were male and 8 were female children of 5 to 12 yrs of age. This include 17 fractures of shaft femur, 1 of fracture shaft humerus, 5 of fracture

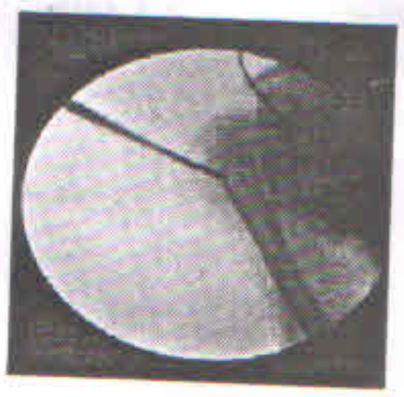


Figure 1

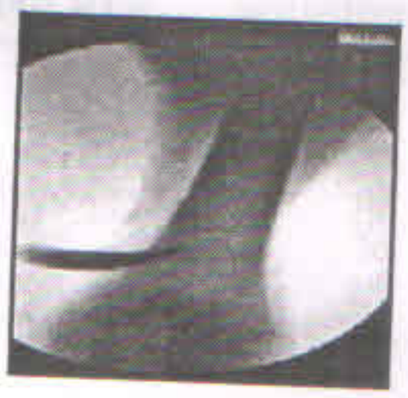
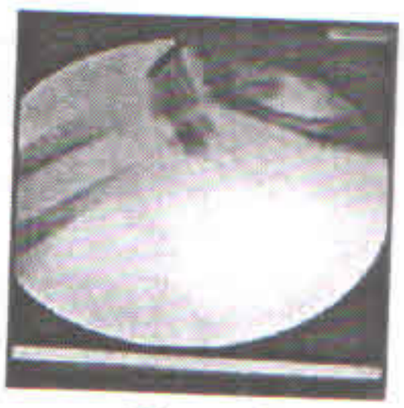


Figure 2

Figure 3



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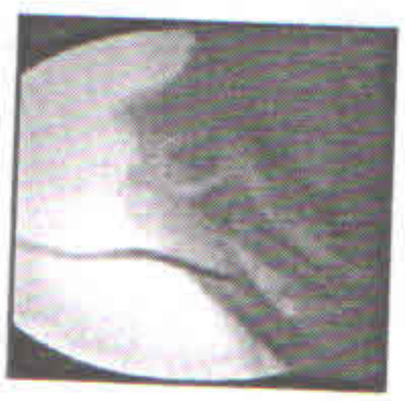

Figure 5

Entry points of nail of deferent long bones

radius-ulna and 2 of fracture tibia including one patient fracture femur and tibia in same limb. One patient with fracture tibia was associated with vascular compromised due to fracture fragment. Diaphyseal fractures of all long bones with sub-trochantrich fracture of femur included in this study. Pattern of fractures in this study were transverse, oblique, spiral or fracture with small wedge with other cortex in continuity. 2 fractures of shaft of femur and one fracture of tibia were compound with Gustilo-Enderson type 1 grade. All patients operated under spinal or general anaesthesia form 1st to 7th day after trauma. All patients treated with closed reduction and TEN fixation. They were followed minimally up to 1year and outcome was assessed on the basis of Flynn criteria

RESULTS

Fracture shaft of femur- union time for fracture ranges from 6 weeks to 12 weeks. Partial weight bearin started at an average 3 weeks. Full weight bearing started between 6 weeks to 10 weeks. Range of motion was normal in all except in one patient with fracture femur and tibia in ipsilateral site, has decreased range of motion of knee. Pain at entry site seen in 1 patient, which was associated protruding nail from entry site (Fig. 6). Transient limb length inequality of more than 1 cm was seen in 2 patients.

Fracture radius-ulna- fracture united between 6-8 weeks in all 5 patients. None of patients was having infection and Pain at entry site. Range of motion was normal in all patients.

Fracture humerus- fracture united at 8 weeks in a patient without infection and Pain at entry site. Range of motion was normal in all direction.

Fracture tibia- one patient was having associated injury with fracture shaft femur while another patient was having vascular compromise with fracture fragment compressing the artery. Post operative flow became normal immediately. Fracture united between 6-8 weeks in both patients. No one have infection and Pain at entry site.

The result was excellent in 88%, satisfactory in 8% cases and poor in 4% cases according to Flynn Criteria (Table 1)

In 2 patients, satisfactory result was due to transient limb length discrepancy which is due to growth potential in children which decreased with time, while in one patient result was poor because of pain at entry site due to protruding nail at entry site (Fig. 6). It can be prevented with correct technique and proper instrumentation.

Tabel 1

Titanium elastic nail	No. of patients	Result			Complications		
		Excellent	Satisfactory	Poor	Nail entry site irritation	Malalignment >10 degree	Lengthening >1 cm
Fracture shaft femur	17	14	2	1	1	0	2
Fracture radius-ulna	5	5	0	0	0	0	0
Fracture shaft tibia	2	2	0	0	0	0	0
Fracture shaft humerus	1	1	0	- 0	0	0	0

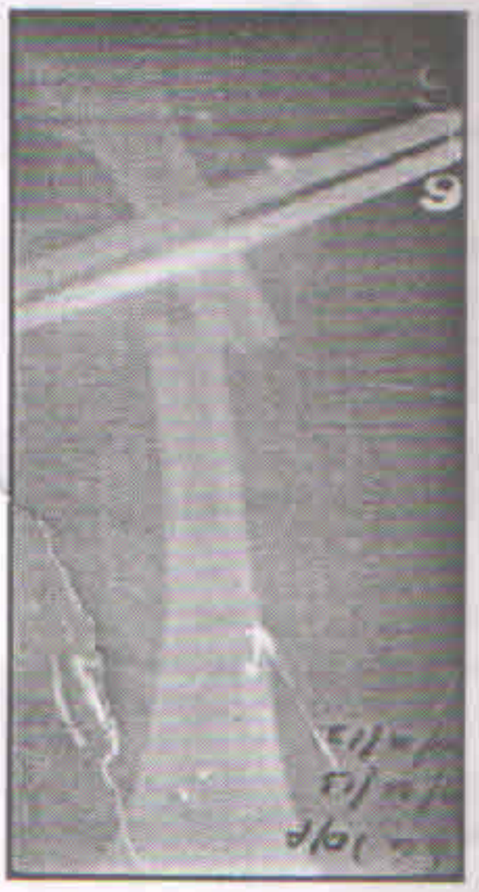

Figure 6

Figure 7

Figure 8

Figure 9

Figure 6, 7, 8, 9 : A case of fracture shaft femur treated with TENS showing pre-operative, post-operative. 4 week follow-up and 8 week follow-up with good union.

DISCUSSION

Long bone fractures are very common. In Paediatric age (5-12 years) treated most of the time with conservative methods. But when it fails operative methods are external fixation, open reduction and plate fixation, locked nails etc. External fixation is associated with pin track infection and re-fracture[1,2] and it is known cause of non-union. It is also inconvenient for patients. Plating is associated with pitfall of open reduction i.e. infection and blood loss, further implant removal is a major surgery after fracture union.[3] After implant removal there are incidences of refracture. Locked nails may cause physeal injury in children and associated with avascula necrosis.[4,5] These all lacunae can be overcome with TENS. It is a closed method, without causing physeal injury, the chance of infection is very low. The blood loss is minimal and the implant removal is easier.

Femoral fracture- In femur we have used 2 pre-bend nails, having opposite action, so it prevent side to side and antero-posterior translation of fracture, angulations, axial compression and rotation at fracture site.[6,9] As the rotational stability is minimal, we use to apply de-rotation bar for three weeks to add rotational stability in patients of 8-12 year of age. As the fixation is stable knee bending started immediately, partial weight bearing started at 3 weeks and full weight bearing started when the sign of union seen on X-rays. Implant removal planned when fracture consolidated, at least after 6 month. The implant removal is easy procedure, with small nick, end of nail can be pulled out with nose plaier.

Radius- ulna fracture- Procedure was same as for femur but one nail used for each bone with diameter of nail to be 60% of canal diameter. Retrograde nailing for radius and ante-grade nailing in ulna was done in 4 cases, while in one case retrograde nailing for both bone done.

Fracture humerus- We have done only one case of fracture humerus because with conservative management most of fractures are reduced within acceptable ranges,[7] further the criteria of acceptable reduction is wider in humerus. In our case we were fail to achieve acceptable reduction by conservative method so, antegrade nailing done

with 2 nails, one in 'C' shape while another in 'S' shape.

Fracture tibia- Operative treatment is rarely required in a closed tibial fracture in children, (<5% of cases). In our study one patient was associated with vascular compromise and another was associated with fracture shaft femur. Both treated with closed reduction and 2 nails used for antegrade nailing. Vascular flow become normal in that patients.

CONCLUSION

Intramedullary elastic nailing for long bone fracture fixation is easy procedure in children, the result are excellent with this method, with very few minor complications which can be prevented with correct technique. Post operatively the patient is comfortable with the internal splint and mobilisation can be done early.

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STUDY OF ASSOCIATION OF OBESITY WITH OSTEOARTHRITIS OF KNEE JOINT IN FEMALES

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ABSTRACT

Introduction: Osteoarthritis is a common degenerative disease of knee joints.[1] Knee osteoarthritis is the most common type. Obesity is the main preventive risk factor that has been identified in large joint osteoarthritis.[2,3] Other risk factors are aging, family history, menopause.

Objective: The main objective was to assess whether obesity and menopause explain the trend in knee pain and osteoarthritis in females.

Methodology: Observational study was conducted at Dept of Orthopedics, Sri Aurbindoo Medical College and Post graduate institute Indore.

100 females between age of 45 and 65 yrs completed a questionnaire regarding their knee pain, joint swelling, crepitus, and stiffness.

Results: Result showed that out 100 females, 96% of the obese females developed symptomatic osteoarthritis of knee. Highest percentage we found for bilateral knee. Chi-square test showed significant association of increased BMI and osteoarthritis of knee (p=0.001).

Key words: OA (Osteoarthritis), Female, BMI (Body Mass Index), Knee, Obesity, Menopause.

INTRODUCTION

Osteoarthritis is a degenerative joint disease of multifactorial origin.[4] It is estimated that prevalence range from 4-30% depending on the age, sex and disease definition.[5] Risk factors including obesity, previous knee injury, physical activities, age. Obesity, defined by either increased weight (kg) or BMI, is a powerful risk factor for development of knee OA,[2] with one twin study finding, 9-13% increased risk for the onset of the disease with every kg increase in body weight6. In addition, obesity is also a risk factor for the progression of the radiological OA.[7,8] Two major theories have been proposed to explain this association (systemic/ metabolic mechanisms).[9] The biochemical theory suggests that obesity increases axial heading with consequence degeneration of articular cartilage, whereas metabolic theory proposes that some metabolic factors adversely affect cartilage.[10] The purpose of the present study was to assess whether obesity and menopause explain the trend in knee pain and osteoarthritis in females.

METHODOLOGY

Study Design: Observational Study (Cross sectional survey)

Sample Size: 100 patients were included.

Duration of the study: 1year (July 2012 - June 2013)

Study Group: Females 45-65 years of age. Data was collected from Dept of Orthopedics, Sri Aurbindoo Medical College and Post graduate institute Indore.

Inclusion Criteria: Females aged 45-65 years.

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Exclusion criteria: Individuals with any evidence of secondary OA, inflammatory arthritis, and those with neurological conditions were excluded.

The written consent was taken from all the subjects for participation in the study.

(A) Detailed History including

a. Onset of pain
b. Aggravating and relieving factor
c. Other joints affected by OA
d. Family history of OA
e. Physical activity
f. History of menopause

(B) Physical examination for OA of the knee joint was done to assess any swelling and note any various movements which may bring on pain.

- BMI was calculated using formula
- BMI = Weight in kg / Height in cm^2

CRITERIA USED TO DIAGNOSE OA OF KNEE JOINT

1. Knee pain for most days of the month
2. Crepitus on active joint motion
3. Morning stiffness more
4. Age >35yrs
5. Bony enlargement of the knee on examination.

Data Collection Tools: Structural questionnaire guide was used to collect data.

STATISTICAL ANALYSIS

Using SPSS 17 the data was analyzed. The continuous variables were expressed as mean SD where as categorized variable were expressed in the form of frequency table and percentage. Chi square test was applied to determine any association between the variables. P value less than 0.05 was taken as significant.

RESULTS

This observational study was based on 1 year time period and data was collected from 100 females between the ages of 45-65yrs.

Table 1

	Mean ± SD
Age	53.2 ± 6.501
Height	1.61 ± 0.91
Weight	86.69 ± 15.48

Mean age: - 53.2 ± 6.501

Mean height: - 1.61 ± 0.91

Mean weight: - 86.69 ± 15.48

=> among 100 females,

65% females were obese.

24% females were overweight

11% females had normal BMI

=> 80% of subjects were diagnosed as OA of knee

Table 2

	Frequency	Percentage of female with O.A.
Right	31	39
Left	7	9
Bilateral	42	52
	80	**100**

Table 3

Variables	Frequency		Percentage	
	Yes	No	Yes	No
Family H/O of OA	04	76	05	95
Menopause	14	66	17.5	82.5
Pain in knee joint	00	80	00	100
Morning stiffness	00	80	00	100
Joint swelling	08	72	10	90
Radiating pain	21	59	26.3	73.7
Crepitus	00	80	00	100
Difficulty in climbing stairs	00	80	00	100
Weak quadriceps	16	74	20	80
Deformity in knee joint	41	39	51.25	48.75

Frequency of variables showed that 76% had a positive family history, 66% females were post-menopausal and almost everyone had pain, crepitus and joint swelling.

Table 4

BMI	Osteoarthritis		
	Yes	No	Total
Normal	3	8	11
Overweight	16	8	24
Obese	61	4	65
Total	**80**	**20**	**100**

Significant association (p=0.001) was found between increased BMI and osteoarthritis of knee.

Table 5

Menopause	Osteoarthritis		
	Yes	No	Total
Yes	12	66	78
No	8	14	22
Total	**20**	**80**	**100**

DISCUSSION

The purpose of the present study was to assess whether obesity (described in terms of increased BMI) and menopause explain the trend in knee pain and osteoarthritis in females

This study showed that 94% of the obese females developed symptomatic OA of knee and obesity is strongly associated with OA. Although the association between obesity and large joint OA is probably mediated by biochemical component, it is unlikely to be the sole means by which obesity contributes to the pathogenesis of OA. Several studies have identified a genetic predisposition towards OA.[11,12] Only one study showed that the off springs of people with medial tibio-femoral OA walked with a less than normal degree of foot rotation, which may ultimately predate disease. Given that obesity is associated with the onset and progression of OA, weight loss represents an important preventive strategy. The Framingham Study showed that weight control significantly affected the risk of developing knee OA. The women who reduced their BMI by 2 units or more, reduced the odds for developing OA by >50%.

CONCLUSION

The Study concludes that: Obesity is strongly associated with the development of secondary OA of knee in both pre and post menopausal females.

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MANAGEMENT OF IPSILATERAL FRACTURES OF PROXIMAL FEMUR AND THE SHAFT OF FEMUR WITH LONG PROXIMAL FEMORAL NAIL

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ABSTRACT

Introduction: Ipsilateral proximal femoral fractures (fracture neck / intertrochanteric) with shaft fractures are uncommon injuries generally occurring in young patients who sustain high energy trauma. Various treatment options are available having their own merits and demerits. We studied the outcome of long proximal femoral nailing in ipsilateral fractures of proximal femur and shaft of femur.

Material and methods: The study involved 09 patients with ipsilateral fractures of the proximal femur and shaft of femur. All patients were male with an average age of 38 years. All of the fractures resulted from high-energy trauma except one with intertrochanteric fracture in the oldest patient of the study. The fracture neck of femur was initially missed in one case and was diagnosed on table. All fractures were fixed by a long proximal femoral nail. Patients were followed up for an average period of 2 years (1-3yrs).

Results: Patients were followed up at 3, 6, 12 and 24 months. Union was achieved in all patients. The average time for union of the proximal femur fracture was 4. 5months (4-6 months) and shaft of femur was 6 months (4-7months). Varus malunion due to collapse of fracture neck of femur was noted in one patient.

Conclusion: Long proximal femoral nailing in ipsilateral proximal and shaft of femur is a reliable method with fewer complications.

Key words: Long proximal femoral nail (LPFN), fracture proximal femur and fracture shaft femur.

INTRODUCTION

The ipsilateral fractures of proximal femur and shaft of femur is a uncommon condition in orthopaedic practice. Such extensive trauma accounts for 1% of femoral fractures. Attributed mechanisms include axial compression against the acetabular roof, with hip adduction or abduction.[1,2] Various techniques and implants have been developed to manage ipsilateral fracture proximal femur and shaft of femur. These techniques include simultaneous trans-cervical screwing and shaft plating, intramedullary fixation with additional transcervical fixation,[3,4] retrograde intramedullary nailing with femoral neck-lag screws, reversed intramedullary fixation with cephalomedullary locking,[5] Ender pins with percutaneous Knowles pins,[6,7] Gamma (long) nailing, and reconstruction nailing.[8,9] All these techniques have their own advantages and disadvantages. We have studied functional and radiological outcome using long proximal femoral nailing (LPFN) in ipsilateral fractures of proximal femur and shaft of femur.

MATERIALS AND METHODS

We studied 9 patients of ipsilateral fractures of proximal femoral and shaft of femur treated with

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LPFN, between January 2011 to December 2013. The mean age was 40 years (range 24-70 years). All patients were male. Most common mode of trauma was road traffic accident (n=7/9). There were 7 cases of fracture neck and 2 cases of intertrochanteric femur. The femoral neck fracture was initially missed in one patient and diagnosed at fracture table. Amongst the fracture neck of femur there were the basal fractures (n=5), subcapital (n=0) and transcervical fractures (n=2). Amongst the femoral shaft fractures 8 were close fractures. The data of shaft fracture pattern are described below, as per OTA classification (Table 1). Most of the patients had fracture of middle third of shaft of the femur. One of the patients had comminuted intercondylar femur fracture on the contralateral side which was managed with locking plate fixation and one had ipsilateral comminuted fractutre shaft of tibia and treated with interlocking nailing. Proximal femoral nails that we used had the proximal diameter of 15 mm and length varied from 36 to 42 cm. The nail had proximal 6° mediolateral angle for smooth fit in the trochanter. The proximal screw inclination angle was of 135°. Surgery was performed within mean time 60 hours (range 48 to 72 h). The patient was placed in the supine position under fracture table traction (with mild adduction of the affected extremity and contralateral deviation of the torso). The leg was kept in a neutral position without internal or external rotation. To reduce the fracture, traction was applied in the direction of the length of the extremity. Closed reduction was carried out and confirmed by the image intensifier on anteroposterior and lateral views. A 5 cm incision was taken from the tip of the greater trochanter proximally. The entry point is usually on the tip of the greater trochanter. A guide wire was passed through the tip of the trochanter distally after reducing the fracture shaft femur by closed manipulation in majority of the cases. Reaming was done over the guide wire according to the planned nail. The nail of appropriate size (between 10 and 12 mm) and of adequate length (between 36 and 42 cm) was implanted manually. The nail is inserted, using minimal hammering force and keeping the proximal holes of the nail parallel to the femoral neck. The reduction of the proximal femoral fracture was re-evaluated in AP and lateral views. Two guide wires are passed. Inferior guide wire should be above the calcar deep in subchondral bone. Reaming is done by step-drill and the cervical screw of 8.0 mm and the stabilizing screw of 6.4 mm were introduced. Depending upon the fracture configuration and the stability, the distal static and dynamic holes were locked in all the cases. No patient in our study needed open reduction. The mean duration for the surgery was 85 min (range 55-105 min). Active and passive exercises initiated within 72 h. The postoperative ambulatory program involved nonweight bearing activities for 6 weeks with walking frame and gradual weight bearing for another 6 weeks with axillary crutches.

Table 1
OTA Classification of fracture pattern of shaft femur

Fracture pattern	No. of cases
Linear (transverse/oblique)	5
Comminuted	3
Segmental (with longitudinal split)	1
Bone loss	Nil

RESULTS:

The patients were followed up at 3, 6, 12 and 24 months. Satisfactory union of proximal femur fracture was achieved in 8 patients. One patient developed varus collapse with superior migration of screws but had satisfactory range of movement and was able to perform his activities of daily living except slight limp (Fig. 1, 2 & 3). The mean time to union for proximal femur fractures was 5 months (range, 4-8 months). We had one case of compound fracture shaft of femur which developed delayed union and later required bone grafting. The mean time of union of fracture shaft of the femur was 6 months (range 6-9 months). We did not come across any case of avascular necrosis of femoral head at final follow-up. One patient had a

superficial infection at the nail entry site which healed by dressing and antibiotic. None of the patients had deep infection. One patients had full range of motion; five patients had limited restriction of terminal range around hip (<20%) but had full range of knee movements and were able to perform all activities of daily living. Two patients had limitation of hip and knee movements between 20-50%. No cases of implant failure (breakage of implant) were noted. Limb shortening of less than 2 cm was noted in one patient due to varus collapse of fracture neck and in another patient because of comminution of shaft of femur. The Friedman and Wyman`s functional assessment system10was used for evaluating the results. The criteria used to evaluate our results included infection, pain, ability to work, shortening, range of movements at the hip and knee, ability to sit cross legged and squat (Table 2).

DISCUSSION:

Ipsilateral fractures of the femoral shaft and proximal femur results from a longitudinal force along long axis of femur. 8 Concomitant femoral neck fractures occur in 3% to 10% of patients with femoral shaft fractures.[11,12] Many of the associated femoral neck fractures are undisplaced and missed initially and have been reported in 30% to 57% of cases. The treatment of this combination of injuries continues to be controversial and still literature has not proved the superiority of a particular treatment protocol over the other. The trend has shifted from conservative management to operative treatment and the lack of consensus about best modality of fixation has lead to evolution of various techniques and numerous implants over a period of time. Plate fixation of the femoral shaft with lag screws fixation of the femoral neck has disadvantages including increased blood loss and periosteal stripping of the femoral shaft, extensive surgical dissection and longer hospitalization with potential risk of infection and non-union.[13,14] Intramedullary nails either antegrade or retrograde mode are the preferred devices. However, each mode has specific advantages and disadvantages. Retrograde mode is relatively simple. However, two separated operative fields with two varied implants (retrograde nail and multiple cannulated screws or dynamic hip screw) significantly lengthen the operating time.[15,16] Antegrade intramedullary nailing of the shaft fracture with placement of cancellous lag screws around the nail is another technique that has been described. These screws can be inserted before or after femoral nail insertion but the technique did not produce uniformly successful results because of the high rates of varus malunion of the femoral neck fracture.[17] A single implant such as a cephalomedullary (reconstruction) nail has been used to treat combined femoral neck and shaft fractures. There are a number of technical and conceptual difficulties with the use of a reconstruction nail for the treatment of combined neck and shaft fractures. First, a medullary implant is unlikely to be the treatment of choice for fractures of the femoral neck. Second, the entry site for the reconstruction nail is frequently in the same location as the femoral neck fracture. 18 The Gamma nail has the risk of fracture shaft especially in Indian femora, due to the use of oversized reaming. The single screw placement for the stabilization of the trochanter and neck gives rise to the increased incidence of superior migration of the nail and subsequent varus collapse.[19] The LPFN is available in 130-135° and has a 6° proximal mediolateral angle to facilitate easy insertion from the trochanter.[20] Recently introduced long proximal femoral nail (LPFN) is a good option for the treatment of complex fractures, with the advantages of closed antegrade nailing with minimal exposure, reduced perioperative blood loss, and biological fixation of both fractures with a single implant. Osteonecrosis and non-union are two major complications of fracture neck of femur. Osteonecrosis represents perhaps the most devastating complication, especially in a young adult. Wiss et al.[6] reported a 6% incidence of osteonecrosis at an average followup of 32 months. Swiontkowski et al.[21] reported that 2 of 9 (22%) patients who were followed for a minimum of 3 years developed osteonecrosis. In our study, we have not seen any case of osteonecrosis after an

average followup of 2 years. Wiss et al.[5] reported an 18% incidence of nonunion in his patients. In our serious there was one case of nonunion of the compound femoral shaft fracture, which required secondary bone grafting with good functional outcome. There was one case that developed varus malunion due to superior migration of screw and collapse of fracture neck of femur. The entry portal in the proximal femoral nailing is through the trochanter, thus theoretically reduce the chances of injury to the hip abductors and vascular supply of femoral neck unlike those nails which need the entry through the pyriformis fossa.[22] In our study among 9 cases, we found 6 cases with good result, 2 cases with fair result and one case with poor result. We conclude that ipsilateral fractures of the proximal femur and femoral shaft if diagnosed early and treated aggressively by LPFN gives a better functional result by a single implant. Limitation of our study is small sample size and unavailability of long term followup.

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COMBINED PREAXIAL AND POSTAXIAL POLYDACTYLY WITH SEVEN DIGITS IN A FOOT- REPORT OF A RARE CASE

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ABSTRACT

Polydactyly with 6 digits is a common congenital hand anomaly. It is classified into preaxial, postaxial and central type. We present an extremely rare case of combined pre & postaxial polydactyly with 7 digits in a foot and 6 digits in the rest of foot and hands.

Key words: Polydactyly, preaxial, postaxial, central

INTRODUCTION

Polydactyly is one of the most common congenital malformations of the hands.

It can occur sporadically but it is usually inherited with a mainly autosomal dominant inheritance.[1] It may appear in isolation or in association with other birth defects and commonly involves only the hand or the foot. Polydactyly involving both hands and feet is rare.[2] Postaxial polydactyly involves the fifth digit or ray. This anomaly with 6 digits in both hands and one foot along with 7 digits in the other foot is a rare condition.

CASE REPORT

A 26 years old male presented with difficulty in wearing shoes due to bilateral post axial polydactyly of feet. He also had similar problem in both hands (ulnar side). He had six well formed digits in both hands and left foot while the right foot had seven digits. There was history of similar congenital anomaly in his father and his father's brothers and one sister. Now, all siblings of the patient are also affected with the same disease. There is no history of consanguinity. Roentgenograms of both hands showed 6 digits, each having rudimentary phalanges without their metacarpal and metacarpophalangeal joints (Fig. 1). Right foot showed 7 digits. The 1st and 2nd toes had common, broad and short metatarsal but normal phalanges. Similarly 6th and 7th toes also had a common broad metatarsal of normal length. There was medial deviation of the 1st and 2nd toes and lateral deviation of 6th and 7th digits (Fig. 2). He was advised excision of accessory digits to enable him to wear t shoes but he refused surgery.

DISCUSSION

Polydactyly refers to an extra digit that is usually a small piece of soft tissue. Occasionally it contains bone without joints; rarely may it be a complete, functioning digit. The highest number of extra digits was identified in a new born named Akshat Saxena from Uttar Pradesh, India. He was born in 2010 with 7 digits on each hand and 10 digits on each foot, for a total of 34 digits. Finley et al in a 2 year prospective study in USA determined the incidence of polydactyly (all types) to be 2.3/1000 in white male population, 0.6/1000 in white female population; 13.5/1000 in black male population and 11.1/1000 in black female population. Incidence in Sweden was 1/1000 with equal distribution for males and females.[3]

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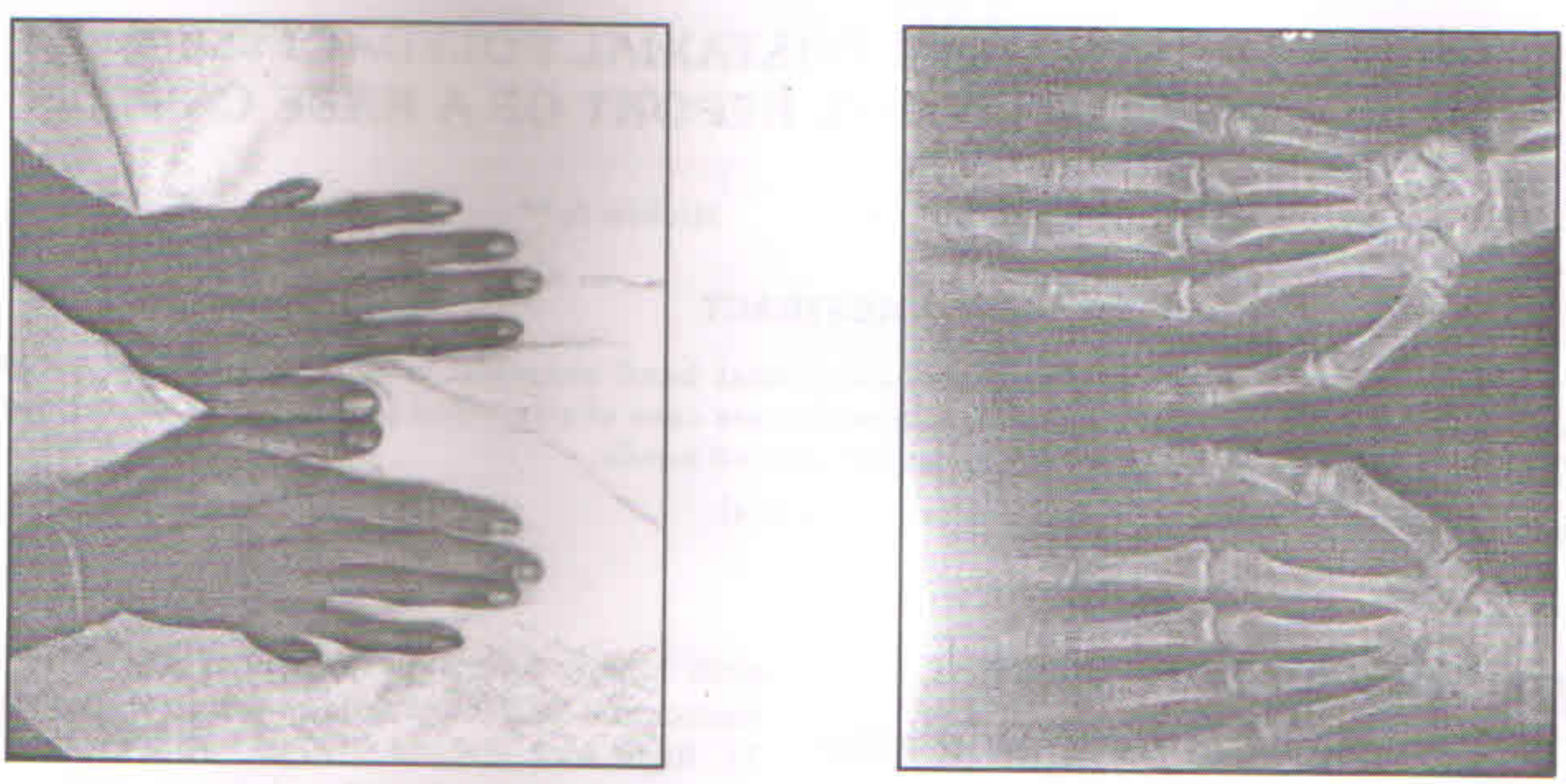

Figure 1 : Postaxial Polydactyly of both hands showing rudimentary type of 6th digit over ulnar side of little finger.

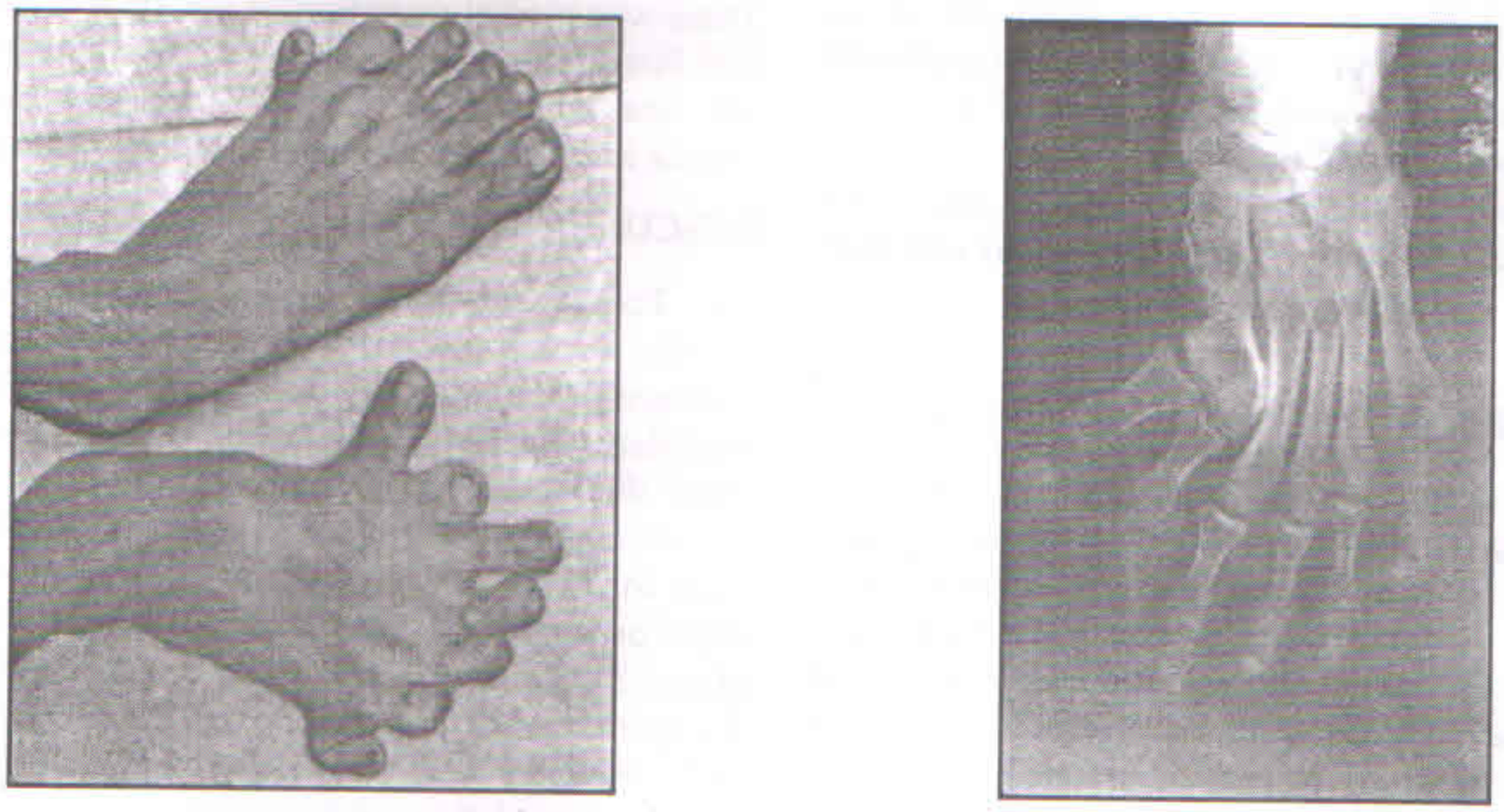

Figure 2 : Postaxial polydactyly of left foot and combined pre & postaxial polydactyly of right foot.

Polydactyly occurs as a result of abnormal duplication of digits during the 4th intrauterine week of embryonic development.[4] Polydactyly has been associated with 39 genetic mutations.[5] It can be divided into three major types - preaxial [radial (thumb) side], postaxial [ulnar (little finger) side] and central polydactyly (within the middle three digits).

Postaxial polydactyly is the most common situation, in which the extra digit is on the ulnar

side of the hand. Ulnar polydactyly occurs ten times more often in negroid ethnicities and is most common in African populations. It usually passes on in an autosomal dominant manner. Turek and Stelling classified postaxial polydactyly as rudimentary masses with a nail, and connected to the hand with a small skin pedicle. (Reference). Mostly one neurovascular bundle can be identified, with no tendons present in the extra digit (Type-I); subtotal duplication with some normal elements that typically articulate with a bifid or broad metacarpal (Type-II) or duplication of the entire osteoarticular column including the metacarpal (Type-III). Type II and III postaxial polydactyly occurs rarely. Castilla et al found prevalence of postaxial polydactyly of hand and or foot to be 14.3/10,000 (n=1,582,289 births). Postaxial polydactyly of hand was 11.0/10,000. Combined prevalence of hand and foot polydactyly was only 1.2/10,000.[6] Well formed postaxial polydactyly is inherited as autosomal dominant trait with variable expression and incomplete penetrance.

In this case, there were both type I (rudimentary mass in both hand and left foot) and type II (broad metatarsal) deformities.

Second common type is preaxial polydactyly which refers to the presence of an extra digit or digits on the radial side of the hand. It is most frequent in Asian populations and it is the second most common congenital hand disorder. Thumb polydactyly varies from barely visible broadening of the distal phalanx to full duplication of the thumb including the first metacarpal. Radial polydactyly is frequently associated with several syndromes.[7]

After an extensive search of literature, we identified this as a unique case because of the rare association of preaxial polydactyly of right foot along with familial postaxial polydactyly of hands and feet.

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RESULTS OF TRANSPEDICULAR SCREW FIXATION IN DORSOLUMBAR SPINE INJURIES

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ABSTRACT

Background - Aims-To assess the effectiveness of transpedicular screw fixation, neurological recovery and pain control thoracolumbar spine injuries.

Setting and design: The study was carried out at the Department of Orthopaedics, R. D. Gardi Medical College, Ujjain from March 2009 to February 2013.

Materials and Methods- The management of thoracolumbar spine injuries is controversial. Operative or non operative treatment is debatable. 27 patients of thoracolumbar fractures were included in this study. Written informed consent was taken. Detail history, clinical examination, x-ray dorsolumbar spineand MRI dorsolumbar spine was done. Patients were operated by decompression and pedicle screw fixation. Neurological status was assessed by Frankel grading for spinal cord injury. Pain relief was measured by improvement in Denis pain scale. History of pain relief and neurological assessment of patients was done on each follow up visit.

Results -: Transpedicular screw fixation was performed in 27 patients including 15 males and 12 females. Mean age was 35±6. 75 years (range 15-61 years). The level of injuries were D11=3 (11%) cases, D12 =8 (30%) cases, L1=8 (30%) cases, L2=3 (11%) cases, L3=2 (7%) cases, L4= 1 (3%), D12 & L1=2 (7%) cases. There were 10 (37%) Wedge fractures, 5 (18%) fracture subluxations, burst fracture in 6 (23%), flexion rotation injuries in 4 (15%) while distraction injuries in 2 (7%) cases. Pre operative neurological status according to Frankel grading was: grade A, 11 (40%) cases, grade B 6 (23%) cases, grade C 3 (11%) cases, grade D 2 (7%) cases and grade E 5 (19%) cases. Six months post operatively, there were 6 (23%) cases in grade A, grade B 2 (7%) cases, grade C 2 (7%) cases, grade D 12 (44%) cases and grade E 5 (19%) cases. Pain control was assessed by improvement in Denis pain scale. Pre operatively there was no patient in P1, 2 (7%) patients in P2, 6 (23%) in P3, 8 (30%) in P4 and 11(40%) in P5. Six months later there were 16(60%) patients in P1, 6 (23%) in P2, 2 (7%) in P3 and 2 (7%) patients in P4. There was one(3%) patient in P5.

Conclusion: Thoracolumbar junction injuries are common in young patients. Transpedicular screw fixation is useful choice for achieving better neurological recovery and good pain control in traumatic thoracolumbar fractures.

INTRODUCTION

The dorso lumbar (DL) segment of spine (D10 to L2) is an unstable zone between fixed dorsal and mobile lumbar spine at a junction of dorsal kyphosis and lumbar lordosis. Acute injury to DL segment is the second most frequent site after cervical spine in adults. The primary objectives of the treatment of unstable thoracolumbar fractures is optimizing neural decompression, early stability, pain relief and good nursing care.[1,2] The optimum treatment of unstable fractures and fracture dislocations of thoracolumbar spine remains controversial.[3] There are different

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types of management of spinal injuries including operative and non-operative techniques.[4] Non-operative treatment can be employed in patients with less vertebral body compression using thoracolumbar orthosis and restriction of activities.[5] Either anterior, posterior or both approaches can be used to achieve fusion.[6,7] However, posterior approach is less extensive.[8] Pedicle screw fixation is safe procedure, which achieves reduction and stability and provides early pain relief and mobility.[9,10]

The aim of this study was to know the functional outcome of transpedicular screw fixation in unstable thoracolumbar spine fractures in terms of neurological recovery and pain relief.

MATERIAL AND METHOD

This study was carried out in Department of orthopaedics, R.D. Gardi medical college, Ujjain from March 2009 to February 2013. Written informed consent was taken from all patients. Detail history, clinical examination, x-ray dorsolumbar spine and MRI dorsolumbar spine were done in all cases. Exclusion criteria was open fractures, fractures with significant kyphotic deformity, fractures with anterior retropulsed fragments, multiple level fractures requiring long segment fixation, pedicles fractures and pathological fractures. Neurological status was assessed using the Frankel grading for spinal cord injury. Fractures were classified according to Denis[10] (3-column classification). Involvement of 2 or more columns was defined as unstable fractures. The neurological status of the study patients was documented at the time of admission and on the day of discharge and subsequent follow up visits. Outcome was assessed on Frankel grading system[11] as follows.

GRADE DESCRIPTION

A : Complete (no sensory or motor function is preserved)

B : Incomplete (Sensory, but no motor function is preserved below the neurological)

C : Incomplete (Motor function is preserved below the neurological level, and the majority of key muscles below the neurological level have a muscle power grade of <3)

D : Incomplete (Motor function is preserved below the neurological level, and the majority of key muscles below the neurological level have a muscle power grade of > 3)

E : Normal (sensory & motor function is normal)

Severity of pain was measured pre operatively at the time of admission using Dennis pain scale as under.

P1 : No pain

P2 : Occasional minimal pain; no need for medication

P3 : Moderate pain, occasionally medications; no interruption of work or activities of daily living

P4 : Moderate to severe pain, occasionally absent from work; significant changes in activities of daily living

P5 : Constant, severe pain; chronic pain medications

Effect of transpedicular screw fixation on pain relief was measured by improvement in Dennis pain scale. All the patients were advised to come to OPD for follow up visits after one month, 3 months and six months. History of pain relief and clinical examination i.e. neurological assessment of patients were done on every visit.

The level of injuries were D11= 3 (11%) cases, D12 = 8 (30%) cases, L1= 8 (30%) cases, L2= 3 (11%) cases, L3 = 2 (7%) cases, L4 = 1 (3%), D12 & L1= 2 (7%) cases.

Table 1
Level of Injury

Level	Number of patient
D11	3 (11%)
D12	8 (30%)
L1	8 (30%)
L2	3 (11%)
L3	2 (7%)
L4	1 (3%)
D12, L1	2 (7%)

There were 10 (37%) Wedge fractures, 5 (18%) fracture subluxations, burst fracture in 6 (23%), flexion rotation injuries in 4 (15%) while distraction injuries in 2 (7%) cases.

Table 2
Type of injury

Type	Number of patient
Wedge fracture	10 (37%)
Fracture subluxations	5 (18%)
Burst fractures	6 (23%)
Flexion rotation injuries	4 (15%)
Distraction injuries	2 (7%)

Pre operative neurological status according to Frankel grading was: grade A, 11 (40%) cases, grade B 6 (23%) cases, grade C 3 (11%) cases, grade D 2 (7%) cases and grade E 5 (19%) cases. Six months post operatively, there were 6 (23%) cases in grade A, grade B 2 (7%) cases, grade C 2 (7%) cases, grade D 12 (44%) cases and grade E 5 (19%) cases.

Table 3
Neurological status of patients

Frankle grade	Preoperative Number	Postoperative Number (6 months)
A (CLSM)	11 (40%)	6 (23%)
B (SPMA)	6 (23%)	2 (7%)
C (IMP)	3 (11%)	2 (7%)
D (GM)	2 (7%)	12 (44%)
E (NM)	5 (19%)	5 (19%)

Pain control was assessed by improvement in Denis pain scale. Pre operatively there was no patient in P1, 2 (7%) patients in P2, 6 (23%) in P3, 8 (30%) in P4 and 11 (40%) in P5. Six months later there were 16 (60%) patients in P1, 6 (23 %) in P2, 2 (7%) in P3 and 2 (7%) patients in P4. There was one (3%) patient in P5.

Table4
Pain assessment of patients

Denis Pain scale	Preoperative Number	Postoperative Number (6 months)
P1 (No Pain)	0 (0%)	16 (60%)
P2 (Mild)	2 (7%)	6 (23%)
P3 (Mod.)	6 (23%)	2 (7%)
P4 (Severe)	8 (30%)	2 (7%)
P5 (Constant)	11 (40%)	1 (3%)

DISCUSSION

Boucher, in 1959, has been credited as being the first to use pedicle screws. It was Roy-Camille, in the late 1970s, who was the first to use screws and hooks and connecting them with rods or plates. In 1983 Arthur Steffee patented the VSP spinal fixation system. Sasso, [16] in fact, has done posterior stabilization either with Harrington rods, Luque rods or pedicle screws and plates. McLain et al[29] have used CD instrumentation.

Olerud[21] et al treated 20 patients with pedicle screw fixation had an average follow-up period of ten months. The primary reduction attains 88% of the calculated height of the injured vertebra, with only a few percent losses during follow-up time. Clearance of fragments in the spinal canal, diagnosed with computed tomography scan in eight patients, was successfully accomplished in all but one, with only distraction or reduction of the fragment through a limited laminotomy. The instrumentation in these cases was lateral to the dura. Nine patients with neurologic deficits improved and could walk without support or with crutches within a few months. One patient with complete paraplegia remained unchanged.

Verlaan[22] et al have done a meta analysis. Full-text papers from 1970 until 2001 were included if strict inclusion criteria were met. Five surgical subgroups were recognized: posterior short-segment (PS), posterior long-segment (PL), reports on both posterior short- and long-segment (PSL), anterior (A), and anterior combined with posterior (AP) techniques. Clearly defined and generally accepted parameters were scored and subsequently analyzed. The preoperative injury severity of the surgical groups was compared. The neurologic, radiologic, and functional outcome and complications of all groups were assessed. A total of 132 papers, the majority being retrospective case-series, were included representing 5, 748 patients. The preoperative injury severity revealed an inequality between the subgroups. Partial neurologic deficits had the potential to resolve irrespective of treatment choice. None of the five techniques used was able to maintain the corrected kyphosis angle. The functional outcome after surgery seems to be better than generally believed. Complications are relatively rare. In general, surgical treatment of traumatic spine fractures is safe and effective. Surgical techniques can only be compared using randomized controlled trials. In our study, 19 (70%) out of 27 patients can walk with or without support.

Moon[23] et al operated by pedicle screw 15 Denis burst and two Denis type D compression fractures between T12 and L3. The lordotic distraction technique was used for ligamentotaxis utilizing the contoured short rods and pedicle screw fixator. Three vertebrae including the fractured one were fixed. The patients after surgery were braced for ten weeks with activity restriction for 2-4 weeks. The patients were evaluated for change in vertebral body height, sagittal curve, reduction of retropulsion, improvement inneural deficit. The unfused motion segments, residual postoperative pain and bone and metal failure were also evaluated. The preoperative and postreduction percentile vertebral heights at, zero (immediate postoperative), at three, six and 12 months followup were 62.4, 94.8, 94.6, 94.5 and 94.5%, respectively. The percentages of the intracanal fragment retropulsion at preoperative, and postoperative at zero, 3, 6 and 12 months followup were 59.0, 36.2, 36.0, 32.3, and 13.6% respectively. The preoperative and postreduction percentile loss of the canal dimension and at zero, three, six and 12 months were 52.1, 45.0, 44.0, 41.0 and 29% respectively suggesting that the under-reduced fragment was being resorbed gradually by a remodeling process. The mean initial kyphosis of 33 degree became mean 2 degree immediately after reduction and mean 3 degree at the final follow up. The fractured vertebral bodies consolidated in an average period of ten weeks (range 8-14 weeks). The restored disc heights were relatively well maintained throughout the observation period. All paraparetic patients recovered neurologically. There were no postoperative complications. Instrument-aided ligamentotaxis for compression and burst fractures utilizing the short contoured rod derotation technique and the instrumented stabilization of the fractured spine are found to be effective procedures which contribute to the fractured vertebral body consolidation without recollapse and maintain the motion segment function.

Pradeep[24] et all operated 23 patients of dorsolumbar spine injury with complete paraplegia and assessed on the clinical and social rehabilitation parameters after surgical stabilization. The study group comprised 21 male and 2 female patients. The dorsolumbar spine injury was fixed by conventional posterior instrumentation using short-segment pedicle screw system and Harrington rod system with or without fusion. Functional and neurologic outcome was recorded in the follow-up period by using Functional Independence Measure and Frankel grade, respectively. Correlation and analysis of results was established statistically. Functional outcome showed statistically significant improvement. Social cognition was found intact in a significant number of patients. This study demonstrates the usefulness of conventional instrumentation as palliative surgical approach to

stabilize and rehabilitate patients from deprived sector of rural India.

Avijit[25] et al evaluated the effectiveness of minimally invasive treatment of dorso-lumbar fractures by percutaneous pedicle screw fixation. Patients of acute traumatic single level dorsolumbar and spine fractures requiring surgical intervention were included in this study. 14 patients (10 male, 4 female), age range 17-47 years (mean 30. 1 ± 7. 9 yrs) with dorso-lumbar fractures (D9:1, D12:3, L1:9, L4:1) with TLICS score>4 were studied (Feb 2009-Feb 2011). Total of 60 screws were put of which 2 screws were malpositioned (3.3%). Open conversion was done in two cases (15.3%) due to difficulty in rod positioning. In one case, screw pull out was noted intraoperatively during ligamentotaxis and rod manipulation. No patient had post-operative neurological deterioration. Mean post-operative hospital stay was 3.8 days. Follow-up scans showed satisfactory correction of deformity. Good to excellent outcome was present in 84.6%. We conclude that percutaneous pedicle screws fixation is a safe, reliable, cost effective technique with favorable results in acute polytrauma cases requiring standalone ligamentotaxis. Complex biomechanics/physics of instrumentation, lack of adequate fusion and steep learning curve during initial cases with increased radiation exposure limits its application in all cases.

In a study by Gosh[26] et al, 25 patients with dorsolumbar spinal injury was treated by pedicular screw fixation along with direct or indirect decompression within 1 and 1/2 years period. Eighteen patients with incomplete neurological deficit had some amount of neurological recovery in terms of ASIA impairment scale but no neurological recovery was seen in 6 patients with complete neurological injury. Mean correction of kyphotic angle was 11.76 degrees. Mean postoperative increase in anterior vertebral body height was 43%. Complications like bed sore, superficial wound infections and peroperative dural tear were seen but all of which were treated successfully. Neurological deterioration after operation, screw pull out and implant failure were seen in none. This study indicates that short segment pedicular screw fixation is a safe and effective method for treatment of unstable spinal injury.

Riaz[20] et al, have done another study. Transpedicular screw fixation was performed in 80 patients including 55 males and 25 females. Mean age was 35 +/- 6.75 years (range 15-61 years). The level of injuries were D11 = 6 (7%) cases, D12 = 13 (16%) cases, L1 = 40 (50%) cases, L2 = 15 (19%) cases, D12 & L1 = 6 (8%) cases. There were 43 (54%) Wedge fractures, 9 (11%) fracture subluxations, burst fracture in 14 (17%), translational injuries in 8 (10%) while distraction injuries in 6 (8%) cases. Pre operative neurological status according to Frankel grading was: grade A, 48 (60%) cases, grade B 12 (15%) cases, grade C 6 (7%) cases, grade D 4 (5%) cases and grade E 10 (13%) cases. Six months post operatively, there were 16 (20%) cases in grade A, grade B 34 (42. 5%) cases, grade C 16 (20%) cases, grade D 4 (5%) cases and grade E 10 (12. 5%) cases. Pain control was assessed by improvement in Dennis pain scale. Pre operatively there was no patient in P1, 4 (5%) patients in P2, 16 (20%) in P3, 24 (30%) in P4 and 36 (45%) in P5. Six months later there were 56 (70%) patients in P1, 16 (20%) in P2, 4 (5%) in P3 and 4 (5%) patients in P4. There was no patient in P5.

In our study, 19 (70%) out of 27 patients can walk with or without support. One patient developed infection, so implant was removed after 3 months. Bed sores in patients were managed by water bed, posture change and by plastic surgery. B/L Foot drop persisted in 8 patients, foot drop splint is given. Bladder and bowl incontinence is difficult to manage. Thoracolumbar spine injuries are common in young patients. Results of our study are comparable to other studies.

CONCLUSION

Thoracolumbar junction injuries are common in young male patients. Transpedicular screw fixation is useful choice for achieving better neurological recovery and good pain control in

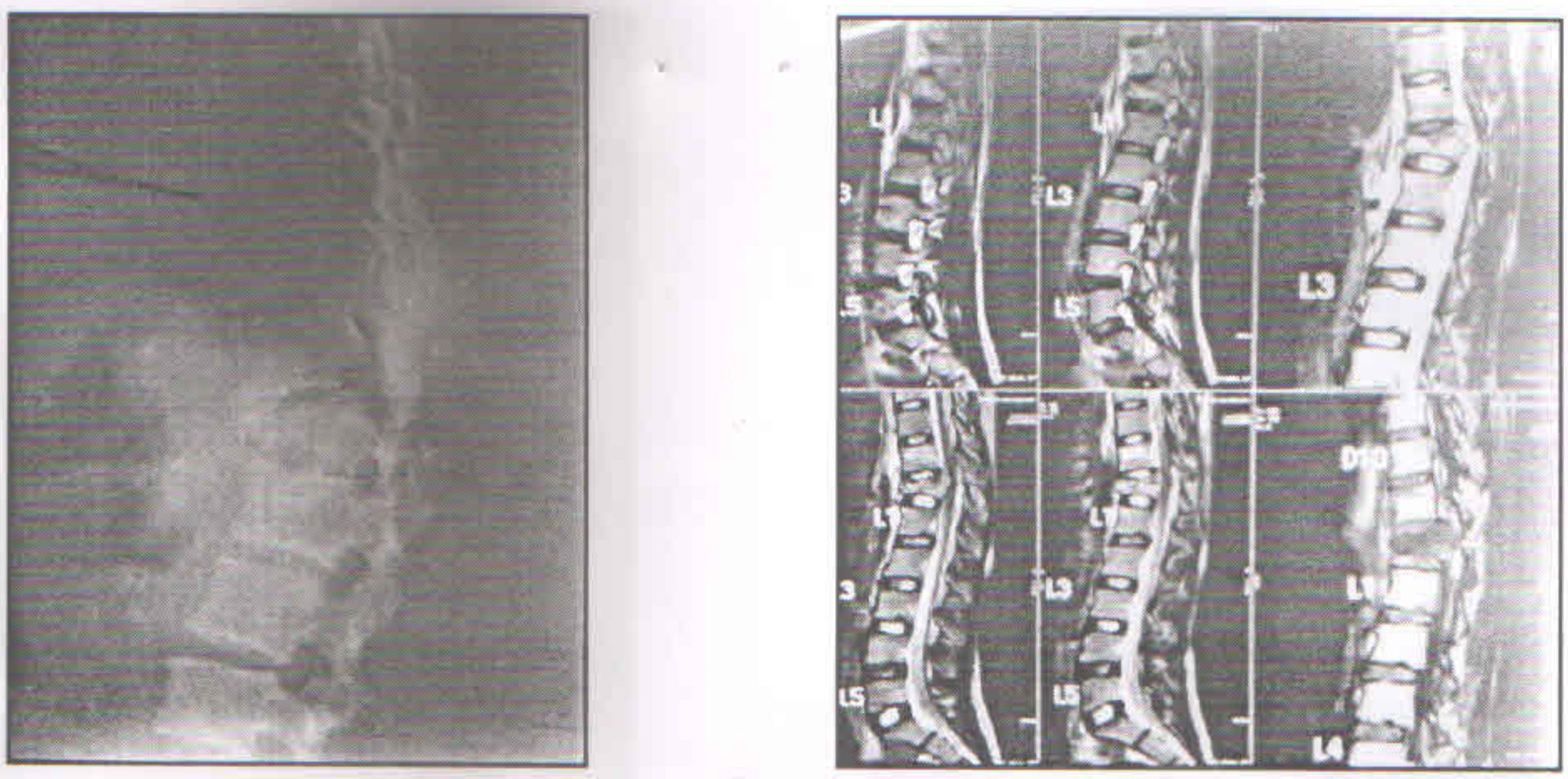


Figure 1(a) : # D12, 25 Yr/M, Pre operative grading A, P5 1 (b) MRI of same patient

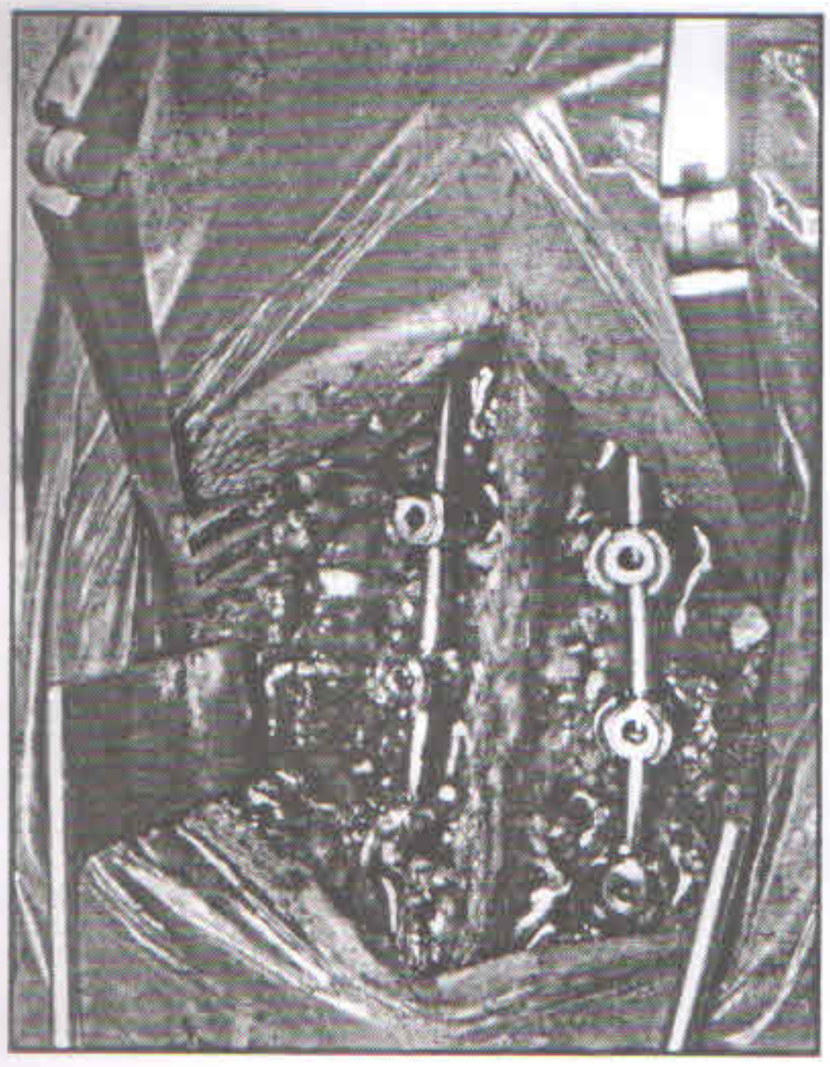
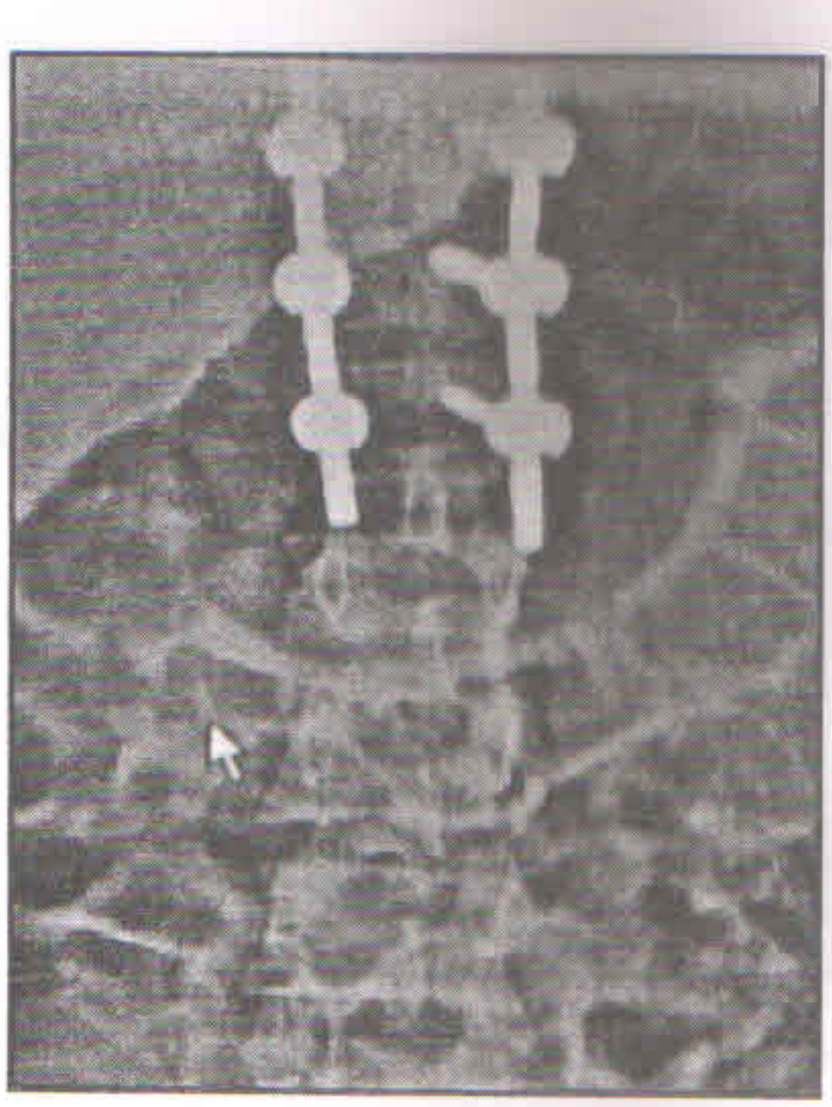


Figure 1(b) : Intra operative photograph



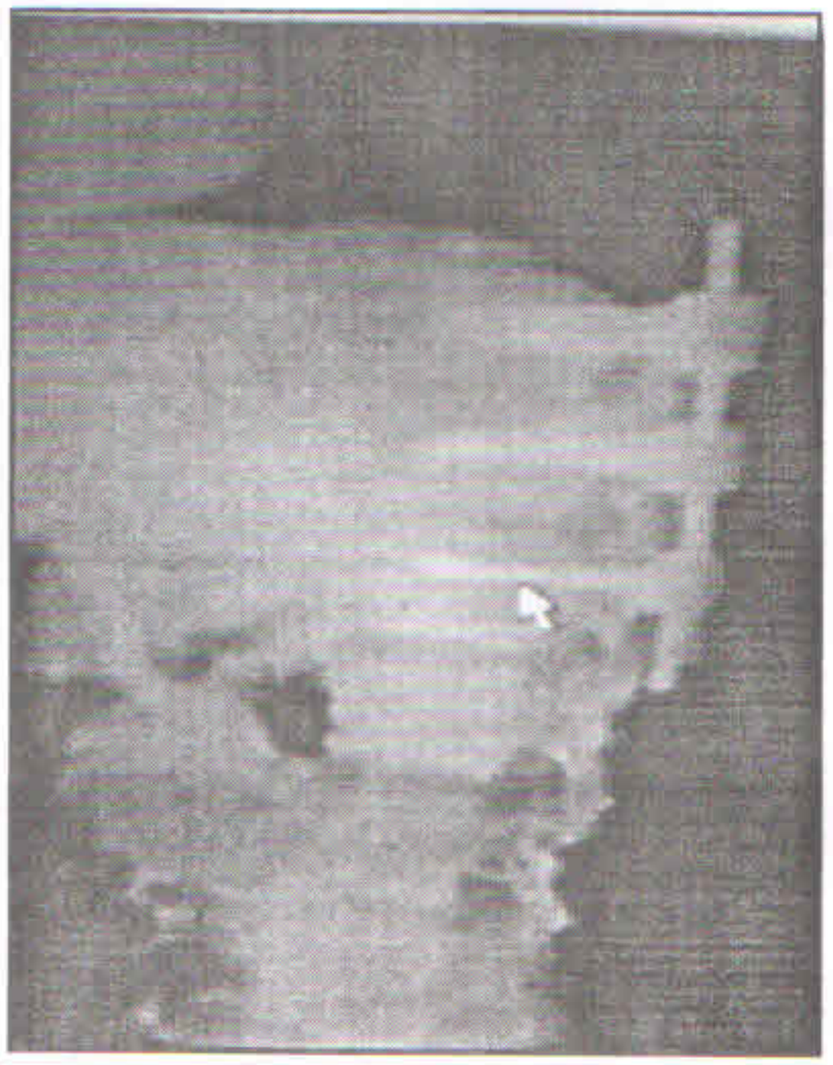


Figure 1(c) and 1 (d) : Immediate post operative X-ray

Figure 1(e) and 1 (f) : 1 year follow up x-ray

Figure 1(g) : Follow up of patient, Frankle grade D and Denis scale P1

traumatic thoracolumbar fracture. Results of our study are comparable to other studies.

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MULTIPLE CYSTIC GANGLIONOSIS - A RARE CASE

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INTRODUCTION

Ganglion cysts are the most common soft tissue tumors of the hand. These mucin-filled cysts are usually attached to the adjacent underlying joint capsule, tendon, or tendon sheath.[1] Ganglia are more prevalent in females.[2,3] Ganglion cyst occurs most commonly in the second to fourth decades of life.[4] The contents of the cyst are characterized by a highly viscous, clear, sticky, jelly-like mucin made up of glucosamine, albumin, globulin, and high concentrations of hyaluronic acid. In some cases, the mucin may be blood tinged.[1]

Ganglions usually occur singly and in very specific locations;[1] The most common sites are the dorsal and volar aspect of the wrist, the dorsum of the foot, and around the ankle and the knee.[5] The prototype of all ganglions of the hand is the dorsal wrist ganglion, which accounts for 60% to 70% of all hand and wrist ganglions. The second most common ganglion of the hand and wrist is a volar wrist ganglion (18% to 20%). Usually ganglionic cyst not found at multiple locations and Reviews of literatures have shown few papers on multiple cystic ganglions. So here we report this rare case in 18 year girl.

CASE REPORT

A girl, eighteen years old, was admitted to the orthopaedic department of JLN Hospital, Bhilai, in 2012 with the chief complaint of multiple swellings at both hands, wrists, feet, and ankles since two years. There was no history of trauma. These swellings increased in size and number. They were not painful and did not limit motion. The family history revealed parents and one brother alive, showing no sign of a similar disorder.

She has no morning stiffness and no articular swelling. There was no history of any motor or sensory deficits. There were no associated constitutional symptoms such as fever, weight loss or fatigue. She had full range of movements in all joints.

General examination revealed average built and height with normal skin texture and nails. There was no abnormal skin pigmentation, no lymphadenopathy, no cyanosis or pallor and no other abnormal finding was noted on general examination. The pulse rate was eighty two per minute, and the blood pressure 124/86 millimeters of mercury. Patient had normal higher function with normal intelligence. The neurological examination did not reveal motor or sensory deficits. The heart sounds were normal. Chest auscultation revealed normal lung fields. The liver and spleen was not palpable. She had normal bowel arid urinary functions. On ophthalmic, ENT, Dental examination there were no abnormalities found.

There were multiple small cysts like lesions along the extensor and flexor tendon of bilateral hands, wrist, feet and ankles varying in size from pea nut to a walnut. No such masses were present elsewhere in body. These swellings were movable under skin, not fixed with bones. They were slightly compressible in nature. On laboratory examination all investigations were within normal limits. Plane radiographs of feet and hands showed no evidence

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of bony involvement.

Magnetic resonance imaging (MRI) showed multiple ganglionic cysts along the tendon sheaths of tibialis anterior muscle, external hallucis longus, flexor hallucis longus, peroneus longus and peroneus brevis muscle around ankle and along the sheaths of muscles of wrist and hand. Largest sized cyst about 5.4 x 2.2 x 1.2 cm was seen along the left tibialis anterior tendon sheath. FNAC give the suggestive impression of ganglion. Histopathological examination showed anastomosing fibro-collagenous tissue, findings that were consistent with ganglion cyst.

DISCUSSION

Ganglions are mucin-filled cysts usually attached to the adjacent underlying joint capsule, tendon, or tendon sheath.[1] They contain highly viscous, clear, sticky, jelly-like mucinous fluid which made up of glucosamine, albumin, globulin, and high concentrations of hyaluronic acid which is more viscous than normal joint fluid. In some cases, the mucin may be blood tinged.[1]

The etiology and pathogenesis of ganglions remain obscure, and a review of the literature reflects the confusion that exists.[6] 18th and 19th century anatomists offered the following hypotheses: (1) synovial herniation or rupture through the tendon sheath, (2) synovial dermoid or rest caused by "arthrogenesis blastoma cell nests" or embryonic periarticular tissue, (3) new growths from synovial membranes and (4) modifications of bursae or degenerative cysts.[6,7,8] The most widely accepted theory was popularized by Carp and Stout is mucoid degeneration.[5] Mucoid degeneration does not, however, explain why the degenerative process is self-limited and solitary and generally occurs in adolescents and young adults and why the fluid recurs after aspiration or incomplete excision.[1]

There is no obvious correlation with patient occupation. Malignant degeneration has never been reported; however, malignant soft tissue tumors are frequently misdiagnosed as ganglion cysts. A specific antecedent traumatic event is present in at least 10% of cases, and repeated minor trauma may be an etiologic factor in their development1. The less common ganglions are often associated with other conditions of the hand (e.g., bossing of the second and third carpometacarpal joints, de Quervain's disease, and Heberden's nodes of the DIP joint). Other conditions that cause diffuse swelling over the dorsum of the wrist, such as extensor tenosynovitis, lipomas, and other hand tumors, must also be considered in the differential diagnosis.[1]

Radiographs of the involved region are often unremarkable, although intraosseous cysts are occasionally present at the wrist. Osteoarthritic changes are commonly seen with cysts at the DIP or carpometacarpal joints1. MRI scanning is of use in diagnosis and one study suggests that MRI is a sensitive and relatively specific imaging modality for the occult.[9]

Treatment can often be non-surgical. In many cases, these cysts can simply be observed, especially if they are painless, as they frequently disappear spontaneously. A 6 year prospective

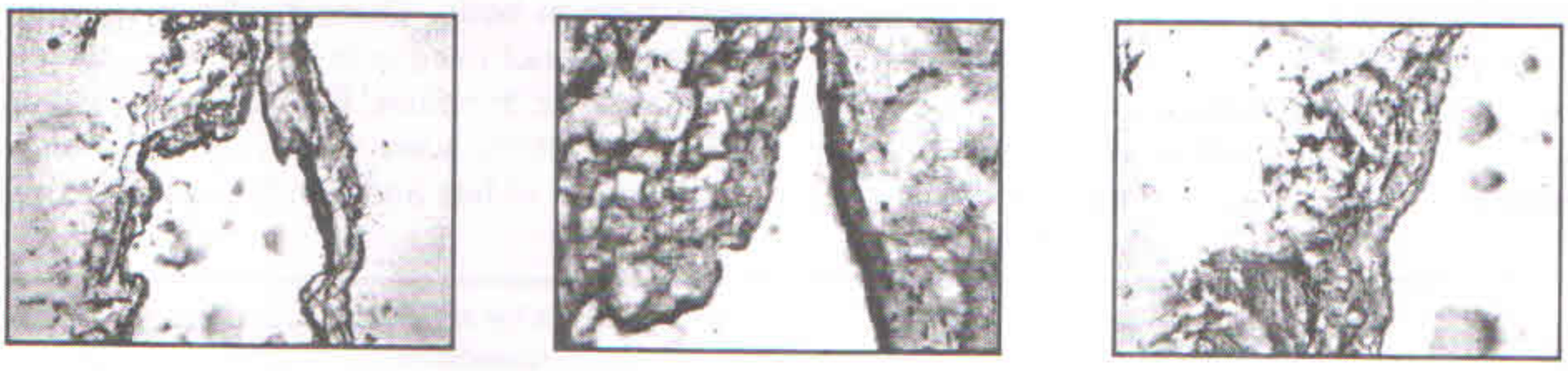

Figure 1 : Histopathology shows- Fibro-Myxoid Cyst Wall Lined with Flattened Mesothelial Cells

Figure 2 : Clinical Photograph -Multiple Cysts (A)Wrist Dorsal Aspect, (B)Wrist Volar Aspect, (C)Ankle

Figure 3 : MRI- Ankle Showing Cystic Lesion

study showed that 33% of dorsal and 45% of volar ganglia will resolve spontaneously.[10] If the cyst becomes painful, limits activity, or is otherwise unacceptable, several treatment options are available. The use of splints and anti-inflammatory medication can be prescribed in order to decrease pain associated with activities. An aspiration can be performed to remove the fluid from the cyst and decompress it. There is evidence that aspiration of a ganglion may alleviate symptoms for a varying amount of time[11] but recurrence of the cyst is common. Single aspiration yields a recurrence rate of 59-88%.[12,13] There is some evidence that injection of a combination of steroid and hyaluronidase may reduce recurrence rates further.[14] However, the recurrence rate after a single aspiration and injection of hyaluronidase has been shown to be inferior to surgical excision.[15]

If non-surgical options fail to provide relief or if the cyst recurs, surgical alternatives are available. Surgical excision of the cyst with capsule and any attachments to the underlying wrist ligaments may be performed either by open surgery or arthroscopically.[16,17] Surgical treatment is generally successful although cysts may recur. Published recurrence rates after excision vary dramatically from 1% - 40%.[10,18,19] J J Dias et al 2003 and 2007 conduct two large studies independently to look at treatments for volar and dorsal wrist ganglia over 5 and 6 years respectively. No significant difference was identified between the groups that had received reassurance, aspiration or surgery.[10,21] Still the treatment for symptomatic ganglia therefore remains controversial.

There were very few literature those reports case of multiple cystic ganglionosis.[20,21] Literature also suggests that there may be genetic association between multiple ganglions[21] but in our case there was no such type of association was found. Due to wide spread nature of lesion any surgical treatment could not be offered and there is no medical treatment known as a curative modality. The case

is being reported for rarity of the lesion and to highlight the scanty of literature available for review. Patient family was counseled and advised regular follow up.

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LOCKING COMPRESSION PLATING FOR DIAPHYSEAL FRACTURE OF FEMUR IN CHILDREN (5-15 YEAR AGE GROUP)

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ABSTRACT

There are several methods of internal fixation for fracture shaft femur in children. But results of locking compression plating for fracture shaft femur in children is encouraging. We used 3.5 or 4.5mm locking plate construct in 21 skeletally immature patients for fracture shaft femur. There were 17 boys and 4 girls. Most of the patients were between 8 to 13 years. Two fractures were open. All fracture healed in an average time of 12 weeks. The follow up period ranged from 6 to 24 months. Implant failure in form of bending and breakage occurred in 1 patient, but without any clinical consequence. 2 patients healed with about 10 degree of varus angulation. There was an average femoral lenghthening of 6mm in 4 patients out of 21 patients. All patients returned to their pre fracture level of activity. Locking compression plating appears as a reliable method of treatment for fracture femur in children.

Keywords- Locking compression plate, diaphysis, femur, varus, lengthening.

INTRODUCTION

Fracture of diaphysis of femur are usually due to high velocity trauma. While fracture of upper limb long bones usually from indirect blow such as fall on hands or by direct impact from very early times, various treatment modalities developed and several studies done for the treatment of fracture of femur for the search of better option of treatment.[1]

Musculoskeletal trauma, although rarely fatal, accounts for 10-25% of all childhood injuries. The chance of a child sustaining a fracture during childhoods is 42% in boys and 27% in girls. The most common sites of fracture are the distal forearm and hand, which account for 50% of paediatric fractures. Overall, the radius is the most commonly fractured long bone, followed by the humerus. In the lower extremity, the tibia is more commonly affected than the femur. When subtrochanteric and supracondylar fractures are included, the femoral shaft represents about 1.6% of all bony injuries in children. The fracture rate increases as children grow, with the incidence peaking in early adolescence.[2,3]

The principles of fracture treatment are the same for all ages, with biological alignment the primary concern. The fracture should not be malaligned or malrotated. Although some angulation is acceptable, it is best to keep the amount of angulation as small as possible by routine fracture treatment methods, whatever the patient's age there are several methods that can be used; in most cases closed reduction and cast immobilisation restores normal function to a paediatric extremity. Other widely accepted treatment options are the use of smooth pins, flexible and rigid intrameddullary nails, and compressive plating.[4]

The new plate generation, point contact

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fixator and locked plate, the stability of the construct depends upon the rigidity of the plate/ screw interface rather than the high frictional forces at the bone plate interface.[5,6] This leads to minimal interference with the periosteal circulation, which reduces the stress shielding and improves both biological and mechanical performance of the implant as shown by laboratory and clinical reports.[7,8] We are reporting here results of locking plate construct fixation in children (5-15 year age group).

MATERIAL AND METHODS

21 skeletally immature patients with femoral fractures were included in this study. There were 17 boys and 4 girls. The age ranged from 5 to 15 years. Almost 85% of the patients were injured as a result of road traffic accidents. 19 fractures were closed and 2 fractures were open. We did not included compound grade-3 fractures for our study. The open fractures were grade 1 and 2 according to classification of Gustillo and Anderson. 1 patient had fracture patella with fracture shaft femur1 patient had monteggia fracture dislocation with fracture shaft femur, 1 patient had fracture both bone leg. These fractures were also fixed along with femur fracture. The time elapsed from injury to surgery ranged from 1 to 45 days, most of the patients were treated within 7 days of injury. Most of the operations were performed under general anaesthesia through a lateral approach with extraperiosteal dissection leaving a thin cuff of muscle covering the bone. All possible efforts were made to minimize the exposure of the fracture ends in closed fractures. Restoration of length, axial and rotational alignment was achieved. A narrow 3.5 or 4.5 mm locking compression plate was used. At least three locked screws were used on either side of the fracture. Static quadriceps exercises were started as soon as pain subsided, mostly from second postoperative day. Non weight bearing with help of walker was started after removal of stitches, mostly after 14 days of postoperative period, and was progressed to partial weight bearing as tolerated. Full weight bearing was allowed when bridging callus was obvious on radiographs, mostly after 12 weeks of post operative period. The time to union was defined as time of surgery to radiographic maturation of the callus. At last followup scanogram was done to evaluate the limb length discrepancy. Results were evaluated on the basis of criteria given by Ruedi and Allgower.

RESULTS

The mean operating time was 45 minutes. 2 patients received one unit blood during surgery. Anatomical reduction achieved in all the patients. Intrafragmentary screws across thesite was used in two patients. The average follow-up period was 12 months (6 months to 24 months). All fractures were united within 12 weeks. Implant failure occurred in one patient because of early weight bearing in a non compliantpatient, he was treated by implant removal and traction for 6 weeks. His fracture healed with about 10 degrees of varus angulation without any functional debility. Another patient with comminuted fracture was treated by bridge plating and MIPPO technique was healed with varusangulation of about 10 degrees. Weight bearing was delayed in that patient and his fracture also healed without any functional restriction. The average hospital stay was 7 days. Non weight bearing exercises' were started as soon as pain subsided. Active knee movements started after stitch removal in most of the patients. Average knee flexion was >120 degrees in all patientsand there was no restriction of movements at hip and ankle joints. There was nil extension lag in our study. In our study we found average femoral lengthening of 6mm in 4 patients out of 21 patients. This minimal lengthening was probably due to growth plate activation. All patients were able to perform cross legging and squatting. All patients returned to their pre fracture level of activity and participated actively in recreational activities. All patients rank very good according to the criteria given by Reudi and Allgower.

DISCUSSION

There are many different surgical treatment alternatives for femoral shaft fracture in children. It is not possible to accurately prove that one surgical

technique is superior to another. Internal fixation techniques have been modified over the last decades to improve fracture healing. The new plating methods seek to minimize exposure of the fracture site and devascularisation of the fractured bones.[9] The superiority of a point contact fixator over a standard and limited contact DCP has been demonstrated by biomechanical and histological testing.[5,6,7,10,11] the construct used in this study is essentially based on a threaded head screws, serving two purposes, it allows screws to lock to the plate, therefore preventing screw toggle and stripping in the bone as the screw is advanced, it also limits the contact of the plate with the underlying bone in an attempt to preserve periosteal perfusion, which leads to better healing, lower infection rate and decrease of bone resorption caused by stress shielding.[7,12]

Kolodziej et al[8] have shown that locking the screws improved the stability of the construct. Kassab et al[13] and Ring et al[14] showed the effectiveness of a locked plate fixation in both complex non-united and malunited fractures. Good results were reported by using the same construct in both recent and non-united fractures in adults.[15,16] In this study, at least three locked screws were used on each side of the fracture and this explained the lower incidence of implant failure compared with similar studies. We had one case of implant failure in our study which occurred at about 6 weeks, and was due to early weight bearing in a non compliant patient. Which was treated by implant removal and traction. This fracture healed well with 10 degrees of varus deformity without any functional debility.

Mann et al[17] reported good results with Ender nail. Ligier et al[18] believe that Ender nails are insufficiently elastic for children"s fractures, with a tendency to straighten the normal bony curvature. Narayanan et al[19] reported an incidence of 70 complications in 78 patients treated with elastic nailing. They reported 41 patients with pain or irritation at the nail insertion site, malunion in 8 patients, loss of reduction in 5 patients, refracture in 2 patients, nerve deficit in two patients, superficial wound infection in another two patients and ten patients required reoperation prior to union. These figures may reflect the possible high morbidity with the use of this technique. Good results were reported with external fixation, but with a high rate of complications.

Hedin et al[20] reported that almost all patients treated by an external fixator healed with some angulation. They further reported pin tract infection in 36% of patients, refracture in two patients and repeat reduction was required in 15%. Three patients developed a slowly progressive bending at the fracture site during the first month after removal of the fixator, making a corrective osteotomy necessary. The ability of a child`s femur to overgrow is a well known phenomenon. It has been shown that femoral overgrowth occurs more frequently with plate fixation than with other methods of treatment.[21]

Overgrowth is caused by activation of the growth plate in some way. Extensive dissection and periosteal stripping during plate application may impair fracture healing or may lead to overgrowth. Eren et al[22] had an average lengthening of 12mm in 13 patients out of 24 patients who had their plates removed. Only two patients out of of ten, who retained their plates had overgrowth. They assumed that avoiding a second periosteal trauma may decrease growth stimulation. In our study average femoral lengthening was 6mm in 4 patients out of 21 patients.

Kregor et al[23] reported an average femoral lengthening of 9mm and tibial lengthening of 4mm.

In our study there was no any tibial lengthening was present in any patient. Bopst et al[24] noted overgrowth in 43.5% of children treated with elastic nailing and it was more than 1centimeter in 8.2% of them. Plate removal is a controversial, because some studies suggest that plate removal may lead to second trauma and growth plate activation and massive periosteal stripping. Some other studies suggest that plate should be removed after the complete union has occurred and to avoid incorporation into the femur of a younger child and fracture at the end of the

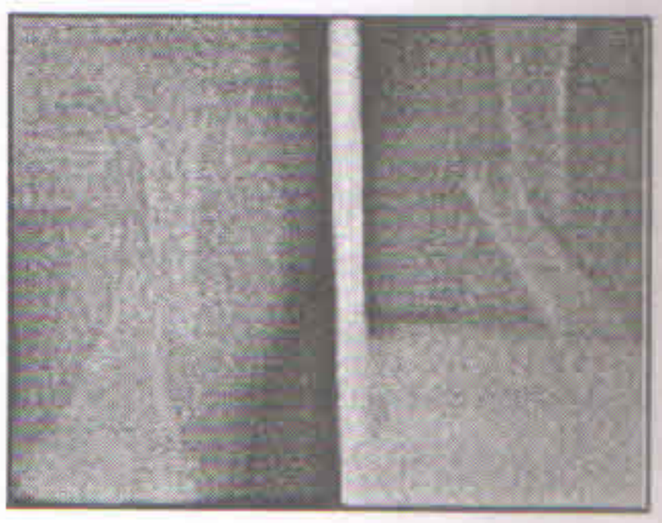

Figure 1 : Pre-operative x-ray showing fracture shaft of femur

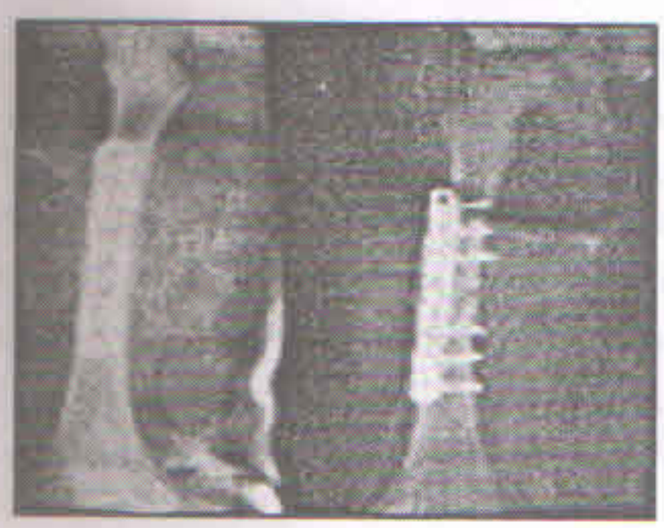

Figure 2 : Post-operative x-ray

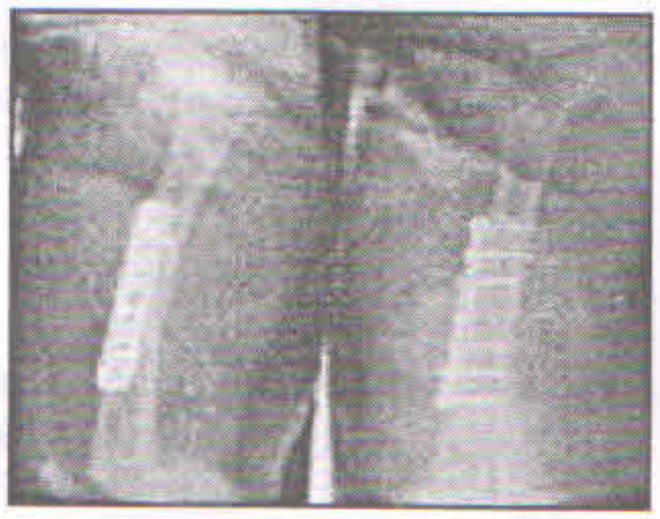

Figure 3 : Followup x-ray of 1 month

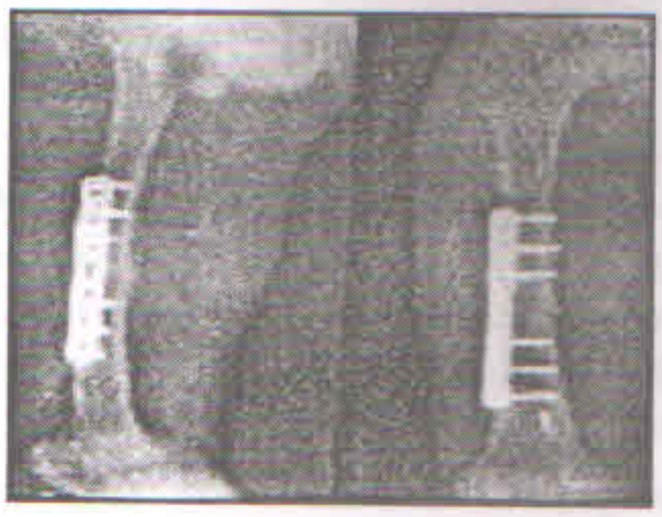

Figure 4 : Followup x-ray of 3 months

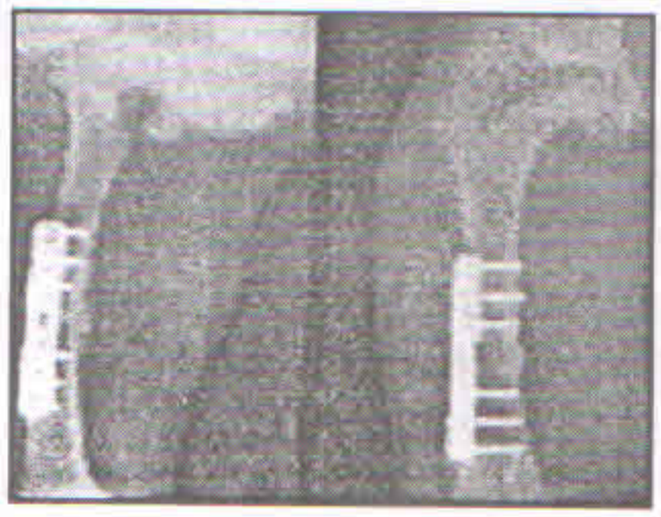

Figure 5 : Followup x-ray of 6 months

Figure 6

Figure 7

Figure 8

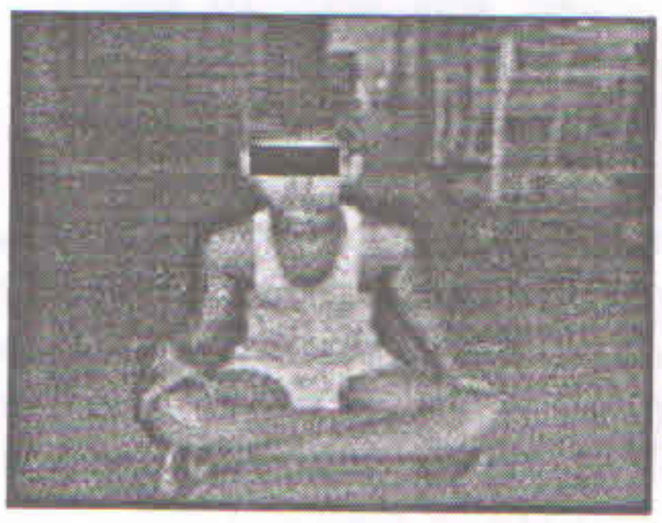

Figure 9

Figure 6, 7, 8, 9 : Clinical photographs at followup showing good function

plate.[25] In this study we routinely removed plates after 12 to 18 months. Our results suggest that this method is a reliable option in skeletally immature patient. It offers some form of biological fixation with no need for special equipments such as fracture table or an image intensifier, as required in medullary nailing, external fixation or percutaneous plating.

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COMPARATIVE STUDY OF CONSERVATIVE AND OPERATIVE STABILIZATION OF POTT'S SPINE

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ABSTRACT

Spinal tuberculosis is the most common and serious problem amongst osteoskeletal tuberculosis lesion in the comprising 50 % of all cases. Spinal tuberculosis is most common pathology of spine in india. Spinal tuberculosis is extrapulmonary infection. Delay in diagnosis and management cause pott's paraplegia. 32 patients with thoracolumbar tuberculosis were treated out of which were12 male and 20 females aged between 20-60 yrs old in department of orthopaedics, SNMC Agra during the period of Sept. 2010 to Sept 2012. The neurological function was evaluated according to the Frankel grading criterion. There were 2 cases of grade A, 8 cases of grade B, 12 cases of grade C, 8 cases of grade D, 2 cases of grade E. After receiving systemic 5 drug treatment of ATT for 4-6 weak and then observe patients were divided into two groups - group A (conservative) in which 20 patients were treated conservatively with bed rest with spinal support braces and group B(operative) 12 patients were treated by pedicle screw fixation with decompression of the cord by posterior approach. All patients were followed for 12-24 months.

At the end of follow up conservative (Group A) Frankel grade was C, D, E in 2, 6, 12 patients respectively in operative (group B) in Frankel grade D and E, 2 & 10 patients respectively. Comparing the both groups the improvement was faster & tremendous in operative (Group B) than conservative (Group A).

Keywords- ATT, Pedicle screw, brace, thoracolumbar spine.

INTRODUCTION

Spinal tuberculosis is the most common and the most serious problem of tuberculosis lesions in the skeleton.[1,2] If the patients are diagnosed early, they can be treated conservatively. Although clinical, pathological and radiological findings are clear in tuberculosis of the spine, making an early and accurate diagnosis is not yet easy, because disease is slowly progressive. Due to this difficulty in the early diagnosis of the disease, several patients have received various treatments like non-steroid anti-inflammatory drugs, physical therapy, a brace, etc., prior to correct diagnosis.[3,4,5]

If there are no complications and if the lesion is confined to vertebrae, five-drug anti-tubercular therapy can treat tuberculosis.[4,5] However, with proper indications, surgical procedures are superior in the prevention of neurological deterioration, maintenance of stability, early recovery and early mobilization, less pain and less kyphosis.[6,7,8,9]

Magnetic resonance imaging (MRI) and computerized tomography (CT) have facilitated the preoperative accurate diagnosis of tuberculosis of the spine, but the histopathological diagnosis is most important.[10,11] CT-controlled biopsy and abscess drainage also aid in confirming the

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diagnosis. Due to these technical advances, cases with severe deformity and complications (gibbus, paraplegia) are seen less frequently today.[3,4,5]

There are several treatment method in the literature-

- Laminectomy and Laminotomy, Chipault in 1896 was first to use Laminectomy in Pott`s paraplegia. 12
- Antero lateral decompression of Dott and Alexender evolve these operations.
- Posterior decompression with post spinal orthosis.
- Calve`s operation- devised a method to aspirate the contents of an abscess without sinus formation.

Simultaneous anterior decompression and posterior stabilization by extrapleural anterolateral approach for TB lesions of dorsal and dorsolumbar spine.[14,15,16]

Our study was aimed to achieve unrestricted mobilization and normalization of patient's daily activities as soon as possible and to compare the results of conservative and operative stabilization of patients by decompression with Pedicle screw fixation via Posterior approach.

MATERIAL AND METHODS

The study was conducted in the department of orthopaedics, S. N. Medical college, Agra. Patient's of dorsal, lumbar and dorsolumbarpott'sspine were selected from OPD & ED of orthopaedics.

Inclusion criteria- Age group B/W 18 -60 years.

Exclusion criteria- Patient less than 18 years of age, trauma, tumor.

Patients were diagnosed by clinical, pathological and radiological investigations. After diagnosis the all patients were treated by 4 drug therapy for 4-6 weeks along with spinal braces. The patients which were improved by ATT along with supported spinal braces, were included in conservative (group A) and those patients which were not improved were included in operative group(group -B).

Group A- conservative 20 cases

Group B- operative 12 cases

Operative Procedure: Pedicle screw fixation in pott's spine via Posterior Approach.

Anaesthesia: General Anaesthesia

OPERATIVE TECHNIQUE

After general anaesthesia, patient was placed in prone position on operating table with bolsters along each side so that anterior chest wall clears the table and the chest can expand. A straight midline incision was made from one spinous process above to one spinous process process below the area. Paraspinal muscles from the spinous process were removed by subperiosteal dissection. The vertebra just above the diseased vertebra was identified and under image control a blunt awl was inserted into pedicle and a poly axial screw is inserted and position was checked under image in both lateral and anteroposterior view. Similarily other screws were inserted in similar fashion. Laminectomy was done to decompress the cord. After that rod was inserted on both sides. Incision was closed in layers.

POST OPERATIVE

The patients were allowed to turn on bed every 3 hourly with active/passive mobilization exercise of lower limb. Neural examination was done in the immediate post operative period & on the alternate day till one week. Sutures were removed at 2 weeks after surgery. Patients were allowed to sit with body contact braces after 2 weeks in continuation with anti tubercular therapy. Clinical and radiological evaluation was done at every three months interval.

Evaluation of Results

The results were analyzed by comparing the following points in both groups.

- Psychological and functional well being.
- Improvement in symptoms i.e. increase

weight, increase appetite, relief from pain, fever.

- Pathological assessment i. e. improvement of Hb% and decrease ESR.
- Radiological improvement regarding cold abscess and healing of the lesion.

RESULTS

In our study out of 32 cases, 20 cases were treated conservatively and 12 cases were treated operatively. Clinical and radiological evaluation was done in all the patients prior to and after surgery. The average age of patients was 20-40 years with female (62.5%) were predominantly affected. The neurological function was evaluated according to the Frankel grading criterion. there were 2 cases of grade A, 8 cases of grade B, 12 cases of grade C, 8 cases of grade D, 2 cases of grade E. After receiving systemic 4 drug treatment of ATT for 4-6 weak the patient were divided into two groups - group A (conservative) 20 patients were treated conservatively with bed rest with spinal support braces and group B (operative) 12 patients were treated operatively by pedicle screw fixation with decompression by posterior approach. All patients were followed for 12-24 months.

At the end of follow up conservative (Group A) Frankel grade was C, D, E in 2, 6, 12 patients respectively in operative (group B) in Frankel grade D and E, 2 & 10 patients respectively.

Comparing the both groups the improvement was faster & tremendous in operative (Group B) than conservative group (Group A).

DISCUSSION

Diagnostic delay is a common problem in spinal tuberculosis. It is necessary to take a detailed patient history and clinical, pathological and radiological investigations to diagnose this problem. MRI findings can detect the proper localization of lesion in involvement of discs and vertebral bodies, abscess formations and their compressive effects on the spinal cord like epidural abscess and paraspinal abscess. Nevertheless, spinal tuberculosis is slowly progressive and early diagnosis before abscess formation and disc degeneration is difficult. For this reason, a detailed patient history is very important in these cases. In the early stages, single-level disc degeneration can be detected by MRI. CT-controlled biopsy from the destroyed area in the centre of the vertebral body is the gold standard technique for the early histopathological diagnosis of these patients.

Localization of abscess is very important which can be observed in two locations, namely paraspinal and epidural. Epidural abscess may cause more serious neurological problems because they can compress the cord as compared to paraspinal abscess. We observed that they are more pronounced in the thoracic region than in the lumbar region. Many spinal tuberculosis cases are diagnosed after the progressive degenerative processes. These cases can only be treated surgically. In cases of vertebral collapse and kyphosis and if there is instability of spine then instrumentation and fusion should be performed. In the present study decompression with pedicle screw fixation via posterior approach was done.

FRANKEL GRADING classification system based on objective findings can be a guide in selecting the treatment method for spinal tuberculosis. There has been no widely accepted classification so far. Our aim was to select the best treatment method depending on objective criteria- as FRANKEL GRADING.

FuY et al in 2009 did Pedicle screw fixation in thoracolumbar spine in 20 patients of which was 20 to 60 year of age they operated 4 -6 weeks of ATT and all patients were followed 12-24 months. The Frankel grading system was used to assess the postoperative neurological function 1 patient in grade B before operation was improved to grade C after operation, 1 patient in grade B was improved to grade D, 1 patient in grade C was improved to graded, 4 patients in grade B were improved to grade E, and 7 patients in grade D were improved to grade E.

Moon et al (1987) in their study treated

Table 1
The age of patients in our study

Pott`s spine	Age group (in years) 20-30	31-40	41-50	51-60	Total
Dorsal	–	1	1	–	02
Dorso-lumbar	7	5	4	2	18
lumbar	6	4	1	1	12

Table 2
The Sex Incidence of the patient

S. No	Sex	No. of Cases	%
1	Male	12	37. 50%
2	Female	20	62. 50%
	Total	**32**	**100%**

Table 3
FRANKEL Grading Scale for our study patients

GRADE	STATUS	NO. OFPt. M	F	T
A	Complete neurological injury - No motor or sensory function detected below the level	–	02	02
B	Preserve sensation only- no motor function detected below the level of lesion	02	06	08
C	Preserve motor, Non functional	06	06	12
D	Preserve motor, functional	04	04	08
E	Normal motor function, normal motor & sensory function below the level of lesion, abnormal reflux may persist	-	02	02

patients for 12-18 months, triple drug chemotherapy, the disease is inactivated at 6 months on average and fusion by 36 months in 87.5% cases.

In our study the patients were treated by 4 drugs chemotherapy with braces. The disease is inactivated at 6-9 months and radiological healing by 18 months in about 90% cases. In our study results are better than Moon et al.

In the both groups (conservative and operative) clinical, pathological, radiological and neurological improvement was seen. But it was earlier and faster in operative group. Movement of spine was painless and nearly to normal in operative group radiological healing of affected vertebrae was observed earlier and better than conservative group.

Delay in diagnosis and surgery can cause degenerative pathologies, deformities and complete paraplegia, especially in cases with incomplete neurological deficit. These types of patients should be immediately immobilized, admitted to hospital, and early surgical treatment should be performed.

Surgical treatment is better than conservative treatment.

CONCLUSION

There is no denying in the fact that conservative treatment will continue to be successful in majority of cases but when indicated, especially in patients with neurological deficit, good decompression should be done promptly. One must remember that neurological deficit due to tuberculosis of spine is reversible in majority of cases especially if decompression is done promptly. Stabilization can prevent pain and late deformity and early mobilization.

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FRACTURE CAPITELLUM

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ABSTRACT

Capitellum fracture is a rare fracture represent 0.5 to 1% of all fractures around elbow. They take place in coronal plane parallel to the anterior surface of humerus. The free articular fragment displaces anteriorly into coronoid or radial fossa and result in block to flexion. We treated two cases: one was 16 years old boy having Bryan and Morrey type IV (Mc Kee type IV) coronal shear fracture of capitellum and second was a 42 years female having capitellum fracture with fracture of lateral condyle both were treated by open reduction through lateral modified Kocher's approach and internal fixation done by two 4 mm partially threaded cancellous screws from posterior to anterior. Clinically good result was achieved in both patients.

Key words: Elbow, capitellum, internal fixation, open reduction

INTRODUCTION

The articular unit of capitellum and trochlea are project distally and anteriorly at an angle of 40-45 degree, act as tie-arch between two columns. The capitellum is a smooth rounded knob like portion of lateral condyle covered completely by articular cartilage. It articulates with head of radius on its anterior portion when the elbow is in flexion. In extension it loses its contact with radial head as it falls away from distal end of humerus. Isolated Fractures of capitellum are rare injuries represent only 0.5-1 % of all elbow fracture and 6% of distal humerus fractures. In children rare below 12 years of age due to cartilaginous nature of capitellum which make it resistant to stress.[1] Some reports in literature report that it is more common in females, with male to female ratio of 1:4. Increase valgus or carrying angle and hyperextension at elbow increase chances of this fracture which reflected by female predominance.[2] Fracture capitellum takes place due to fall on to outstretched hand with elbow in varying degree of flexion or direct blow to fully flexed elbow. The force is transmitted through head of radius to capitellum is maximum during 0 to 30 degree of elbow flexion and forearm in pronation.[3] A true lateral view of elbow is essential for diagnosis; a slightly oblique projection can easily miss the fracture. The characteristic feature in lateral view is the 'double arc sign' because of lateral part of trochlea and sub-chondral bone of capitellum.[4] The goal of treatment is anatomic restoration to prevent post traumatic arthritis, cubitus valgus, stiffness, proximal migration of radius, disruption of triangular fibrous cartilage complex or wrist osteoarthritis and rarely osteonecrosis.[2] The methods of treatment are close reduction and immobilization,[5] excision of fragment,[6] open reduction and internal fixation with K-wires, 4 mm partially threaded cancellous screws in PA direction, headless Herbert screws an PA and AP direction, and arthroscopic fixation of screws[7] and use of biodegradable pins and screws for fixation.

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CASE REPORT-1

A 16 years old male patient presented with pain in right elbow after fall on outstretched hand. He had pain and swelling over right elbow and tenderness over antero-lateral part of elbow. Joint movements were painful with restriction of flexion in terminal range. Antero-posterior and lateral view of elbow showed coronal fracture of capitellum extending medially up to lateral part of trochlea displaced antero-superiorly (Fig. a). Under general anaesthesia and tourniquet control the fracture was exposed through lateral approach [modified Kocher's approach]. The fracture fragment was lying antero-superiorly was exposed reduced and held with a towel clip then temporarily fixed by k-wire. Two small partially threaded 4mm cancellous screws were introduced from posterior to anterior (Fig. b). An above elbow posterior splint was applied for three weeks. After three weeks patient was sent for physiotherapy which consisted of active and active assisted range of movements. After one year follow up radiograph showed normal articular relationship of capitellum with full range of movement (Fig. c, d).

CASE REPORT-2

The second case was a female of 42 years who sustained injury due to fall from stairs on out stretched hand. There was pain and swelling over right elbow on examination. There was tenderness over lateral condyle and joint movement restricted and very painful. AP and lateral radiographs were done. On examination there was fracture of lateral condyle and lateral view showed 'double arch sign' of fracture capitellum (Fig. e). Open reduction and internal fixation of lateral condyle done by lag screw and capitellum is fixed by a 4mm partially threaded cancellous screw introduced posterior to anterior (Fig. f); an above elbow POP slab was applied posteriorly for 4 weeks followed by physiotherapy and elbow mobilization with elbow kept in arm pouch till 8 weeks. After 6 month follow up radiograph showed stable fixation and clinically there is good range of movements with 5 degree loss of extension.

DISCUSSION

Capitellum fracture is more commonly a part of comminuted supracondylar fracture than the isolated one. Different type of capitellum factures have been documented in literature; type1-Hahn-steinthal fracture [large articular fragment of capitellum with trochlear involvement], Type2-Kocher- Lorenze fragment [articular cartilage with minimal subchondral bone attached or uncapping of condyle] Type3- highly comminuted, capitellum fractures extending medially into trochlea is reported and currently classified as type-4 also known as coronal shear fracture[Mc Kee type IV].[4]

The clinical findings in capitellum fracture are pain and swelling in elbow and on examination there is restriction of flexion. Shoulder and wrist examination are done to exclude any associated injuries. Standard anterior-posterior and lateral view of elbow detect the fracture, especially the lateral view is helpful in finding amount of displacement and the size of fragment. Sometimes oblique view may be helpful to identify small fracture fragments and other unusual fractures of capitellum.[3] CT scan is only done in complex and comminuted fractures.

Associated injuries have been reported as supracondylar fracture, fracture lateral condyle, posterior dislocation of elbow, fracture head radius, disruption of ulnar collateral ligament, interosseous membrane and distal radio-ulnar joint.

Close reduction can be obtained by fully extending elbow under GA then gradually flexing elbow while distracting the elbow joint to reduce the fracture[5] but it is difficult to maintain the reduction and achieve anatomic articular congruity. Excision is only indicated for severely comminuted fractures of any type it may leads to instability of elbow joint[2] however advantages of excision are described as it is a simple and definative procedure with no chance of re-displacement, imperfect reduction and avascular necrosis.[6]

Open reduction and internal fixation for displaced type -1 fracture was done to achieve anatomic restoration via lateral modified Kochers

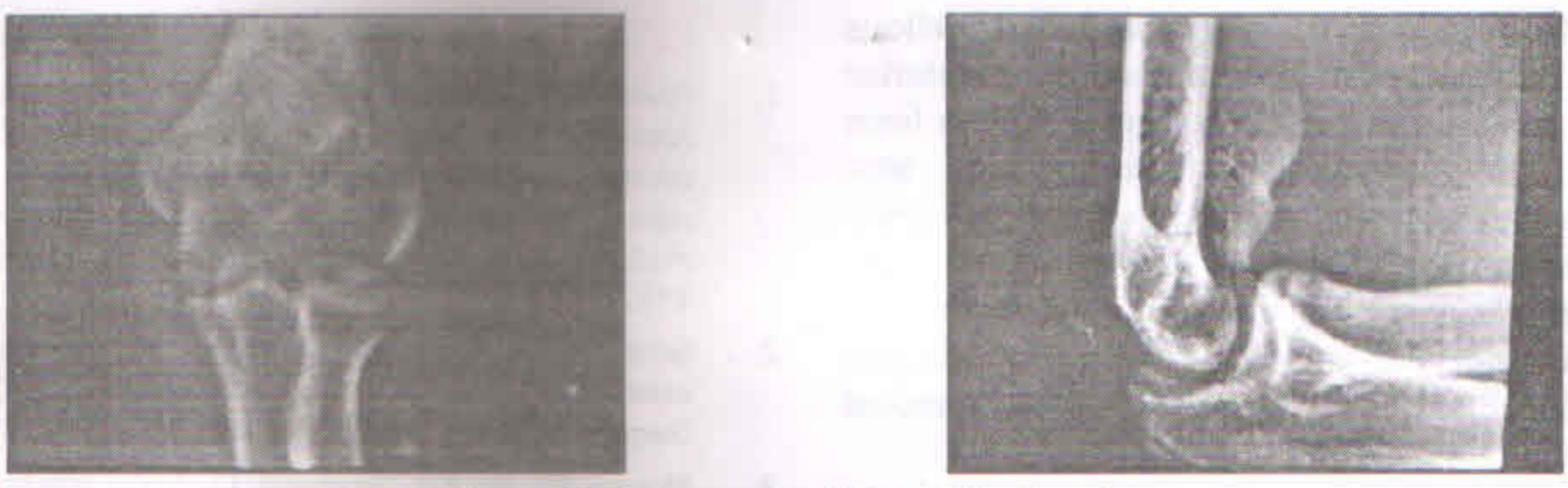

Figure (a) : Pre operative X-Ray of the Case-1

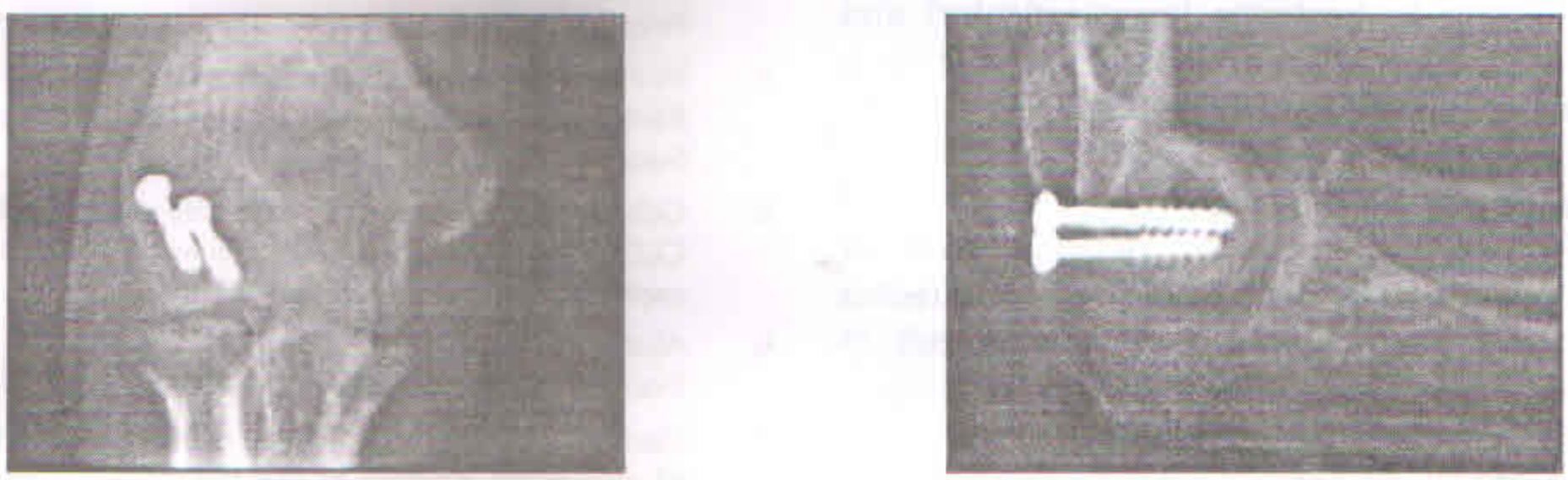

Figure (b) : Post operative X-Ray of the Case-1

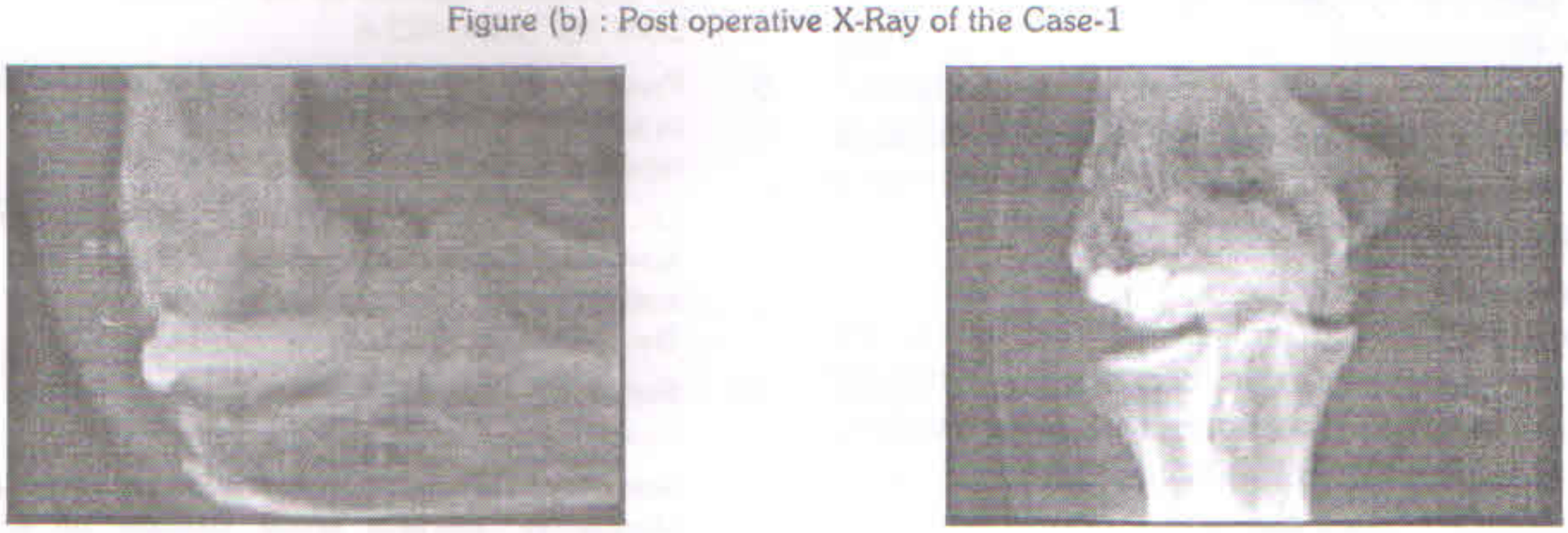

Figure (c) : After 1 year X-Ray of the Case-1

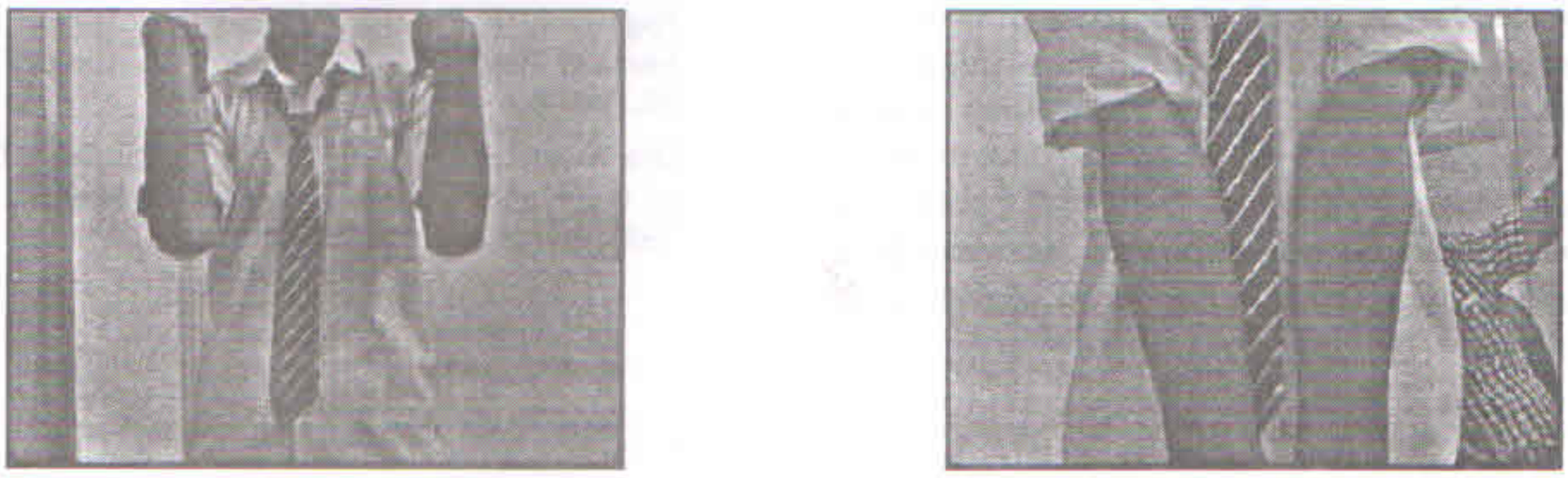

Figure (d) : After 1 year full movement at elbow Case-1

approach and 4 mm partially threaded cancellous screw was introduced from posterior to anterior direction to hold the reduction. Screw fixation from posterior to anterior is more stable bio-mechanically because more purchase of screw threads in sub-chondral bone in PA directed screw and less chances of splintering due to less countersinking. There is no damage to articular cartilage in PA directed screws and easy removal through stab incision.[9,10]

The headless screw /Herbert screw can be placed anterior to posterior [trans-articular] and also in PA direction [extra-articular].[11] Advantage is that screw is placed inside the bone without any external prominence and soft tissue irritation, metal work removal is rarely necessary.[12] The problem starts when patient develop AVN or chondrolysis which leads to erosion of head radius due to exposed implant and removal is difficult. In a biomechanical study there is no significant difference of stability between headless screws and 4 mm partially threaded cancellous screws; it depends on operating surgeon and technique with which surgeon feels most comfortable.[9] Arthroscopic fixation of screws[7] which minimizes damage to peri-articular tissue demands expert and sophisticated instrumentation.

The other methods used for fixation of capitellum are; K wire which are less stable for early mobilization and also damage the articular cartilage. There are also reports of plate fixation, upcoming device like cannulated Martin screws or bio-degradable screws are under investigation for stability and better result. The fixation is difficult many times due to small size of fragments and considerable shearing forces which may displace it. We think PA directed 4 mm cancellous screws fixation is a simple and easy way to achieve good result in type-1 fractures but the choice of treatment should be selective and individualized depending on age, quality of bone, and type of fracture.[13]

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PROSPECTIVE STUDY OF DIAPHYSEAL FRACTURE SHAFT FEMUR TREATED WITH INTRAMEDULLARY INTERLOCKING NAIL

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ABSTRACT

Introduction: Orthopaedic surgeons often encounter diaphyseal femur fractures because these fractures most often result from high energy trauma, one must have a high index of suspicion for complications or other injuries. Intramedullary nail being close to centre of femur can tolerate bending and torsional loads better than plates. . Closed nailing causes no damage to extraperiosteal soft tissues and the biological environment round the fracture is least disturbed. Also, the chance for early ambulation of the patient which reduces the complications of prolonged bed ridden patient.

Materials and Methods: Prospective Hospital Based Analytical study. A total of 50 cases with diaphyseal fracture of femur in a period of 2 years were selected for treatment with Interlocking nail with a minimum follow up of 5 months to a maximum followup of 1 and a half years.

Results: In our study we found that 74% patients had Excellent results, 16% Good results, 6 % Fair results and only 4% had Poor results with Closed intramedullary Interlocking nail in Diaphyseal femur fractures.

Conclusion: Interlocking intramedullary nailing is a very effective and successful method of definitive primary treatment, in most types of fractures of the shaft of the femur.

Keywords: Closed, Antegrade, Intramedullary Interlocking Nailing, Femur Diaphyseal Fracture

INTRODUCTION

Orthopaedic surgeons often encounter diaphyseal femur fractures because these fractures most often result from high energy trauma. The art of femoral fracture care is a constant balancing of the often-conflicting goals of anatomical alignment and early functional rehabilitation of limb. In the past two decades Intramedullary nailing has become the standard care in the management of closed femoral diapysis fractures.[1,2] The advent of interlocking nailing has widened the spectrum of femoral shaft injuries. The following study attempts to analyse the effectiveness of interlocking nail in management of diaphyseal fracture of femur so as to return the patient to functional pre-fracture state as soon as possible.

MATERIALS AND METHODS

A prospective case study of 50 cases of closed and Gustilo Anderson type I & II open diaphyseal fractures of femur was done during a period of 2 years. Patients of age 18 and above and both the sexes were included in the study. Pathological, Metaphyseal and Gustilo Anderson type III open fractures were excluded from the study. Emergency care was given with special attention to cardiopulmonary status, abdominal status and the status of the Central Nervous System. Xrays were taken of the injured femur. The arterial status of the lower limb was analysed carefully. The patient was then put on a Thomas Splint and shifted.

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All patients were operated using standard operative guidelines[1,2,3] and all fractures were fixed by using locally available nail based on AO design using closed technique under image intensifier. Distal neurovascular status was always assessed at the end of the procedure. All patients were encouraged to do static quadriceps exercises and straight leg lifting from first postoperative day with active and passive knee exercises within 48 hours or as tolerated by the patient. The patients were mobilized with crutches or walker as soon as pain and local condition permitted with total non-weight bearing. They were asked to follow-up every month for the first 6 months and were advised to partial or complete weight bearing according to their fracture pattern and sign of union on follow up radiographs. We considered a fracture to be united, if there was no pain on palpation or attempted motion at fracture site, no increase in warmth at the fracture site, no discomfort on full weight bearing and serial radiograph demonstrated bony trabeculae across the fracture site.

For evaluation of results Thoresen et al[4] classification system was used

Table 1
Classification system for the results of treatment (Thoresen et al)

	Result			
	Excellent	Good	Fair	Poor
Malalignment of femur (degrees)				
Vaurs or valgus	<5°	5°	10°	>10°
Antecurvatum or recurvatum	<5°	10°	15°	>15°
Internal Rotation	<5°	10°	15°	>15°
External Rotation	<10°	15°	20°	>20°
Shortening of femur (cm)	<1 cm	2 cm	3 cm	> 3 cm
Range of motion of knee (Degrees)				
Flexion	>120°	120°	90°	<90°
Extension deficit	5°	10°	15°	>15°
Pain or swelling	None	Sporadic, Minor	Signi-ficant	Severe

STATISTICAL ANALYSIS

The frequencies and crosstabs procedure were used to create two-way and multiway tables. Statistics and graphical displays (values in ascending or descending order) were used for describing variables, chart, and graphs. After tabulation, P value was determined by applying standard Chi-square and Gaussian test. P value less than 0.05 was considered to be significant. All the statistical methods were carried out through the SPSS for Windows (version 16.0) and Minitab (version 11.0) for windows.

RESULTS

It was noted that the fracture was most common in the second decade with a mean age of 27.58 years. The youngest patient was 18 years old and the oldest was 60 years old. There were 31 patients with involvement of the right side and 19 patients with involvement of the left side. We did not have any case with involvement of both femur. 76% of the cases were due to road traffic accidents. We found that Winquist Hansen Type III as the commonest Type of comminution (46%) followed by type II (28%), Type I (24%) and Type IV (2%). 66% of the patients had associated injuries mainly due to the fact that majority were involved in high velocity road traffic accidents.

Table 2
Fracture Geometry

Fracture Geometry	No. of Cases	Percentage
Oblique	10	20%
Spiral	6	12%
Comminuted	17	34%
Segmental	0	0%
Transverse	17	34%

Middle 3rd fractures were noted to be the commonest (62%) followed by upper 3rd fractures (26%) and distal 3rd (12%). The majority of the fractures in this series were closed fractures (41) with only 9 open fractures.

Table 4
Knee Motion

Knee Motion	No. of cases	Percentage
Full (>120 deg)	40	80%
120 deg	7	14%
90 deg	2	4%
<90 deg	1	2%

4 patients developed superficial infection. There was delayed union noticed in 7 patients. Restriction of range of movement was present in 10 patients; Shortening was present in 5 patients.

DISCUSSION

The treatment of fractures of the shaft femur has been revolutionized by advent of Kuntscher's[5] nail in 1940. The scope of femoral shaft nailing has been broadened with reaming and interlocking of intramedullary nails. Since then, the unacceptable rates of malunion and non-union shown by various methods of conservative treatment has fallen dramatically.

Our study had Winquist type I 24% (12 patients), type II 28 % (14 patients) type III 46% (23 patients) and Type IV 2 % (1 patient). Thus the commonest pattern seen in this series was Type III with 46%. Lhowe[6] reported type III 36%, type I 29%, type II 21 % type IV 14% in 67 cases.

Our study had 34% comminuted fractures and 34 % transverse fractures as a commonest fracture pattern and 20% were with oblique configuration of the fracture line. Klemm-Borner[7] showed comminution in 40.6%, Butterfly 21.1%, Transverse l6. 4% in 293 patients.

In our series, we performed dynamisation of 7 cases, at average of 12 weeks after primary procedure. Union occurred at 12 weeks post dynamization. After dynamisation 2 cm shortening was seen in 1 patient. Wucc et al[8] studied the effect of dynamisation on slow healing. He performed dynamisation at 16 weeks on an average after statically interlocked nailing. 58% of his dynamised cases healed after 22 weeks.

COMPLICATIONS

In 4 patients there was external rotation deformity. 2 patients with 20°, 1 patient with 15° and 1 patient with >20° which were observed on immediate postoperative period. Intraoperatively special attention was paid to prevent internal rotation deformity as external rotation deformity is better tolerated as compared to internal rotation. In this series there were no cases with internal rotation deformity. Wiss[9] reported 7% (8 patients) with 10°-30° external rotation deformity cases. Winquist Hansen[10] reported 7% with rotation deformities in type III and IV comminuted fractures.

We had excellent knee range of movement in our cases. Early resumption of range of movement exercises were started after surgery as per patient tolerance. 10 patients had restricted range of movement of knee of which, 7 patients had 120° range of movement, 2 patients had 90° range of movement and 1 patient with an open comminuted Winquist Hansen type IV had developed superficial infection probably because of increased operative time and increased soft tissue handling which was responsible for inadequate physiotherapy resulting in poor range of motion at the knee (< 90°).

In all, there was shortening in 5 patients (10%). 1cm shortening was noted in 3 patient (6%) and 2 patients had 2cm shortening (4%). For the patients with 2 cm shortening, shoe raise was given and now those patients are managing well, without any difficulty in daily activities. Christie et al[11] reported 2 patients (1.7%) with more than 2 cm shortening both had spiral fractures, which were dynamically locked, in his study of 117 patients.

In our series, 4 patients developed superficial infections. The 1st patient had sustained an open comminuted Winquist Hansen type IV, developed superficial infection probably because of increased operative time (255 mins) and increased soft tissue handling. In rest of the patients the cause for infection couldn't be determined. In all the cases the wound was debrided and antibiotics were given. Wound healed completely. None of the

patients showed evidence of deep infection. Wiss[10] reported only 1 superficial infection in 112 patients at the trochanteric incision with no deep infection and no osteomyelitis.

In this series there were 7 cases of delayed union, (14%). Out of the 7 patients who progressed to delayed union (14%), all 7 patients were dynamised on an average at the 12th week post operative when healing was not satisfactory. Satisfactory union was achieved 12 wks post dynamisation with total time period of 24 wks for union. There were no cases of non union noted in this series.

Table 5
Comparison of results

Series	Excellent	Good	Fair	Poor
Alho et al[12]	63.4%	19.5%	15.4%	1.6%
Thoresen et al[4]	63.8%	17.0%	14.9%	4.25%
Present Series	74%	16%	6%	3%

We had 50 patients of which 37 patients had excellent results (74%) with full, pain-free, function of the extremity. We had 8 patients with good result (16%); 5 patients had range of motion 120°, 2 patients had shortening of 2 cms and 15 degrees external rotation was observed in 1 patient. We had 3 patients with fair result (6%) ; 1 patient had range of motion of 90°, 1 patient had range of motion of 90° with 20° external rotation and 1 patient had range of motion of 120° with 20° external rotation. We had 2 patients with poor result (4%) one with the range of motion < 90° at the knee joint and the other with >20° external rotation and range of motion of 120°. So overall we had, 90% excellent to good result and 10% fair to poor results.

CONCLUSION

Interlocking intramedullary nailing is a very effective and successful method of definitive primary treatment, in most types of fractures of the shaft of the femur. It is effective in controlling rotational and longitudinal forces that act across the fracture site and provides strong fixation, rotational stability and earliest return to functional status, as the rate of healing is good with this method.

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TO STUDY OUTCOME ANALYSIS OF FIBULAR FIXATION ADJUVANT TO DISTAL TIBIAL NAIL IN FRACTURES OF DISTAL THIRD TIBIA AND FIBULA

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ABSTRACT

Objective : To study the outcome of fibula fixation adjuvant to distal tibia nail in fractures of distal third tibia and fibula.

Method : 20 patients including 15 males and 5 females with average age of 35. 65 years, who had fractures of distal third tibia and fibula with right side dominance, majority due to road traffic accident were treated in Department of Orthopaedics, Gandhi Medical college and associated Hamidia hospital, Bhopal and were followed up for the study. In all the patients fibula was fixed with one-third tubular plate prior to intramedullary nailing of tibia. The average duration of follow up was 12. 05 months.

Results : In the present series total 20 patients were included in the study. The average age of the patient was 35. 65 years. The males outnumbered the females, male:female ratio was 3:1. Road traffic accident accounted for 60% of the cases. According to AO Muller's classification A1 was the most common type of fracture. The fracture was two times more common on the right side. The mean injury-surgery interval was 4. 9 days. the average healing time was 14. 85 weeks. The average valgus angulation at the fracture site was 2. 55 degrees. Complications were seen in 20% of cases. According to Johner and Wruhs's criteria there were excellent results seen in 7 patients, good in 11 and fair in 2 patients.

Conclusion: Distal tibia and fibula fractures particularly at the same level has inherent instability therefore needs fixation of both medial as well as lateral columns. Locked intramedullary nailing along with plate fixation of fibula gives high beneficial results. The competitive nature of fibular fixation in union is raised, but in present series high rates of union, low number of complications and good quality of functional outcome were achieved.

Keywords : distal tibia, fibula plate

INTRODUCTION

Of all the long bones of the body, the tibia has the highest incidence of diaphyseal fractures. Shaft of the tibia is subcutaneous throughout its length and exposed to direct and indirect trauma leading to various pattern of fractures, serious complications and major disability, as common outcomes. Fractures of the tibia and fibula can range from completely undisplaced fractures with minimal soft tissue damage, to even traumatic amputations. As per available literature the treatment modalities described for tibia and fibula fractures range from simple cast immobilisation to complex surgical procedures. Considerable concerns exist that mal-alignment of a healed tibial shaft may result in post traumatic arthritis of the

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knee and ankle joint. The mal-alignment results in mal-distribution of articular surface pressure that may predispose the patient to premature osteoarthritis. The location of the mal-union is important, with distal deformities more likely to be symptomatic. Distal tibial fractures occur in around 37.8% out of all tibial fractures and associated with fibular fracture in 77.7% of the cases. In initial phase the fractures of distal third tibia and fibula, the fibular fixation was often ignored during surgical management and was not fixed because it was assumed that it does not have an important role as far as outcome is concerned. Available literature at present redefined the role of the fibula in maintaining stability after fixation of distal tibial fractures. Although limited studies are available on the effect of fibular plate fixation in patients with fractures of distal third tibia and fibula. Several clinical reports have demonstrated that fracture stability of distal tibia with intact or stabilised fibula does not ensure successful healing. Few studies claim distal tibia with intact fibula has increase chances of delayed union, non-union, varus malunion. However, various cadaveric studies have shown that fibular fixation increases rotational stability in tibial fractures treated with intramedullary nailing of tibia. In view of these conflicting reports this study was undertaken to study the clinical relevance of fibular fixation in lower one third fractures of tibia and fibula and in an effort to outline the advantages and benefits, if any of fixation of the fibula. A prospective study was undertaken to determine the role of fibular fixation in fractures of distal third tibia and fibula. It was hypothesised that fibular fixation increases stability and affects the overall outcome of fracture treatment.

MATERIAL AND METHODS

This study was conducted during the period of May 2011 to December 2013 in Department of orthopaedics, Gandhi medical college and Hamidia Hospital. All the cases of fracture distal tibia and fibula were thoroughly examined clinically and radiologically and associated injuries, complications and neurovascular injuries. All the patients were evaluated for selection in the study. The cases were taken up for internal fixation under anaesthesia depending upon their fitness for surgery. In all the cases fibula was fixed with one-third tubular plate prior to intramedullary nailing of tibia. The cases were followed up at regular intervals. In the present study we included the patients with Extrarticular fractures of distal third tibia, skeletally mature patients, Age group 18 yrs to 70 years, injury period less than 1 month, Closed injuries and Open injury- Gustilo and Anderson type I. Patients with intra-articular fractures of distal third tibia, Skeletally immature patients, age group less than 18 yrs and more than 70 yrs, Injury period more than 1 month duration, Gustilo and Anderson type II AND III and pathological fractures were excluded from the study. Data collected included demographic aspects, such as: age, gender. Data concerning injury details, such as determinant mechanism of trauma, associated injuries, type of fracture according to AO Muller's classification. Total 20 patients were treated with male:female ratio was 3:1. Road traffic accident was the most common mode of injury seen in 12 patients while in 8 patients the mode of injury was due to fall. In seventeen patients injury was closed type while in 3 patients it was open compound grade I injury. According to AO Muller's classification 13 patients had type A1, 5 had type A2 and 2 had type A3 fracture. Right limb was predominantly involved (13 out of 20 patients).

RESULTS

Total 20 patients were included in the study. The average age of the patient was 35.65 years. The males outnumbered the females, male:female ratio was 3:1. Road traffic accident accounted for 60% of the cases. According to AO Muller's classification A1 was the most common type of fracture. The fracture was two times more common on the right side. The mean injury surgery interval was 4.9 days (range from 0 to 12 days). Fibula was fixed prior to nailing of tibia in all the cases and

the mean valgus angulation among these patients was 2.55 degrees assessed radiologically. Average period of follow up in these patients was 12.05 months(range from 8 months to 16 months). The mean time to union was 14. 85 weeks(range from 13 to 17 weeks). Complication was seen in 20% of the cases(4 out of 20 patients). 1 patient had developed superficial infection at fibular site which required intravenous antibiotics and debridement, 1 had deep infection at fibular site requiring removal of the fibular plate, 1 had tibia interlocking nail distal locking screw back out requiring removal, 1 had distal tibio-fibular synostosis limiting the range of movements at the ankle joint.

According to Johner and Wruh's criteria we got excellent results in 7 patients, good in 11 and fair in 2 patients. There were no poor results seen in this study.

CRITERIA FOR EVALUATION (JOHNER & WRUHS)

EXCELLENT GOOD FAIR POOR

NON UNION NONE NONE NONE YES

DEFORMITY VARUS/VALGUS

NONE 2°-5° 6°-10° >10°

MOBILITY AT ANKLE(%)

NORMAL >75% >50% <50%

GAIT NORMAL NORMAL

INSIGNIFICANT LIMP

SIGNIFICANT LIMP

Angulation at # site

Union time(in weeks)

0

5

10

15

0-1 ...

2-5 ...

6-10 ...

>10 ...

No. of patients

7

1

0

2

4

6

8

10

12

NO. OF PATIENTS

TIME PERIOD(IN WEEKS)

2

Angulation at # site RESULTS

Union time(in weeks) Complications

TIME PERIOD(IN WEEKS)

0

0. 2

0. 4

0. 6

0. 8

1

RESULTS

EXCELLENT

GOOD

FAIR

NO OF

PATIENTS

DISCUSSION

The role of fibula fixation in distal third fractures of the tibia and fibula has not been clearly defined as per available literature. The study was conducted in 20 patients to analyse the results of fixing the fibula fracture in fractures of the distal third of tibia and fibula. In all the cases, preliminary fixation of fibula was done followed by intramedullary nailing of the tibia.

Puno et al (1986) enumerated the probable reasons for valgus angulation at the fracture site could be:

The short distal segment

The role of fibula fixation in distal third fractures of the tibia and fibula has not been clearly defined as per available literature. The study was conducted in 20 patients to analyse the results of fixing the fibula fracture in fractures of the distal hird of tibia and fibula. In all the cases, preliminary fixation of fibula was done followed by intramedullary nailing of the tibia.

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Puno et al (1986) enumerated the probable reasons for valgus angulation at

The relatively wider diameter of the medullary canal of the distal fragment decreases the amount of fixation with less contact surface between the nail and the bone.

The most important in avoiding mal-alignment of the distal fragment is proper center placement of the guide wire in the medullary canal.

Comminution in the distal fragment.

This series included 20 patients as compared to 14 in Buzzi. R et al. study, 98 patients (50 with fibular fixation) in Yih-shiunn lee et al. study, 25 patients in Krishan. A et al. study, 51 patients in Ehlinger. M et al. study and 14 in Derek et al. study.

The mean age was slightly lower than those reported in other series. In present series the mean age was 35. 63 years as compared to 40 years in Derek et al. study, 39. 1 years in Yih-shiunn lee et al. study, 48. 7 years in Buzzi. R et al. study, 46. 2 years in Ehlinger M et al. study. This difference from western literature is because life expectancy is slightly higher in the western countries and it is also a reflection of improper mechanisation and undisciplined traffic. Increase in two wheeler population with resultant increase in the traffic on roads. Younger population is preferring two wheelers in rural and urban area for longer drives for occupational reasons. Although in present series the mean age was comparatively less as compared to other groups, the results can be extrapolated even to the higher age groups.

Males in the study considerably outnumbered the females, the Male: Female ratio being 3:1. Buzzi. R et al. reported Male: Female ratio of 4.5:1. Krishan. A et al. reported Male:Female ratio of 3:2, Ehlinger. M et al. reported Male: Female ratio of 1.68:1 while Rouhani. A et al. in his series reported Male: Female ratio of 11:1. In present series males were predominantly affected probably because Road traffic accidents was the commonest cause and males are more commonly involved in outdoor activities. Simple fall or fall from height was the most common mode of injury in females as they are mostly involved in household activities.

The most common mode of injury was Road traffic accident similar to the other study groups. Among twenty patients, in twelve patients the mode of injury was RTA and rest being due to fall. However Ehlinger. M et al. in their series reported 'fall' as the most common mode of injury.

In present series according to AO Muller classification the most common fracture pattern was A1 type similar to the other series.

SERIES Type A1 Type A2 Type A3

Krishan. A et al. 17 6 2

Jose. P et al. 17 26 4

Bonnevialle. P et al. 48 10 25

Ehlinger. M et al. 29 12 10

Present series 13 02 05

In present series there were 17 patients with closed injury while 3 patients had grade I compound fracture as classified by Gustilo and Anderson.

Jose. P et al. in their series included total 47 patients (32 closed, 15 open), Buzzi. R et al. et al reported total 14 patients(9 closed, 5 open), Ehlinger. M et al. in their series reported total 51 patients (41 closed, 10 open).

However Rouhani. A et al. in their series reported more no. of compound injuries (28 patients) than closed injuries (25 patients).

Closed # Compound #

Jose. P et al. 32 15

Buzzi. R et al. 9 5

Ehlinger. M et al. 41 10

Rouhani. A et al. 25 28

Present Series 17 03

Right limb was predominantly involved in majority of the studies- 13 out of 20 in present series similar to Buzzi. R et al. study (10 out of 14) However, in comparative study reported by Jose. P et. al. left side was predominantly involved in both the groups. The probable reason could be related to the traffic rules of left or right sided driving on the road.

In present series after final follow up 20 patients we reported mean valgus angulation of 2.55 degrees. Jose. P et al. in their series reported mean valgus angulation of 4.9 degrees. Krishan. A et al. in their series of 25 patients reported 2 patients with valgus more than 5 degrees. Rouhani. A et al. in their series reported valgus in 1 patient. The probable reasons for the difference in the present series and other series can be:-

Less number of cases with A3 fracture pattern.

Extra efforts to place the guide wire central in the distal fragment

Use of poller screws

Distal locking was done prior to proximal locking in all the cases.

The average follow up period in present series is 12.05 months. In other series the average duration of follow up was as under:

SERIES FOLLOW UP PERIOD (in months)

Buzzi. R et al. 27.1 months

Krishan. A et al. 24 months

Jose. P et al. 22.6 months

Ehlinger. M et al. 12 months

Rouhani. A et al. 6 months

Present series 12.05 months

In present series the average union time was 14.85 weeks. In other series reported mean time of union were as follows:

Series Mean time of Union (in weeks)

Jose. P et al. 14.6 weeks

Ehlinger. M et al. 15.7 weeks

Krishan. A et al. 20 weeks

Buzzi. R et al. 28 weeks

Present series 14.85 weeks

In present series we reported complications in 4 patients. 1 had superficial infection requiring intravenous antibiotics and debridement, 1 had tibio-fibular synostosis, 1 had deep infection at fibular site requiring plate removal but showed complete union and 1 had tibia interlocking nail distal locking screw back out requiring removal. Few patients had complained of knee and ankle pain in the initial follow up period but the pain subsided gradually over a period of time and none of the patients had complaints of knee and ankle pain in the final follow up. None of the cases in our series had unacceptable valgus malunion, delayed union or gait abnormalities, which signifies the important role of fibular fixation adjuvant to tibial intramedullary nail in late outcome of fracture treatment in cases of distal third fractures of tibia and fibula. Buzzi. R et al. in their series reported 1 case of non union, 1 case of delayed union and 2 cases of knee and ankle pain. Ehlinger. M et al. in their series reported 2 patients with delayed union and 2 with deep infections. Rouhani. A et al. in their comparative study of 53 patients reported 1 case of superficial infection, 1 case of deep infection, 1 with valgus deformity and 6 cases of delayed union.

In present series the results are similar to studies conducted by Jose P. et al. and Ehlinger M. et al. but different from that of Krishan et al. and Buzzi et al. The discrepancy in time to union may have arisen because in present series compound fractures of grade more than I were excluded while in other studies patients even with grade III b were included which indicates high energy trauma and compromised soft tissue condition. The no. of A3 fractures in other series were also numerically higher that may affect time to union. Inclusion of higher grade compound injuries may reflect upon results and time to union. The other probable reason can be that patients in present series had lesser mean age than other series that may have an influence in time to union.

In the present series open injuries above Grade I were excluded. Hence it can be a reason for lesser number of complications in the form of non union, delayed union, deep infection and malunion.

Although in present series the total number of operated patients is less, but results at the end of follow up supports the hypothesis that the fibular fixation adjuvant to tibial nailing is helpful in the cases of fractures of distal third tibia and fibula.

SUMMARY AND CONCLUSION

The present prospective study comprised of 20 patients of fracture of distal third tibia and fibula, in which all the patients were treated by intramedullary nailing of the tibia and open reduction and internal fixation of fibula using one-third tubular plate. After discharge from the hospital the patients were followed up at regular intervals for an average period of 12.05 months. During follow up they were assessed clinically and radiologically for union, associated angulation at the fracture site and their functional outcome. Average age of the patients studied was 35. 65 years. Males outnumbered the females, male:female ratio was 3:1. In present series the nature of the injury was road traffic accidents in 60% of the cases. According to AO Muller's classification A1 was the most common type of fracture. The fracture was found approximately 2 times more common on the right side. The mean injury-surgery interval was 4.9 days. The mean Valgus angulation was 2.55 degrees in the present series. Range of movements at the ankle at the end of six months was excellent in 7 patients and good in 11 patients and fair in 2 patients. The mean time of union of the fracture was 14.85 weeks in present series. Complications were noted in 20% of the cases (4 out of 20 patients). In present series according to Johner and Wruh's criteria, the final results was excellent in 7 patients, good in 11 patients and fair in 2 patients and poor in 0 patients.

CONCLUSION

At the end of the study following conclusions could be drawn:- 1) Distal tibia fractures with concomitant fibula fractures, particularly those at the same level increases inherent instability, needs fixation of both medial and lateral columns. 2) Locked intramedulary nailing of metaphyseal fracture are technically difficult to treat but gives highly beneficial results. Soft tissue coverage around distal tibia is delicate and the consequences of injudicious handling of soft tissues are well known. Hence, tibial nailing in distal fractures has advantage of full respect to the soft tissues and it does not disturb the periosteal blood supply, minimising further wound complications. 3) Comparing the results of other series, there is clear advantage of fibula fixation adjuvant to distal tibial nailing in fractures of the distal tibia and fibula. The competitive nature of fibular fixation in union has been raised. But in present series we achieved high rates of union, low number of complications and good quality of functional outcome in patients. Preliminary fixation of the fibula is recommended in all the cases of fractures of distal tibia and fibula so as to control the length, rotation and the axis. Absence of fibular fixation arose as a probable factor of a reduction defect, insufficient stability and tibial pseudoarthrosis in late cases. However a long term study with large number of patients will be required to substantiate these statement.

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PARTIAL FIBULECTOMY FOR UNUNITED FRACTURE OF THE TIBIA WITH NONDRAINING (QUIESCENT) INFECTION

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ABSTRACT

Management of open tibia fibula fracture includes multiple surgeries including external fixation, soft tissue coverage, bone grafting and later conversion to internal fixation. Early union of fibula may delay union of tibia fractures. Five cases of ununited fractures of tibia were managed between 2008 and 2012, by partial fibulectomy done average 5 month after open fracture, depending upon the healing of soft tissue around the fracture. A walking PTB cast was given in each case. All fractures were united at an average time of 5 month after partial fibulectomy with acceptable alignment. There were no neurovascular complications. Partial fibulectomy is a simple option in the management of ununited tibia fracture with nondraining (quiescent) infection

Keywords : Fibulectomy, ununited, open fracture.

INTRODUCTION

In ununited tibia fracture with nondraining infectionwith inadequate soft tissue coverage, debridement and bone grafting may further prolong immobilization and may require more number of surgeries to get union. The prevalence of non-union of closed tibial shaft fractures is 2. 5% and increases 5-7 folds for open fractures with gross contamination and extensive soft-tissue damage. Early weight-bearing mobilisation allows intermittent compression to the fracture site contributing to healing and lowering the rate of non-union.[1] Associated fibular fractures usually heal quickly within 6 to 8 weeks. Compressive forces are then transmitted through the fibula, causing it to deform. Subsequently the compression at the tibialnonunion site, essential for the healing, is reduced and healing is adversely affected.[2,3,4] The removal of a portion of the intact healed fibula to increase compression forces across an ununited fracture of the tibia while weight bearing has been reported by several authors.[5,6] It is simple technically, gives opportunity to correct any malposition, avoids opening the fracture site thereby the chances of reducing the vascular supply to the fracture fragments.[4] There is no evidence that this technique used alone is effective in the treatment of infected tibialnonunions.

We are presenting the role of fibulectomywith weight bearing in cast in ununited tibia fracture with nondraining (quiescent) infection.

MATERIAL AND METHOD

Five male patients of mean age 41.8 years presented with ununited tibia fracture at average 5 month after open injury. There were history of external fixation and soft tissue cover (local flap and skin grafting). An ununitedfracture was diagnosed on the basis of absence of radiological evidence of union, and warmth, local tenderness with or without movement at fracture site. Three of the ununited fractures were in the middle third of

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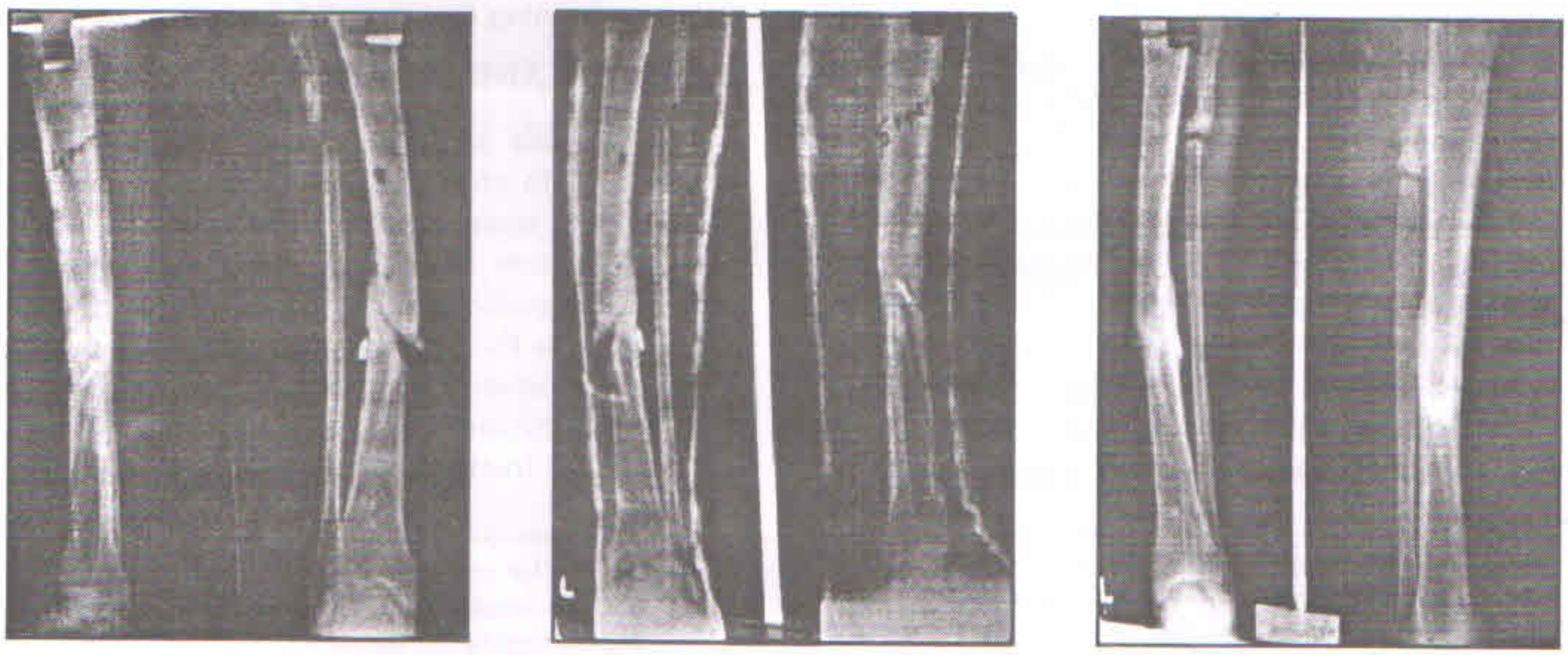
tibia and two in the lower third of tibia. There were no associated injuries. Patients with bone gap more than one cm were excluded. Fractures with unacceptable alignment were excluded. The nondrainingsinus at fracture site was present in each case. The partial fibulectomy consisted of subperiosteal resection of 1 to 1.5 cm of fibula, at a site remote from the level of the tibial fracture. After fibulectomy, a long leg slab was applied for 10 days. Stitches were removed, anda patellar tendon bearing cast was applied. Patients were allowed to walk until union was evident.

RESULTS

The mean duration of union was 5 months (range: 3 to 7 months). The infection were controlled in the course of treatment. There were no major complications associated with the treatment and all fractures were united within an acceptable alignment. Ankle dorsiflexion were limited in two cases but they were able to walk with plantigrade feet.

Illustration of progressive callus formation with PTBcast:postoperativelyat 4 months (A), at 5 months (B), at 10 month (C) and clinical photograph (D & E).



(A) (B) (C)

DISCUSSION

The usual treatment of adult open tibia fracture with extensive soft tissue damage is external fixation and soft tissue coverage with flap and skin grafting. The external fixation is removed and the ununited fracture is treated with posterolateral bone grafting and cast, bone marrow injection and cast, and internal fixation with or without bone grafting. The conversion of the external fixation to intramedullary nail depends upon the condition of the soft tissues.[7] The rationale for fibular resection is to permit the tibial fracture to compress with walking. In three series, results showed healing in 77%, with a mean time to union of 25 weeks in the first; 87% union rate, with time to union not reported in the second;and 100% union rate with a 14% refracture rate and a mean time to union of 18 weeks in the third.[8,9,4]

Teitzet al[10] studied the load on a fresh frozen adult human lower limb after creating an oblique tibial fracture, while keeping both the fibula and interosseous membrane intact. With increasing load the interosseous membrane buckled and the distal tibia fragment developed varus angulation. This causes strain in the tibia and fibula which in

(D)

(E)

the clinical condition may lead to non-union or malunion.

Thomas et al[11] used cadaver lower limbs to study the stresses on the tibia and fibula. Theydemonstrated that during loading on an intact tibia the anterior surface was continuously in relativetension. This tension diminished after partial fibulectomy. When a transverse fracture was madeon the tibia with an intact fibula, a decreased compressive force was noted, leading to formationof an anterior gap. Partial fibulectomy increased the compressive strain of the tibia antero-mediallyand helped in closing the gap.

Failure of union after fibulectomy was associated with either failure of the patient to bear weight postoperatively, the presence of a true pseudoarthrosis at the fracture site, or previous prolonged treatment of the initial fracture.[8] Dujardyn J et al showed in a review of 28 patients that partial fibulectomy combined with an Ilizarov frame is a reliable method for the treatment of tibial delayed and non-union.[12] Moed and Watson[13] and Seldge et al[14] used partial fibulectomy together with exchange-reamed intramedullary nailing in management of non-union of tibia.

Butt et al[15] described twenty five cases of ununitedtibial fractures in which union of the fracture occurred in average fourteen weeks followingfibulectomy. There was no limitation of range of motion of ankle or knee joint. Jain AK et al[16] reviewed 42 patients with infected nonunion of the long bones, and concluded single-stage debridement and bone grafting with fracture stabilization as the methods of choice for infected nonunion of long bones with nondraining (quiescent) infection, with or without implant in situ with a bone gap smaller than 4 cm. In our series the bone gap was less than 1 cm and all fractures with nondraining (quiescent) infectionwere united in average 5 months.

CONCLUSION

We conclude that partial fibulectomy combined with walking cast is a reliable alternative in ununited tibia fracture with nondraining (quiescent) infection.

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NERVE BLOCKS COMMONLY USED IN ORTHOPEDICS

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INTRODUCTION

Regional anesthesia and the use of peripheral nerve blockade have evolved greatly since the discovery of cocaine as an effective local anesthetic by Austrian ophthalmologist Carl Koller, M.D., in 1884.[1] Use of regional anesthesia waxed and waned during the ensuing decades; but during the 21st century it has again become popular as both the technology and the reliability of the equipment used for its administration have improved and has become the most commonest method of anesthesia used in orthopedic surgeries. In this article let us briefly have a look on few commonly used nerve blocks in orthopedic surgeries.

UPPER EXTREMITY BLOCKS

A sound knowledge of anatomy is a vital prerequisite for achieving successful nerve blocks. In simple terms, the course of the brachial plexus, for example, can be compared to an hourglass. Near the spine, its roots extend out broadly and then narrow around the middle of the clavicle, where the nerve bundles form thick clusters that are packed tightly together. This, to continue our metaphor, would be the waist of our hourglass. Towards the armpit, the nerves fan out again. In regional anaesthesia of the arm, this hourglass form has thefollowing consequences:

More or less complete anaesthesia of the arm (excepting the shoulder) is best achieved at the hourglass's waist, namely infra- and medioclavicular. Proximal to this (interscalene nerve blocks), as the technique also includes the sensory parts of the superficial cervical plexus (supraclavicular nerve), anaesthesia will reach the shoulder, but not always the ulnar parts of the lower forearm and the hand. These types of block will rarely reach the caudad segments of the brachial plexus. Distal to this (e.g. as with axillary nerve blocks) anatomical gaps can be expected in the region of the radial and musculocutaneous nerves. Thus, in order to choose the most suitable procedure for the patient it is especially important to be properly informed about the localisation and the extent of the planned surgical intervention.

INTERSCALENE BLOCK

Patient Position: Supine, with the head turned approximately 45° to the opposite side.

Indications: Shoulder surgery

Needle Size: 22-gauge, 25-mm insulated needle

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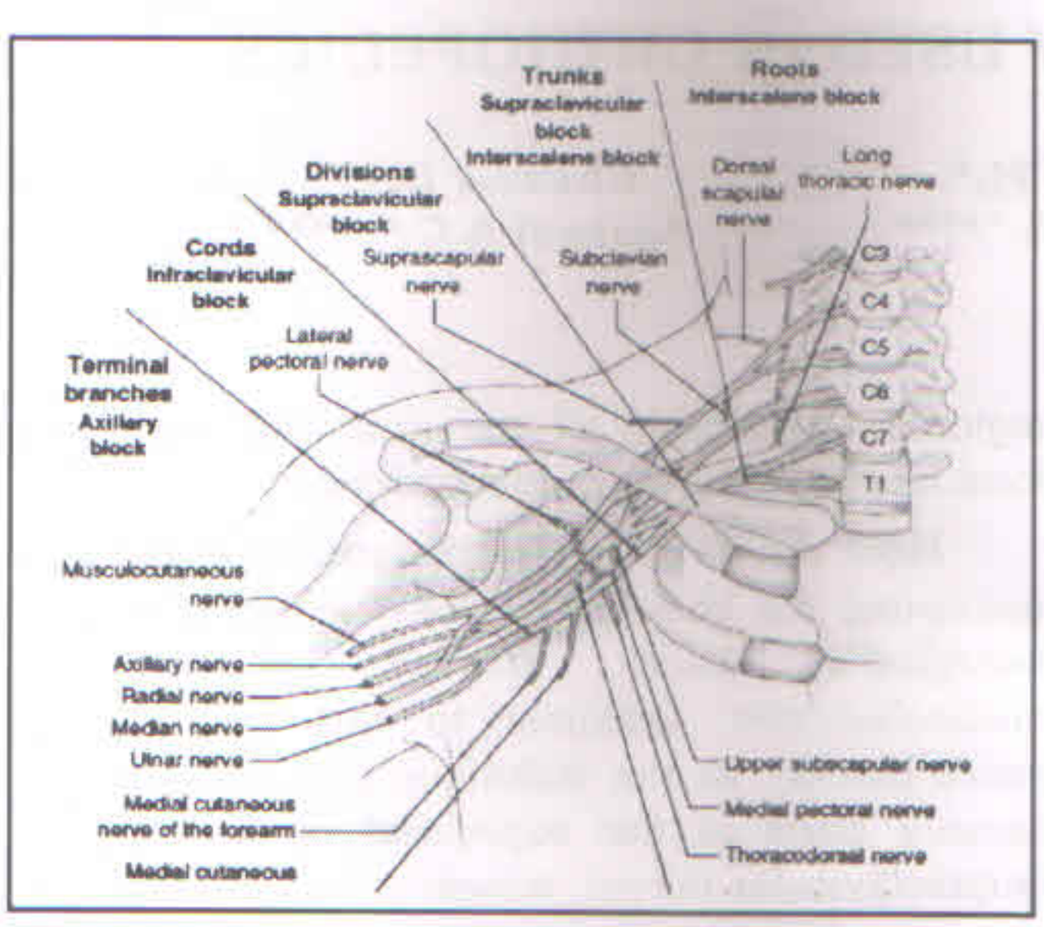


Figure 1 shows the anatomy of brachial plexuses and its relation to various types of blocks.

Volume of Local Anesthetic: 30 to 45 mL

Anatomic Landmarks: The cricoid cartilage (indicative of the transverse process of C6), the clavicular head of the sternocleidomastoid muscle, and the anterior and middle scalene muscles with the interscalene groove in between

Approach and Technique: The patient lies supine (without a pillow!) and the arm that is to be blocked is positioned comfortably on the abdomen. The head is turned slightly to the side. Briefly raising the head from the table may help to identify the posterior edge of the sternocleidomastoid muscle. The puncture point is located at the level of the superior thyroid notch at the posterior edge of the sternocleidomastoid muscle. Care should be taken with the external jugular vein, which is to be found in this region with a relatively high frequency.

The direction of insertion is caudad, however with a discrete dorsal orientation relative to the body axis. After 3-4 cm, the upper trunk or portions of the lateral sheath are reached which becomes evident by contractions in the region of the biceps brachii muscle (musculocutaneous nerve). Inject the local anaesthetic after the threshold current (0.2-0.3 mA) is reached. Complete dissemination of the blockade takes between 10-15 minutes.

Testing the Motor Block: (a) Inability to elevate the arm (the "deltoid sign"). (b) The "money sign, " in which the patient rubs the thumb against the index and middle fingers indicating the onset of paresthesia or numbness in the distribution of C6 and C7.

Testing the Sensory Block: Loss of sensation over the upper lateral aspect of the upper arm in the distribution of the C6 dermatome.

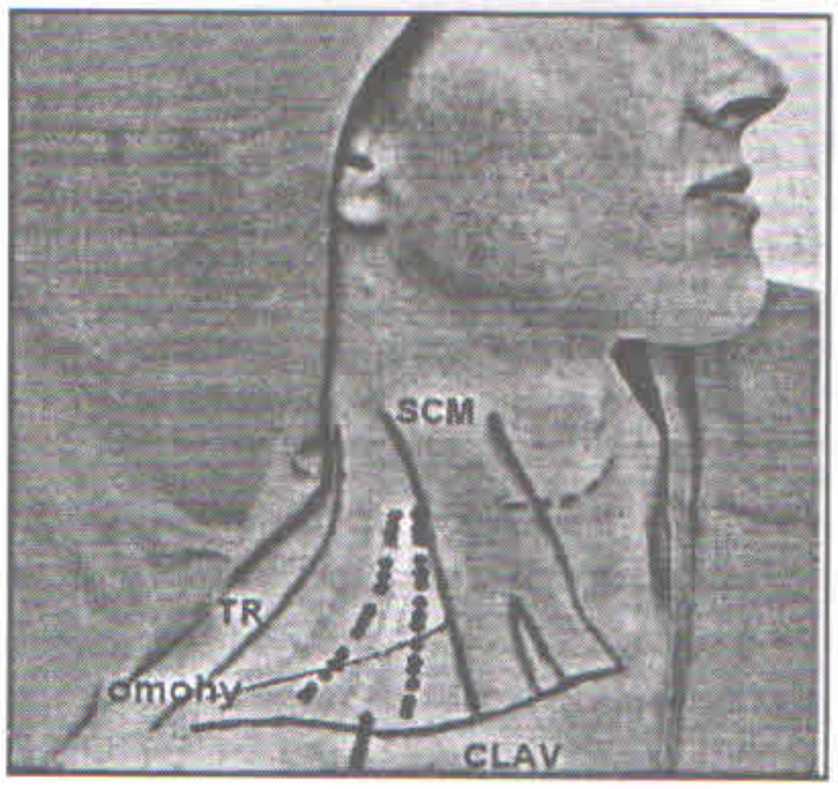


Figure 2 shows the landmaks for Interscalene block

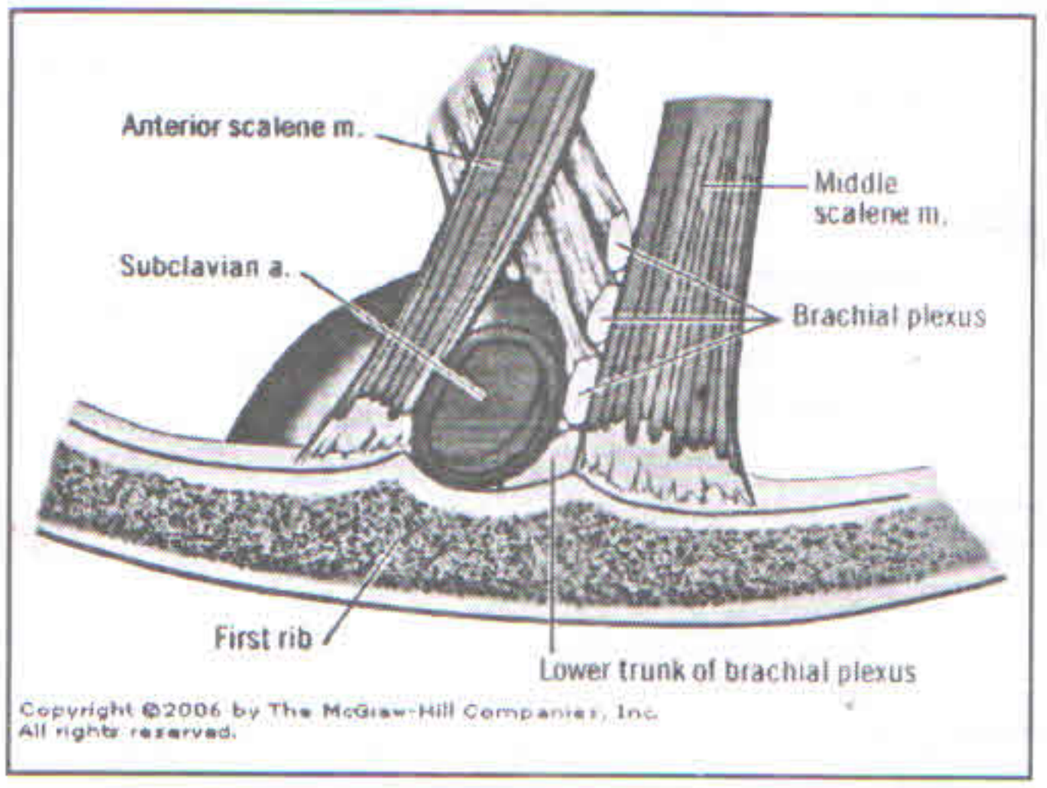


Figure 3 Shows the Functional anatomy of Scalene muscles

SUPRACLAVICULAR BLOCK

The supraclavicular block is often called the "spinal anesthesia of the upper extremity" because of its ubiquitous application for upper extremity surgery. The reasons for its high success rate are in its anatomic characteristics. The block is performed at the level of the distal trunks and origin of the divisions, where the brachial plexus is confined to its smallest surface area.

The three trunks carry the entire sensory, motor, and sympathetic innervation of the upper extremity, with the exception of the uppermost part of the medial side of the arm (T2). The densely packed divisions, in contrast, carry a similar amount of innervation in a slightly larger surface area, but there is a larger surface of absorption. Another important anatomic feature of the supraclavicular block is the presence of the subclavian artery in front of the lower trunk and its divisions.

Patient Position: The patient is placed in a semi-sitting position, about 35° to 45° from the horizontal plane, with the head turned to the opposite side. The arm on the operative side is adducted, the shoulder is down and the elbow is flexed.

Indications: Anesthesia and postoperative analgesia for any surgical procedure on the upper extremity that does not involve the shoulder. It is an ideal technique for surgery on the elbow, the forearm, the wrist, as well as the hand

Needle Size: 22-gauge, 50-mm insulated needle.

Anesthetic Volume: 30 to 40 mL.

Anatomic Landmarks: Clavicle and lateral border of the clavicular head of the sternocleidomastoid at its insertion in the clavicle

Approach and Technique: The lateral (posterior) border of the sternocleidomastoid is identified and traced caudally to the point where it meets the clavicle. This point is marked with an arrow on the skin covering the clavicle. This mark is used as a reference to find the needle insertion point, which in adults, lies at a distance of approximately 1 in (2.5 cm) lateral to it and one fingerbreadth above the clavicle.

The index finger of the palpating hand is placed cephalad and parallel to the clavicle at this level where the operator usually is able to palpate the elements of the brachial plexus. The needle insertion point is located immediately cephalad to the palpating finger or one fingerbreadth above the clavicle as indicated by the lateral upper arrow in. A small skin wheal of local anesthetic is raised at this level and the insulated needle connected to a nerve stimulator (0.8-0.9 mA, 1 Hz, 0.1 ms) is inserted first perpendicular to the skin (easier penetration) and then under the palpating finger in a caudal direction that is also parallel to the patient's midline as shown in

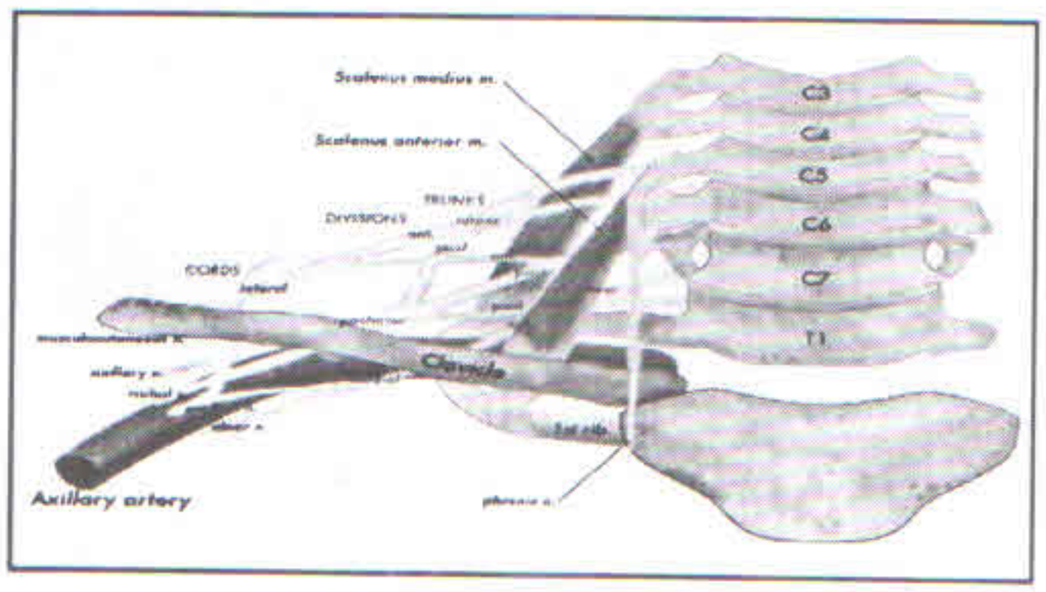


Figure 4 Shows Functional Anatomy of Supraclavicular Block

Usually a motor twitch of the shoulder is first obtained (upper trunk). The needle is then slowly advanced until a twitch of the fingers, either in flexion or extension is visible. The local anesthetic solution is slowly injected with frequent aspirations.

AXILLARY BLOCK

Patient Position: Supine, with the arm abducted at 90° to 110° at the shoulder and flexed 90° at the elbow.

Indications: Anesthesia and postoperative analgesia for surgery at the elbow and below (hand and forearm).

Needle Size: 22-gauge, 50-mm insulated needle.

Volume: 40 mL of a mixture of 0.5% ropivacaine and 1.5% mepivacaine v/v.

Anatomic Landmarks: Axillary artery in the middle portion of the axilla.

Approach and Technique: The axillary artery pulse is palpated and marked in the middle of the axilla. After disinfection, sterile draping, and local infiltration with 1% lidocaine, a 50-mm insulated needle connected to a nerve stimulator (1.5 mA, 2 Hz, 0.1 ms) is inserted above the artery, pointing in a proximal direction almost parallel to the artery at a 30° to 45° angle to the skin. After identification of a median nerve response (flexion of the fingers and the wrist) at a current below 0.5 mA, 15 mL of local anesthetic is injected slowly (10 mL/min) and in 5-mL increments.

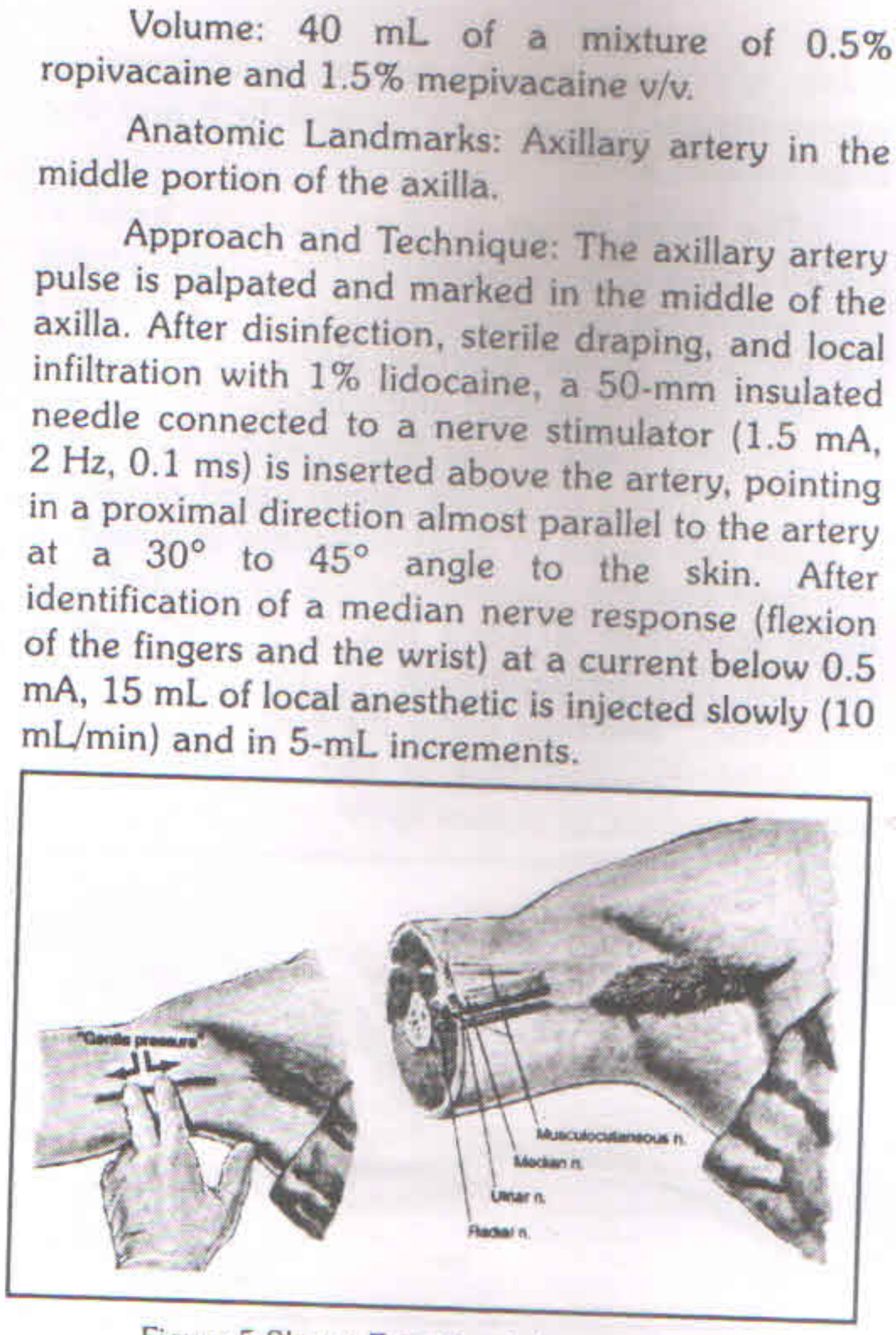


Figure 5 Shows Functional Anatomy and Arm Position During Axillary Block

The 50-mm insulated needle is then withdrawn from the skin and redirected toward the coracobrachialis muscle. After identifying a musculocutaneous nerve response (biceps contraction, flexion of the elbow) at a current below 0.5 mA, 10 mL of local anesthetic is injected slowly (10 mL/min) and in 5-mL increments. The 50-mm insulated needle is then completely withdrawn and reinserted below the artery 45° to the skin and to the artery. After identification of a radial nerve response (extension of the fingers and the wrist) at a current below 0.5 mA, 15 mL of local anesthetic is injected in the same fashion as for the two other nerves. The axillary block is completed by a subcutaneous infiltration at the medial aspect of the upper arm at a high humeral level to block intercostobrachial nerve fibers.

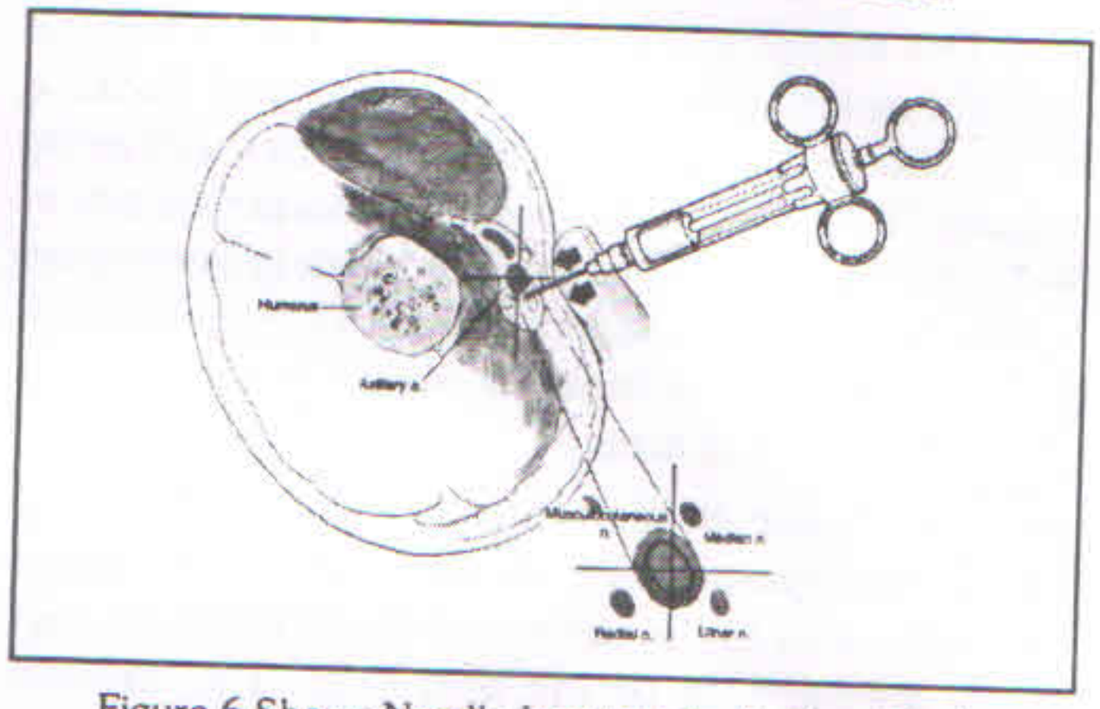


Figure 6 Shows Needle Insertion In Axillary Block

LOWER EXTREMITY BLOCKS

Most anaesthesiologists are comfortable with upper extremity regional block than the lower extremity regional block. This is because the surgery in the lower limb can be comfortably done with neuraxial blocks whenever regional anaesthesia is contemplated. Also the nerves of the lower limb and not as compactly packed like in the brachial plexus of the upper limb. The nerves enter the leg in a widespread manner farther away from each other.

The nerve supply to the lower limb is by the lumbar plexus and lumbosacral plexus. The lumbar plexus innervates the anterior aspect of the lower limb through the lateral cutaneous nerve, femoral nerve and obturator nerve. While the lumbosacral plexus innervates the posterior aspect of the lower limb through the sciatic nerve and posterior cutaneous nerve of thigh.

FEMORAL NERVE BLOCK

Root Value: L2, L3, & L4

Course: It enters the femoral triangle by passing behind the inguinal ligament to course posterolateral to the femoral artery. The nerve lies outside the femoral sheath. After coursing for about 3-4 cms it divides into anterior and posterior divisions. Anterior division mainly supplies the sartorius muscle while the posterior division

innervates the three vasti muscles and rectus femoris.

Position: Supine

Site of Needle Entry: A point 2 cms below the inguinal ligament and 1cm lateral to the femoral artery.

Technique: A 4cm needle is entered at the above point perpendicular to the skin to pierce the iliopectineal fascia and fascia lata and parasthesia is elicited. If nerve locator is used the motor response depends on division of the femoral nerve that is stimulated. If the anterior division is stimulated the vasti respond. It is always better to have a motor response of the posterior division for a complete block especially if surgery is around the knee joint.

After the first injection of the drug the needle is removed and again entered into the skin from a site 1 cm lateral to the previous point and the needle is directed to lie below the femoral artery. About 8 ml of drug is injected here. This ensures the posterior division is always blocked.

Volume: 20ml

Pearls:

- In 20% of individuals the nerve divides above the inguinal ligament. In such circumstances separate block of the posterior division is very vital
- Continuous catheter can be placed here
- Very useful for acute pain relief in femur fractures.

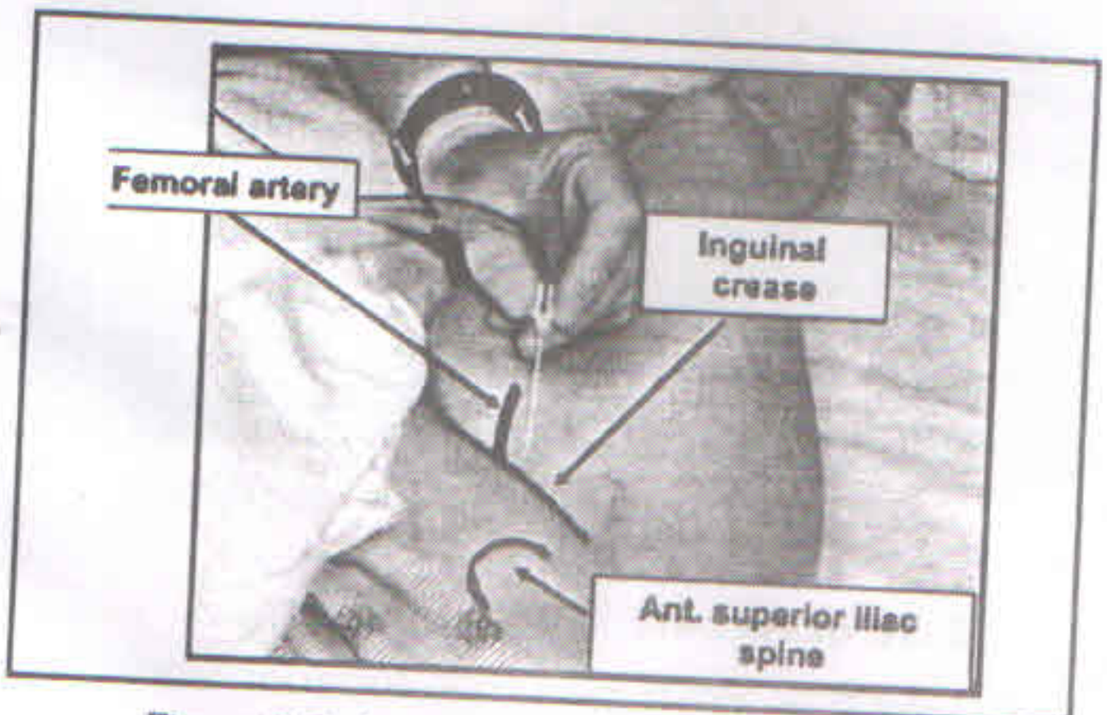


Figure 7 Technique Of Femoral Nerve Block

THREE IN ONE BLOCK (INGUINAL PERIVASCULAR BLOCK)

It is based on the concept that injection of local anaesthetic near the femoral nerve in higher volumes causes the local anaesthetic to track proximally along the fascial planes between the iliacus and psoas muscles to reach the lumbar plexus roots. This blocks all the three major nerves arising from the lumbarplexus namely the lateral cutaneous nerve of thigh, the femoral nerve and the obturator nerve.

Position: Supine

Site of Needle Entry: Similar to femoral nerve block but the direction of needle entry may be about 45 degree to 60 degree to the skin especially when a continous catheter is planned. The angulation of the needle facilitates catheter insertion.

Volume: 30-40ml

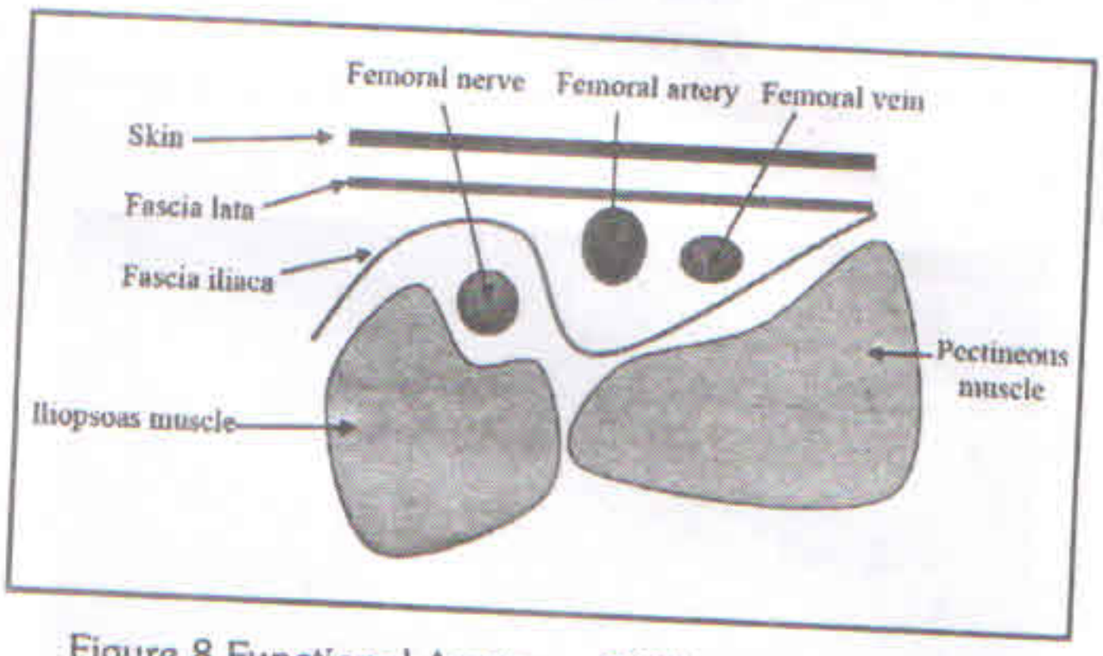


Figure 8 Functional Anatomy Of Three In One Block

Technique: Once the femoral nerve is located with the nerve locator the local anaesthetic is given while giving distal pressure. The drug may also be milked cephalad to facilitate travel along the iliopsoas muscle plane.

Alternatively a catheter may be introeduced through a suitable needle to lie within the iliopsoas muscle plane near the lumbar nerve roots as shown in the figure. Catheter is inserted for 10-15cms. The muscle plane may be expanded with local anesthetic or normal saline prior to cathether insertion.

Pearls:

- All three nerves are not always reliably blocked with single needle technique.
- Lateral cutaneous nerve is often missed as it is more proximally placed and has a different nerve root origin.
- As the lumbar plexus gives contribution to the sacral plexus, spill over into thesciatic nerve territory may occur rarely. This results in a four in one nerve block
- Motor response of the vastus muscles is elicited to ensure blockage of the posterior division, especially when surgery near the knee joint is required.
- The motor response of the sartorius indicates stimulation of the anterior division of the femoral nerve.
- This block becomes more predictable when the catheter is introduced between the muscle plane to lie near the lumbar nerve roots.

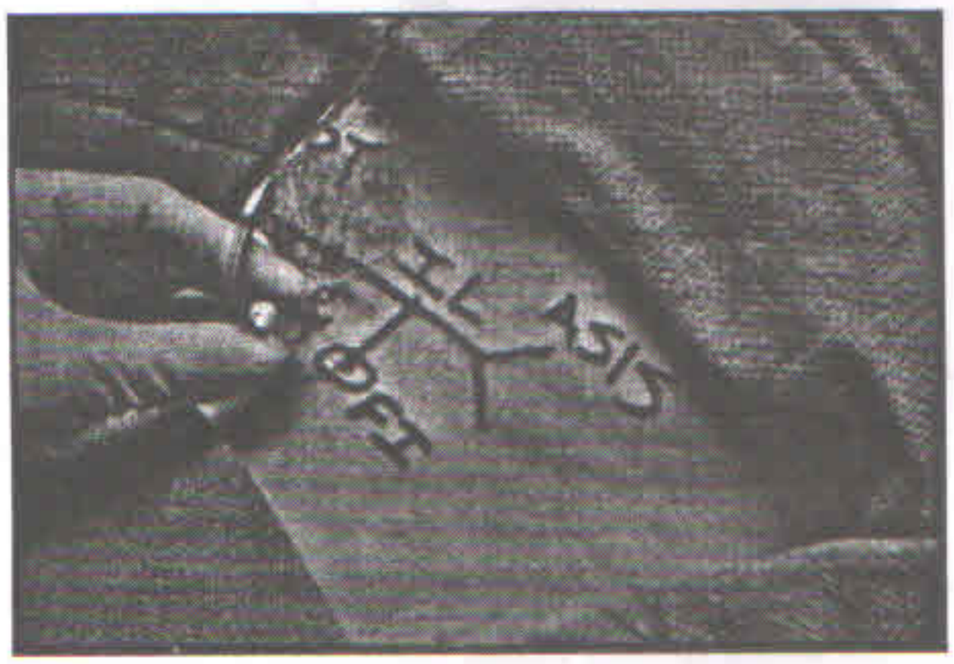


Figure 9 Technique Of Three In One Block

SCIATIC NERVE BLOCK

Largest peripheral nerve of the body. There are two common approaches

1. Classical approach of Labat
2. Anterior Approach

Root Value: L4, L5, S1, S2, S3.

Course: The roots join to form the sciatic nerve on the anterior surface of the piriformis muscle.

It is formed due to the union of the following major trunks.

- The medial sciatic nerve is due to fusion of the ventral branches of the ventral rami of L4-S3. This is functionally the tibial nerve.
- The lateral sciatic nerve is due to fusion of the posterior branches of the ventral rami of L4S3. This is functionally the common peroneal nerve.

The nerve comes out of the pelvis through the greater sciatic foramen. Once the nerve crosses the piriformis muscle it lies anterior to gluteus maximus and posterior to obturator internus and quadriceps femoris. The nerve continues through the thigh along the posteromedial aspect of the femur to reach the popliteal fossa. In the fossa it divides into tibial and common peroneal nerve.

CLASSIC APPROACH OF LABAT

Position: Patient is placed laterally. Side to be blocked is nondependent. Dependent leg is extended and nondependent leg is flexed to 90 degree. Heel is placed apposing the knee of the dependent leg.

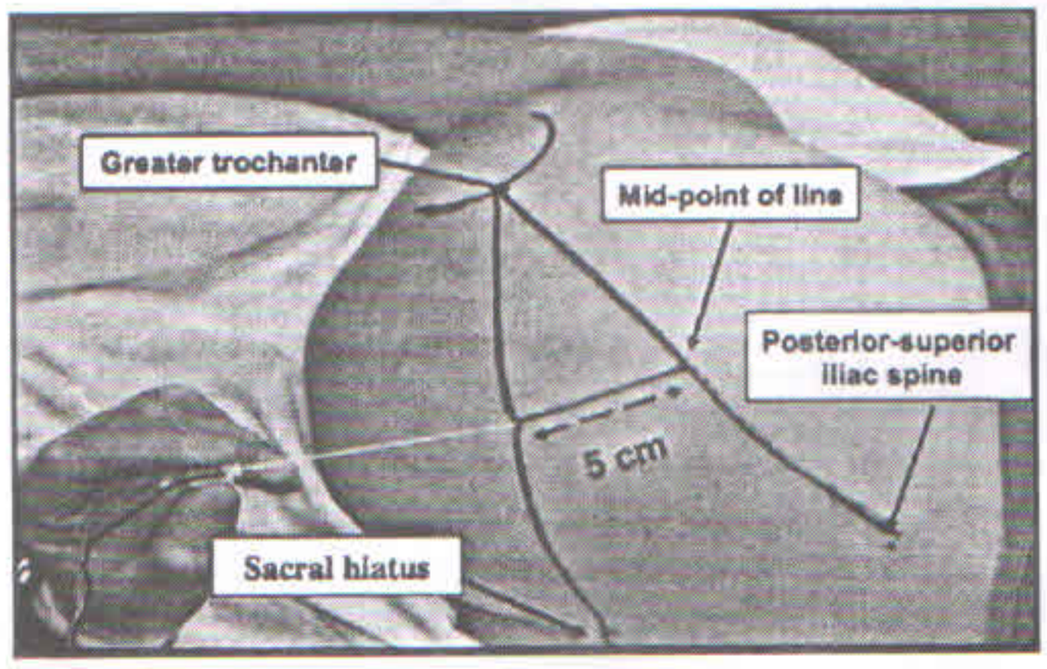


Figure 10 Landmarks In Labats Approach

Site of Needle Entry:

Line I - From posterior superior iliac spine to greater trochanter

Line II - From sacral hiatus to greater trochanter

Line III - From midpoint of the Line I perpendicularly to join the Line II.

Site of needle entry is where the perpendicular line meets the second line. This point is opposite the site where the sciatic nerve comes through the greater sciatic foramen.

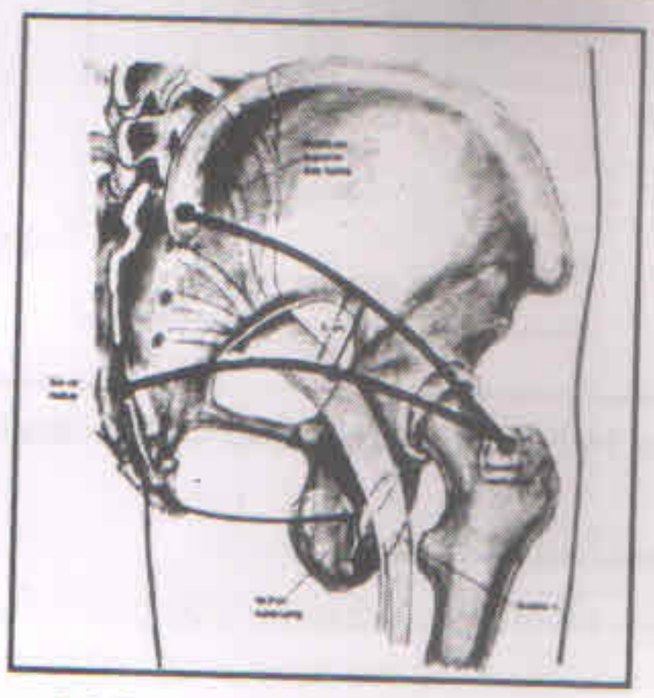


Figure 11 Sciatic Nerve Functional Anatomy

Technique: A12 to 15cm needle is entered from the above point perpendicular to the skin towards an imaginary point where femoral vessels go under the inguinal ligament. If the bone is contacted before parasthesia or motor response withdraw the needle and redirect it along the second line till parasthesia or motor response is obtained. Do not advance the needle for more than 2cm after bony contact. The nerve is usually located at a depth of 8cms in a moderately built patient. Paresthesia is more commonly felt in the peroneal territory. The motor response to be anticipated is dorsiflexion and eversion of foot.

Volume: 15-20 ml

Pearls:

- Not very useful for traumatic patient as the position is difficult to achieve
- As the nerve is blocked more proximally of all the approaches the block is complete
- As the nerve is thicker, higher concentration of local anaesthetic is needed.
- Ideal site for continuous catheter analgesia of the sciatic nerve
- Use of nerve locator is very useful as the nerve is deeply placed.

ANTERIOR APPROACH

Position: Supine with leg in a slightly abducted position

Site of Needle Entry

Line I : From anterior superior iliac spine to pubic tubercle

Line II : From midpoint of the greater trochanter parallel to L I over the anterior aspect of the thigh

Line III : Trisect the first line and draw a perpendicular line from the junction of medial 1/3 and lateral 2/3 to join the second line.

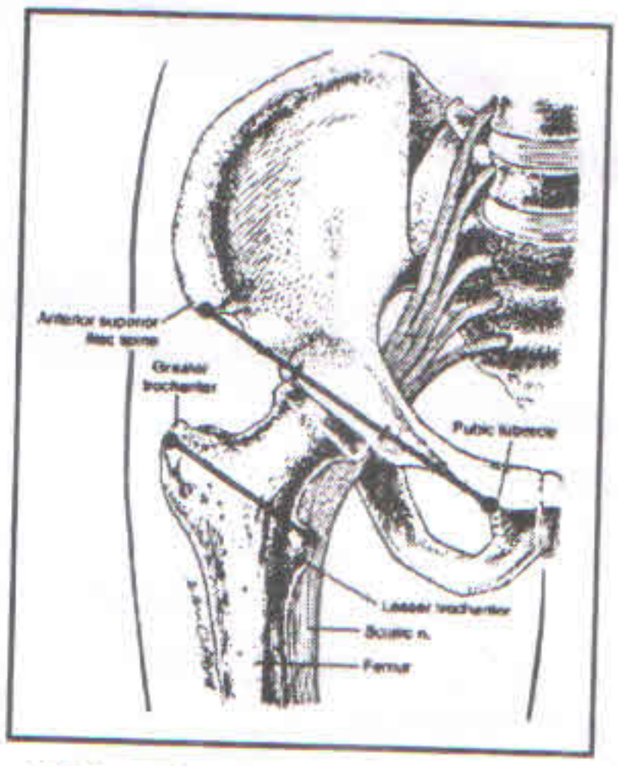


Figure 12 Landmarks For Anterior Approach

Technique: A 12 or 15cm needle is inserted perpendicular to the skin. At about 5 to 6 cm it contacts the femur. The needle is withdrawn and directed medially and if necessary little cephalad to locate the sciatic nerve. About 4cms past the femur, parasthesia or motor response is elicited. Inversion/ eversion of foot or dorsiflexion or plantar flexion of ankle is the motor response obtained, depending on whether the tibial or common peroneal is stimulated.

Volume: 15ml

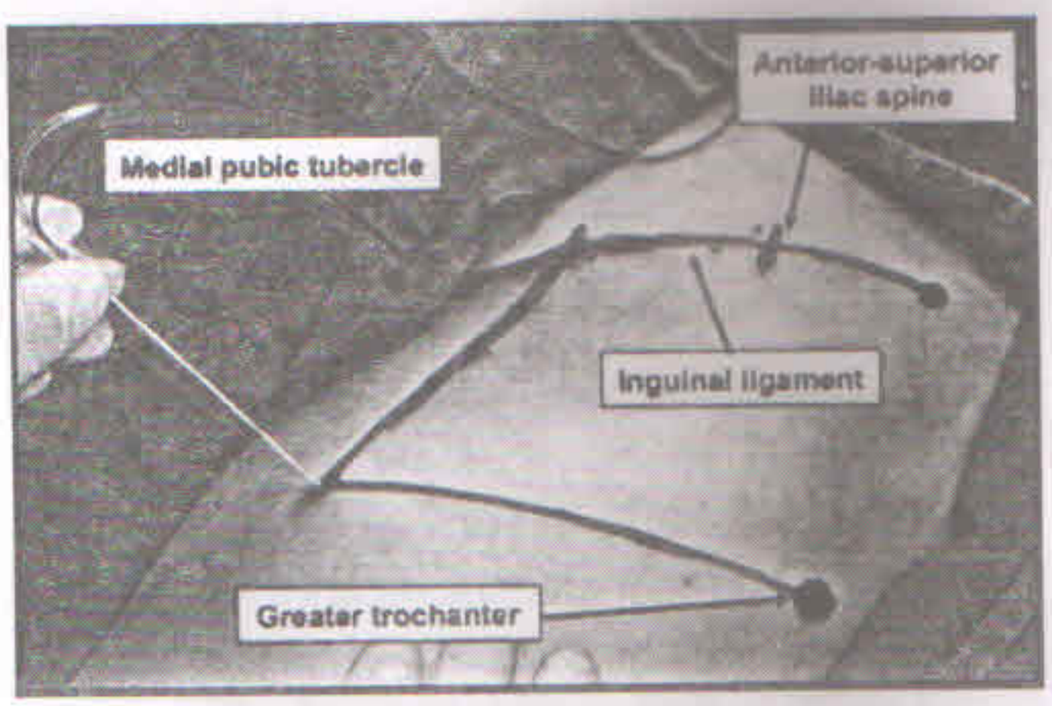


Figure 13 Showing Needle Insertion in Anterior Approach

Pearls:

- Very useful in trauma patients
- The site of block of the nerve is lower down than the classical approach and then block may not be complete always.

POPLITEAL BLOCK

Involves blocking the sciatic nerve in the popliteal fossa. Useful block in foot and ankle surgery. Combined with saphenous nerve block for full analgesia of the foot and ankle.

Anatomy:

The popliteal fossa is a quadrilateral space behind the knee joint. It is formed cephalically by Semimembranosus and Semitendinosus muscles medially and biceps femoris laterally. Caudally it is bound on both sides by the neads of the gastrocnemius.

The part of the popliteal fossa above the knee joint can be separated into a triangle by drawing a line over the skin crease. This triangle is further divided into two equal quadrants by a perpendicular line drawn from the apex of the fossa to the skin crease. The lateral quadrant is of importance as the nerve lies here. The popliteral artery is in the medial quadrant. After coursing for 3cm in the fossa, the nerve divides into a tibial and common peroneal nerves.

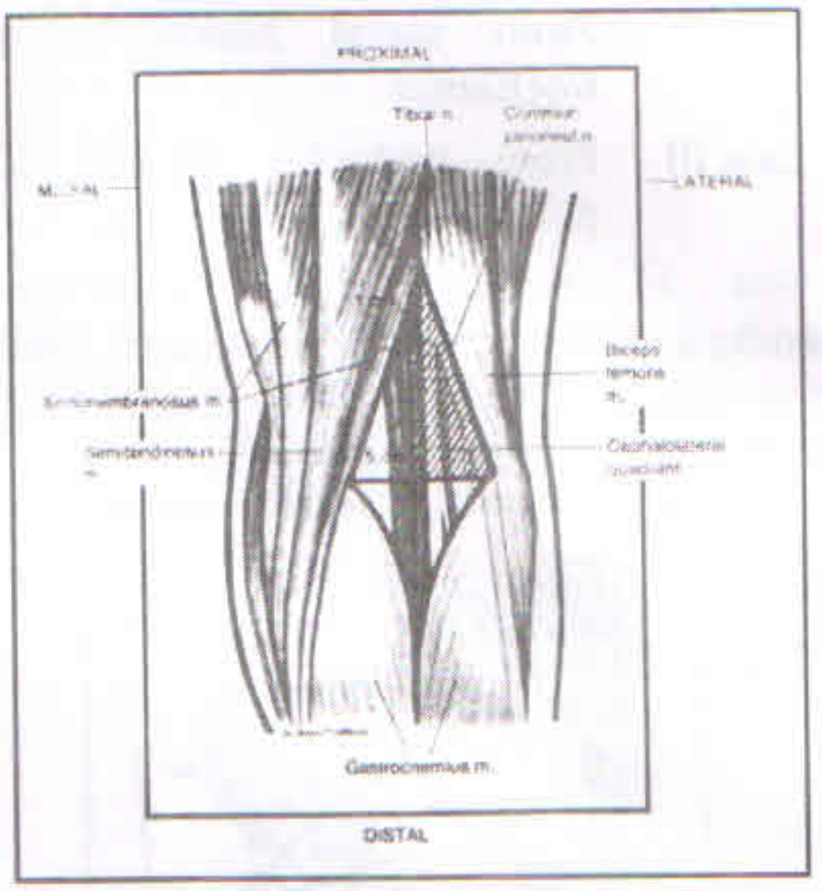


Figure 14 Functional Anatomy Of Popiliteal Nerve

Position - Prone

Site of Needle Entry : A point 5cms above the popliteal skin crease and 1 cm lateral to the line bifurcating the popliteal fossa.

Technique: A 7.5cm needle is preferred. It is advanced at an angle of 45 degree to 60 degree to the skin in a cephalad direction. At a depth of 3.5 to 5cm parasthesia or motor response is elicited and drug in injected. It is advisable to have a tibial motor response of plantar flexion and foot inversion.

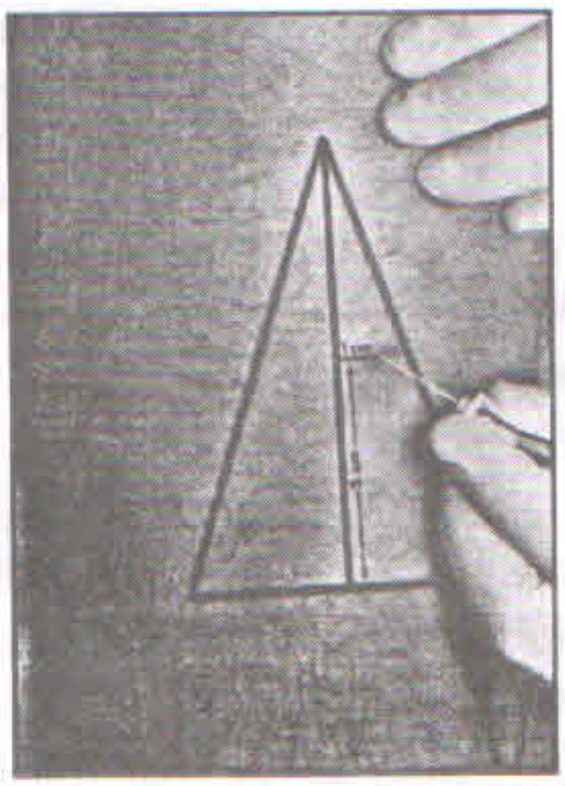


Fig 15 Showing Technique of Needle Insertion in Popiliteal Block

Volume - 30ml

Pearls:

- Continuous catheters can be placed here
- The nerve is blocked close to the apex of the fossa before its division
- Not very useful in trauma because of prone positioning

ANKLE BLOCK

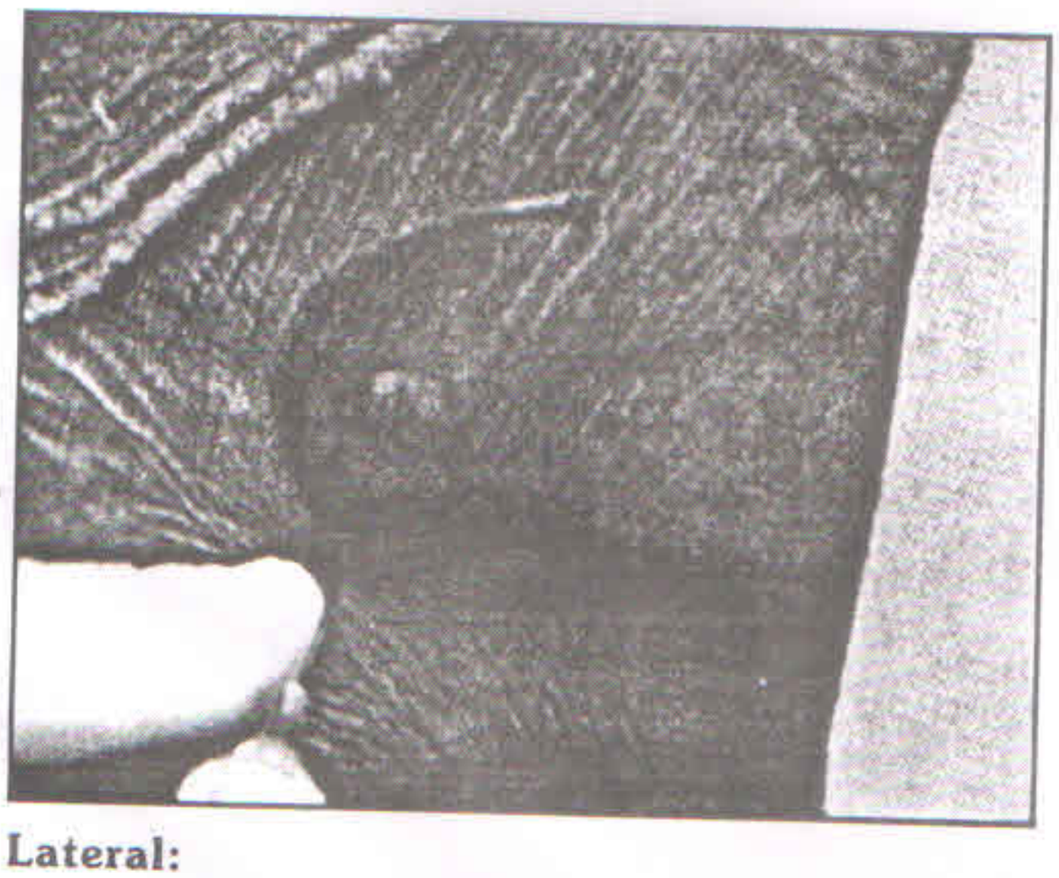
Involves blocking the following five nerves around ankle joint

- Posterior tibial nerve
- Sural nerve
- Saphenous nerve
- Deep peroneal nerve
- Superficial peroneal nerve

Technique:

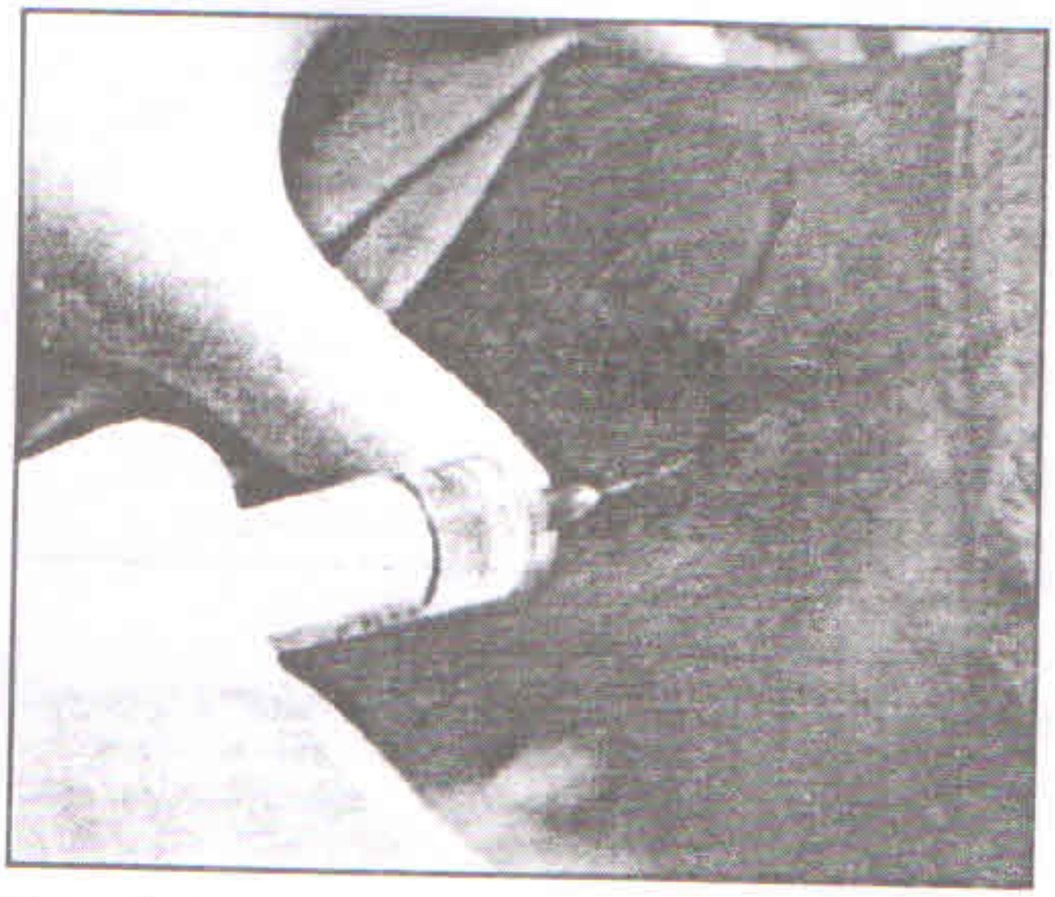
Medial:

The posterior tibial artery is palpated near the medial malleolus. Needle is inserted close to the artery to elicit parasthesia. If it is difficult to elicit paresthesia, advance the needle further toh itch the medial malleolus. Then withdraw by 1cm and give 3-4ml of LA.



Lateral:

The needle is inserted just below the lateral malleolus to elicit paresthesia. If the paresthesia cannot be elicited, hitch the medial malleolus and withdrfaw by 1.5 cm and give 3-4 ml of LA.



Dorsal:

Insert needle between the anterior tibial artery and Extensor Halucis Longus tendon on the line jointing the two malleolus. Once flexor retinaculum is pierced inject 3 to 4 of local anaesthetic to block the deep peroneal nerve. From this point a subcutaneous weal is raised aznd drug is given in a medial and lateral direction to block the saphenous and superficial peroneal nerve.

Pearls:

- As multiple injections are required good sedation is a must for patient cooperation.

Optimal evoked motor response (EMR) for each block

Interscalene Block	Flexor → Deltoid, Biceps, Pectoralis Major Extensor → Triceps, Brachioradialis, Wrist Extensors
Axillary Block	Radial → Extension of Wrist/fingers Median → Flexion of wrist/fingers Ulnar → Adductionof Thumb/4th & 5th finger flexion
Sciatic Block	Inversion, Plantar Flexion
Femoral Block	Quadriceps → Patellar Snap

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MANAGEMENT OF A TRAUMATIC ATLANTO-OCCIPITAL & ATLANTO-AXIAL SUBLUXATION WITH FRACTURE OF DENS BY A NEW FIXATION TECHNIQUE

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ABSTRACT

Atlanto occipital subluxation and dislocation, both are fatal brain stem injuries. Very few survivors have been reported in literature. Various procedures are prescribed for atlanto occipital and atlanto axial fusion. We are presenting a new fixation technique for the same acquired as an alternative to Goel & Harms technique to deal with a case complicated by intra-operative excessive bleed from C1-C2 junction and pre mature ventricular beats causing hypotensive shock. One month post operatively, patient is stable & neurological deficit is resolving. The rationale behind this approach is discussed and the relevant literature reviewed.

Key words: Atlanto occipital subluxation, atlanto occipital dislocation, atlanto axial subluxation, Goel & Harms technique.

INTRODUCTION

Atlanto-occipital subluxation of more than 2 mm indicates a loss of major occipitocervical stabilizers.[1,2] Occipitocervical dislocation is associated with a fatal brain stem injury leading to cardiac and respiratory arrest. Most authors advocate occipitocervical fusion, for which various methods have been described viz. Gallie fusion, Brooks-Jenkins fusion, Sonntag posterior C1-C2 technique, C1-2 trans-articular screw technique, Goel's technique modified by Harm and plate-screw -rod construct.

We treated this patient with occipital plate linked by rods to lateral mass screw of axis vertebra and atlas vertebra to connecting rod by circlage wire in association with bone graft.

CASE REPORT

A 14 years old, mentally challenged female came to the emergency department of MBS Hospital, Kota (RAJ), with history of fall from stairs. On examination, she found to have right upper and lower limb paralysis (MRC grade 0). Babinski's sign, well sustained clonus & exaggerated knee & ankle jerk were evident on right side. Initial radiographs revealed atlanto-axial subluxation with no visualisation of dens. NCCT cervical spine [Fig. A & B] revealed atlanto-axial & atlanto-occipital subluxation with displaced Type 2 fracture of dens. MRI revealed compression at C 1 - C 2 level.

SURGICAL TECHNIQUE

Original plan for the surgery was to fix occiput, C1 & C2 in reduced position by Goel's Technique modified by Harm.[3] 2 poly axial 3.5 mm pedicle screw were fixed in C2 vertebra. C1 lateral mass screws were being put but due to excessive bleeding from C1 - C2 epidural space patient landed in hypotensive shock and developed premature ventricular contractions and this step

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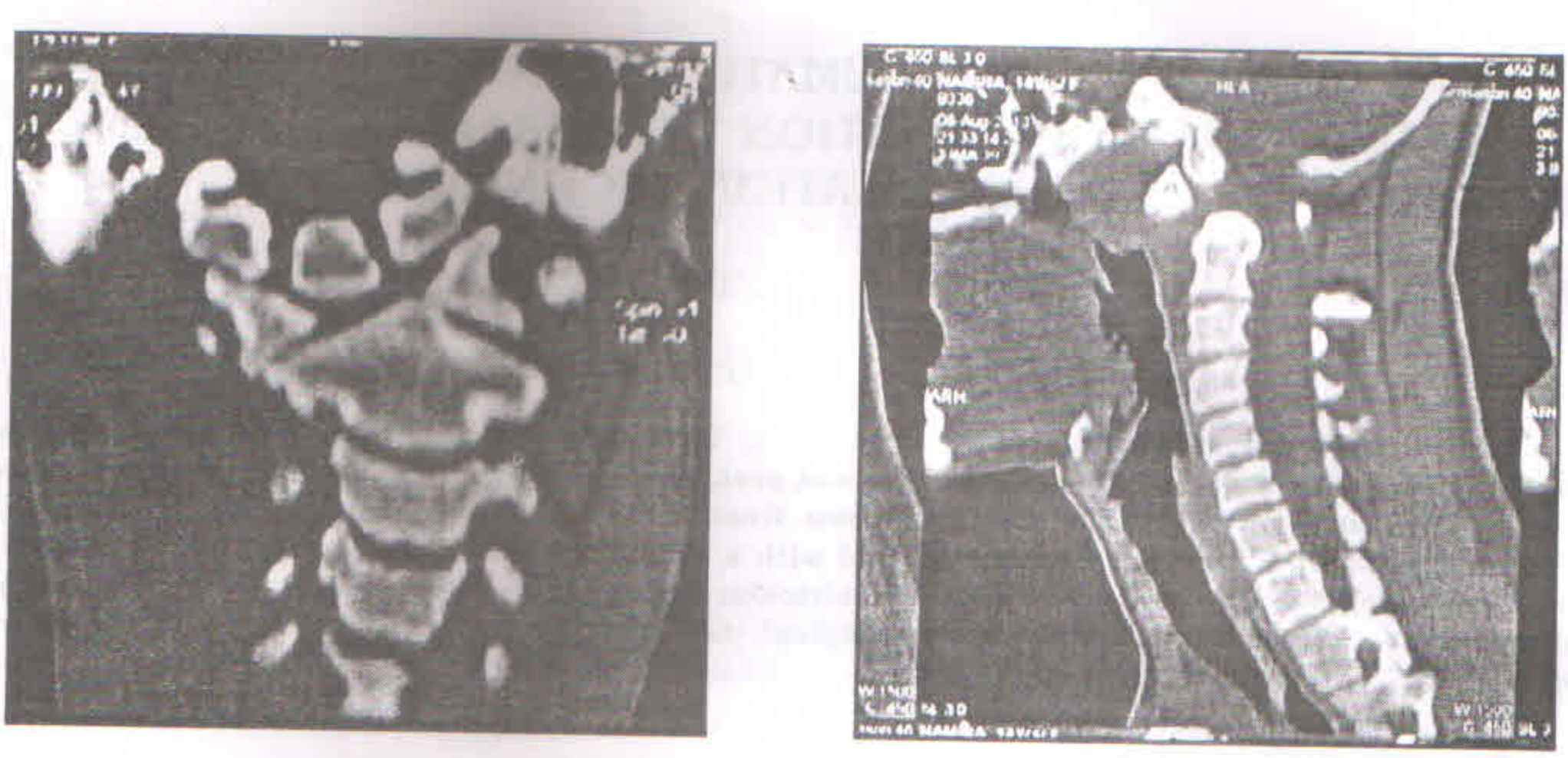

Figure A and B : Pre-operative NCCT showing Atlanto-occipital and Atlanto-axial subluxation along with fracture dens

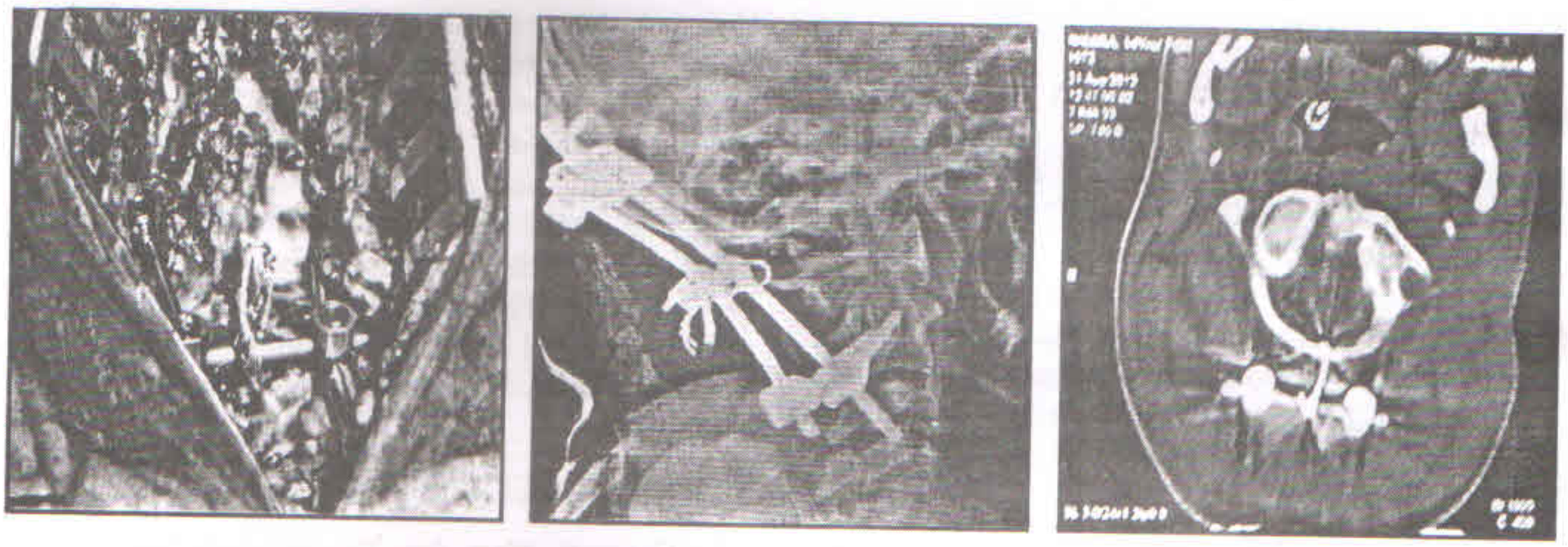

Figure C, D & E: Showing posterior instrumentation along with circlage wire holding posterior arch of C1 to cross link bar.

was abandoned. T plate was fixed to occiput and connected to C2 pedicle screws by connecting rod. A sub laminar 20 gauze circlage wire was passed below the centre of posterior arch of C1 and tightened to cross link bar between to connecting rods and bone graft placed. [Fig. C, D & E]

DISCUSSION

Oda et al[4] studied the biomechanics of five different occipitocervical fixation constructs in cadaveric spines, and found that screw fixation from the occiput to the pedicle of C2 was the stiffest. Transarticular screws afforded greater

stability than hooks and wires. The use of wires relies on the integrity of the posterior elements and associated with risk of injuring dura when they are passed through occipital burr holes or under the lamina of the spine. The siting of transarticular screws is technically demanding. Currently, the best method to achieve atlanto-axial fixation is the technique first described by Goel and popularised by Harms.[3] We would expect our construct to function biomechanically in much the same way as Oda's occipitoaxial pedicle screw fixation, but with the loss of cervical rotation.

CONCLUSION

Atlanto-occipito-axial posterior instrumented fusion, as described in this paper for traumatic atlanto-occipital and atlantoaxial subluxation has provided stability. Successful reduction has been confirmed radiologically on follow up & can be used when placement of C1 lateral mass screw placement is difficult.

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LIMB SALVAGE PROCEDURE IN GIANT CELL TUMORS AROUND THE KNEE JOINT BY ENBLOC EXCISION OF BONE & SIMULTANEOUS BONE LENGTHENING BY ILIZAROV METHOD

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ABSTRACT

Background: Enbloc excision of bone in Giant Cell Tumor (GCT) around the knee joint leaves a bone defect which requires a complex reconstructive procedure. The present study analyzes limb salvage procedures by enbloc excision of bone and bone lengthening by Ilizarov method, in terms of various complications and morbidity encountered.

Materials and Methods: Ten cases (M-six and F-four; lower end femur- three and upper end tibia - seven) of Giant Cell Tumor around the knee joint, stage 3 tumours were included. Mean age was 24. 8 years (range 18-32 years). Enbloc excision of the femoral and tibial condyles and bone transportation by Ilizarov technique by distal tibial corticotomy and later on knee arthodesis was performed in all the cases.

Results: Shortening was the major problem following enbloc excision and subsequent limb lengthening. Infection occurred only in one case and required multiple drainage procedures. After enbloc excision, the resultant gap (mean ~15cm) was managed with simultaneous limb lengthening with a distal tibial corticotomy on an Ilizarov fixator. The complications were skin and soft tissue impingement between the proximal and distal fragment (n=4) and distortion of the ankle mortis due to proximal transportation of the distal end of ulna (n=1). The usual time taken for union and limb length equalization was approximately one and half years.

Conclusion: Enbloc excision of bone and simultaneous bone lengthening by Ilizarov method achieved limb length equalization with relatively short morbidity.

Keywords: enbloc resection, giant cell tumor, limb salvage, ilizarov method.

INTRODUCTION

Giant cell tumour of the bone (GCT) is one of the most common primary bone tumours in young adults. It most frequently occurs in the distal end of the femur and the proximal end of the tibia. The majority of patients are between 20 and 45 years of age. Local extensions, regional and systemic tumour implantation and malignant transformation with widespread metastases are among the reported manifestations of these neoplasms that are indicative of their aggressive and unpredictable nature.

The ideal form of treatment for lesions that arise near major joints remains unclear. A variety of treatment modalities are available for GCT. They include curettage and bone grafting, cryotherapy, phenol application, insertion of methylmethacrylate, insertion of hydroxyapatite, resection followed by allograft or prosthetic reconstruction. Although extended curettage with adjuvant and local reconstruction is the standard treatment for uncomplicated giant cell tumours, it

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carries high recurrence rates in aggressive or recurrent GCT. There has been a great deal of development in the surgical management of the aggressive, recurrent or peri-articular giant cell tumour towards limb salvage. In these situations, wide resection of the tumour has been accepted as the standard treatment. But it has always been a challenge to reconstruct the resected gap, especially across joints.

This challenge to provide long-lasting survival and function of the limb after reconstruction is now being met with biological solutions using living bone. The ideal reconstruction should have biological affinity, resistance to infection, sufficient biomechanical strength and durability.

The present study evaluates limb salvage technique after enbloc excision for GCT around the knee and simultaneous bone lengthening by Ilizarov method to evolve a biologically sound, reconstructive procedure with reduced morbidity.

MATERIALS AND METHODS

Ten cases with established diagnoses of Giant Cell Tumour around the knee joint presenting from 2002 to 2010 were included in the study. All the patients included in the study had stage 3 lesions (Campanacci et al 1987; Table I). There were six males and four females in the study group. The mean age was 24.8 years (range 18-32 years). The distal end of the femur was involved in three cases and the upper end of the tibia was involved in seven cases. All the cases were operated by senior author (RKSD). The enbloc excision of tumor bone was done, along with simutaneous bone lengthening by Ilizarov distraction histogenesis technique to attain limb length after resection arthrodesis.

OPERATIVE TECHNIQUE

The primary procedure was directed towards en-block resection of the tumour and stabilisation of the limb together with simultaneous application of simple five-ring Ilizarov apparatus along with distal tibial corticotomy. Corticotomy is usually performed with an oscillating saw or a Gigli saw Distraction was begun approximately after 7 to 10 days at a rate of 0.5 mm twice daily or 0.25 mm four times daily at each of the distraction sites. The distraction at the corticotomy site was confirmed using radiographs after 5 days of distraction. This was then continued until the docking of both of the fragments. The patients were allowed toe-touch weight-bearing crutch walking as soon as the pain subsided. The

Fig 1(a)

Fig 1 (b)

Figure 1 (a), (b) : Giant cell tumour of proximal tibia, AP and Lateral view.

patients were discharged once they could manage distraction by themselves. Patients were followed up every 4 weeks with radiographs to assess the bone transport and quality of the regenerate. Any complications encountered were identified at the earliest stage and treated aggressively.

Fig 2 (a)

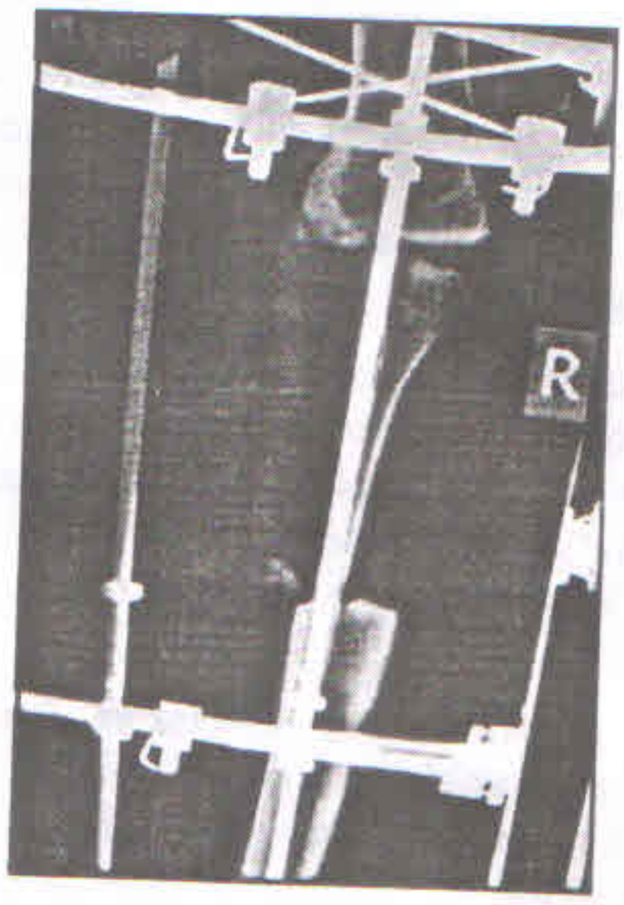

Fig 2 (b)

Figure 2 (a), (b) : Ilizarov application following excision.

When callus formation was poor, distraction was delayed or compression and distraction of a moving segment (the accordion manoeuvre) was applied. When the regenerate was consolidating prematurely, the distraction rate was increased to 1.5 mm per day. Once the bone fragments were docked, the Ilizarov fixator was removed. Arthrodesis was performed at the docking site. To facilitate union at the docking site, fibrous tissue was removed and cancellous bone grafts applied

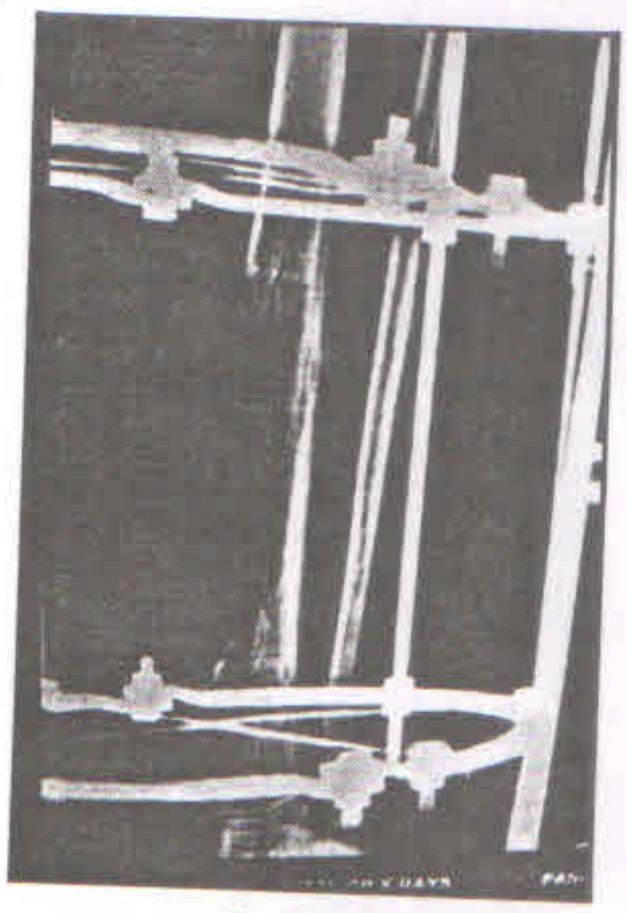

Fig 3 (a)

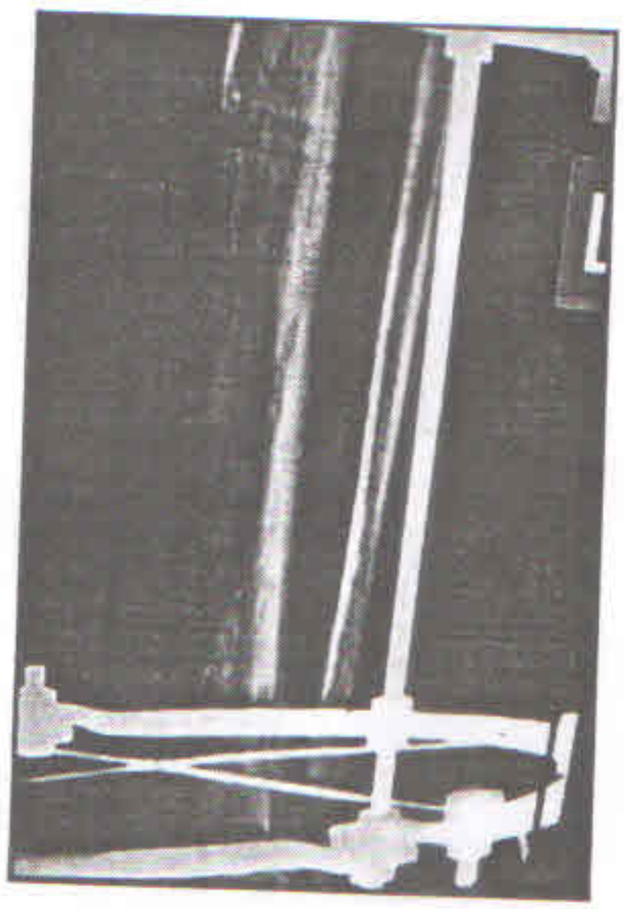

Fig 3 (b)

Figure 3 (a), (b) : New bone formation following bone-transport.

soon after the defect has been bridged. A further biopsy is then taken at this stage.

Full weight bearing was allowed only after the docking site had united in at least three of the four cortices with trabeculae crossing the bone ends.

RESULTS

The mean length of the diaphyseal defect was 15.7 cm (12.5 to 19.5). The mean duration of distraction was 124.7 days (78 to 162) and of external fixation 259.3 days (174 to 298). The mean treatment index, obtained by dividing the duration of external fixation by the length of bone regeneration, was 40.5 days/cm (36.0 to 43.8). All patients obtained union at the docking site and corticalisation of the regenerated bone. The final function of the affected leg was excellent in all cases. There were no local recurrences at a mean follow-up of 43 months (32 to 48). There were complications in three patients. One (case 2) had a distortion of the ankle mortise due to transportation of the fibula proximally, due to passing up of an olive wire through the distal fibula. The other two had skin and soft tissue impingement between the proximal and distal fragment which required soft tissue release during the arthrodesis procedure.

Histological examination at the time of docking showed varying degrees of callus formation continuous with the bone trabeculae of the transported segment; this segment was shown to be viable in all cases at 65 to 133 days after the initial operation.

DISCUSSION

The World Health Organization has classified GCT as "an aggressive, potentially malignant lesion". Its histogenesis is uncertain. Historically, curettage / intralesional excision has been associated with a high rate of recurrence (30-50%). Intralesional excision / curettage combined with local adjuvants like methylmethacrylate and liquid nitrogen (thermal action) or phenol and hydrogen peroxide (chemical action), may decrease the rates of local recurrence. However, the adequacy of the removal of tumor rather than the use of adjuvant modalities is what determines the risk of recurrence.

The risk of local recurrence after an en bloc resection involving the joint is lower than that after an intralesional procedure. Campanacci reported a recurrence rate of zero in 58 wide (en bloc resections) or radical procedures. Now increasing emphasis is being laid on preservation of joint in treating GCT. Resection is usually performed in a) Stage 3 lesions, which have already destroyed the cortex and tend to recur more often; b) when the defect is large; and c) when the joint surface is destroyed or cannot be salvaged. However, Szendroi tries to preserve the joint even in Stage 3 lesion, taking into account the higher probability of recurrence. He believes that extended curettage and application of bone cement are the most accepted methods of treatment of GCT. When the tumor is less than 1 cm from the articular surface, the incidence of degenerative changes in articular cartilage after the use of cement alone is more than 2.5 times greater than that when the tumor is more than 1 cm away. Interposing a cm or two of bone graft between the cartilage and cement may reduce heat damage and the resultant early degenerative changes. Studies have shown that cement constructs are less rigid than normal subchondral bone or successful bone graft. Our patients generally presented late in the course of the disease when the lesion had become large in size and abutting the articular cartilage.

Gitelis et al compared the results of en bloc resection of GCT (n=20) and intralesional excision with adjunctive local insertion of methylmethacrylate or phenol (n=20). They reported only one recurrence in the intralesional surgery group. There were no recurrences in the patients who had an en bloc resection. However, the disadvantage of this treatment was the relatively poor functional outcome.

An arthrodesis is less attractive initially but once it is achieved it provides a stable leg and the patient is unlikely to require revision surgery. A realistic estimate of the expected function after a

proposed reconstructive procedure must be given preoperatively. In most developing countries resection-shortening-distraction offers a very real alternative. In a young active patient with GCT around the knee, with a normal lifespan, endoprosthesis is not a sound biological solution that matches life expectancy. It is likely to require multiple revision surgeries.

The Ilizarov method is widely used for reconstruction of the proximal tibia in the treatment of fractures, nonunion, traumatic bone defects, osteomyelitis and deformity (Ilizarov 1991; Maiocchi and Aronson 1991), but there are few reports of the use of distraction osteogenesis in the management of bone tumours (Stoffelen, Lammens and Fabry 1993; Tsuchiya et al 1993; Ca¯nadell, Forriol and Cara 1994; Said and El-Sherif 1995).

In the last 15 years distraction histogenesis is in vogue. Resection-shortening-distraction offers a very good alternative. However, in large defects the lengthening and consolidation time can be substantial.

Kapukaya et al described limb reconstruction with the callus distraction method in seven cases of tumors of the distal femur. The defect after tumor resection ranged from 8-20 cm. Tsuchiya et al described the use of the Illizarov technique for management of subarticular defects after en bloc resection or curettage and phenol cauterization in GCT of the proximal tibia in five patients. The mean length of bone defect was 5.7 cm and the mean duration of external fixation was 233 days. The advantages of this method include the lack of graft rejection, the reattachment of ligaments and tendon to the bone, the prevention of articular collapse, early movement of the knee and ankle joint and early weight bearing. Disadvantages include the long duration of external fixator application, pin tract infection, wire breakage and frustration of patients due to long duration of treatment. However, most of our patients present to us late when the subchondral bone plate is thinned or breached and the resultant defect after en bloc excision is large. Bridging such a large gap by distraction histogenesis alone is a lengthy process and has its own sets of problems and complications.

Enbloc excision and simultaneous bone lengthening by ilizarov distraction histogenesis technique may provide a good biological long-term alternative solution for GCT around the knee. It helped us in achieving a functional limb with a sound arthrodesis in a reasonably short duration of time.

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