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Editorial

Basics of Medical Research

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Literal meaning of Research as given in Cambridge English Dictionary, it is a detailed study of a subject especially in order to discover new information or new understanding .Research is a systemic approach to discover facts .The fundamental reason why research is done is to find out answers to “when “and “how “ questions. The aim of medical research is to improve health through understanding how the human body works, how do we fall sick and how a disease can be cured and prevented. Research forms the foundation of improved medical care.

Health research has different dimensions:

•Theoretical research and applied research.

•Preventive and therapeutic research.

•Bench based research and bedside research.

•Exploratory research and confirmatory research.

•Implementation research and transitional research.

Steps in Medical research

We all are well conversant with the fact that science is a systematic study of facts which follows a set pattern. Thus, any scientific research must follow a step by step methodological approach, which encourages clarity and avoids multiplicity. Medical research aims at finding answers or practical solutions at individual and community level.

Jenicek (2006) has provided a layout of modern argument in medical research. This involves processes that go on from what is in your mind to searching external evidence for or against, making a qualified claim, then conducting leading to the results with limitations such as probability [1].

The whole research can be divided intosteps:

1.Pre-investigation step:

This step is the vital step for any research, following are the important aspects to be followed

Identifyproblem:The first step is to pinpoint the problem on which the research work has to be done. There are 3 important areas which are to be matched with research problem (a) relevance and applicability, (b) interest of research team, (c) feasibility. The problem should be converted to a research question. A good research question has a strong theoritical back up.

Evaluate existing information: Collect all the available information on the chosen subject by searching literature,unpublished research, and communicating with experts.

Formulate research objectives:Consider whether you expect to come up with entirely novel findings or just confirm previous work that left some doubt, or would address the present conflict (Brand 2003) [2].

Identify the study population.

Study Design:Observational or interventional.Randomisation is a vital step of interventional studies.Blinding and matching should be performed carefully

2.Investigation Step:

Pilot study:This will help in identifying any shortcomings in formulating research objectives or in the design or tools for study.

Data collection: The backbone of research is the data and thus the data collection step is of utmost importance, it could be prospective in form of interview, record filling and questionnaires. Retrospective study requires careful retrieval of medical records.

Scrutiny of Data: Data cleaning or scrutiny helps in maintaining external validity and internal consistency.

3. Post Investigation step:

Following are some of the important post investigation steps;

Data analysis:Analysing the collected data is the most important and meticulous step in any research. It itself has got different steps which will cumulatively help in arriving on the answer to research question.

Interpretation of Results: after analysing the data,statistically the results are to be imterpreted using critical thnking and in context of objectives of study.

Manuscript writing: It could be in the form of thesis, project report, an article or dissertation.

Outcome of Medical research:A meticulously planned and executed research bears fruits of accomplishment for researcher and improvement in termsof care provided at individual and community level.

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Original Article

Pelvic Fracture - Results of Early External Fixation

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Investigation performed at Department of Orthopaedics, NSCB Medical College, Jabalpur, Madhya Pradesh, India

Abstract

Background: The behavior of pelvic ring fracture following surgical fixation has been very sparsely studied. Pelvic ring injuries, depending on their severity had been treated by variety of closed method. The purpose of the study is to assess the short-term functional outcome of pelvic ring fracture following surgical fixation.

Method: Present prospective study consists of 62 patients of pelvic fracture admitted in department of orthopedics, NSCB medical college and hospital Jabalpur (M.P) during the period of Oct. 2010 to Sep. 2011. All patient of type A (stable) fracture treated by conservative method. Out of 40 patients of unstable pelvic fracture (involving pelvic ring) 14 were treated by surgical method. Out of 14 patients 4 were treated by external fixation, 8 by internal fixation, and 2 by combined external and internal fixation. Functional outcome assessment was done by Majeed Scoring System [1].

Results: Functional outcome score in surgically treated patient is excellent in 7 patients, good in 4, fair in 2, and poor in 1 patient at 3 month follow-up. Pain is the most common complaint after 3 month of surgical fixation, it is seen in 4 patients (28.57%) but only 1 patient changed his job because of this pain.

Conclusion: Unstable Pelvic ring injury has poor outcome, it should be treated by operative methods for optimal functional outcome.

Keywords: Pelvic Ring injury, external Fixation

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Introduction

Pelvic fracture constitute 3% of all skeletal injuries [2]. Among poly trauma patients the incidence is about 25%. Henderson (1989) followed 26 patients with major pelvic disruption and found low backache in 50%, limp in 32%, and work disability in 43% of patients [3]. Tornetta et al (1996) achieved a high long-term success rate with operative management of pelvic fractures while Mirada et al found no difference in the outcome among operatively and non-operatively managed cases of pelvic fractures [2,4]. The actual outcome is likely

to be much more adversely affected with the cultural practices of sitting and squatting. So pilot study was planned to assess the short term functional outcome following surgical fixation in pelvic ring injury, in Indian scenario.

Materials and Methods

Present prospective study consists of 62 patientsof pelvic fracture admitted in Department of Orthopedics, NSCB medical college and hospital Jabalpur (M.P) during the period of Oct. 2010 to Sep. 2011. An anteroposterior (AP) x-ray of the pelvis was included in the initial radiographic examination of all patients with blunt trauma. The pelvis has a remarkable ability to recoil to a near-normal alignment after trauma. This elastic recoil can mask severe instability. Fractures noted on the AP x-ray should prompt further investigation of the pelvis with inlet and outlet views.

All patients with unstable type of pelvic injuries were planned for surgery. 14 patients were treated by surgical method in this study. There were 7 patients with type B and 7 with type C pelvic injury. Out of 14 patient 4 were treated by external fixation, 8 by internal fixation, and 2 by combined external and internal fixation. All unstable pelvic fracture were managed conservatively initially Conservative management includes bed rest, pelvic belt, skeletal traction etc.

Results

Higher incidence was observed in young active person in 3rd 4th and 5th decades (74.19%). The incidence was more in males than female (M:F= 1.8:1). Fall was the commonest (56.45%) mode of injury in patient with pelvic fracture followed by RTA (road traffic accident). Out of 62 patients of pelvic fracture, 40 (64.51%) had unstable type of injury. Anteroposterior compression injuries (53.23%) were the commonest type of injuries. Out of 14 patients, 1 (7.14%) got infection at operated site in the form of pin tract infection. Persistent pain seen in 4 (28.57%) operated patients. Limb length discrepancy seen in 1 (7.14%) patient. This discrepancy was 10 mm. Average time to start mobilization after surgical fixation was 19 days (range 1-62 days) for all operated patients, 10 days(range 1-24 days) for patient with type B pelvic injury, and 28 days (range 3-62 days) for patients with type c pelvic injury. Follow up duration for all patients ranged from 3 months to 8 months.

Pre op x-ray

Post op x-ray shows good compression at fracture site.

At 1 and half after fixate application pt start doing his all work with fixator insitu. [Functional Majeed score 62].

At 6 month follow-up patient can walk, sit and do all his routine work. [Functional Majeed score 86].

Majeed functional outcome score in surgically treated patient is excellent in 7 patients, good in 4, fair in 2, and poor in 1 patient at 3 month follow-up. Pain is the most common complaint after surgical fixation, it is seen in 4 patients (28.57%) but only 1 patient required change inhis job because of this pain.

Discussion

Historically, pelvic ring injuries, depending on their severity had been treated by a variety of closed methods. Unstable pelvic injuries treated by these conventional measures often result in significant disability, moreover the mortality can reach up to 21.8%.[5,6,7,8] There was a growing body of evidence that the application of an external skeletal frame will reduce venous and bony bleeding and improve tamponade by reducing and maintaining the pelvic volume to the extent that other interventions are rarely required.[4,7,9,10]. Recently, biomechanical studies showed that external frame could not ensure sufficient stability to allow mobilization without the risk of re-displacement of the fragments particularly those with vertical instability. External fixation can be used temporarily in vertically unstable injury as a part of emergency treatment to allow the patient to be placed with trunk in the upright position to improve ventilation [12,13]. External fixation used as definitive fixation in Tile's type B (partially unstable) pelvic injury. Our results agree with other studies stating that anterior or posterior fixation, or both could restore excellent stability and adequate consolidation of the unstable (Type-C) pelvic injuries with subsequent decrease in morbidity and mortality [6,13,14]. They were mobilized relatively earlier without significant risk of re-displacement of the fragments. Early mobilization minimized the complications associated with prolonged recumbency. It has been emphasized that surgical treatment should be carried out 5-7 days post trauma when the patient's general condition allows [13,14] It is the author's opinion to perform internal fixation for unstable pelvic injuries as soon as the general condition stabilized even up to 6weeks after the injury. The functional results are often affected by the associated skeletal or extra skeletal injuries as well as other variables [5,8,12,13].

Conclusion

Unstable pelvic injury should be treated operatively as soon as general condition of the patient allows. Surgical treatment gives superior results even when performed as

late as 6 weeks. External fixation of Tile's type B unstable fracture allows early mobilization of the patient and avoids early and late complication associated with conservative management.Tile's type C vertically unstable (>10mm displacement) injury should be treated by internal fixation because an external fixator does not correct the malalignment and is not rigid enough to provide stability in vertical plane.

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Original Article

Treatment of Unstable Intertrochanteric Femoral Fractures by Dynamic Hip Screw Vs Proximal Femoral Nailing

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Investigation performed at Department of Orthopaedics, V.S.S. Medical college, Burla, Sambalpur, Odisha, India

Abstract

Background*:*Inter trochanteric fractures are increasing as the incidence of contributing conditions like osteoporosis, old age and trauma increases. Unstable fractures pose a challenge in management of these fractures. Multiple options for fixation are available but the more commonly used DHS has its own pros and cons. Intra medullary devices offer more stable construct and a good functional outcome.

Method*:* A prospective study was done on 40 cases of unstable intertrochanteric fractures. They were randomly allocated to two groups. Group A was treated with DHS and group B with PFN. Post operatively the cases were followed up for a period of 2 years at regular intervals. Comparison between the two groups in terms of intra operative and post-operative advantages was done.

Results*:* Intra operative parameters like operative time and blood loss were more in DHS group whereas radiation exposure was more in PFN group. Post-operative parameters like duration of stay in hospital, early weight bearing, union rate, infection rate, implant failure was favourable in PFN group.

Conclusion*:* In treatment of Unstable Intertrochanteric Fractures PFN is better than DHS.

Keywords: Unstable intertrochanteric Fracture, PFN, DHS

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Introduction

With increase in road traffic accidents and life expectancy, the incidence of hip fractures is in increasing trend. The incidence was estimated to reach 5.12 million in the year 2040 [1]. Hip fractures mainly include fracture neck of femur and intertrochanteric fractures. Intertrochanteric fractures contribute to considerable morbidity of the individual [2]. Although intertrochanteric fractures are managed by internal fixation, the implants are diverse from plates, Dynamic hip screw (DHS) to intra medullary nails. DHS was routinely used in the management of these fractures [3,4]. With the development of biomechanical advances, intramedullary implants overtook the position of DHS [5].

Even then there are some failures in intramedullary nails with improper techniques [6,7]. In this study, a comparative analysis ofunstable fractures managed by DHS and Proximal femoral nail (PFN) was done.

Material & Methods

A prospective study was done at our tertiary care centre on unstable intertrochanteric fractures between March 2014 and February 2016. 40 consecutive patients who met the inclusion criteria were included in the study. Inclusion criteria were patients above 45 years of age with unstable intertrochanteric fracture, who were willing to participate in the study. Compound fractures, pathological fractures, associated shaft fractures, patients unfit for surgery and those who were not willing to participate in the study were excluded. Patients were randomly grouped into two groups. Group A received DHS and group B received PFN as fixation modality for the intertrochanteric fracture.

After thorough history of the injury, patients were examined clinically. Then roentgenograms of pelvis with both hips antero-posterior view and lateral view of the involved hip were taken. Patients were stabilized. After fitness for surgery, patients were posted for surgery. Using C-arm and traction table, fracture was anatomically reduced and internally fixed with either DHS or PFN as per the group where the patient belonged. Intra-operative details like operative time, blood loss, number of C-arm images required for surgery were recorded. Post-operatively the patients were managed according to the protocol of the centre. Post-operative details like duration of stay in hospital, time taken to bear weight on the affected limb, time taken for radiological union and complications related to fracture and implants were noted on subsequent follow-up. The results were compared between the groups.

Results

Average age of the patients included in the study was 62.5 years(Range: 45 – 70 years). Out of 40 cases, 65% (26 cases) were female. 67.5% (27 cases) were due to domestic fall and rest was due to road traffic accident. Average admission to operation time was 3.4 days (range: 3-7 days). Average duration of surgery was 58.4 min for PFN and 71.2 min for DHS. Average blood loss was 40% more in DHS. Number of intraoperative C-arm pictures required was 30% more for PFN. Average duration of stay in hospital was 8.6 days for PFN (5 days -12 days) and 10.4 days (7 days – 15 days) for DHS. Weight bearing was started on an average of 4.3 weeks (2 weeks – 6 weeks) in PFN and 5.2 weeks (4 weeks – 8 weeks) in DHS. Tip-apex distance was more in DHS than PFN. All cases operated by PFN united but one fracture (5%) in DHS group had non-union which was managed by bone grafting. Average time taken for radiological union was earlier in PFN (12.2 weeks) than DHS (13.5 weeks).

Complications	DHS	PFN
Joint stiffness	7	2
Malunion	3	1
Nonunion	4	0
Infection	1	0
Shortening	3	0
Implant failure	4	1

Table 1: complications noted in DHS and PFN groups.

Discussion

The ideal fixation device for intertrochanteric fractures is not optimized and [8,9] a single device isnot suitable for all the fractures, indicating the complexity of this fracture. With the development of DHS, these fractures were managed with good results in earlier periods [10]. Larger exposure, blood loss, increased operative time and mechanical failures if implant [11] lead to the search of newer implants. Improper placement of lag screw, not placing screw close to subchondral bone of head and not maintaining minimal Tip-Apex distance (TAD) were imposed as causes for screw cut-out [12]. In early 90's, PFN was developed with biomechanical advantages over DHS and has become more prevalent in use [13,14,15]. PFN were also not without failures, still mechanical failures remain a major concern. One method to reduce the mechanical failure significantly is placing screws in "safe zone" shown by Herman et.al [16].

Various studies showed PFN has several advantages over DHS. Pan X-h et.al [17], showed minimal invasiveness, reduced operative time, reduced blood loss in PFN operations as compared to DHS. Saudan M et.al [18], noted reduced infection rate in patients operated with PFN. Rigid fixation, thus early rehabilitation and reduced hospital stay was emphasized in the study by Pajarinen J et.al [19]. Better union rates with PFN as compared with DHS were demonstrated by Kumar et al [20].

In our study, we noted similar results as those of previous studies with reduced operative time, minimal blood loss, reduced infections, earlier rehabilitation, union and less implant failure in PFN group. One disadvantage we came across was slightly increased number of C-arm exposures required for PFN procedure. Overall, PFN has the mechanical and biological advantage over DHS in management of unstable intertrochanteric fractures.

Conclusion

Unstable variety of intertrochanteric fractures are difficult to manage. PFN is load sharing device with a better biomechanical advantage, offers biological indirect reduction, allows early mobilization and weight bearing. Hence, PFN scores above DHS in unstable trochanteric fractures.

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Original Article

Functional Outcome of Operatively Treated Floating Knee Injuries in Adults

Aher D, Sonkar D, Sharma P, Maravi D S.

Study performed at Department of Orthopaedics, Gandhi Medical College, Bhopal, Madhya Pradesh, India

Abstract

Background: Floating knee injuries result from high velocity trauma and are associated with high morbidity. There are no clear guidelines for their management. This study evaluated the functional outcomes of operatively treated floating knee injuries in adults and the factors affecting them.

Methods: Thirty patients (29 men, 1 women; mean age30.7 years; range, 15 to 70 years) were included in the study. The fractures were classified according to the classification by Blake and McBrydes.Femur fractures were treated using intramedullary interlocking nails either antegrade or retrograde or locking compression plate and tibia fractures were treated with either external fixator, locking compression plate or intramedullary interlocking nails. Follow up was done at 4 weeks, 8 weeks, 6 months and 1 year.

Results: The functional outcome was accessed using Karlstrom And Olerued Criteria and was: Excellent in 3, Good in 9, Acceptable in 10 and Poor in 8 patients.

Conclusion: The factors which determine the functional outcomes were type of fracture (open or closed), pattern and site of fracture, presence of intra articular extension and method of fixation used. The best management of these injuries involves intramedullary nailing of both the fractures.

Keywords: Ipsilateral, Fracture, Femur, Tibia, Floating knee

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Introduction

Floating knee injury is a term used to denote ipsilateral femoral and tibial metaphyseal injuries. But recent literature has however expanded this term to include most ipsilateral fractures of the femur and tibia. They usually occur due to high energy trauma. These are always associated with high morbidity. There are no clear guidelines for the management, as per the available literature. The implant of choice needs to be determined depending on nature of fracture and soft tissue injuries. The incidence of floating knee injuries was reported as 2.6 % of all fractures by Letts et al[1]. These injuries were associated with life threatening injuries such as head injuries, chest injuries and abdominal injuries as shown by Veith [2]. There was extensive soft tissue damage of the limb as well. The soft tissue injuries

can also be variable from minor abrasions to grade III open injuries. Injuries to the neurovascular structures add a treacherous component to the whole picture. This often perplexes even the most experienced clinicians in the planning of management.

Material and Methods

A prospective study was conducted in Department of Orthopedics and Traumatology, Gandhi Medical College and Hamidia Hospital, Bhopalfrom Sept 2014-Sept 2016. Thirty non-consecutive patients with ipsilateral femur and tibia fractures who fulfilled the inclusion criteria were included in the study.

The patients were classified according to Blake and Mcbryde'sClassification for floating knee injuries [3].

Inclusion criteria:

1.Patients with age >15 and <70

2.Recent history of trauma (within 1 week)

Exclusion criteria:

1.Patients with age <15 and >70

2.Pathological fractures

3.Associated contralateral hip and ankle injuries.

All patients were managed in emergency department as per ATLS protocol. In Open fractures wound wash and irrigation was done with minimum of 5L of sterile normal saline. Broad spectrum antibiotics were given and prophylactic tetanus toxoid was given. Open fractures were classified according to Gustilo and Anderson classification [4].

Once the patient was stable the femur fracture was fixed prior to the tibia fracture. Thromboprophylaxis was initiated in all patients during the postoperative period. Physiotherapy was started as soon as the pain subsided. Non weight bearing walking using crutches was permitted after 2 weeks, followed by partial weight bearing. Full weight bearing was allowed only after clinical and radiological union had been confirmed.

Follow up was done at 4 weeks, 8 weeks, 6 months and 1 year to evaluate the functional outcome and the radiological signs of union.Functional assessment was measured using the Karlstrom's and Oleruedcriteria [5].

The statistical analysis was done using the chi square test and the P value.

Results

The age of the patients ranged from 15 years to 70 years. There were 29 males (96.66%)and 1 female(3.3%).

Right sided injury was more common - 18 (60%). Road traffic accident was the commonest cause – 30(100%). Open fractures were seen in 12 femurs (40%) and 18 tibias (60%).There were 6 femur intraarticular fractures(20%) and 11 tibia intraarticular fractures (36.66%). Comminuted fractures were present in 20 femur fractures(66.66%) and 24 tibia fractures(80%). Type I Blake and McBryde's floating knee injuries were the commonest 20 cases(66.66%). External fixators were applied to and 2 tibias(6.6%). Plating was done in 12 femurs(40%) and 12 tibias(40%). Antegrade intramedullary nailing was done in 16 femur fractures (53.33%).Retrograde intramedullary nailing was done in 2 femurs(6.6%). Tibial Nailing was done in 16 patients(53.33%). Infection was seen in 5 patients (33.33%) and Malunion in 3 patients(26.6%).

All the three patients with excellent outcome had tibial nailing done.Among the eight Poor outcome patients, six patients had comminuted fractures of the femur and tibia.Infection was the most dreaded complication in our study. There were 5

cases (16.6%) with infection, 2 of them underwent implant removal, 3 underwent wound debridement . Poor outcomes were seen in 3 patients with infection. The Initiation of knee mobilization ranged from one week to seventeen weeks with a mean of 5.17 weeks.The initiation of weight bearing range from 4 weeks to 25 weeks with the mean of 10.47 weeks.The overall Average knee range of motion was 5 to 1000. The average knee range of motion in Excellent outcome group of patients was 0 – 170^0. Good outcome group of patients had 0 – 160^0. Acceptable outcome group of patients had 0 - 140^0 and Poor outcome group of patients had 15 – 60^0.

Discussion

Floating knee injury occur due to high velocity trauma. There is an increase in the occurrence of floating knee injuries due to the increase in number of road traffic accidents. Most of these injures results in permanent disability if not treated appropriately.In our study the most common mechanism of injury was road traffic accidents (100%).The more number of road traffic accident cases were due to the fact that our hospital is a tertiary referral centre. Hayes JTsuggested that automobile passengers with floating knee injury braced their feet firmly against the sloping floor of the front seat just prior to the collision , their legs getting crumpled under the massive decelerating forces produced by the impact [6]. In a study of 222 cases in 1978 , of floating knee by Fraserall cases were involved in road traffic accidents [7]. In the present study also, road traffic accidents was the cause in all 30 patients (100%). Adamson et al in their study encountered 71% major associated injuries with 21% vascular injuries [8]. Hee et al described similar results in their study [9]. In this study right sided injuries (60%) were more common than left sided injuries (30%). Among the femur fractures 18 (60%) were closed, open grade II were 2 (6.6%), open grade III A were 5 (16.6%) and grade III B were 5 (16.6%). Among the tibia fractures, closed were 12 (40%), open grade II were 5(16.6%), open grade IIA were 3 (10%), open grade III B were 8 (26.6%) and grade IIIC were 2 (6.6%). Hee et al had described that comminuted and segmental fractures were poor predictors of the functional outcome [9]. Fraser found that poor functional outcome was seen in intraarticular fractures [7]. Similar results were shown by Bansal et al [10]. In our study, 17 (28.3%) cases had intraarticular fractures and 13 cases had extrarticular fractures.Blake and McBryde [3] were one of the pioneers to classify floating knee injuries. After an extensive study, they had classified floating knee injuries as Type I fractures involving both shafts, Type II A- fractures involving the knee joint, Type IIB- fractures involving the hip or ankle joints. In this study we had 20 (66.66%) of type-I, 10 (33.33%) of type-IIA and none (0%) cases were type-IIB injuries as per Blake and McBryde.

There are only few studies in literature which shows specific treatment for floating knee injuries. Initially non operative management was described by Ul-Haque et al in 1983 [11]. In 1984 Katada et al described that both femoral and tibial fractures, must be fixed rigidly [12].. In 1986 Letts et al 1described that at least one fracture should be rigidly fixed either internally or externally, usually the femur. Femoral fixation and non operative management for associated ipsilateral tibial fractures by plaster of paris was described by Bansal et al 10 in 1984. Flexible intramedullary nails were described by Behr et al in 1987 [13]. Soft tissue sparing surgery like percutaneous plating was described by Lobenhoffer 1996 [14]. Single incision nailing for both tibia and femur was described by Rethnam et al in 2006 [15]. Dwyeret al 2005 described that the

preferred method of fixation in both femoral and tibial diaphyseal fracture was intramedullary nailing [16]. In study done by Gregory et al in 1996, he described retrograde nailing of the femur and undreamed nailing for the tibia [17]. In our study, all fractures were fixed rigidly Retrograde intramedullary nailing was done in 2 (6.6%) antegrade nailing in 16 cases and plating in 12 cases of femur fractures. Among the tibial fracture 2 (6.6%) were fixed with External fixators out of which both had poor outcome. 12 patients were treated with plating and they had good outcome. 16 patients were treated with intramedullary nailing and out of which 9 patients had either excellent or good outcome.

Infection was the most common complication seen in 33% patients .The complications were found to be more in open fractures. Scheidts et al conducted similar study for malunion [18].

Knee mobilisation was started depending upon the type of fractures and the implant used. Knee mobilization period ranged from 1 week to 17 week. Weight bearing depended upon the type of fracture, implant used and associated other injuries. Full weight bearing was done after complete bony union. The knee range of motion was an important criterion for the functional outcome [19]. In our study,the maximum range recorded was $0\text{-}170^0$. The minimum range recorded was $20 – 80^0$.

Name ofStudy	n	Excellent	Good	Acceptable	Poor
Fraser et al1978	63	3	15	30	15
Schiedts etal 1994	18	4	7	-	7
Hee et al2001	89	6	53	25	4
AnoopKumar et al2006	42	7	14	14	7
UlfinRethnam etal 2007	29	15	9	2	3
THISSTUDY2016	30	3	9	10	8

Table 1: Comparison of functional outcome of this study with other studies

Conclusion

Floating knee injuries are due to high velocity trauma. Poor outcomes were seen in open fractures, comminution and intraarticular extension. Excellentoutcome wasseen in Blake And Mcbrydes type I fractures and whereboth femur and tibia fractures were either close or transverse or both.Intramedullary nailing of both femur and tibia gave excellent outcome. As per the site of fracture,diaphyseal fractures or fractures at the diaphyseal metaphyseal junction had excellent outcomes.Performing early operative intervention gave good outcomes in this study.Further studies are needed in future to strengthen this conclusion.

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Original Article

Demographic Characteristics of Congenital Talipes Equinovarus in Bundelkhand Area of Madhyapradesh

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Abstract

Background: Most author reported the prevalence of congenital anomalies in patients with CTEV from 10 to 40%, depending on the population and method of study. The aim of our study was to determine demographic characteristic of CTEV in Bundelkhand area of Madhya pradesh. The second purpose of this study was to determine whether the Ponseti method can correct non-idiopathic CTEV with low recurrence risk, with Null hypothesis stating there was no difference between the two groups treated by Ponseti method.

Material& Methods: One hundred eight patients with one hundred and fifty-seven feet who had been treated with Ponseti's method of casting at our institution between November 2012 to March 2016 were enrolled in this study. All the relevant data was collected that includes patient's clinical profile including precast and post cast Pirani`s score, post treatment complications.

Results: Out of total of 159 feet in 108 patients (44 females, 64 males), 131 feet were idiopathic in 91 (84%) patients, whereas 28 feet were non-idiopathic in 17 (16%) patients. Idiopathic variety had 7.6% recurrence whereas non-idiopathic variety had 28.5% recurrence. On applying Chi-Square Test we concluded that null hypothesis is wrong and non-idiopathic CTEV has more recurrence rate compared to idiopathic variety.

Conclusions: In our study majority of patients with CTEV (84%) are idiopathic, 16% were non-idiopathic. We found that Ponseti method is an excellent method of correction for idiopathic clubfeet in infants. We demonstrated here that non-idiopathic CTEV can be treated with the Ponseti method with higher recurrence rates as compared to non-idiopathic variety.

Key-words: CTEV, Non idiopathic CTEV, Ponseti method of Casting

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Introduction

Congenital Talipes Equino Varus (CTEV), more commonly known as clubfoot, with estimated incidence 1-2 per 1000 live births is most common congenital anomaly of the musculoskeletal system. The CTEV can be easily recognized at birth and can present

in two forms. Idiopathic CTEV and Non-idiopathic CTEV in which other malformations are present such as arthrogryposis, spina bifida, congenital dislocation of the hip, spinal muscular atrophy, ray anomalies of the foot, sacral agenesis, the absence of some tarsal bones, or joint laxity, tibial torsion. Various theories have been proposed including effect of the position in utero, anatomical, viral infections, vascular, environmental, genetic factors, following a compartment syndrome etc. History includes birth order, maternal age, history of amniocentesis, TORCH infection, maternal thyroid anomalies, normal and caeserian deliveries etc. Examination includes look for number of fingers status, of other limb anomalies (e.g. club hand, transverse or longitudinal limb defect, syndactyly etc.), stiffness of joint movements and exclude cerebral palsy.

In various studies the prevalence of associated congenital anomalies in patients with CTEV varied from 10 to 40%, depending on the population and method of study.[1,2] The aim of our study was to determine demographic characteristic of CTEV with respect to gender, laterality, presence of other congenital anomalies and maternal obstetric history in central rural India (Bundelkhand area of Madhyapradesh Distt Sagar). The second purpose of this study was to determine whether the Ponseti method can correct non-idiopathic CTEV with low recurrence risk, similar to idiopathic CTEV with Null hypothesis stating there was no difference between the two groups treated by Ponseti method.

Material and Methods

This study was prospective study done at tertiary centre, Department of Orthopaedics Bundelkhand Medical College & Associated Hospitals, Sagar from November 2012 to March 2016. All the patients of CTEV presenting at the Outpatient department were registered. All parents were informed and counselled about the CTEV cast procedure. Each CTEV patients was seen by a single paediatrician to detect congenital anomaly or associated syndrome. Proper history and thoroughly examination for other anomalies were carried out. There name, age, sex, father and mother name, residential address and contact number, maternal antenatal history, birth weight, order, mode of delivery and significant birth events were also recorded. We looked for laterality, arthrogryposis, neural tube defects, constriction bands of limbs, urogenital anomalies, cleft lip, cleft palate, developmental dysplasia of hip, knee subluxation and dislocation etc.

All the relevant data was collected that includes precast and post cast Pirani`s score, post treatment complications like skin abrasions, pressure sore, recurrence, relapse or any other complication [3]. All patients were carefully examined, evaluated and serial casting by Ponseti Technique was started as soon as skin condition allowed. Meanwhile parents were taught the manipulation during breastfeeding at home.

Following correction of forefoot and midfoot correction of equines was done, percutaneous Achilles tendon tenotomy was done followed by above knee corrective cast applied for 3 weeks. Final cast was applied in 70^0 of abduction and $20^0$of dorsiflexion, care must be taken to apply pressure at mid foot and not on fore foot otherwise foot may develop rocker bottom foot. After cast removal Foot Abduction Orthosis was wore 23 hours per day until child do not starts walking than day time CTEV shoes was applied and night time Denis Browne splint. The splint maintains the external rotation in 70^0 and 40^0 in unaffected foot, splint not only maintains the correction but every time child kick his leg it produces further valgus. All children were advice for monthly follow up. Assessment of deformity in our study

done by Pirani scoring at the mean follow up of 11 months (5 month to 30 month)[3,4]. These results were evaluated for correction of deformity, the number of casts required, the need for a percutaneous tenotomy of Achilles tendon, relapse of the deformity and possible further surgery and available literature.

Results

The number of patients with CTEV registered

in this study were 120 , out of which twelve patients were lost to follow up, so sample size was 108.

Patterns of Clubfeet deformity: Out of total 108 patients, 64 (59.2%) patients were male and 44 (40.8%) were female (Male Female ratio= 1.4: 1). 51 (47.2 %) out of the total 108 patients, had bilateral clubfeet.

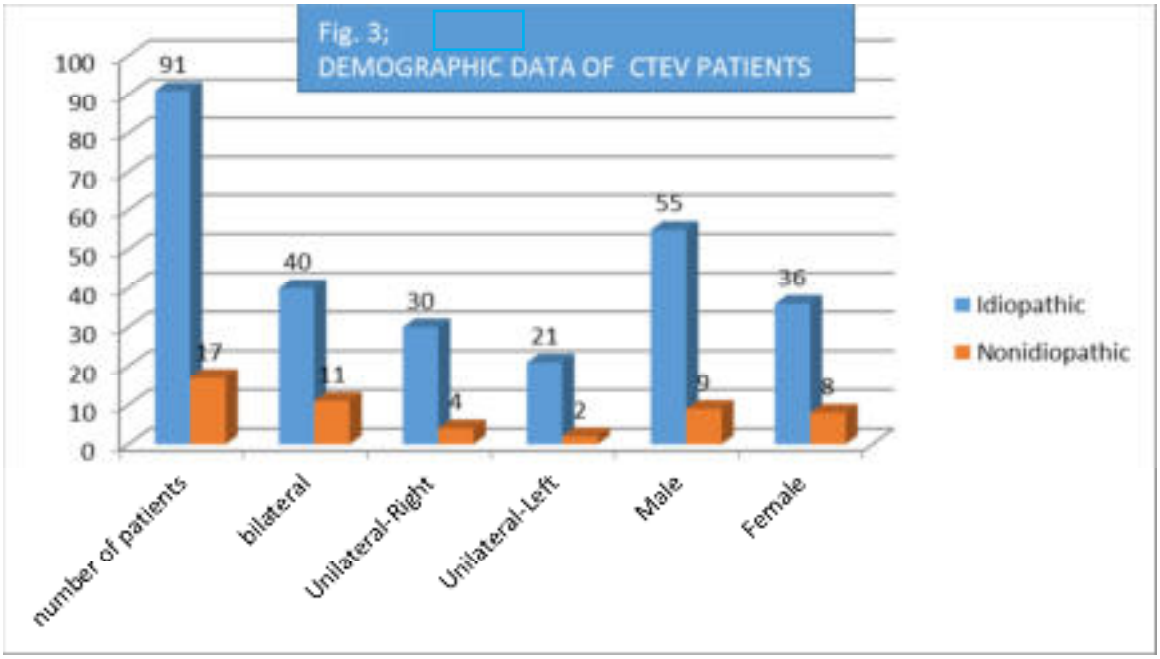

Figure 1: Bar diagram showing demographic data of CTEV patients

Associated Congenital anomaly :91 (84%) patients had primary idiopathic clubfoot (131 feet), whereas remaining 17 (16%) patients had clubfoot deformity associated with other congenital anomalies (28 feet). Neural tube defects and Arthrogryposis Multiplex Congenita were the commonest anomalies associated with clubfeet as shown in pie diagram.

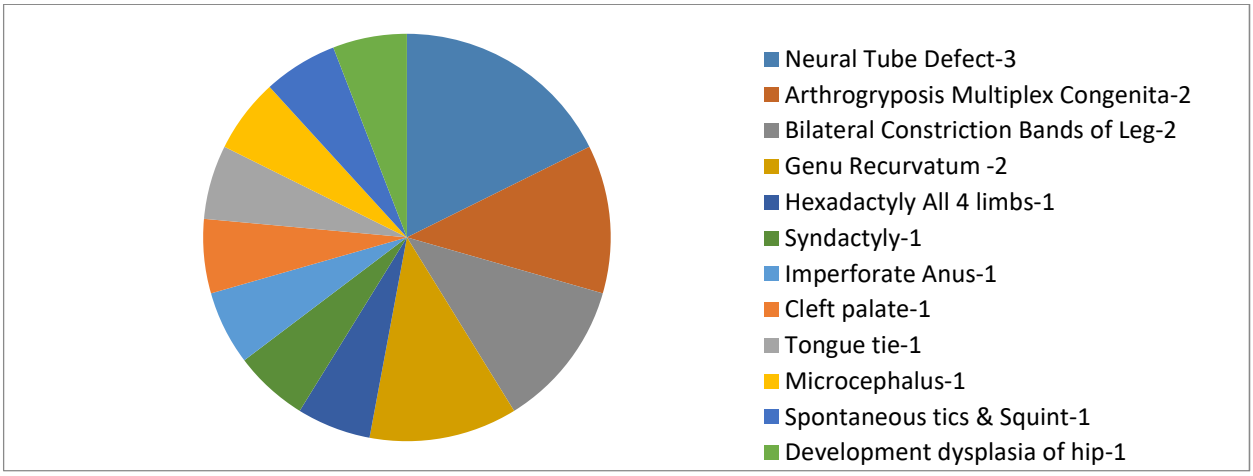

Figure 2: Pie diagram showing associated congenital anomalies in CTEV patients

Gestation Period: 5 out of 108 patients with clubfeet were preterm, out of which 4 had idiopathic clubfeet and one had clubfeet associated with imperforate anus. 101 children with clubfeet were born at term, whereas two patient was post-term and associated with genu recurvatum and microcephalus.

In our study, no mother had history of alcohol consumption or cigarette smoking. Age of presentation was 01 day to 210days with mean age 62.06 days.

Treatment was started at a mean age of 87.5days with range from 14days to 168days.

Out of the 159 feet in 108 patients, 141 (88.6%) feet were corrected whereas eighteen feet have recurrence of CTEV. Idiopathic variety had 7.6% recurrence (10 out of 131) while non-idiopathic variety had 28.5% recurrence (8 out of 28). 8 feet (in 5 patients) required soft tissue procedure. Those who required, soft tissue procedure 6 were non-idiopathic and 2 were idiopathic.

	Idiopathic	Nonidiopathic	Overall (Idiopathic+Nonidiopathic)	Chi-Square Test($\chi 2$)
Corrected feet	121/131 (92.3%)	20/28 (71.4%)	141/157 (89.8%)	9.99
Recurrence	10/131 (7.7%)	8/28 (28.6%)	18/157 (10.2%)	

Table 1: Showing results of Ponseti Casting

On applying Chi-Square Test X2 value came out to be 9.99 and degree of freedom was 1.[5] On referring to X2 table, with 1 degree of freedom the value of probability (P-value) of 0.05 is 3.84. since the observed value (9.99) is much higher we conclude that null hypothesis is wrong and nonidiopathic CTEV has more recurrence rates as compared to idiopathic variety. In 141 corrected feet, total 988 cast were applied mean 7.83. Tenotomy was performed on 35 feet (23.6%). Mean Pirani score at presentation was 4.8 SD ± 0.4 mean mid foot score was 2.2 SD ± 0.2 and mean hind foot score was 2.6 SD ± 0.4. After treatment the mean Pirani score was 0.5. There was only a few complications 03 patients develop plaster sore and 01 has develop post tenotomy transient discolouration which resolved and 02 patient develop tight cast treated with removal of cast.

Discussion

The current study is based on patients treated in an orthopaedic tertiary referral centre and found 16% to have known etiologies of their CTEV. While other studies had reported up to 24% of associated abnormalities.[1,2,4,7] A difference in the prevalence of associated abnormalities is probably because of the higher rates of poor pregnancy outcomes, neonatal death, stillbirth, termination of pregnancy. The most common congenital anomaly associated with CTEV deformity includes neural tube defects and arthrogryposis, Probably because disorders specifically involving the neuromuscular system represent a final common pathway for disruption anywhere along the unit (brain, spinal cord, nerve, or muscle)[6]. In our study male: female ratio is 1.4:1 whereas Charles reported 3.17:1 , Bhaskar 3:1 and SJ Laaveg and Ponseti reported 2.18:1[8,9,10]. The difference may

be because of poor educational background of parents so more affection towards male child that brings male child earlier to clinics for seeking treatment. We had 47.2% bilateral cases and 52.8 % unilateral cases similar to SJ Laaveg and Ponseti 49 % bilateral and 51 % unilateral cases[10].

Ponseti's technique of serial manipulation and casting came into being as an effort to achieve a plantigrade and functional foot without the need of a major surgical intervention. Though the treatment by cast is an old method, Ponseti's technique is a standardized method supported very well by anatomic principles. Ponseti said that open surgery could be avoided in 89% of cases by his technique of manipulation, casting and tenotomy [11].Complications of open surgery included wound infection, overcorrection and relapse to neurovascular compromise resulting in amputation and long term complication like weakness, stiffness leading to early arthritis. Ponseti and Smoley advocated that sectioning the heel cord after correction of other components allows the shorten heel cord to lengthen. [11]

In our study 988 cast were applied on 141 corrected feet with mean cast was 7.83, whereas P. J. Dyer et al reported mean cast 5.31, and Changulani et al reported mean cast 06, in our study most of the patient had late presentation attributing to increased number of casts [4,14].

In our study we found 88.6% correction rate R.A. Agrawal reported 96%, and Bhaskar 80% correction rate. While percutaneous tenotomy of tendo achillis done in 35 feet in 141 corrected feet Changulani et al performed tenotomy in 85 feet in 100 feet and R. A Agrawal performed in 58 of 60 feet. [9,12,13]

Maintenance of deformity is challenging and important because ill-fitting splint and noncompliance to splint is the major cause for recurrence. In our study eighteen feet had recurrence of CTEV because of non compliance to splint. Those who requires, soft tissue procedure six out of twenty-eight feet (17.8%) were nonidiopathic type (one unilateral and two bilateral) because the feet were stiff and contracted. In idiopathic CTEV two out of hundred and thirty one feet (1.5%) requires soft tissue release. Chi-Square test value comes out to be 9.99 which is quiet significant. Suggesting nonidiopathic CTEV frequently requires soft tissue surgeries for correction as compared to idiopathic variety.

Conclusion

In our study majority of patients with CTEV (84%) are idiopathic, 16% were non-idiopathic. We found that Ponseti method is an excellent method of correction for idiopathic clubfeet in infants. We demonstrated here that non-idiopathic CTEV can be treated with the Ponseti method with higher recurrence rates as compared to non-idiopathic variety.

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Original Article

Comparison of Outcome of Comminuted Fractures of Shaft Humerus Treated with Interlock Nailing and Anterior Bridge Plating

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Abstract

Background: Humeral shaft fractures are uncommon injuries constituting about 3-6 % of all fractures and are most commonly caused by high energy trauma and usually occurs in middle third of the shaft. Operative treatment for fracture of shaft humerus has always been controversial and subject of debate among the orthopaedic surgeon particularly after bridge plating was introduced few years back. [1,2]

Objectives: In this study, we have compared the two system of surgical treatment i.e. Interlocking nail and bridge plating by minimal invasive percutaneous plate osteosynthesis. MIPPO both in terms of intra-operative and post-operative outcome.

Methods: This was randomized control trial study. All patients with comminuted fractures of shaft of humerus that met the criteria for operative interventions presenting to the Department of Orthopaedics, SAIMS in the study period and giving informed consent were included in the study. Sample size was taken 15 patients in each group.

Results: The usual mode of injury in both the groups was fall or assault and road traffic accident. The operating time, Hospital stay, dosage of antibiotic, Early mobilization, Amount of blood loss, Time taken in the procedure for both the groups were comparable with no significant difference. ASES shoulder scoring was similar in both the groups at final follow up.

Keywords: ILN- interlocking nail, anterior bridge plating, MIPPO

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Introduction

Fractures of the shaft of humerus have been treated conservatively since ages.

Sarmiento et al[3] since 1977 have published good results with functional cast bracing for fractures shaft humerus with residual angular deformities usually functionally and aesthetically acceptable.However conservative treatment cannot be recommended in every case.

Chapman et al [4] in their study to compare the clinical and radiographic results for locked intramedullary nail and plate reported follow-up of average thirteen months. 42 fractures (93 percent) in the Plate group were healed by 16 weeks versus 33 fractures (87 percent) in the nail group (p = 0.70). Shoulder pain and a decrement in

shoulder range of motion were significant associations with nail (p = 0.007 for both variables) but not with Plate. A decrement in elbow Range of motion was significantly associated with Plate (p = 0.03), especially for fractures of the distal third of the diaphysis (p = 0.123)[4].

In 1996 , the concept of MIPPO was introduced by Krettek and Tscherne[5] for fractures of distal femur.

Bridge plating is used to stabilize comminuteddiaphyseal fracture of long bones by an elastic construct, without an attempt to anatomically reduce the comminuted fragments,with an aim only to restore length , alignment and rotation of distal fragment in relation to proximal fragment. The elasticity of the construct allows fracture healing by callus formation,unlike rigid compression plating.A long elastic plate is able to withstand bending stresses better, as load is distributed over a longer area , so that load per unit area is less and chances of implant failure reduces considerably.

In 2005 Apivatthakakul T et al[6] explored the possibility of anterior bridge plating for shaft of humerus fractures in a cadaveric study.Since then several papers on anterior bridge plating for fractures shaft of humerus have been published in literature.

Yu, Liu et al[7] in their meta-analysis compared Bridge plating using MIPPO with conventional plate osteosynthesis, found that radial nerve injury which is as common as 6.5 % in conventional plate osteosynthesis was very rare in Bridge plating. The incidence of non-union and delayed union was also less in bridge plating.

Singisetti et al[8] compared nailing with conventional plate osteosynthesis and found no difference in outcome. There are several other studies comparing interlock nailing with conventional plate osteosynthesis but very few with Bridge plating.

KejianLian et al[9]in their study in 2013 had compared MIPPO with interlock nailing of shaft humerus fractures and found the outcome comparable in two groups.

Changulani et.al [10]in their study compared the results of the humerus intramedullary nail and dynamic compression plate in 47 patients. This study proves that nail can be considered a better surgical option for the management of diaphyseal fractures of the humerus.

Early restoration of joint motion to normal physiologic function and minimal morbidity is now regarded as ideal fracture treatment. Though plate fixation has given high rates of union, it requires extensive surgery, increase chances of infection or nerve damages. Conventional nail of Kuntscher, Rush Pins, and Enders nail have been used with varied results. These devices do not provide rotational stability; locked intramedullary nailing technically avoids these problems by transverse locking screws at each end, thus allowing early mobilization. Specially the shaft fractures with severe comminution and bone loss can be effectively treated by this method.

The treatment ofcomminuted humeral shaft fractures, the choice of bridge plating or Intramedullary nailing remains controversial.

Aims and Objective

To compare and analyse outcome of treatment of comminuteddiaphyseal fracture humerus by interlocking nail with bridge plating in terms of –Early mobilization, Range of Movement, Size of incision, Hospital stay, Number of antibiotic dosage, Blood loss, Fracture healing, Complications.

Material and Methods

The study was conducted in the Department of Orthopedics, Traumatology and

Reconstructive surgery Sri Aurobindo Medical College and Post Graduate Institute, Indore on total 30 patients, 15 for nail and 15 for bridge plate, from September 2012 to September 2014.

Inclusion criteria:

Age: >18 yrs, Both sex, Humeral shaft fractures treated within 1week by nailing or plating, Patients with grades 1 and 2 open fractures, Polytrauma, Unstable fractures

Exclusion criteria:

Epiphyseal plate open, Fracture line extending into the metaphysis, Patients with grade 3 compound fractures, Patients with pathological fractures, Patients with neglected fractures of the humerus.

The patients presenting to the hospital with humerus diaphyseal fracture and fulfilling inclusion criteria were randomised by computer generated table and treated surgically by bridge plating or interlocking nailing.

Only ante-grade nailing was done because of greater familiarity with the method among the

surgeons. From the second day, isometric exercises were carried out.

For bridge plating only anterior surface of humerus was used. In all cases minimally invasive approach was used. Reduction was achieved by manual traction.

Immediate active mobilization was done in all cases.

All patients were followed up in outpatient for Clinical and radiological assessment at 6weeks and at 3, 6 months.

The outcomes were assessed in terms of functional outcome, ability to return to previous jobs after 6 months, union time, union rate and the incidence of complications. Functional outcome was assessed using the American Shoulder and Elbow Surgeons Score.

Results

Blood loss during procedure:

BLOOD LOSS(ml)	0-50ml	50-100ml	100-150ml	150-200ml	200-250ml	250-300ml	TOTAL
NAILING	2 (6.67%)	4 (13.33%)	6 (20%)	3 (10%)	0 (0%)	0 (0%)	15 (50%)
PLATING	3 (10%)	6 (20%)	3 (10%)	2 (6.67%)	1 (3.34%)	0 (0%)	15 (50%)
TOTAL	5 (16.67%)	10 (33.34%)	9 (10%)	5 (16.67%)	1 (3.34%)	0 (0%)	30 (100%)

	Mean	SD
Nailing	108.34 ml	182.57
Plating	98.34 ml	222.11

Table 1: Table showing Blood loss in the plating and nailing group

Two-sample T for Blood loss in Nailvs Blood loss in Plate

P value = 0.8938 This difference is considerednot to be statistically significant.
t = 0.1347, df = 28

Duration of Procedure:

Duration	30mins -60 mins Number %	60 mins-90 mins Number %	90mins – 120mins Number %	120 mins - 150mins Number %	150 mins – 180 mins Number %	Total Number %
Nailing	2 6.67%	8 26.67%	3 10%	2 6.67%	0 0%	15 50%
Bridge Plating	0 0%	8 26.67%	5 16.67%	1 3.34%	1 3.34%	15 50%
Total	2 6.67%	16 53.34%	8 26.67%	3 10%	1 3.34%	30 100%

	Mean	**SD**
Nailing	85	100.995
Bridge Plating	95	100.995

Table 2: Table showing Duration of Surgery in the plating and nailing group

Two-sample T for Duration of procedure Nail vs Bridge Plate

P Value:0.7883. This difference is considered not to be statistically significant.
t = 0.2712 , df = 28

Number of dose of Antibiotic –

No of doses of antibiotics	4 doses %	5-8 doses %	8 -12 doses %	12-16 doses	Total

Nailing	4 13.34%	9 30%	1 3.34%	1 3.34%	15 50%
Bridge Plating	3 10%	9 30%	2 6.67%	1 3.34%	15 50%
Total	7 23.34%	18 60%	3 10%	2 6.67%	30 100%

	Mean	SD
Nailing	6.23	11.95
Bridge Plating	6.76	11.95

Table 3 : Table showing Antibiotic dose in the plating and nailing group

Two-sample T for No. of antibiotic doses Nail vs Bridge Plate

P Value : 0.9042 This difference is considered not to be statistically significant.
t = 0.1215 , df = 28

Number of days of hospital stay –

No of days of hospital stay	1-3 days %	4-6 days %	7-9 days	10-12 days	Total %
Nailing	4 13.33%	9 30%	2 6.67%	0 0%	15 50%
Bridge Plating	5 16.67%	7 23.34%	2 6.67%	1 3.34%	15 50%
Total	9 30%	16 53.34%	4 13.33%	1 3.34%	30 100%

	Mean	SD
Nailing	4.6	7.18
Bridge Plating	4.8	9.91

Table 4 : Table showing Hospital Stay in the plating and nailing group

Two-sample T for No. of days of hospital stay Nail vs Bridge Plate

P value : 0.9500 This difference is considered not to be statistically significant.
t = 0.0633, df = 28

ASES Scoring:

ASES Score	Excellent %	Good %	Fair %	Poor %	Total %
Nailing	12 (40%)	1 3.33%	1 3.33%	1 3.33%	15 50%
Bridge Plating	12 (40%)	2 6.67%	0 0%	1 3.33%	15 50%
Total	24 (80%)	3 10%	1 3.33%	2 6.67%	30 100%

Table 5 : Table showing ASES Scoring in the plating and nailing group

Chi square : 0.667., DF : 3, P value : 0.8809

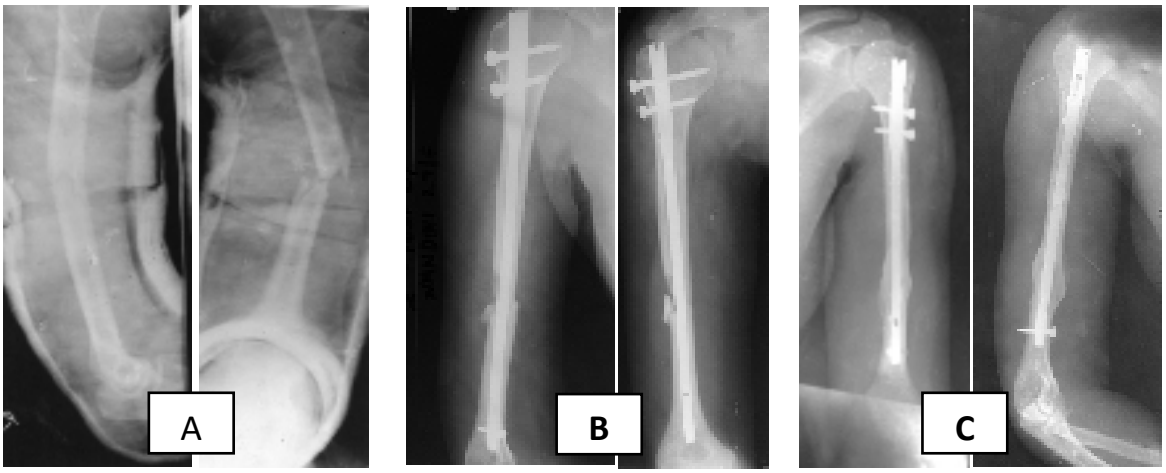

Figure 1 : 28 year old female fracture left humerus A-O type 12.B2 treated with Interlock nailing. (A) Pre-operative x-ray. (B) immediate post-operative x-ray. (C) 4 month post-operative x-ray.

Figure 2 : 28 year old female fracture left humerus A-O type 12.B2 treated with Interlock nailing. Functional Result at Final Follow up.

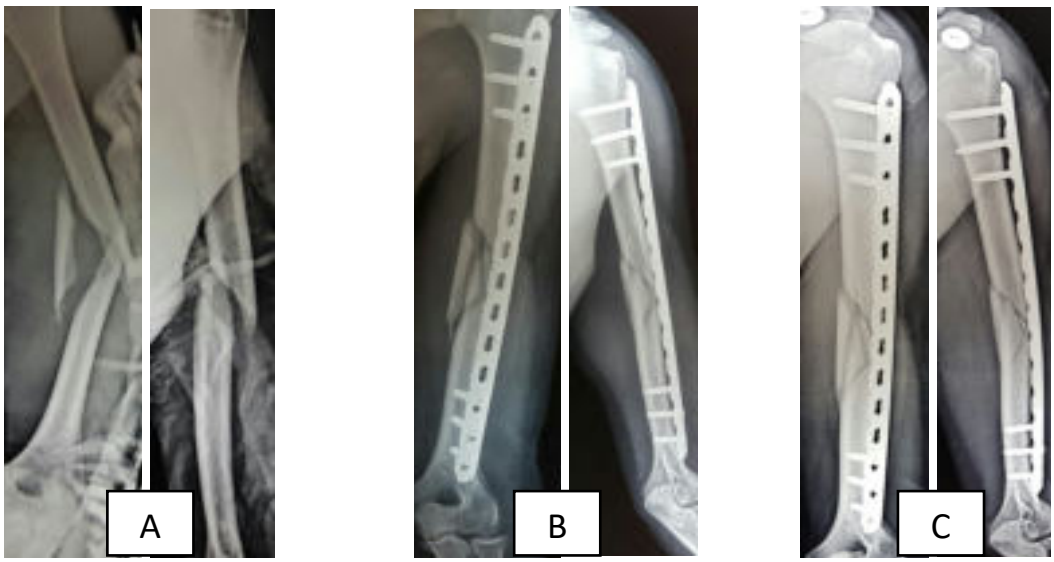

Figure 3:24 year male fracture left humerus A-O type 12 B.3 Bridge plating with Locking Compression plate. (A) Pre-operative x-ray. (B) immediate post-operative x-ray. (C) 3 month post-operative x-ray.

Discussion

The nailing and bridge plating groups were similar with respect to age, sex, dominant limb, injured limb, mode of injury, immediate treatment, injury surgery interval which indicated that the randomization had been effective. A total of 53% were male and 46.67% female in both nailing and plating group. In the study of Changulani M et al. [10] 86.9% were males and 13% females in nailing group, while in plating group 79.2% were males and 20.8% were females. The

mean age of the patients in our study 37.6 years in nailing and 42.73 years in plating group which compared to 39 years in nailing and 35 years for plating group in their study.In a study of Kejain Lain et

al.[9]comparing intramedullary nailing with bridge plating, he found that mean operating time was more in Intramedullary nailing (126 mins). In present study we found that mean operating time was almost equal for both the groups (nailing- 85 mins, bridge plating -95 mins). Similarly mean blood loss was statistically bit more in Nailing group as compared with bridge plating group in the study of kejain et.al.[9].It was 147ml in bridge plating and 195 ml in nailing group, while in our study blood loss difference between two groups was statistically in significant and was about 108 ml in nailing group and 98 ml in plating group. In our study ASES score in both groups was comparable, while in kejain et al.[9] study ASES score was better in plating group. In our study, one patient (22 years old) in bridge plating group had poor results in ASES score due implant failure. Which is comparable to the study done by Bell et.al and Dabezies E. J. et.al [11,12] in which they found 2-5% osteosynthesis failure rate in plating group. Bridge plating does not cause shoulder dysfunction which may occur in intramedullary nailing. In our study one patient from nailing group had shoulder dysfunction as revealed by poor score. Post-operative hospital stay are comparable in the study done by RaghvendraS et.al.[13].

Conclusion

In our study outcome of bridge plating and Interlock nailing for treatment of comminuted fracture shaft humerus was comparable with respect to time taken for surgery (p = 0.78), Amount of blood loss(p = 0.8938), duration of hospital stay(p = 0.95), antibiotic dosage(p = 0.904) and ASES Score. In none of the cases we encountered radial nerve palsy. In nailing group the poor result was due to shoulder stiffness while in bridge plating group poor result was due to implant failure.We found no significant difference in terms of radiological union time and functional outcome. Further study with large sample size is recommended to validate these results.

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Original Article

Management of Soft Tissue Complications Associated with Leg Bone Injuries by Local Muscle Pedicle Flap

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Abstract

Background: Subcutaneous nature of tibia and poor blood supply to leg bone area causes increased complications and poor wound healing which can be managed by applying principles of plastic surgery

Aims & objectives: To evaluate the use of gastrocnemius, soleus and sural flap by orthoapedic surgeon in management of complications of open leg bone fractures i.e. exposed implants, soft tissue defects.

Material & methods: We prospectively studied 20patients with soft tissue complications in patients having both bone leg fracture. Out of which12 patients were managed by gastrocnemius flap,5 patients by soleus flap & 3 patients were treated by sural flap according to the location of the wound. Patients with age between 18-60 years with no or minimal infection, size of wound <50cm^2 for middle leg and <9×12cm for lower leg were included in study. The mean follow up was of 6 months.

Results: Only two sural flap and one soleus flap had marginal necrosis. Hypoaesthesia over lateral border of foot was noted in two patients of sural flap which was not troublesome. Not any patient had developed significant functional loss. All flaps resulted in a good wound coverage with early healing.

Conclusions: Local muscle flap is efficient and easy method of treating wound defects over leg and allows an orthopaedician to manage the compound fractures comprehensively.

Keyword : compound fractures; gastrocnemius flap; Muscle pedicle flap; neurocutaneous flap.

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Introduction

High velocity trauma leads to open leg bone injuries and their operative complications i.e. exposed bone & implants and infection remain a challenge for orthopaedic surgeons from many years. The subcutaneous location of tibia, poor blood flow to the region are attributable factors for these complications. [1,2]. From management point of view these complications of soft tissue defects are managed by plastic surgeons, and the centers where these facilities are not available these patients are referred to the higher centers.

The goal in management of the open wounds is to provide stable soft tissue coverage. Soft tissue coverage with muscle

can seal the joint and bone from ongoing contamination and help to revascularize underlying structures. Muscle flaps are first introduced by Ger R.[3]. For leg bone important muscle flaps are medial and lateral head gastrocnemius flap for proximal tibia, patellar tendon & patella [4] ,soleus flap for closure of exposed middle third of leg bone [5], and reverse artery sural flap for exposed part of lower 1/3rd tibia [6].

The consistent vascular anatomy and superficial location of gastrocnemius muscle flap have made it a workhorse for coverage of defects around knee joint and in patellar region.

Soleus is a suitable muscle to repair soft tissue defects in the middle third of the leg due to its unique anatomic features.Its main advantage is its binary blood flow supply which allows us to cut it into two longitudinal parts [5] to be used as hemisoleus flap.

For the wounds over distal third of leg, free flap is the preferred choice but it has several major disadvantages [7] like it is a difficult long duration surgery and needs microsurgical instruments & expertise.

Reverse sural artery flaps for injuries of distal third of tibia provide good coverage both form functional and aesthetic point of view. It can be used in traumatic legs with major arteries defect [8].It provides durable skin coverage with ideal contouring with minimal postoperative discomfort and can be performed quickly.

By learning and using these techniques and procedures orthopaedic surgeons can also manage these complications successfully. Advantage of these local procedures are increased vascularity of the area and thus decreased infection [9], which promote early fracture healing [10] and it results in decrease morbidity of the patients, decrease referral and burden on health care facilities. With this background, we conducted a study with the aim to evaluate the outcome of local muscle pedicle flap surgeries done by an orthopaedician for management of compound leg bone fractures.

Material and Methods

We have prospectively studied 20 patients between the period of July 2013 and August 2015 admitted in orthopaedic department having Gustillo type 3 fracture leg bone or exposed implant in leg area.The male female ratio was 3:2. with an average age of 37 years. We had 12 patients with soft tissue defects or exposed implant in proximal leg/patellar region, 5 patients in middle leg and 3 patients in distal third leg / ankle. We treated them with gastrocnemius flap, soleus/reverse soleus flap and reverse sural artery flap for soft tissue defects in proximal, middle and lower third of leg/ankle respectively. All the patients of fracture leg bone were primarily operated with either external fixator or internal fixation methods. The mean interval between the flap surgery and pervious bony fixation surgery was 4.5 weeks.This delay in surgery was due to presence of infection, which was controlled by appropriate antibiotics and repeated debridements. The mean follow up was of 6 months after definitive surgery.

The inclusion criteria were-

A. Patients with age <60 years.

B. Patients having either exposed implant or bone in leg area, with no or minimal infection

C. Size of wound <50cm^2 for soleus and <9×12cm for sural flap.

The exclusion criteria were-

A. Patients >60 years.

B. Presence of active/florid infection.

C. Presence of peripheral vascular disease and insufficient peroneal,posterior tibial, sural arteries and lesser saphenous vein.

D. Compound leg bone fractures with damaged/crushed gastrocnemius or soleus muscle

E. History of recent deep vein thrombosis in the involved extremity.

Pre-operative planning-

After determining the size of recipient site defect,patients have been assessed for presence of infection,if it was present thorough debridement were done and a clean granulated wound bed had been achieved.A vascular examination for patency of popliteal,peroneal, posterior tibial artery and lesser saphenous vein was done.Status of donor site muscle(either traumatized or presence of hematoma),and the function of remaining muscles of lower leg(to determine if loss of gastrosoleus due to flap could result in significant loss of planter flexion) had also been assessed.

Surgical techniques-

Gastrocnemius , Soleus and Reverse Sural Artery flaps were done in the patients with defects in proximal middle and distal third leg respectively as per the standard operating technique.

Post Operative management-

To prevent pedicle compression and vascular congestion limb elevation and immobilization was done. The drain was removed once the drainage was <30ml/day. The dressing was changed after 5days and then compression bandages/elastic wraps were advised. Follow up was done (ranges from 1.5 to 9 months) to look for donor site morbidity (scar, contracture or functional limitation),condition of flap and associated complications. Mobilisation was started after 5 days. Range of motion for joints were assessed.The final results were assessed according to healing of wound and stability of the flap coverage.

Results

We operated 20 patients out of which 12 with gastrocnemius flap,5 patients with soleus and 3 with reverse sural artery flap.Results for gastrocnemius flap were excellent. Thegastrocnemius flap for proximal leg & patellar region were healed completely. Results for soleus flap were good. Two soleus flap develop partial necrosis and one reverse sural flap develop partial necrosis with infection.Some showed venous congestion which was managed by limb elevation. One of the soleus flap had ugly scar at donor site.The final outcome was unaffected in all of the cases.None of the patients with gastrocnemius& soleus flap had planter flexion weakness at final follow-up.Hypoesthesia over lateral border of foot was noted in all patients of sural flap but it was not troublesome.At the final follow-up range of motion at knee and ankle joints was marginally compromised. One of the patient had donor site scar contracture around knee joint.Patients with reverse sural flap had non-cosmetic bulbous shaped flap but it was acceptable to them and had no difficulty in wearing shoes.

Figure 1 : Intraoperative pictures of Gastrocnemius flap.

Figure 2 : Intraoperative pictures of Soleus flap.

Discussion

Comparing the vascularity and results of fasciocutaneous flaps with the muscle flaps there is more advanced healing of fractures and wounds by muscle flaps compared to fasciocutaneous flap despite the high vascularity density of the latter. [11]

Cross leg flaps may be an option to cover the soft tissue defects but patient compliance is poor and they may lead to joint stiffness and pressure sores.So we used ipsilateral pedicle flap.

Gastrocnemius flap is most commonly used for knee and upper tibial defects. We used medial head in most of the cases because of its long arc of rotation. The damage to common peroneal nerve may occur during elevation of lateral head, but it is preventable by carefuldissection. The territory of medial head extends to within 5cm of medial malleolus and for lateral head the distal limit is within 10 cm of lateral malleolus [12].

The soleus is a type 2 flap according to Mathes and Nahai [13]. It can be used in various ways i.e. proximally or distally based, hemisoleus flap or composite flap which are based on the vascular supply of the muscle [14] The hemisoleus flap is a better option for wound defects and exposed bone over middle leg [15]. Some studies [16]show high failure rates associated with soleus flap.The reason for this is because the distal end of soleus is muscular, not tendinous and it is friable and vulnerable to damage to its blood supply. By dissecting and freeing the first

perforator to increase its arc of rotation, the distal reach of this muscle can be enhanced [16] The elevation of soleus flap requires more time and microsurgical techniques.Despite these disadvantages soleus flap is the workhorse for middle third of leg.

Reverse sural artery flap was first described by Masquelet et al [17] as neurocutaneous island flap in 1992. It has numerous advantages, it is a one stage operation, which does not require microsurgical techniques. Elevation of the flap is easy and quick. The donor site has minimal morbidity as it can be closed primarily when small flap is raised and skin grafted when large flap is raised [18]. The vascular supply to the arterial network of the sural area is constant and reliable, and have been studied in details and there is no need to sacrifice any major artery and or sensory nerve [19].As the chances of survival of sural and soleus flaps dependsupon location and presence of patent perforators, so the preoperative colour Doppler evaluation of perforators may help in pre op planning.but it is not essential or recommended routinely.One of the few disadvantages of sural flap is hypoesthesia at lateral border of foot due to damage to sural nerve. Damage to Sural nerve may also occur during gastrosoleus flap,but with careful dissection it can be avoided.In our

study, none of the patients of gastrosoleus flap had this complication.Injury to sural nerve may lead to painful neuroma formation which may be prevented by deep burial of nerve ends.All these flaps take minimum of 2 weeks for being taken up, requiring immobilization, but it may lead to stiffness of knee or ankle joint.To prevent this we started mobilization of the joints after one week,depending on the fracture union.

The cosmetic results of flaps remain a problem. In gastrosoleus flap long ugly posterior scar may form which may result in contracture formation.Sural artery flap usually gives a bulbous appearance, but these do not affect the final functional outcome.There occurs minimal functional limitation of donor site muscle after flap surgeries.Normal walking is unaffected, however functionally more demanding activities like walking uphill and running are affected [20].The major limitation of this study is small sample size. Considering the complications Neale et al [21] have reviewed the complications of muscle flap transposition for traumatic leg defects and concluded that the causes of complications were mainly technical errors, inadequate debridement, use of diseased and traumatized muscle and unrealistic objectives.

Conclusion

The complex open injuries of leg can be successfully managed by proper evaluation, adequate debridement, use of appropriate muscle flap resulting in early good wound healing, creating environment for faster fracture healing with good functional outcome.

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Original Article

Use of Double Bone Graft to Stabilize Prosthesis in Uncemented Partial Hip Replacement in Elderly Patients with Fracture Neck of Femur

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Abstract

Background: Partial hip replacement (cemented or uncemented) is the frequently done surgery in elderly patients with fracture neck of femur. Problems with cementing techniques are reported like increased infection rate and cardiac problems particularly in elderly patients with compromised cardiopulmonary reserve. Austin Moore prosthesis has its own complication like femoral loosening and frequent revision.

Material& Methods: We analysed results of 30 patients of fracture neck femur with Dorr type A and B proximal femoral morphology, treated by uncemented partial hip replacement (20 patients with Austin Moore prosthesis,10 patients with bipolar prosthesis) in elderly age group (range 60 to 75 years) where double bone graft were used for additional stabilization of the stem of prosthesis in femoral canal which included transverse peg grafts in fenestrations and conical graft over the tip of the stem of prosthesis to centralise the stem.

Results: The mean follow up was 9.3 years (range from 2 to 15 years). According to Harris Hip score, final outcome was excellent in 21 hips, good in 7 hips and poor in 2 hips.Prosthesis subsidence was found in uncemented partial hip replacement with mean of 2.5 mm (range from 0 mm to 3.5 mm) which was well tolerated due to bone plugs formed around the tip and fenestrations of prosthesis except in one patient who had complained of thigh pain which required revision with cemented modular prosthesis subsequently. Groin pain was reported in another one patient due to acetabular erosion which required cemented total hip replacement subsequently. There was no incidence of hip dislocation.

Conclusions: Our study shows that in addition to the transverse bar by fenestration grafts, bone block formed around the tip of the stem by conical graft provided strong pillar support and once it is integrated, it prevents excessive subsidence of the prosthesis with excellent result.

Key-words: Uncemented Bipolar prosthesis, uncemented Austin Moore Prosthesis, Double Bone graft.

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Introduction

Femoral neck fracture is the common hip fracture in elderly age group of patients. Prosthetic replacement can be partial or total depending upon the case [1].

Uncemented Partial hip replacement with unipolar Austin Moore Prosthesis is the treatment of choice in elderly patients with limited mobility but it is controversial in otherwise healthy patients of 60 years or older. For them reduction and internal fixation, cemented or uncemented bipolar partial hip replacement and total hip replacement are usually recommended.There is evidence in the literature supporting better functional outcome and less need for re-operation with hip arthroplasty compared to internal fixation in the treatment of displaced femoral neck fractures in the elderly. [2,3,4]

Austin Moore prosthesis is still commonly done in developing countries in elderly patients with low functional demand and poor candidate for revision surgery [5], having no failure history of about 20 years in few case reports. The responsible factor attributed for early failure is the technical error in implantation of the prosthesis [6]. Few studies suggest high incidence of femoral loosening and acetabular erosion with unipolar prosthesis. [7] Although Cemented prosthesis are claimed to avoid thigh pain but it has its own complication like transient hypotension, increasedinfection and cardiac problems particularly in patients with compromised cardiopulmonary reserve. [8, 9, 10]

In view of complication of cementing with cemented prosthesis and femoral loosening with unipolar (Austin Moore) prosthesis we have used double bone graft to fix the stem of prosthesis transversely by fenestration peg grafts and prepared conical graft at the tip of stem vertically to stabilise the prosthesis.

Material and Method

A total of 40 patients of the fracture neck of femur were operated by a senior orthopaedic surgeon in elderly age group (range 60 to 75 years), with uncemented bipolaror uncemented unipolar (Austin Moore) prosthesis. 30 patients met the required criteria for the study.10 patients were lost in the follow-up. Among 30 patients, 20 patients, comparatively older with less functional demand were treated with Austin Moore prosthesis and rest 10 patients, comparatively younger with community ambulatory activity with uncemented bipolar prosthesis. We included patients with Dorr type A and B proximal femoral morphology. We excluded patients with wide femoral canal (Dorr Type C femur) and also those patients having intra-operatively loose fitting of the stem that was felt during rasping of the proximal femur. Patients with loose fitting stem were excluded from the study and their surgery was completed with cemented prosthesis.

In our study, each patient was operated in lateral decubitus position with affected hip above and about 8 to 10 cm incision was taken with Moore approach. Skin, subcutaneous tissue and fascia were cut in the line of the incision. Gluteus maximus muscle fibres were split from anterior to posterior direction and retracted with hand held retractors. External rotators were cut in the single line of incision and secured.Capsule was cut in T shape manner, then head was extracted out and size of the prosthesis was measured.Bone graft was taken from the removed head of the femur, Conical graft was prepared with the help of femoral head extractor and its size was measured with K nail gauge. Fenestrations of the prosthesis were packed with bone graft and conical graft was fixed to the tip of the stem. Neck was prepared and rasping of the proximal femur up to two third of the length of stem was done with keeping proper ante version and lateralisation in mind. If the femoral canal was found press-fit for the stem, the prepared stem was implanted. If the femoral canal was felt wide for the stem, the patient was excluded from

the study and cemented prosthesis was. The capsule and external rotators were repaired. Wound was closed in layers. Patients were mobilised to partial weight-bearing for six weeks and then allowed full weight-bearing without support. Active hip abduction exercises and quadriceps exercise were initiated postoperatively. Follow up was done at 6 weeks, 3 month, 6 month and then once a year for clinical and radiological evaluation. Among clinical criteria absence of pain and limp and ability to do daily living activities independently were assessed. Among radiological criteria sign of acetabular erosion and femoral stem subsidence (distance from the calcar to the prosthesis tip) were assessed.

Result

The mean follow up was 9.3 years (range from 2 to 15 years). There were excellent clinical and radiological results in all patients except in three patients. According to Harris Hip score, final outcome was excellent in 21 hips, good in 7 hips and poor in 2 hips. Prosthesis subsidence was found in uncemented partial hip replacement with mean of 2.5 mm (range from 0 mm to 3.5 mm) which was well tolerated due to bone plug formed around the tip of the stem and in the fenestrations of prosthesis except in one patient who had complaints of thigh pain due to femoral loosening which required revision with cemented modular bipolar prosthesis subsequently. Groin pain was reported in another one patient due to acetabular erosion which required cemented total hip replacement subsequently. There was no incidence of hip dislocation.

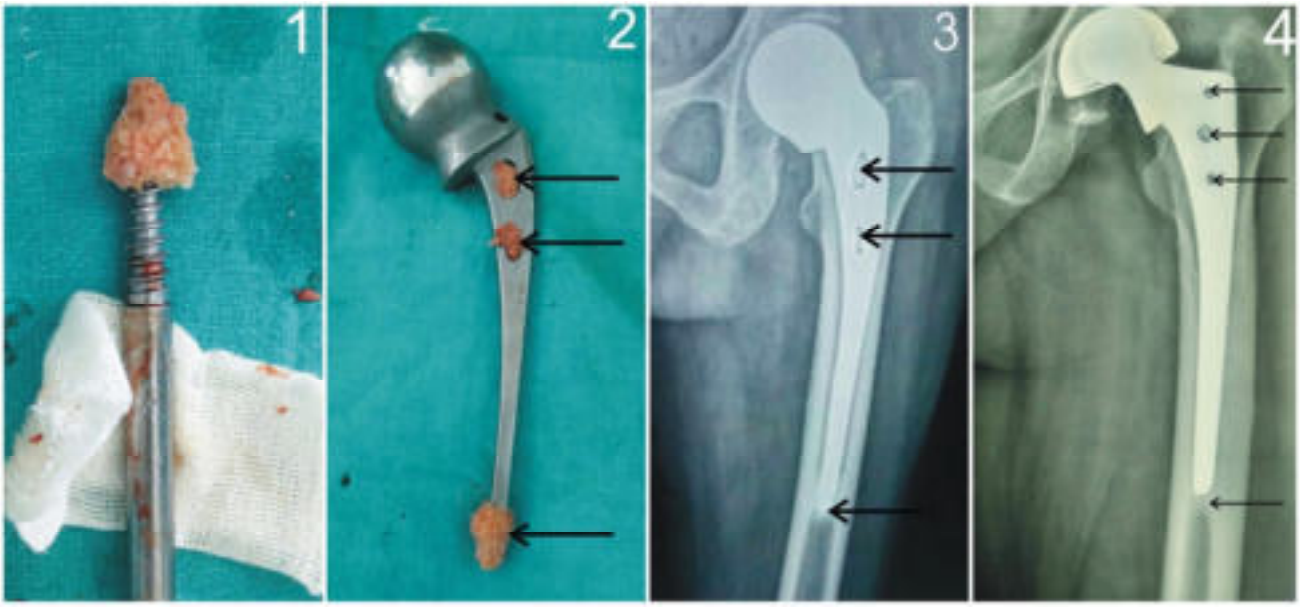

Figure 1 -Preparation of conical graft with the help of femoral head extractor

Figure 2 -Austin Moore prosthesis with fenestrations peg grafts and conical tip graft

Figure 3- Arrows show the bone plug formed in fenestrations and around the tip of stem of Austin Moore Prosthesis in a patient with 10 year follow up

Figure 4 -Arrows show the bone plug formed in fenestrations and around tip of stem of bipolar prosthesis in a patient with 10 years follow-up

Discussion

Primary partial prosthetic replacement for recent fracture neck of femur is recommended in elderly ambulatory patients because of complications associated with

internal fixation like nonunion and osteonecrosis. [11, 12]

During procedure adequacy of calcar seating, residual femoral neck length and metaphyseal fill were kept in mind and errors in sizing the prosthesis were also avoided to prevent prosthesis failure. More than 12 mm length of the neck remnant, measured from the superior margin of the lesser trochanter to the resection margin at the calcar of femur ; Less than 1 mm for Calcar seating, measured from the medial prosthetic collar to calcar and the relative metaphyseal fill greater than 70% of the stem of prosthesis in the medullary canal of femur at the level of tip of lesser trochanter on anteroposterior radiograph are considered adequate. Equal prosthetic head size measured from femoral head gauge is considered satisfactory [13]

Dorr's classification [14] was used to assess anatomy of proximal femur with three types: - Type A - Good cortical bone stock with narrow medullary canal. We did rasping and sometimes reaming also.

Type B - Relatively good cortical support with wide medullary canal with no change of morphology. We prepared ourself for Bone graft impaction for such case and kept bone cement standby for those patients where stem fitting was felt loose. Once we did cementing, we excluded the case from our study.

Type C- Loss of much medial and posterior cortex with very wide medullary canal. We excluded these cases from beginning and did cemented prosthesis.

Hudson et al. noted significantly higher mortality rate with internal fixation than partial hip replacement in their study of 367 femoral neck fracture in patients with 65 to 80 years of age group, although revision rate in both method of treatment was similar. They also noted similar complications and revision rates in unipolar and bipolar prosthesis. [15]

Lu-Yao et al found 20% to 36% re-operation rate within 2 years after internal fixation and 6% to 18% re-operation rate in partial hip replacement group in their meta-analysis of 106 reports of displaced femoral neck fractures.[16] Bhandari et al in his meta-analysis in 1162 patients reported significantly less revision rate with patients with arthroplasty than patients with internal fixation group, although in arthroplasty group blood loss, infection rate , operative time and mortality were higher. [17] Rogmark et al. reported reported higher failure rate in internal fixation group and higher complication in arthroplasty group in their 2 year of prospective study of 409 ambulatory patients with 70 years or older having Garden stage III or IV fractures. [18] A Cochrane database survey with 17 trials involving 1920 patients showed no significant complication with cemented prostheses patients compared with cement less prostheses patients, at a mean follow-up of 1 year. Similarly, no significant differences were found between unipolar and bipolar hemiarthroplasty (seven trials, 857 participants, 863 fractures). [19] That's why we used bipolar prosthesis and unipolar Austin Moore prosthesis in our study.

Although prosthetic replacement is reserved for patients 70 years old or older patients with a life expectancy of about 10 to 15 years but in our study reason for inclusion of patients younger than 70 years were old neck fracture due to long waiting list for operation theatre and inability to accept second revision surgery that is significantly common in patients with internal fixation. [15,16,17].

Conclusion

Our study showed that in addition to the transverse bar by fenestration grafts, bone block formed around the tip of the stem by

conical graft provided strong pillar support and once it was integrated, it prevented subsidence of the prosthesis with excellent result.

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Original Article

OutcomeAnalysis of dual plating in bicondylar fracture of Tibia.

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Abstract

Background: The operative treatment of bicondylar fractures of tibial plateau remains a challenging job. Treatment goals include, restoration of articular congruity and alignment in the lower extremity and preservation of soft tissues and achieving functional range of knee motion. With multitude of surgical procedures available, there still remains ambiguity regarding the ideal approach for tibial plateau fractures. The aim of this study is to evaluate the functional outcome of dual plating via two incisions for bicondylar tibial plateau fractures.

Methods: A prospective analytical cohort study was undertaken in the Department of Orthopaedics in Hamidia Hospital, Bhopal. Twenty eight patients who presented with Schatzker type V or VI tibial plateau fractures during the period of July 2014 to July 2016,were treated with dual plating via lateral plate through an anterolateral approach and a medial plate through an posteromedial approach. Rasmussen Functional criteria was used to evaluate functional outcome.

Results: Twenty-eight patients with tibial plateau fractures of Schatzker type V and VI treated by dual plating were analysed. The Mean range of motion at 14 weeks follow up was 110^0.The mean time to union was 14.6 weeks.As per Rasmussen's knee criteria, 57 % of patients had excellent results and 43% of patients had good results. The mean score was 26.54 (Range 21 - 29).Mean Functional Score was higher in patients with fractured fibula as compared to patients with intact fibula in patients with bicondylar tibial plateau fractures.

Conclusion: Treatment of BicondylarTibial Plateau Fractures (Schatzker type V & VI) with dual plating gives excellent functional outcome with a very low complication rate.

Keywords: Bicondylar Tibia, Dual plate, Schatzker, Tibial plateau.

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Introduction

The tibial plateau is amongst the most important weight bearing region of human body. Intra-articular fractures of the proximal end of tibia are serious complex injuries and difficult to treat. Proximal tibial fractures account for 1.2% of all fractures in adults [1]. Such injuries generally result due to high energy trauma, majority due to road traffic accidents and the rest are sports related or fall from height. As per the Schatzker classification Bicondylar Fracture fall under type V and VI [2]. Surgical fixation of

bicondylar tibial plateau fracture is complicated because of metaphyseal and articular comminution and the frequent occurrence of associated soft tissue injuries. Treatment goals include, restoration of articular congruity and alignment in the lower extremity and preservation of soft tissues and achieving functional range of knee motion. To achieve these goals open reduction and internal fixation is mandatory. For open reduction and internal fixation of bicondylar tibial plateau fractures, several methods can be used like unilateral fixation with single plate, dual plating or bicolumnar plating, hybrid external fixator or a less invasive stablisation system(LISS). Dual plating via two incision technique has received recent support because it allows for direct visualization of the articular reduction while minimizing the need for stripping off the soft tissue in the fracture area. With multitude of surgical procedures available, there still remains ambiguity regarding the ideal approach for bicondylar tibial plateau fractures. The aim of this study is to evaluate the functional outcome of dual plating via two incisions for bicondylar tibial plateau fractures.

Material and methods

A prospective analytical cohort study was undertaken in the Department of Orthopaedics, Hamidia Hospital, Bhopal. Twenty-eight patients aged between 18-65 years who presented with Schatzker type V or VI tibial plateau fractures during the period July 2014 to July 2016 were enrolled in the study.All patients were treated with dual plating - lateral plate through an anterolateral approach and a medial plate through an posteromedial approach. Patient with compound fracture, pathological fracture and with polytrauma were excluded from the study. Patients were given initial Splintagein the form of above knee slabor calcaneal skeletal traction along with limb elevation for soft tissue swelling to subside. After taking patient's consent, patient was posted for elective surgery under spinal anaesthesia. Institutional Antibiotic protocol was followed, all patients were operated under tourniquet. The medial column was fixed first through posteromedial approach followed by lateral column by anterolateral approach.

Non-weight bearing mobilisation and quadriceps exercises were started on first post-operative day.Partial weight bearing was started after 6 weeks till fracture union. Thereafter, full weight bearing was started.

Patients were followed up at regular interval with clinical and radiological assessment. The functional outcome parameters were measured by same observer to minimize inter-observer bias. The parameters measured were according to the scale given byRasmussen. Patients were graded as excellent, good, fair and poor as per their functional outcomes. Any complication noted was managed accordingly.Data entry and appropriate statistical analysis was done.

Results

Twenty-eight patients with tibial plateau fractures of Schatzker type V and VI treated by dual plating were analysed. Majority of study subjects were male(24 out of 28). 16 patients had Schatzker type V and 12 patients had Schatzker type VI tibial plateau fracture. Most common mode of injury was road traffic accident (24 out of 28) followed by fall (4 out of 28). Mean age of study subjects was 39 years. Both the sides were almost equally affected left side accounting to 57% and right side 43%. 6 patients (22%) had ipsilateralfibula fracture.Mean range of motion at 14 weeks follow up was 110^0. The mean time to union was 14.6 weeks. Mean time to union in patients with schatzker type V fracture was 13.8 weeks and in Schatzker type VI fracture was 14.8 weeks. Patients with fractured fibula had shorter time to

union as compared to patients with intact fibula. This difference in time to union was stastistically significant. (p<.05)Most common complication seen was stiffness at knee joint in 7% of patients followed by superficial infection and hardware prominence seen in 3.5% of patients.

All the patients had an acceptable knee function according to the Rasmussen's knee criteria. 57 % of patients had excellent results and 43% of patients had good results. The score ranged from 21-29 and the mean score was 26.54.

Mean Functional Score was higher in patients with Fractured fibula as compared to patients with Intact fibula in patients with bicondylar tibial plateau fractures. This difference in mean functional score was statistically significant. (p<.05)

Discussion

High-energy tibial plateau fractures remain a challenge to the orthoapedic surgeon. The use of open reduction and internal fixation techniques has historically been associated with wound complications, especially when a single midline incision is employed. This has led to the emergence of alternate methods of fixation such as Ilizarov ring fixation, external fixation with limited internal fixation, hybrid external fixation, etc., achieving good reduction and stable fixation sparing knee joint is a challenging task in external fixation [3]. Reaching the posteromedial fragment through a single incision causes wide periosteal stripping and extensive muscle dissection and may hamper reduction as well. Dual incisions have proved better than single incision in preserving soft tissue and visualization of articular reduction [4]. 28 patients with tibial plateau fractures were treated operatively in our study by dual plating via anterolateral and posteromedial approach with an aim to preserve the biology of fractures and to provide better axial and angular stability, maintaining the articular congruity. The most common associated injury in our series was ipsilateral fibula fracture. None of the patients had common peroneal nerve palsy in our study. Using Rasmussen's functional criteria, 58% of the patients had excellent, 42% had good and none had poor or fair outcome. All had satisfactory results. The mean Rasmussen score was 26.57 at 16 weeks follow up. Partenheimer A, et al had an average score of 26.7 [5]. Chang wug oh et al reported similar good results with dual plating in 23 patients with unstable proximal tibia fractures [6]. Schatzker et al obtained 78% and 58% acceptable results in those operatively and non-operatively respectively [2]. Thus similar to other studies on dual plating our study also reported better Functional outcomes with bicolumnar plating. Union was achieved in all cases. The average time of union was 14.6 weeks. All the patients had union within 18 weeks. George C. et al found the average union time in their study to be 14.3 weeks [7]. Cole, Peter A et al in their study of tibial plateau fixation using locking compression plate reported the average time of union to be 12.6 weeks with range of 6 to 21 weeks [8]. Time to union in our study was comparable to most other studies done on different modalities of surgical treatment. In our study, Patients with associated fibular fracture had shorter time to union and better functional score as compared to patients who had intact fibula. Sarmiento et al found that fractures of both the condyle did not collapse further or angulate, when the proximal fibula was fractured and displaced. However medial condyle usually collapses creating varus deformity when the fibula is intact [9].Soft tissue complications are a major concern in the treatment of bicondylar tibial plateau fractures with dual plates and have been reported to be as high as 23% to 100% with dual plates through a single incision [10,11].With advances in surgical

technique, the deep infection rate has been reported to have reduced to 4.7% with dual plates through 2 incisions[12].To minimize soft tissue stripping, small wire external fixators were explored for the treatment of tibial plateau fractures. Deep infection and osteomyelitis remain a significant problem, with rates between 7% and 13% [13].In our study, no patient had deep infection. There was 1 patient with superficial wound infection (3.5%) which responded to antibiotic treatment. Partenheimer A et al had 5.6% rate of superficial infections and 1.5% deep infections [5].The infection rate in the current study was lower than previous reports. Gentle handling of the soft tissues with a non-traumatic technique allowed the compromised soft tissue to heal and helped reduce soft tissue complications and infection rate. 1 of our patients(3.5%) had hardware prominence where the plates or screws were prominent on medial side. Phisitkul P. et al also found hardware prominence with rates corresponding to our study [14].The mean range of motion in our study was from $0\text{-}109^0$ at 16weeks follow up. 2 (7%) patients developed knee stiffness similar results were reported by Yercan et al[15].Cole Peter A et al reported the mean range of motion to be 1-122 degrees [8]. Schatzker et al reported >90 degrees flexion at knee in 86% of the patients immobilized for <4 weeks in those treated operatively and in 57% of the cases who were immobilized for more than 4 weeks [2].Paul F Lachiewicz et al reported 128^0mean range of Motion at knee in a study of 43 tibial plateau fractures treated by open reduction and internal fixation [16].We conclude that open reduction and Internal fixation of high energy tibial plateau fractures with dual plates gives excellent to good functional outcome with minimal soft tissue complications.

Conclusion

We conclude that treatment of Tibial Plateau Fractures (Schatzker type V & VI) with dual plating gives excellent functional outcome with a very low complication rate. Functional outcome was better in patients with associated fibula fracture. Further randomised comparative trials with large sample size are recommended to prove superiority of dual plating over other methods.

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Case Report

A Child presenting with Bilateral Tuberculous Osteomyelitis of Calcanei: A Case Report

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Abstract

Introduction: Osteoarticular tuberculosis represents 1.7-2% of all tuberculosis. The localization in the foot is rare and accounts for less than 10% of osteoarticular tuberculosis. The clinical observations of this case highlight the unusual bilateral skeletal involvement of tuberculosis.

Case Report: A case of a six year old male child presenting with swelling of both heels and discharging sinus is reported. Biopsy of the curetted material from both lesions revealed tuberculous nature. Patient was kept on conservative treatment of antitubercular drugs.

Conclusion: A high index of suspicion is mandatory for early diagnosis, prompt treatment and better clinical outcome.

Key words: calcaneus, tuberculosis, osteoarticular.

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Introduction

Tuberculous osteomyelitis of calcaneum is a very rare entity and has been very scarcely reported. The stress on study of calcaneal tuberculosis has also been diluted by the fact that most of the times tuberculosis of tarsals involves more than one bone and joints of the region. Thus, its awareness is low and diagnosis is often delayed. Furthermore, tuberculosis of the calcaneum is debilitating if untreated and delayed treatment may lead to functional disability.

Case Report

A six year old male child presented with complaints of pain, swelling and discharging sinus at both heels for duration of four months. It was associated with mild fever. Child had previously been evaluated at Primary health centre and Incision and Drainage was done on the right side. While the incision healed, a sinus remained at the distal most part of incision. Patient developed a sinus on left side later, and was referred to this hospital for non-healing sinuses. His parents did not give history of treatment of tuberculosis and had no family history of tuberculosis. The boy had received routine vaccinations including BCG.

On Examination, patient had swelling of both the heels for four months and discharging sinuses over both heels for three months. Swelling involving the heel region, was initially for one and half months, was associated with pain which later subsided. He had history of night sweats, evening rise of temperature in initial one month. No history of loss of weight or systemic illness was given by the parents.

Physical examination revealed temperature 97.40F, pulse 108/min., respiratory rate – 24/min. He had mild pallor. His body weight was 15 kgs. His inguinal lymph nodes were enlarged on both sides. Both feet had swelling in the heel region with sinus placed at posterolateral aspect with minimal discharge of serosanguinous fluid. Swelling was diffuse over both heels more on the lateral and posterior aspects, below and behind the lateral malleoli on both sides, of size about 5 cm. x 3 cm. x 1 cm. with skin discolouration due to increased pigmentation.

Figure 1: Clinical Picture Right Heel

Figure 2: Clinical Picture Left Heel

Sinuses were of size about ½ x ½ cm. with no active discharge but a minimal soakage. The sinuses were present about 1 cm. below and behind the lateral malleolus on left side while 2 cm. below and behind lateral malleolus on right side (Figure 1 & 2) On the right side it was present over the distal most and of an oblique healed incision of previous operation. Sinus had their edges undermined, some granulation tissue over right side. The skin around the sinuses was excoriated and showed hyperpigmentation. Movements of both ankles were free while inversion was restricted and eversion absent.

Radiographs revealed central osteolytic lesions in both calcanei of size about 1 and ½ cm. x 1 cm. (Figure 3), with marginal sclerosis and osteoporosis of whole calcanei.

Figure 3: X ray of Both Heel

Laboratory data included, haemoglobin 10 gm%, total leukocyte count 9,600/mm3 with 62% polymorphonuclear cells, 36% lymphocytes and 2 % eosinophils. His ESR was 5mm at one hour and his urinalysis was normal.Biopsy taken through both sinus tracts with the help of a thin curette revealed tuberculous lesion.

Treatment consisted of chemotherapy with Rifampicin 10 mg/kg. body weight once daily empty stomach, Isoniazid 5 mg/kg body weight once daily, Ethambutol 25 mg/kg body weight once daily and Pyrazinamide 35 mg/kg body weight in two divided doses. A regular vitamin "B" complex supplementation too was prescribed. Patient was discharged with advice for bed rest and follow up every month to see his progress, clinically and radiologically.

Over a period of three months, his sinuses healed and the patient could stand and walk

without pain and showed no relapse after a 18 months follow-up.

Discussion

Osteoarticular tuberculosis is a leading cause of morbidity and mortality in many developing countries and actually in the entire world due to the increased incidence of TB in HIV-positive patients. Osteoarticular tuberculosis represents 1.7-2% of all forms of TB. It is the third amongst extrapulmonary TB after the peritoneal and lymph node forms of TB. It is a disease that must be diagnosed quickly before the disease progresses and injures or destroys the bone and joint.

In osteoarticular tuberculosis, the spine and the hip joint are the most commonly involved areas, with the ankle and foot being rarely involved and represent only 1% of all infections of TB and about 10% of osteoarticular involvements. Clinical presentation of calcaneal tuberculosis is non-specific and thus diagnosis is often delayed. The tubercular sinus can also be infected and this may lead to misdiagnosis [1,2].

Tuli (1991) reports 1% to 3% incidence of osteoarticular involvement of all the tuberculosis cases. In his series of 980 patients, he found 3.26% cases with involvement of calcaneum, however, he has not distinguished how many of them were involving calcaneum alone and how many had other bones and joints involved too[3].

Wilkinson (1964) states that tuberculosis does not distinguish different joints and bones forming the foot and usually affects several of them. He further states that in infants it mainly involves metatarsals, in children tarsal bones; while ankle becomes more susceptible as the ossification advances[4].

Bosworth (1959) states that in round bones the pathology of tuberculous affection is same as that in diaphysis of long bones i.e. expansive central lesion due to slow development of the disease and relative softness of cortical structures in children [5].

Shannon (1990) stated that in adults skeletal tuberculosis involves spine in 50% cases, hip in 15% and ankle, wrist, elbow and others in 20% cases. He also quotes report of American Academy of Paediatrics which says that resistance to Isoniazid is 15% in south east Asia. A third drug is therefore recommended in first two months [6].

Tuli (1991) advocates at least one month of drug therapy and general treatment before any major surgery is done. Antituberculous drugs in their doses according to body weight of the patient could be followed by appropriate surgery if it seems necessary.

In this institution, we use four drugs up to 2 months, two drugs for next 10 months. Dosages are calculated according to the body weight of the patient and in child have to be reviewed in every follow-up with weight measurement, complete hemogram & ESR. An X-ray after every 2 to 3 months is also required. Surgery can be planned after one month of anti-tuberculous treatment and after assessing the patient for any clinical or radiological improvement [7].

Conclusion

The location of tuberculosis at the calcaneum is extremely rare. The diagnosis and treatment of calcaneal tuberculosis are often delayed because of the unawareness of the surgeon and less dramatic signs and symptoms of calcaneal osteomyelitis than osteomyelitis of long bones. Thus a high index of suspicion is mandatory for early diagnosis, prompt treatment and better clinical outcome. The clinical observations of this case highlight the unusual bilateral

skeletal involvement of tuberculosis and should be considered to prevent delay in diagnosis and therapeutic management.

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Case Report

Centralization of Ulna in Treatment of Giant Cell Tumor of Distal Radius - A Case Report

Jati S, Singh P, Jain N

Investigation performed at Department of Orthopaedics, Sri Aurobindo Medical College and Post Graduate Institute, Indore, Madhya Pradesh, India

Abstract

Distal end radius is third most common site for Giant Cell Tumour. Various Options for reconstructions are available. In this case report we assessed Functional outcome of centralization of ulna in aggressive giant cell tumour of Distal end radius.

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Introduction

Giant cell tumour is a solitary benign locally aggressive lesion characterized by osteoclast like multinucleated giant cell mainly involving epiphysis. They are 4-5% of primary bone tumours and 20% of benign bone tumours [1]. Aggressiveness of this lesions is between purely benign and frankly malignant. It occurs in patients 20 to 40 years old. The most common location for this tumour is the distal femur followed closely by the proximal tibia and the distal radius [2]. Patient usually presents late with pain, local swelling and limited range of motion at wrist and associated pathological fracture locally, pulmonary metastases occur in approximately 3% of patients [2]. Treatment of Giant cell tumour in distal radius is difficult, mainly because of their close proximity to multiple tendons, nerve, radial artery and carpal bone. Radiographic findings often are diagnostic. The lesions are eccentrically located in the epiphyses of long bones and usually about the subchondral bone. Management of giant cell tumour of distal end

radius mentioned in literature are, curettage with polymethylmethacrylate cement, en bloc excision and reconstruction with fibular autografts, allografts or ulnar centralization however the aims of treatment are complete removal of the tumour while preserving maximum function of the limb [3,4].

Case Report

35year Normotensive Euglycemic male presented to us with complains of swelling and restricted range of motion at Right wrist since last 6 months for which curettage and cementing was done 4 month back somewhere else. Patient was asymptomatic for next 2 months' post procedure but gradually swelling reappeared with restricted movement at wrist, since last one month patient complains of pain which increases on performing any day to day activity and relives with rest. Patient had no history of

trauma, fever, weight loss or loss of appetite.

On examination old healed scar present on dorso- lateral aspect of right wrist, a gross,

firm and tender swelling of size 8 x 6 cm was seen on dorso- lateral aspect of distal radius with feeling of egg shell cracking, all wrist movement were restricted and painfulwith no Distal neurovascular involvement.

Figure 1: Clinical Picture

Radiograph of wrist revealed an eccentric lytic, multiloculatedlesion in epiphyseo-metaphyseal region of distal radius giving soap bubble appearance without periosteal reaction or soft tissue involvement.

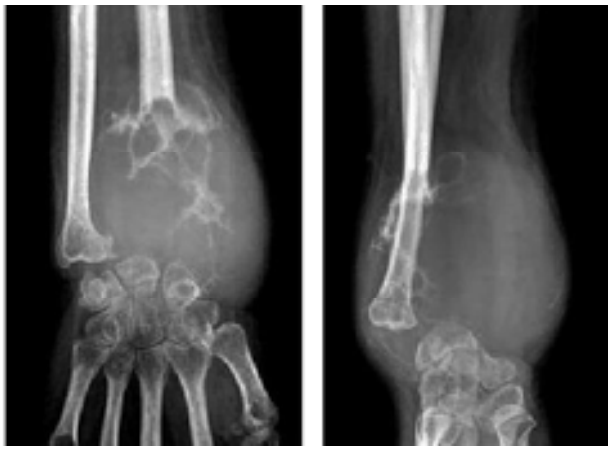

Figure 2: Pre Op Radiograph

Patient was offered wide resection and reconstruction with ulnar centralization. Tumour was exposed by dorsal approach upto 2nd metacarpal a wide resection was the done with margins of normal tissues. Approximately 10 cm of the distal radius along with parts of the radio-scaphoid, radio-lunate capsules and distal radio-ulnar joint capsules was resected, distal ulna was freed of cartilage, the lunate was freshened.Tumour bed was treated with 5% phenol and 3% hydrogen peroxide to take care of the inadvertent spillage. The wrist translocated so as to place the lunate in line with the distal ulna. Stabilization was achieved by means of locking plate at radio ulnar junction and a reconstruction plate applied to ulna across the wrist and over the second metacarpal.

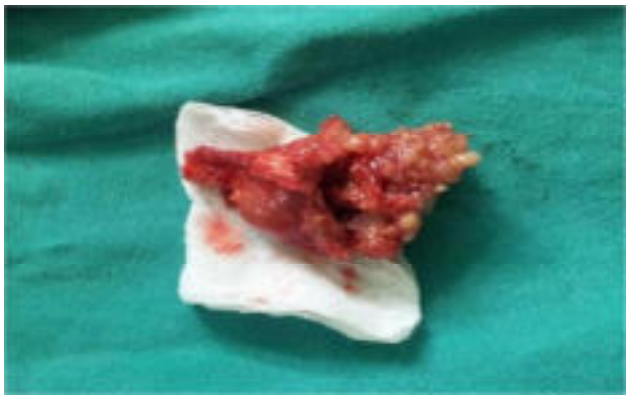

Figure 3: en bloc excision of distal end radius

Figure 4: Postoperative X-ray

Patient was followed up for 18 months with no local recurrence, with good functional

outcome assessed by Revised Musculoskeletal Tumour Society scoring system for upper extremity (MSTS score) [5]. Union at Radio ulnar junction was evident at 4 months and union at ulno carpal junction was evident at 6 months withoutany additional procedure.

Discussion

GCT of the distal radius can be managed by excision of the tumour while preserving good function of the wrist and hand. It has been suggested that intra-lesion curettage may be preferred to reduce the incidence of local recurrence [6]. However O Donnell R. J. et al. reported high rate of recurrence [7].Factors that needed to be considered when evaluating a technique of reconstruction includes the ease of the procedure, its morbidity, the complications and functional outcome and the durability of the reconstructed segment.

En bloc excision and reconstruction with fibular autograft, allograft or ulnar centralization is preferred choice of treatment for giant cell tumour of distal end radius. However, the disadvantage, of en bloc excision and reconstruction with fibular autograft or allograft includes donor site morbidity, delayed union or non-union [8]. Also, allografts may not be available in all orthopaedic setups and there is at least a theoretical risk of transmission of viral diseases [9].Centralization of ulna is relatively shorter surgical procedure and use of local vascular graft possibly help to reduce infection and improves the chances of union. The complications cited with this procedure includes ankylosis of the wrist, damage to neural structures, vascular insufficiency of the hand, wound infection, necrosis of wound margins, fracture of the ulna, and hardware failure. However, we did not note any of these complications in our case over the period of 18 months. Local recurrence of tumours is not a reflection of the technique of reconstruction which has been used.

Conclusion

En bloc excision with centralization of ulna is easy, less expensive method for reconstructing of aggressive giant cell tumour of distal end radius, which provides fewer complication, good functional results. However local recurrence rate cannot be predicted.

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Letter to Editor

Comparative Analysis of Results Between Conventional and Accelerated Ponseti Technique for Idiopathic Congenital Clubfoot

Sirsikar A, Turkar R, Verma HS.

Sir,

I read with great interest the article by Sharma P et al.[1] titled as “Comparative Analysis of results between Conventional and Accelerated Ponseti Technique for idiopathic congenital clubfoot”. The application of best available evidence to any health care setting is important, particularly if there are clear benefits to the recipients of this care. The rescheduling of the weekly clubfoot clinic for casting, to at least twice weekly, is now a possible shift in contemporary evidence based practice. We congratulate the authors for conducting this study of its first kind in the Indian population.

However, there are a few concerns that we would like to share:

1. The article does not mention about the pre-casting manipulation, which is important and indications are that more time spent may be beneficial in correcting the clubfoot deformity. Notable in the current findings on accelerated casting is the longer manipulation time, (two minutes) specified by Xu et al.[2], an additional departure from the original Ponseti Protocol. Whilst the effect of manipulation time has not been formally studied, histological investigations directs maintained loading of ligaments to promote the lengthening or ‘uncrimping’ of these structures.Paying more attention to time spent on careful manipulation might render cast changefrequency less relevant. Hence, it is important to underline the fact of undergoing ‘more rather than less’ manipulation prior to casting, as suggested by Sutcliffe et al [3].

2. Morcuende et al reported a recurrence rate of 8% & 7% for the five and seven-days group, respectively, with an 8.5 times greater risk of recurrence, if compliance with abduction bracing was not adhered to [4]. Unfortunately, limitations on this study did prevent further follow-up with patients to identify cases of relapse and this is something that certainly needs consideration in this area of research. It is too early to know how or if accelerated casts would affect long term outcomes.

The authors of this study were fortunate enough not to have encountered any case of relapse in both the groups. It is only a kind suggestion to the author to keep all the cases in follow-up & to report the relapse, if any, in the near future, so as also to validate the study in terms of long term outcome.

3. Morcuende et al in their study, were concerned that further acceleration in the casting procedure may give rise to problems like swelling in the cast [4]. Does the author encounter any such problems in this Indian study?

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Author's Reply

Sir ,

We thank Sirsikar et al.[1] for their keen interest in our research titled "Comparative Analysis of results between Conventional and Accelerated Ponseti Technique for idiopathic congenital clubfoot" [2].

The authors have very rightly emphasized the importance of manipulating the feet before casting and the fact of undergoing 'more rather than less' manipulation prior to casting to achieve better and faster correction seems the right approach, further studies are warranted in this direction to establish its conclusiveness [3]. In our study we had kept the manipulation time same in both the groups to exclude any confounding factor among the two groups.

We have published only the early results of accelerated Ponseti technique, we are closely following the children in that group and plan to publish the results after a longer follow up has been done, only then we will be able to address the concerns of a higher relapse rate in that group as shared by Morcuende et al [4].

We did not encounter any problem like swelling in the cast in accelerated group.

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