

Next Orthopaedic Pandemic Awaiting

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Natural history of most of the pandemics which have occurred previously shows regression following the second wave. All these previous pandemics have occurred during the time when the medical and health facilities were not so developed and hence had profound and long lasting effects due to the pandemic itself. But in today's era of modern medical technologies, the health facilities have been developed and grown to such an extent, that the vaccine and treatment for pandemic which previously took 3 to 4 years to develop, are been developed in just 6 to 8 months time. Hence, post covid era will show sustained and long lasting effects not only due to covid disease alone, but will also show the complications and side effects of covid treatment as well.

The ideal treatment of covid-19 is yet to be deduced, but guidelines for mild, moderate and severe form have been designed by AIIMS, New Delhi and approved by ICMR and WHO. The treatment of milder forms (URTI or fever) involves just home isolation and symptomatic treatment by antipyretics and oral Ivermectin. Steroids should not be used in milder form of disease. Treatment of moderate form of covid requires hospital admission, oxygen support, antiviral therapy with injection Remdesivir, convalescent plasma along with intravenous methyl-prednisolone and low dose anticoagulants. Severe form of covid additionally requires ICU support and injection Tocilizumab and high end therapies like lung transplant and ECMO.

With the kind of scattered health facilities and mixed pathies present in our country, it is quite evident that there is lack of protocol and guideline based management. Multiple types of treatments ayurvedic, homoeopathic, herbal, desi kadha etc are used frequently for treatment without evidence based proven effect and without even knowing what the contents are. Further due to, huge population, high ignorance and illiteracy, delayed

presentation, treatment by quacks and untrained staffs, it is quite common to have improper treatment with inadvertent, unjustified, long duration of treatment with the drugs other than prescribed. Hence steroid, which should not be given in milder form, are given or advised even in mild or non-symptomatic cases, that too for longer duration's. This irrational, inadvertent and continued use of the treatment especially by use of steroid and remdesivir will cause complications and side effects associated with use of these drugs. This problem probably will be further increased by use of sub-optimal quality and sub-optimal doses of the treatment leading to poor response to treatment and further provoking longer duration of treatment, creating a vicious circle. Thus to summaries, with the quantum of covid infected patients as rampant in our country and use of treatment based on irrational protocol, yet another pandemic due to side effects and complications related to the covid treatment is going to come in near future. Early complications following the treatment like diabetes, cardiac arrest and mucormycosis are already been manifested in society.

The use of inadvertent, irrational, suboptimal and prolonged steroid therapy, along with other complications, is also associated with severe orthopaedic complications, among which the most common are osteoporosis, fragility fractures and avascular necrosis of femoral head. Hence we orthopaedic surgeons in near further will see a pandemic of these post-covid infected cases presenting to us after the treatment with steroids.

Hence we should be aware, suspicious, prepared for prompt diagnosis and judicious early treatment of these cases. We should also be aware and prepare ourselves with newer modalities of diagnosis, instruments, equipment and treatment guidelines of these complications so that these entities can be

diagnosed earliest and treated successfully, without any severe complications.

Post steroid osteoporosis, skeletal fragility fractures and avascular necrosis can lead to rapid deterioration of health status, decreased quality of life, increases dependency and economic burden. Fragility fractures, particularly hip fractures are also associated with high rates of mortality, which is preventable if we could reduce them. Contrary, to the fact that these were the pathologies seen in elderly patients, after the post steroid treatment in covid patients, these pathologies will be at rise in early age groups as well, and if we are not aware, suspicious and prompt enough to diagnose them in even these younger age group, we are likely to miss them or can have delayed diagnosis when they present to us with complications.

Screening for osteoporosis and avascular necrosis in these high risk patients of post covid with steroid treatment will help us to diagnose and treat osteoporosis and avascular necrosis, at early stage and minimize the risk of fractures and joint destruction, respectively, associated with these entities. This will involve orthopaedician to do early assessment by complete medical examination with thorough clinical history, look for clinical risk factors, and order for basic laboratory investigations and biomedical markers of bone turnover along with measurement of bone mineral density (BMD) with Dual-energy X-ray absorptiometry (DEXA) scan or high quality digital x rays. Further patients with positive medical history, suggestive clinical suspicions and or presence of additional risk factors should undergo further additional targeted laboratory testing and investigations which will provide useful information to risk stratify patients.

Specific additional risk factors which should warn the orthopaedician are, advancing age, history of prior fracture, low body weight, cigarette smoking, excessive alcohol consumption, estrogen deficiency, vitamin D or calcium malabsorption, systemic inflammation, autoimmune disorders and/or high bone turnover states. Measurement of bone mineral density most commonly, precisely and accurately can be done by Dual-

energy X-ray absorptiometry (DEXA) or quantitative ultrasound.

Evaluation of biochemical markers can predict low bone mass and bone loss, estimate future fracture risk and monitor the treatment. Biochemical markers, which can be used, are the marker of bone formation which are alkaline phosphatase, osteocalcin and Procollagen I Extension Peptides, and markers for bone resorption which are hydroxyproline, Pyridinium Cross-links and Teloptides and Tartrate-Resistant Acid Phosphatase.

In addition to measurement of bone quantity, high-resolution peripheral quantitative computer tomography (HR-pQCT) and magnetic resonance imaging technology can help to measure bone strength and determine qualities of bone such as its geometry, macro, micro, and nanostructure, material composition, volumetric bone density, cortical and trabecular micro-architecture. These non-invasive methods can also help to diagnose avascular necrosis of femoral head early before the signs occur which are evident on x rays.

Surgeon should also be familiar with fracture risk assessment tools like FRAX algorithm, which provides estimates of an individual's 10-year probability of hip fracture or major osteoporotic fractures which incorporates 11 patient factors (i.e., age, sex, height, weight, prior fracture, parental hip fracture, smoking, alcohol, glucocorticoids, rheumatoid arthritis, and either secondary osteoporosis or BMD) to calculate an individual's fracture risk.

Once the diagnosis has been made, we should treat the osteoporosis and avascular necrosis earliest by use of proper nonpharmacological, medical and surgical therapy, to prevent complications associated with it. Non-pharmacological treatment of these, include life modification to prevent falls and subsequent fragility fractures. This includes correction of refractory errors, use of walking aids, installation of bars, railing and support specially in bathrooms and stairs, using non skid floors, and use of antifracture devices. Light exercises and taking a healthy diet rich in calcium supplements, vitamin D and high proteins along with avoiding risk factors,

smoking and alcohol will keep the bone healthy.

Medical therapy of osteoporosis and avascular necrosis includes prescribing anti-resorptive therapy in form of bisphosphonates, hormone replacement therapy, calcitonin, selective estrogen receptor modulators like raloxifene. Surgeon should also know about dosage, prescription, interaction and contraindication of the recent and evolving therapies like Denosumab and biologics like growth hormone, Teriparatide and Parathyroid hormone etc.

Surgical treatment of these patients can be a challenge, owing to their younger age, poor bone quality and lack of ideal fixation method in porous bones and delayed mobilization. We should be prepared for surgical treatment, if needed at earliest, as early surgery can reduce, hospital stay, mortality and complications. Surgical treatment of osteoporosis involves vertebroplasty, kyphoplasty or prophylactic fixation in certain cases specially hip before the fracture occurs. Further, when bone quality is impaired, surgeon should be prepared for augmented synthesis with use of bone grafts auto as well as allografts, cements, bone substitutes like tricalcium phosphate and biologic and growth factors like BMPs along with armamentarium of specific implants like locking plates, TSP plates, helical blades fixations, multi

directional nails and longer implants than normally used etc. Surgical treatment for avascular necrosis in early stages by core decompression and pedicle grafting can prevent the joint replacement surgery.

To summarize, we the orthopaedic surgeons should be prepared, aware and cautious enough, to deal with the forthcoming pandemic, which is just about to come after the end of second wave of the covid. This orthopaedic pandemic will be especially in the form of large number of cases presenting to us with osteoporosis, fragility fractures and avascular necrosis of hip, which will be due to complications associated with the steroid treatment of covid patients. If we can diagnosis and treat the patients early before the occurrence of fragility fractures or the need for joint replacement, we could successfully say that we orthopaedic surgeons have dealt with this pandemic successfully.

“It is better to prevent and prepare rather than rent and repair”

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