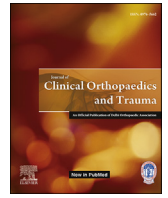




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Original article

Revisiting conservative orthopaedic management of fractures during COVID-19 pandemic

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ABSTRACT

COVID-19 pandemic has brought the need to revisit the conservative management of orthopaedic injuries back into sharp focus. On the advent of COVID-19 pandemic, it has been acknowledged by the British Orthopaedic Association (BOA) emergency COVID-19 and the National Health Service England (NHSE) guidelines to manage urgent orthopaedic and trauma conditions pragmatically balancing optimum treatment of patients against clinical safety with resource utilization. The current Coronavirus outbreak has refocused orthopaedic minds on managing many injuries conservatively, which would have otherwise been managed with operative fixations. We revisit the role of conservative orthopaedic management of fractures in the context of COVID-19 and current guidelines.

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COVID-19 pandemic has brought the need to revisit the conservative management of orthopaedic injuries back into sharp focus. Over the years as trauma and orthopaedics have evolved, operative techniques have been developed, along with refinement of implants and instruments with an aim of transforming contemporary treatment of fractures to provide anatomical or near anatomical alignment of the fractures, stable fixation, with early pain free range of motion and rehabilitation.¹ In the last five decades or so, the management of most fractures of the extremities has revolved around the operative management.

On the advent of COVID-19 pandemic, it has been acknowledged by the British Orthopaedic Association (BOA) emergency COVID-19 and the National Health Service England (NHSE) guidelines to manage urgent orthopaedic and trauma conditions pragmatically balancing optimum treatment of patients against clinical safety with resource utilization.^{2,3} The current Coronavirus outbreak has refocused orthopaedic minds on managing many injuries conservatively, which would have otherwise been managed with operative fixations. It is mainly because of the restraints put on by this viral infection, limited availability of resources including personnel and operating theatre slots (whilst they were redirected to manage urgent clinical priorities including respiratory emergencies due to

COVID-19 infections on the frontline) and due to reluctance of undertaking operative intervention in an atmosphere of increased risk of viral transmission, responsibility of protecting staff and 'social distancing' guidelines.⁴

The fracture healing involves a combination of inflammatory, vascular, anabolic and catabolic events to allow eventual return of function.⁵ Traditional conservative treatment of fractures is based on three basic principles of fracture management; namely, reduction of fracture, holding the fracture reduced and keeping it reduced in a supported environment (such as a cast or splint) till the fracture heals. "Closed treatment of fractures" was very elaborately and scientifically described by Sir John Charnley in his monograph in 1950.⁶ Earliest example of non-operative active treatment of fractures in humans was discovered by G. Elliot Smith during his Egyptian expedition in 1903. Over the years it was propagated by Sir Robert Jones (1857–1933), who demonstrated effectively the importance of life saving potential of the 'Thomas splint' invented by his uncle Hugh Owen Thomas (1834–1891) in reducing the mortality due to open femoral fractures sustained in World War-I from 80% to 20%.⁷ Conservative management of fractures has shown good results in a variety of fractures in the current generation particularly in upper limb injuries and the use of Sarmiento functional bracing techniques in tibial fractures.^{8,9} Decision becomes more pragmatic in managing lower limb 'obligatory' fractures such as hip injuries where weight bearing mobilization is essential to avoid problems of recumbence and immobility.

Operative treatment of fractures was heralded by the

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development of three major inventions of anaesthesia (1846), antiseptics (1865) and Roentgen discovery of X-rays in 1895.¹⁰ As such advances in operative management of fractures coupled with asepsis have been the key in the modern orthopaedic principles of managing injuries. In late 1960s, the AO group of surgeons from Switzerland popularized the principles and techniques of various fracture fixation by several metallic implants. Since, then the operative management of the fractures has evolved significantly across the globe, to the extent that it has now become a panacea. However, the current pandemic situation has exposed us to the situation faced by Sir R Jones in the midst of chaos of World War-I, with limitations posed by the shortage of resources both personnel and equipment but the need to manage orthopaedic injuries in a safe manner whilst protecting patients including staff. Hence, conservative management of the fractures, wherever possible has since been highlighted by the current BOA (and other national

guidelines), especially adopting non-operative strategies of the limb injuries with an aim of reducing burden on the National Health Service (NHS) wherever it is possible and safe.¹ Paediatric orthopaedic trauma guidelines provide similar emphasis on managing children with non-operative strategies with an aim to minimise long-term consequences and by prioritizing conditions which need emergent operative intervention (supracondylar humerus fractures with neurovascular compromise) [Table 1]. It is obvious from this table that a majority of paediatric injuries can be adequately managed with conservative treatment.

Articular and peri-articular fractures may provide a challenge, since principles of fracture fixation (anatomical reduction, rigid fixation, early range of joint motion) and avoidance of post-traumatic arthritis are not possible with conservative management in most of these injuries [Table 2] and hence operative management may be required, at a later stage. Meanwhile,

Table 1

Suggested Indications and Contraindications for conservative management of Paediatric fractures and dislocations, during COVID-19 Pandemic.

Limb injuries in Children and Adolescents	Preferred indications	Equivocal indications	Contraindications
Upper Limb trauma	<ul style="list-style-type: none"> •Clavicle fractures •Proximal humerus fractures •Shaft humerus fractures with angulation of less than 45° •Supracondylar fractures (Undisplaced/ minimally displaced) •Extra articular distal radius fracture •Hand fractures •Reducible dislocations 	<ul style="list-style-type: none"> •Displaced fractures e.g., Supracondylar humerus, lateral condyle humerus, neck radius, distal radius and fractures radius and ulna. •Fracture-dislocations •Dislocations 	<ul style="list-style-type: none"> •Un reduced dislocations •Compartment syndrome •Fractures with vascular deficits •Compound fractures •Crush injuries
Lower Limb trauma	<ul style="list-style-type: none"> •Shaft femur fractures with acceptable angulation and displacements •Fractures around the knee •Shaft tibial fractures •Metatarsal and phalanx fractures •Calcaneus fractures •Reducible dislocations 	<ul style="list-style-type: none"> •Fracture- dislocations •Dislocations •Displaced fractures e.g, neck of femur, shaft femur, fractures around the ankle 	<ul style="list-style-type: none"> •Un reduced dislocations •Compartment syndrome •Fractures with neurovascular deficits •Compound fractures •Crush injuries •Compound fractures
Pelvic-Acetabular trauma	<ul style="list-style-type: none"> •Stable/minimally displaced fractures 	<ul style="list-style-type: none"> •Open book type of injuries •Unstable fractures 	<ul style="list-style-type: none"> •Compound fractures

Table 2

Suggested Indications and Contraindications for Conservative Management of fractures and dislocations in adults, during COVID-19 pandemic.

Limb and Spinal injuries in Adults	Preferred Indications	Equivocal Indications	Contraindications
Upper Limb	<ul style="list-style-type: none"> *Clavicle fractures *AC joint dislocations *Scapula fractures *Fractures without gross displacements e.g. proximal humerus, humeral shaft, Humeral supra-condylar, *Extra articular distal radius fractures *Scaphoid fractures *Metacarpal fractures *Phalanx fractures *Reducible dislocations 	<ul style="list-style-type: none"> *Fractures with significant displacement e.g., proximal humerus, humeral shaft, intercondylar humerus, olecranon *Radius and ulna shaft fractures *Intra articular distal radius fractures *Periprosthetic fractures *Pathological fractures 	<ul style="list-style-type: none"> *Severe compound fractures *Severe crush injuries *Fractures with vascular injuries *Compartment syndrome *Grossly comminuted and displaced intra articular fractures *Irreducible dislocations
Spine	<ul style="list-style-type: none"> •Stable fractures 	<ul style="list-style-type: none"> •Unstable spine fractures with neural deficit 	<ul style="list-style-type: none"> •Stable spine fractures •Fractures with Progressive/ acute neurologic deficit
Lower limb	<ul style="list-style-type: none"> •Pubic rami fractures •Undisplaced pelvic-acetabular fractures •Undisplaced fractures around knee •Calcaneus fractures without gross displacement •Metatarsal fractures •Phalanx fractures 	<ul style="list-style-type: none"> •Pelvic-acetabular fractures with significant displacement •Inter trochanteric fractures •Intercondylar fractures •Tibial shaft fractures •Tibial condyle fractures •Patella fracture •Talar fractures •Calcaneus fractures with gross displacement •Lis franc injuries •Peri prosthetic fractures •Pathological fractures 	<ul style="list-style-type: none"> •Fracture neck of femur •Femur shaft fractures •Severe compound fractures •Severe crush injuries •Fractures with vascular injuries •Compartment syndrome •Grossly comminuted and displaced intra articular fractures •Irreducible dislocations

complementary traditional techniques of skeletal traction, splintage, with an aim to best manage fracture to restore function and availability of future reconstruction surgery in such injuries with the current restraints may be therefore deemed necessary.¹ However, there are certain absolute indication for the surgery of fractures and dislocation, even in the pandemic times (Table 2), which are also the contraindications for conservative management. The aim should be to minimise risk of viral transmission by avoiding Aerosol Generating Procedures (AGP) and minimising risk of infection with appropriate use of Personal Protective Equipment (PPE). These principles are critically engrained in our current orthopaedic response to the pandemic.

Conclusion

Conservative, non-operative therapeutic approach may thus provide an alternative in non-obligatory fractures in the current COVID-19 pandemic (and perhaps later on as well). It may serve as a route for us to manage orthopaedic injuries till we tide over the peak of the pandemic and resume conventional surgery. Perhaps the Coronavirus crisis has given us this unique opportunity to rethink and revisit traditional methods of treating fractures and the tolerance to operate every limb fracture must be risen. We must realize that all the fractures do not always need operations and the conservative management still has a certain place in our armamentarium of fracture management, in an evolving world!

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Declaration of competing interest

None.

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