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Functional Outcome After Conservative Management By 'Bag of Bones' In Intra Articular Distal Humerus Fractures in Covid-19 Pandemic - A Case Series

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Abstract

Introduction:

With the advent of the COVID 19 pandemic and the ever-increasing case load of novel corona virus pneumonia worldwide cases, the management of various orthopedic cases was forced to be changed from operative to conservative.

Case Series:

Here we present a case series of 3 patients aged 50 years and above with various comorbidities. These patients presented to us in difficult times of COVID-19 pandemic, when only lifesaving emergency surgeries took place in most countries. We managed these patients with conservative bag of bones technique and achieved a good functional range of motion, adequate enough for their daily activities.

Conclusion:

Distal humerus fractures are technically challenging and difficult fractures to manage owing to its complex anatomy and surrounding soft tissue and neurovascular structures, especially in eldlery population with osteoporotic bone quality.

Keywords: Distal humerus, bag of bones, conservative management, COVID-19, pandemic

INTRODUCTION

With the advent of the COVID 19 pandemic and the ever-increasing case load of novel corona virus pneumonia worldwide cases, the management of various orthopaedic cases was forced to be changed from operative to conservative. As a part of the lockdown effort in India, all elective surgeries were cancelled and banned across the country. Only orthopaedic trauma cases with urgent treatment were accepted in all hospitals.^[1]

With the influx of cases in India on 24th March 2020, the Government of India declared a nationwide lockdown. With this most people started working from home and this also lead to decrease in the number of orthopaedic trauma cases to hospitals. Mumbai being the epicentre of Indian Covid 19 infection, the restrictions and precautions were heavily implied. Hence the need for conservative approach of fracture management came to light versus the surgical fixation.^[2]

Similar trend was applied to a case series of three patients with comminated distal humerus fractures with articular involvement.

Distal humerus fractures consist of 1-2% of total adult fractures. Incidence being 5.7 per 100000 per year. Majority of these are seen in patients older than 50-60 years of age due to low energy trauma leading to comminated fractures.^[3]

Fractures of distal end of humerus are seen in young males involved in high velocity trauma or elderly females involved in low velocity falls over elbow.^[4]

More common are complex metaphyseal and intraarticular fractures than simple fracture patterns. More than 95% of distal humerus fractures are of AO classification Type C with articular extension and bicolumnar involvement.^[5]

In 1981, Morrey et al had stated that to perform most routine activities of daily living, 100 degrees of both forearm supination and pronation with 100 degrees of elbow flexion and extension are essential.^[6]

There are various modalities of treatment in these fractures like closed reduction and splintage, closed reduction with k wires, external fixation, open reduction and internal fixation with different approaches like paratricipital, triceps reflecting, triceps reflecting anconeus pedicle, triceps splitting and olecranon osteotomy techniques.^[7]

The most preferred mode of management consists of open reduction and internal fixation with plating in young patients but carries high risk of complications in comorbid elderly and osteoporotic bones of old patients. In elderly osteoporotic bones, implant failure and screws loosening have been recognized as well documented complications. Hence, intra articular distal humerus fractures have also been recently managed with total elbow arthroplasty but with controversial success rates.^[8]

CASE SERIES:

1] 52 years old male, came to our casualty with pain and swelling of right elbow following fall from bicycle after dash with a car 2 hours back. There was no history of any other trauma. Patient has history of chronic alcoholism with dementia. X rays revealed right distal humerus comminuted intra articular fracture as seen in figure 1.

He was managed by gentle traction and above elbow slab for 2 weeks under adequate analgesic coverage. The slab was then broken and gradual elbow mobilization started as tolerated by the patient. Initial controlled passive motion exercises commenced between 3 to 4 weeks followed by range of motion exercises till 12 weeks, followed by elbow strengthening exercises.

Follow-up range of motion is showed after 3 months in fig.2, with bony union in x rays in fig.3.

2] 60 years old female, came to our casualty with pain and swelling of left elbow following slip and fall at home 30 minutes back. There was no history of any other trauma. Patient has history of uncomtrolled diabetes on medications. X rays revealed left distal humerus comminated intra articular fracture as seen in figure 4.

She was managed by gentle traction and above elbow slab for 2 weeks under adequate analgesic coverage. The slab was then broken and gradual elbow mobilization started as tolerated by the patient. Initial controlled passive motion exercises commenced between 3 to 4 weeks followed by range of motion exercises till 12 weeks, followed by elbow strengthening exercises.

Follow-up range of motion is showed after 3 months in fig.5, with bony union in x rays in fig.6.

3] 54 years old male, came to our casualty with pain and swelling of right elbow following skid and fall from motorcycle while riding pillion 1 hour back. There was no history of any other trauma. Patient is known case of hypertension and has history of stroke with right hemiplegia, on anticoagulants. X rays revealed right distal humerus comminuted intra articular fracture as seen in figure 7.

He was managed by gentle traction and above elbow slab for 2 weeks under adequate analgesic coverage. The slab was then broken and gradual elbow mobilization started as tolerated by the patient. Initial controlled passive motion exercises commenced between 3 to 4 weeks followed by range of motion exercises till 12 weeks, followed by elbow strengthening exercises.

Follow-up range of motion is showed in fig.8, with bony union in x rays in fig.9.

All 3 patients came at the time of Covid-19 pandemic lockdown, when only emergency life saving surgeries were allowed to perform.

In follow-up, all patients had good range of motion arc upto 100 degrees, allowing them to accomplish activities of their daily living satisfactorily. Follow-up x rays at 3 months showed good bony union.

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DISCUSSION:

During this pandemic, there is critical decision making on hospital administration and individual care providers on how to conserve critical resources like N95 maks, personal protective equipment kits, oxygen beds and ICU vacancies. Half of doctors, nurses and other hospital staffs have been diverted to COVID duties. There are limited general wards and even some operation theatres are converted to COVID ICUs.^[9]

Routine elective surgeries should be stopped including the day care surgery which lifts the load of patients from general and ICU wards with more availability of hospital personnel for emergency surgeries and COVID duties. This also decreases the risk of cross infections. Considering the limited number of resources and hospital staff, conservative non-surgical management should be thoroughly looked into before posting the patient for surgery.^[10]

The emergency surgeon has to take into account all these factors and accordingly plan for further line of management protecting both patients and hospital staff from intrahospital transmission.^[9]

The distal humerus is a triangular bone consisting of medial and lateral columns with an interposed trochlea. The medial column ends as non-articular medial epicondyle with common origin for flexor muscles of forearm. The lateral column becomes lateral epicondyle with common extensor origin of forearm which ends as capitellum. In sagittal view articular surface of capitellum and trochlea projects anteriorly by 40 degrees with respect to humeral axis. Troclea is externally rotated by 3-8 degrees and i n 4-8 degrees of valgus. Stability of surgical fixation depends on adequate reduction and internal fixation of these 3 structures with preservation of periosteal circulation. The proximity of ulnar nerve to medial epicondyle makes it susceptible to injury during exploration.^[4,11]

The high amount of energy in constrained elbow joint is transferred to narrow supracondylar isthmus with little inadequate subchondral metaphyseal supporting bone, especially within olecranon fossa.^[12]

These fractures have been classified comprehensively by Muller, bicolumnar fracture classification by Mehne and Matta and AO classification. AO classification has been widely accepted and is as follows:

TYPE A: extraarticular

- A1: avulsion
- A1.1 lateral epicondyle
- A.1.2 medial epicondyle
- A2: simple
- A2.2 oblique
- A1.3 transverse
- A3: wedge or multi fragmentary
- A3.2 intact or fragmentary wedge
- A3.3 multi fragmentary

TYPE B: partial articular, the fracture is involving one part of the articular surface, yet the rest of the joint is still attached to the metaphysis and diaphysis

- B1: lateral sagittal
- B1.1 transtrochlear
- B1.2 transcapitellar
- B1.3 transtrochlear multi fragmentary
- B2: medial sagittal
- B2.1 transtrochlear
- B2.2 medial articular surface
- B2.3 transtrochlear multi fragmentary
- B3: frontal/coronal
- B3.1 capitellum
- B3.2 trochlea
- B3.3 combo of capitellum and trochlea

TYPE C: complete articular, the fracture is distributing the joint surface and separated from the diaphysis

C1: both the articular and the metaphyseal portions are simple

C2: simple articular with a fragmentary metaphyseal component

C3: multi fragmentary articular. ^[4,13]

In 1937, Eastwood described Bag of bones as a technique for conservative non operative management in complex intra articular distal humerus fractures and was further developed by Morgan in 1971, using a

simple sling or collar and cuff immobilization with gradual mobilization after 3 weeks.^[4,13]

Radin and Riseborough in their study in 1969, recommended nonoperative management of comminated intra articular distal humerus fractures due to unpredictable and poor outcomes of surgical interventions.^[5]

Non operative treatment is suitable for elderly patients with frail bones and patients with advanced debilitating diseases precluding operative intervention. There is also increased risk of anaesthesia in such patients. Initial pain management with medications and appropriate splintage with early return to mobility by initiating active range of motion with elbow strengthening exercises is the goal of this treatment. This helps in securing osteocapsular envelope and prevents elbow stiffness. If even after 6 months the functional outcome of elbow joint is unsatisfactory, then we can salvage the joint by total elbow replacement. [3,14]

Non operative management also carries risk of pseudoarthrosis, gross instability or a stiff elbow, if not mobilized in time with physiotherapy.^[15]

Factors like angle between axis of humeral condyles and axis of humeral shaft with articular congruity play critical role in functional outcome.^[16]

Distal humerus fractures are usually associated with ulnar nerve injury, especially in type C fractures consisting of 24.8%.^[7]

Surgeries for distal humerus fractures are technically challenging due to complex anatomy of elbow, small comminuted fracture fragments and limited quantity of subchondral bone, especially in elderly osteoporotic patients with intra articular comminution and poor general condition. The rise in postoperative complications like infections, malunion, non-union of olecranon osteotomy, metaphyseal shortening, ulnar nerve injury, implant loosening and heterotopic ossification has led to bag of bones therapy of brief immobilization technique followed by physiotherapy. ^[13,16]

There is also propensity of scarring of joint capsule necessitates adequate stable fixation to allow early joint mobilization.^[13]

This has been backed by Watson Jones who stated that anatomical reduction and fixation alone doesn't guarantee stable rigid fixation. There is also intraoperative soft tissue injury and prolonged immobilization.^[16]

Pidhorz et al reported exceptional long term safe and satisfactory results with conservative management of bag of bones in patients over 65 years of age without any elbow joint instability or severe stiffness.^[17]

CONCLUSION:

Distal humerus fractures are technically challenging and difficult fractures to manage owing to its complex anatomy and surrounding soft tissue and neurovascular structures, especially in elderly population with osteoporotic bone quality. Hence in selected group of old debilitated and comorbid patients at times of COVID-19 pandemic, non-operative conservative management with bag of bones therapy and early mobilization by physiotherapy yields better functional outcome compared to surgical intervention in this population. This treatment should be emphasized upon in pandemic situations like COVID-19 where only lifesaving emergency surgeries were allowed. This way, the complications of surgical exploration and hazards of anaesthesia on frail old patients can be avoided. Functional range of motion of 100 degrees can be obtained eventually in both flexion-extension and supination-pronation movements.

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Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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Conflicts of interest

There are no conflicts of interest.



Figure 1: X rays immediately after trauma showing comminuted intra articular distal humerus fracture



Figure 2: Clinical photos 3 months after trauma showing good functional outcome in flexion-extension arc of 100 degrees and supination-pronation arc of approximately 80 degrees.



Figure 3: X rays 3 months after trauma showing bony union of distal humerus fracture



Figure 4: X rays immediately after trauma showing comminuted intra articular distal humerus fracture



Figure 5: Clinical photos 3 months after trauma showing good functional outcome in flexion-extension and supination-pronation arc of approximately 120 degrees each.



Figure 6: X rays 3 months after trauma showing bony union of distal humerus fracture



Figure 7: X rays immediately after trauma showing comminuted intra articular distal humerus fracture



Figure 8: Clinical photos 3 months after trauma showing good functional outcome in flexion-extension arc being 80 degrees and supination-pronation arc of approximately 100 degrees.



Figure 9: X rays 3 months after trauma showing bony union of distal humerus fracture