

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 caseload of novel coronavirus pneumonia worldwide cases, the management of various orthopedic cases was forced to be changed from operative to conservative. As a part of the lockdown effort in India, all elective surgeries were canceled and banned across the country. Only orthopedic trauma cases with urgent treatment were accepted in all hospitals.

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 the COVID-19 pandemic, when only lifesaving emergency surgeries took place in most countries. We managed these patients with a conservative bag of bones technique and achieved a good functional range of motion, adequate for their daily activities.

Conclusion: Distal humerus fractures are technically challenging and difficult fractures to manage to owe to their complex anatomy and surrounding soft tissue and neurovascular structures, especially in the elderly population with osteoporotic bone quality. Hence in a selected group of old debilitated and comorbid patients at times of COVID-19 pandemic, non-operative conservative management with a bag of bones therapy and early mobilization by physiotherapy yields better functional outcome compared to surgical intervention in this population.

Keywords: Distal humerus; Bag of bones; Conservative management; COVID-19; Pandemic

INTRODUCTION

With the advent of the COVID-19 pandemic and the ever-increasing caseload of novel coronavirus pneumonia worldwide cases, the management of various orthopedic cases was forced to be changed from operative to conservative. As a part of the lockdown effort in India, all elective surgeries were canceled and banned across the country. Only orthopedic 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 led to a decrease in the number of orthopaedic trauma cases in hospitals. Mumbai being the epicenter of Indian Covid-19 infection, the restrictions and precautions were heavily implied. Hence the need for a conservative approach to fracture management came to light versus the surgical fixation [2].

A similar trend was applied to a case series of three patients with

comminuted distal humerus fractures with articular involvement.

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

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

More common are complex metaphyseal and intra-articular fractures than simple fracture patterns. More than 95% of distal humerus fractures are of type C with articular extension and bicolunar 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].

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There are various modalities of treatment in these fractures like closed reduction and splinting, 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 a 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

A 52 years old male, came to our casualty with pain and swelling of the right elbow following a fall from bicycle after dash with a car 2 hours back. There was no history of any other trauma. The patient has a 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 a range of motion exercises till 12 weeks, followed by elbow strengthening exercises.

Follow-up range of motion is showed after 3 months in Figure 2,

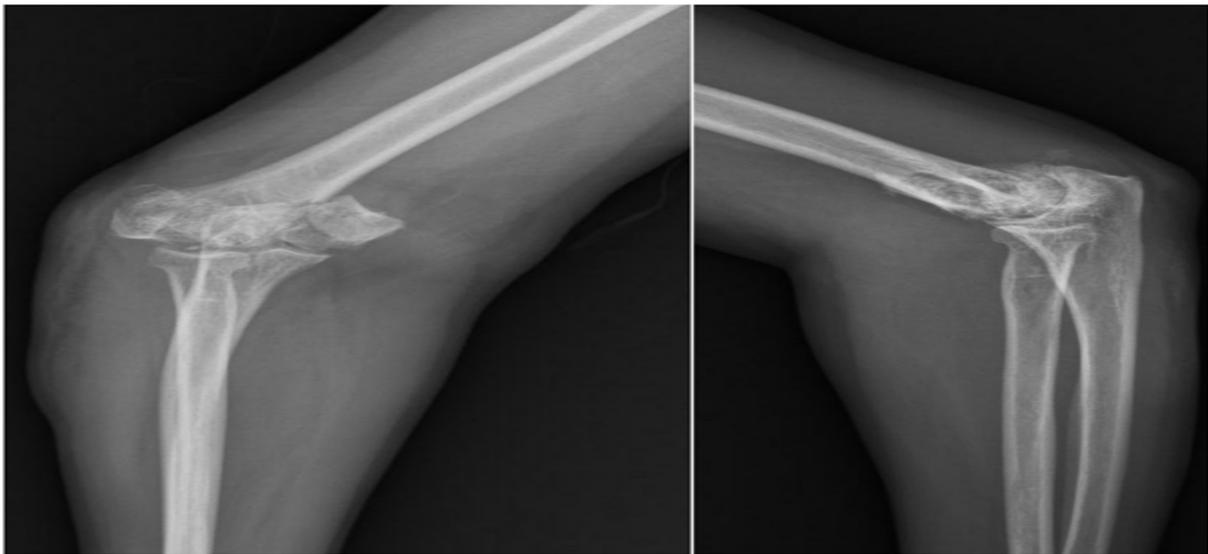


Figure 1: X-rays immediately after trauma showing comminuted intra articular distal humerus fracture.



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



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

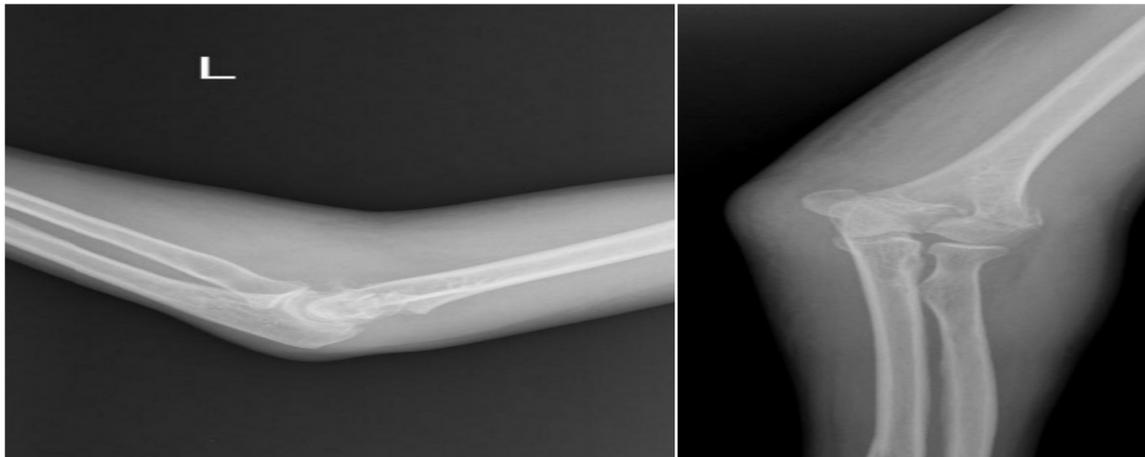


Figure 4: X-rays immediately after trauma showing comminuted intra articular distal humerus fracture.



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

with a bony union in x rays in Figure 3.

A 60 year old female, came to our casualty with pain and swelling of the left elbow following slip and fall at home 30 minutes back. There was no history of any other trauma. The patient has a history of uncontrolled diabetes on medications. X rays revealed left distal humerus comminuted 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 a range of motion exercises till 12 weeks, followed by elbow strengthening exercises.

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

Another 54-year-old male, came to our casualty with pain and swelling of the right elbow following skid and fall from motorcycle

while riding pillion 1 hour back. There was no history of any other trauma. The patient is a known case of hypertension and has a 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 a range of motion exercises till 12 weeks, followed by elbow strengthening exercises.

A follow-up range of motion is shown in Figure 8, with a bony union in x rays in Figure 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 a good range of motion arc up to

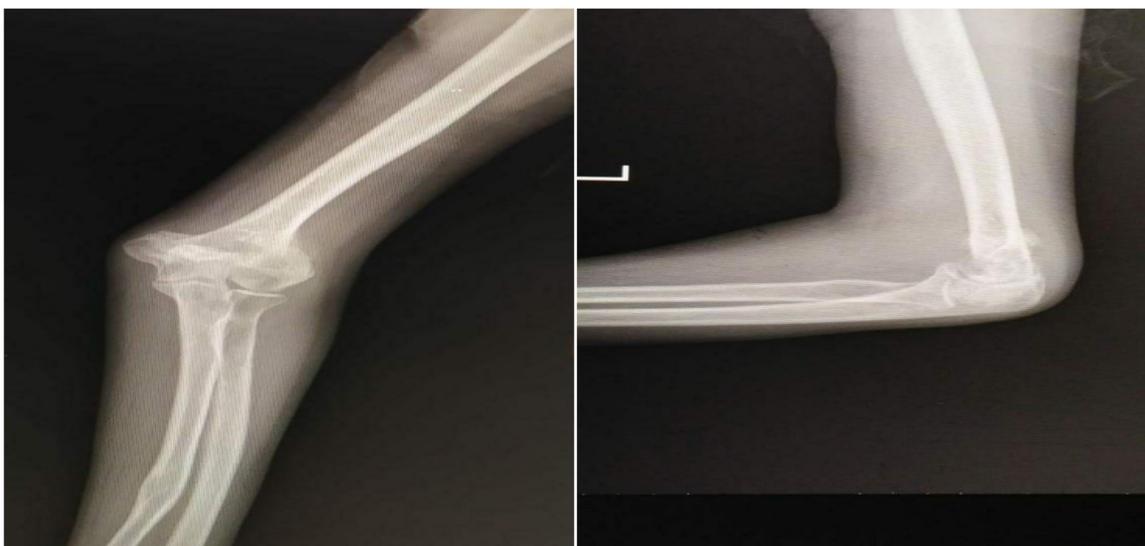


Figure 6: X-rays 3 months after trauma showing the bony union of distal humerus fracture.



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

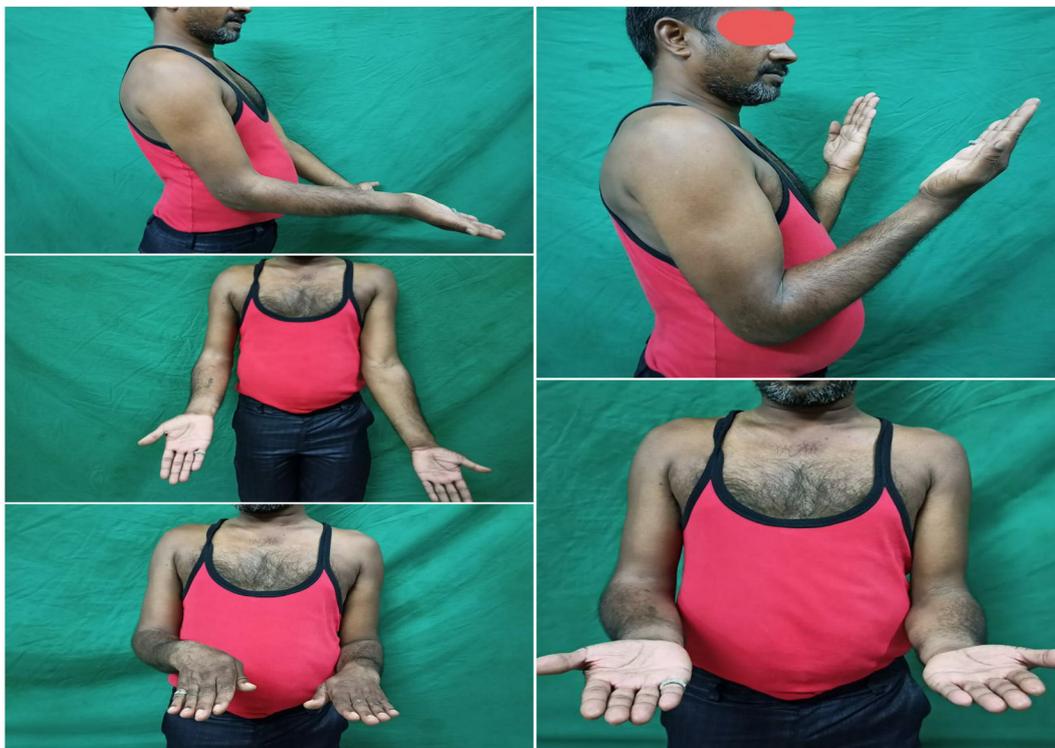


Figure 8: Clinical photos 3 months after trauma showing good functional outcome in flexion-extension arc being 80 degrees and supination-pronation arc of approximately 100 degrees.

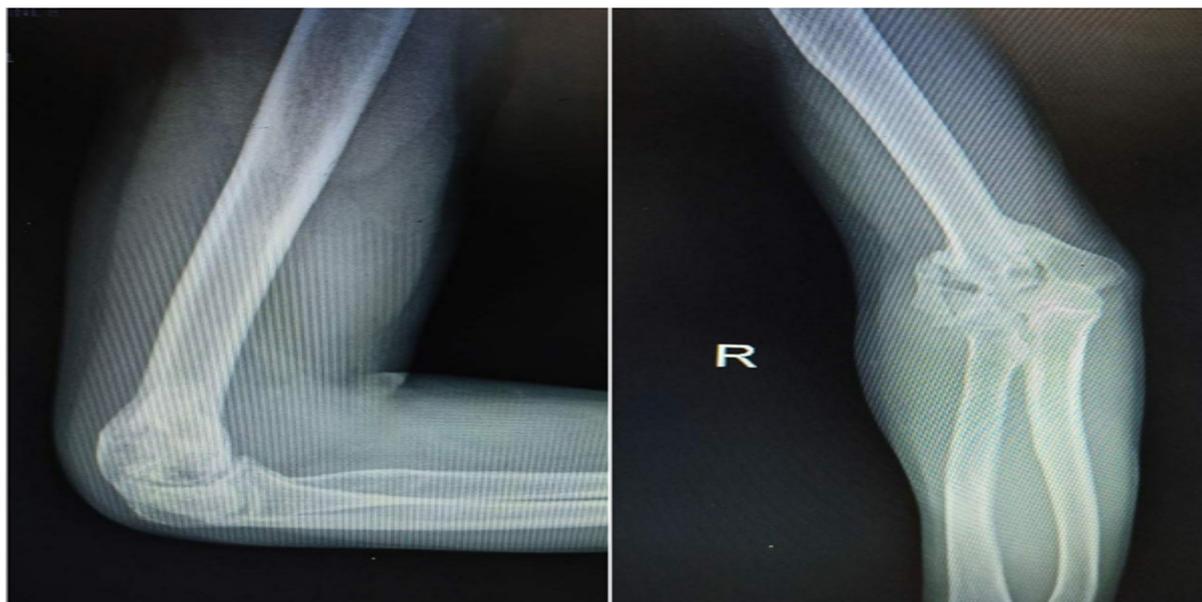


Figure 9: X-rays 3 months after trauma showing the bony union of distal humerus fracture.

100 degrees, allowing them to accomplish activities of their daily living satisfactorily. Follow-up x rays at 3 months showed good bony union.

DISCUSSION

During this pandemic, there is critical decision-making on hospital administration and individual care providers on how to conserve critical resources like N95 masks, personal protective equipment kits, oxygen beds, and ICU vacancies. Half of the doctors, nurses, and other hospital staff 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 daycare

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 amount 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 a non-articular medial epicondyle with a common origin for flexor muscles of the forearm. The lateral column becomes a lateral

epicondyle with a common extensor origin of the forearm which ends as capitellum. In sagittal view articular surface of capitellum and trochlea projects anteriorly by 40 degrees concerning the humeral axis. The trochlea is externally rotated by 3 degrees to 8 degrees and in 4 degrees to 8 degrees of valgus. The stability of surgical fixation depends on adequate reduction and internal fixation of these 3 structures with preservation of periosteal circulation. The proximity of the ulnar nerve to the medial epicondyle makes it susceptible to injury during exploration [4-11].

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

These fractures have been classified comprehensively by Muller, bicolunar 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 Multifragmentary

A3.2 Intact or Fragmentary Wedge

A3.3 Multifragmentary

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 Multifragmentary

B2: Medial Sagittal

B2.1 Transtrochlear

B2.2 Medial Articular Surface

B2.3 Transtrochlear Multifragmentary

B3: Frontal/Coronal

B3.1 Capitellum

B3.2 Trochlea

B3.3 Combo of Capitellum and Crochlea

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: Multifragmentary Articular [4,13]

In 1937, Eastwood described bag of bones as a technique for the 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 non-operative management of comminuted 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 an increased risk of anesthesia in such patients. Initial pain management with medications and appropriate splintage with early return to mobility by initiating an active range of motion with elbow strengthening exercises is the goal of this treatment. This helps in securing the osteocapsular envelope and prevents elbow stiffness. If even after 6 months the functional outcome of the elbow joint is unsatisfactory, then we can salvage the joint by total elbow replacement [3,14].

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

Factors like the angle between the axis of humeral condyles and the axis of the humeral shaft with articular congruity play a critical role in functional outcomes [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 the complex anatomy of the elbow, small comminuted fracture fragments, and a 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 the bag of bones therapy of brief immobilization technique followed by physiotherapy [13,16].

There is also a 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 to owe to their complex anatomy and surrounding soft tissue and neurovascular structures, especially in the elderly population with osteoporotic bone quality. Hence in the selected group of old debilitated and comorbid patients at times of COVID-19 pandemic, non-operative conservative management with a 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 anesthesia on frail old patients can be avoided. A functional range of motion of 100 degrees can be obtained eventually in both flexion-extension and supination-pronation movements.

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