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Original Research Article

A Hospital-Based Comparative Assessment of the Role of Conservative and Operative Treatment for Acute Scaphoid Fractures

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Abstract

Aim: The aim of the present study was to assess the role of conservative vs operative treatment for acute scaphoid fractures.

Methods: The present study was conducted in the Department of Orthopaedics, ESICMCH, Bihta, Bihar, India over a period of two years and we performed a prospective cohort study of all patients presenting to our OPD/ Casualty with a suspected or confirmed injury to the scaphoid. A total of 50 cases of acute scaphoid fracture (</= 3 weeks) were seen in a period of 1 year.

Results: There were 37 male as compared to 13 females. 60% had right side affected and rest had left side affected. According to Herbert Classification, most of the patients belonged to B2 followed by B1. According to the treatment options, 35 patients underwent conservative treatment and rest of the patients underwent operative treatment. According to the outcome, 45 patients had union and 5 patients had non-union.

Conclusion: The choice of operative or nonoperative treatment must be individualized based on the discussion of pros and cons of treatment with the patient. Early fixation promotes early mobilization & early return to work, avoids development of complications in future & improves over all functional outcome. Non-operative treatment has good results in case of acute, non-displaced stable fractures through the scaphoid waist and in distal pole without other bony or ligamentous injury and for scaphoid fractures in children.

Keywords: Acute scaphoid fracture, conservative treatment, operative treatment

Introduction

Post-traumatic radial-sided wrist pain is common and can represent a fracture, wrist sprain, ligament disruption or a combination of injuries. Previous studies have shown that a scaphoid fracture is the most common fracture among patients with post-traumatic radial-sided wrist pain. [1,2] Scaphoid fractures are notorious for being difficult to diagnose as well as to achieve fracture union. The serious consequences of non-union, such as progressive degenerative changes and carpal collapse, the so-called SNAC (scaphoid non-union advanced collapse) wrist have for patients, typically young and active, resulted in a restrictive treatment regime with immobilization from eight to 12 weeks. [3] However, in the case of the non-displaced scaphoid waist fracture, which is the most common among scaphoid fractures, it has been suggested that union can occur after just four to six weeks of immobilization. [4–6]

It is well known that scaphoid fractures can be difficult to diagnose on initial radiographs. In cases of suspected scaphoid fracture where the initial radiographs are negative, magnetic resonance imaging (MRI) is recommended for diagnostics, while computed tomography (CT) has proven more reliable and accurate in the assessment of scaphoid fracture characteristics and union. [7–9] Scaphoid waist fracture is a common type of wrist fracture [10] accounting for 51% to 90% of wrist fractures and 2% to 7% of total body fractures. [11,12] Because of the particular distribution of scaphoid blood vessels, blood circulation is often blocked after fracture of the scaphoid. [13,14] If blood

circulation cannot be properly restored, severe wrist dysfunction can develop. [15]

Firstly, scaphoid fracture is prone to be missed in clinical assessment & is usually neglected as simple wrist injuries. Adding to that, this notorious fracture is often missed in first x-ray immediately after injury. Second line of investigation is a matter of debate & varies from doctor to doctor & centre to centre. This does not end here. Once diagnosed, there is no clear-cut protocol for deciding appropriate treatment technique. There is controversy regarding whether to be managed conservatively or operatively. Both have their own pros & cons. If managed conservatively, there is again no agreement in the literature as to the optimum position of immobilization (extension, ulnar deviation, neutral) or type of cast (thumb-spica, interphalangeal [IP] free/IP included, long arm/short arm). Last but the most nuisant are the complications. Scaphoid fracture is known for its complications like AVN, Non-union, arthritis owing to its peculiar blood supply, position in wrist & shape. Management of these complications are again not free of confusions & controversies. [16]

The aim of the present study was to assess the role of conservative vs operative treatment for acute scaphoid fractures.

Materials and Methods

The present study was conducted in the Department of Orthopaedics, ESICMCH, Bihta, Bihar, India over a period of two years and we performed a prospective cohort study of all patients presenting to our OPD/ Casualty with a suspected or confirmed injury to the scaphoid. A total of 50 cases of acute scaphoid fracture (</= 3 weeks) were seen in a period of 2 years.

Inclusion Criteria:

1. All isolated acute scaphoid fractures (<3 weeks) irrespective of the location.

2. All scaphoid fractures as a part of other acute injuries like peri-lunate instabilities.

The attending orthopaedic surgeon at the Emergency department or OPD examined all patients with post-traumatic radial sided wrist pain, who were suspected of having a scaphoid fracture. The clinical examinations consisted of three diagnostic tests: A. tenderness in the anatomical snuffbox (ASB); B. scaphoid tubercle tenderness (STT); and C. pain on longitudinal compression of the thumb (LTC). If any of these tests were positive, the patients were referred for a radiographic investigation of the wrist). The initial radiologic examination of the wrist included posteroanterior, lateral view, scaphoid view, oblique (45 deg. Pronation) view of the wrist. If the radiology reveals no fracture, wrist was immobilized with below elbow slab & was instructed to review after 15 days. The same series of x-ray was repeated after 2 weeks. All patients were thoroughly counselled & instructed regarding participation in the study. If the patient accepted the invitation, they were enrolled in a prospective database, that included a patient questionnaire that sought information on sex, age, activity when the injury occurred (sport, traffic, work, or other), type of injury (fall, blow, or other), patho- mechanism (extension, flexion, or other), and high-energy trauma (defined as a fall from > 1 m of height), nature of previous treatment received & past medical history etc.

Each patient was closely observed & managed as per the recommended protocol. The pre-operative radiograph, range of motion, intra operative photographs, immediate post-operative radiographs, range of motion & X-Ray in subsequent follow up were collected. In case of a clinically suspected scaphoid fracture without radiological signs of a fracture, early functional treatment was started using a below elbow slab. Patients with persistent clinical suspicion of a scaphoid fracture are repeated radiological evaluation after 2 weeks of the trauma to evaluate the current treatment strategy and to potentially adjust the treatment strategy as a result based on the radiographic findings. Displaced fracture is the one with >2 mm gap at fracture site. Several authors have reported that scaphoid fractures not visible on initial x-ray films are “incomplete” or otherwise minor and will heal regardless of treatment. For practical purposes if a fracture is visible in all views immediately after injury, then it may be considered displaced. Otherwise a CT scan was done primarily to substantiate the clinical findings.

We advised for primary rigid fixation for all acute scaphoid fractures with consent of the patient. Those patients who were not agreed for operative procedure were managed with scaphoid cast (below elbow POP thumb- spica cast in glass holding manner sparing the IP joint of thumb with thumb in palmar abduction and the wrist in neutral or slight extension).

Post operatively, a posterior POP cast was used to support the wrist for the first two weeks and then, after the removal of sutures, limb was immobilized for 4 weeks in case of fresh fractures & for 6 weeks in case of non-unions. After 6 weeks removable splint was applied for 6 weeks & supervised physiotherapy was started gradually. Up to 12 weeks after surgery, patients were advised to avoid full loading of the wrist and to refrain from contact sports.

All patients were asked to attend for routine review at two and six weeks, three months, 6 month and one-year, additional visits being scheduled as required. Standard Scaphoid series radiographs were

taken at each visit and a full clinical assessment was recorded. Modified MAYO Wrist score was used to assess functional out-come of individual patient after treatment. Patients who failed to attend for the six-month review were sent a questionnaire and encouraged to return for late clinical and radiological assessment. Radiological results were more rigorously defined: fractures were recorded as united, only if cross- trabeculation was present and the fracture line was no longer visible on any of the four standard views.

Results

Table 1: Gender distribution

	Right	Left	Total
Male	22	15	37
Female	8	5	13
Total	30	20	50

There were 37 male as compared to 13 females. 60% had right side affected and rest had left side affected.

Table 2: Herbert Classification

Herbert Classification	Male	Female	Total
A1	6	0	6
A2	1	6	7
B1	4	8	12
B2	11	2	13
B3	4	4	8
B4	4	0	4

According to Herbert Classification, most of the patients belonged to B2 followed by B1.

Table 3: Treatment

	Poor	Fair	Good	Excellent	Total
Conservative	9	3	14	9	35
Operative	2	3	4	6	15
Total	11	6	18	15	50

According to the treatment options, 35 patients underwent conservative treatment and rest of the patients underwent operative treatment.

Table 4: Outcome

	Conservative	Operative	Total
Union	30	15	45
Non-union	5	0	5
Total	25	12	50

According to the outcome, 45 patients had union and 5 patients had non-union.

Discussion

Traditionally, nondisplaced and minimally displaced fractures have been considered by most surgeons to be stable. Several studies have demonstrated predictable rates of healing in association with conservative treatment for these types of fractures, ranging from 90% to 100%. [17-20] In contrast, displaced scaphoid fractures—defined by most authors as those with >1 mm of displacement—have been recognized as unstable fractures that are associated with a significant risk of nonunion if not treated surgically. [21]

The classical clinical tests described for patients with post traumatic radial wrist pain anatomical snuffbox tenderness, scaphoid tubercle tenderness and pain at longitudinal compression of the thumb & combinely, they have better specificity & sensitivity. Singh & Dias [22] described ASB tenderness, Effusion in USG, Scaphoid tubercle tenderness & Scaphoid compression test for diagnosing scaphoid fracture. Chen [23] has described the Scaphoid Compression Test, which is intended to discriminate scaphoid fracture from other causes of snuffbox tenderness. In his series of 52 traumatized wrists with snuffbox tenderness, he reports very high sensitivity and specificity of this test for scaphoid fracture. Others have not found such high

specificity. The test is, at least, sensitive for fracture on the radial side of the wrist and thus provides an aid to diagnosis. The absence of scaphoid tubercle tenderness makes a diagnosis of scaphoid fracture unlikely. There were 37 male as compared to 13 females. 60% had right side affected and rest had left side affected. Most common location of fracture reported by us was waist followed by distal oblique. Leslie & Dickson [24] also reported similar results. First-line of radiologic investigation in patients with a suspected scaphoid fracture is wrist radiographs which are described to be good at ruling out a fracture (high specificity). [25,26]

According to Herbert Classification, most of the patients belonged to B2 followed by B1. According to the treatment options, 35 patients underwent conservative treatment and rest of the patients underwent operative treatment. According to the outcome, 45 patients had union and 5 patients had non-union. Mink van der Molen et al. reported the time off work in carpal injuries to be 155 days in a cohort of 447 patients treated conservatively (98%). Most patients were young men with manual work. [27] The development of minimal invasive techniques in combination with an increasing demand from professional athletes of a quick functional recovery has evolved wrist surgeons globally toward offering percutaneous screw fixation of even un-displaced waist fractures to avoid plaster immobilization. [28,29] Operative treatment for scaphoid fracture ensures two advantages. [30-32] Firstly, patients will have an immediate fracture stabilization which is beneficial for healing and which allows for early return to normal activity. Secondly, preoperative assessment is insufficient for diagnosing the true nature of the fracture. Displacement and instability that are strongly associated with poor outcome, are most safely diagnosed in the operating theatre.

S. L. Filan, T. J. Herbert [33] in 1996 stated in his review that apart from the one case of screw protrusion, they do not attribute any late non-unions to failure of fixation. Several of our patients sustained further injuries to their wrist within three months of surgery, but in none of these was outcome affected adversely. They therefore questioned the relevance of recent work which has compared the mechanical properties of different fixation devices in cadaver or foam model scaphoids. Davis et al [34] calculated that open reduction and internal fixation would be cost saving compared to casting from a societal perspective. They also found that the late consequences in the form of secondary arthritis were actually less in the operated group than in the conservatively treated group.

Conclusion

The choice of operative or non-operative treatment must be individualized based on the discussion of pros and cons of treatment with the patient. Early fixation promotes early mobilization & early return to work, avoids development of complications in future & improves over all functional outcome. Non-operative treatment has good results in case of acute, non-displaced stable fractures through the scaphoid waist and in distal pole without other bony or ligamentous injury and for scaphoid fractures in children.

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