Upper Extremity Injuries in Children Maltreated by Traditional Bonesetters

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ABSTRACT

Introduction: To observe the findings of different upper extremity injuries in children maltreated by traditional bonesetters (TBS).

Material and Methods: From November 2018 to April 2020, fifty children aged between 5-15 years presented to our hospital with various upper limb injuries maltreated by traditional bonesetters. Upper extremity soft tissue and bony injuries treated by bonesetters and upper extremity malunited fractures less than 4 weeks old treated by bonesetters were included in the study. The type of injury, duration of injury and type of treatment administered by the traditional bonesetters was noted. The types of complications with which the patients presented were noted.

Results: Most of the cases (72%, 36 cases) were in the age group of 5-10 years with an average age of 8 years. There were 18 females (36%) and 32 males (64%). Fracture of both bones of forearm was observed in 31 (62%) cases, with fracture of less than 1 week duration in 24 (48%) cases and malunited fractures of 2-4 weeks duration in 7 (14%) cases. Supracondylar humerus fracture of less than 1 week duration was seen in 3 (6%) cases while malunited supracondylar fractures of 2-3 weeks old with elbow stiffness were seen in 3 (6%) cases. Distal radius physeal injuries were seen in 4 (8%) cases and distal radius fracures of less than 1 week duration were found in 7 (14%) cases. Compartment syndrome of forearm was seen in 1 case, Osteomyelitis of phalanx of thumb with septic sequale of IP joint was seen in 1 case, Osteomyelitis of distal radius was seen in 1 case. Among the fresh injuries, tight splints were seen applied in all forearm fractures with herbal preperations applied direct to the skin and ropes/bandages were seen tightly wrapped over the tight splints. Swelling of the distal portions of limb resulting from compression by the tight splint applied directly over the injured site was seen in all fresh injuries.

Conclusion: Different types of bone and soft tissue injuries of upper limb in children are frequently being maltreated by traditional bonesetters in rural villages. The majority of these cases report to the hospital with tight splints applied, resulting in complications or they report after a few weeks with malunited fractures. The complications resulting from traditional bone setter treatment can be avoided by educational programs by orthopedic practitioners and other health care professionals posted at peripheral rural hospitals.

Keywords: Traditional Bonesetter, Tight Splints, Children, Complications.

INTRODUCTION

The injuries in children most commonly result from falls like fall from hieghts, fall from stairs, fall from walls, fall from bicycles etc. Many of these injuries are treated by traditional bonesetters (TBS), who are abound in our community, in both urban and rural areas. A traditional bonesetter (TBS) is a lay practitioner of joint manipulation. He or she is the "unqualified practitioner" who takes up the practice of healing without having had any formal training in accepted medical procedures.[1] According to one estimate, between 10 to 40% of patients with fractures and dislocations in the world are managed by these unorthodox practitioners.[1] In a developing country like India, TBS are one of the largest specialist groups practicing traditional medicine.[2] Their numbers are superseded only by traditional birth attendants or Dais.[2] It is believed that there are about 70,000 traditional healers and bonesetters in India and that they treat 60% of all trauma.[3] The common practice of these TBS is to apply combined herbal and earthen concoctions on the limb followed by improper immobilization with a splint without recourse to anatomy, physiology, or radiology. Usually, the splint is tight and this results in swelling of the distal part of the limb and sometimes compartment syndrome and gangrene.[4] Displaced fractures of forearm bones usually remain unreduced resulting in malunion, nonunion and limb deformity.

This study was carried out to observe the spectrum of complications in case of paediatric upper limb injuries treated by traditional bone setters.

MATERIAL AND METHODS

This was a hospital-based study conducted at a peripheral hospital of North Kashmir from November 2018 to April 2020. The study was approved by Block Medical Officer of the hospital and consent was taken from guardians of all the cases. The study included 50 paediatric cases, aged between 5-18 years, from 27 different villages of north kashmirs

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Uri region. Upper extremity soft tissue and bony injuries maltreated by TBS and upper extremity malunited fractures less than 4 weeks treated by TBS were included in the study. Local examination of the involved upper limb was done for swelling, tenderness, deformity, distal neurovascular status, local temperature, wounds and blister formation. The type of injury, duration of injury and type of treatment administered by the TBS was noted. The types of complication with which the patients presented were noted.

In cases of fresh injuries, the tight splints were removed. Limbs were examined for soft tissue injuries and neurovascular status was rechecked. Limb elevation was advised for the swollen limbs and radiographs were taken.

RESULTS

Most of the cases (43 cases, 86%) were in the age group of 5-10 years with an average age of 8 years (Table – 1). Gender distribution is shown in table-2.

Different types of upper extremity injuries were observed (Table – 3). The most common type of injury noted was fracture of the forearm bones followed by supracondylar fracture of humerus. Among the fresh injuries, tight splints were seen applied in all forearm fractures with herbal preperations applied direct to the skin and ropes/bandages were seen tightly wrapped over the tigtht splints (Figure 1, 2 and 3). Swelling of the distal portions of limb resulting from compression by the tight splint applied directly over the injured site was seen in all fresh injuries (Figure 1).

Fracture of both bones of forearm was observed in 31 (62%) cases, with fracture of less than 1 week duration in 24 (48%) cases and malunited fractures of 2-4 weeks duration in 7 (14%) cases.

The fractures of radius and ulna of less than one week old were treated by close reduction and cast technique.

In malunited forearm fractures, the level of malunion was near to the physis and the deformity was in acceptable criteria range as per the level of the fracture and age of children. The loss of forearm supination of 20 degrees was seen in one child with malunited fracture of forearm bones.

Supracondylar humerus fracture of less than 1 week duration was seen in 3 (6%) cases while supracondylar fractures of 2-3 weeks old with elbow stiffness was seen in 3 (6%) cases. The treatment of supracondylar fracture depends upon the fracture type. In our cases, these fractures were type 1 and type 2 supracondylar fractures. Fractures less than 1 weeks duration were treated conservatively by plaster splints with elbow in 90 degree flexion. While type 1 and type 2 supracondylar fractures of more than 2 weeks duration were observed and range of motion was started.

Distal radius physeal injuries were seen in 4 (8%) cases and distal radius fracures of less than 1 week duration were found in 7 (14%) cases.

Compartment syndrome of forearm was seen in 1 case. Figure 7 shows the photograph of an eight year old boy with compartment syndrome of forearm and hand after application of tight traditional splint by a TBS in case of fracture of both bones of forearm.

Age (in years)	No. of patients	Percentage
5-10	36	72
11-15	14	28

Table–1:

Gender	No. of Patients	Percentage
Males	32	64
Females	18	36

Table–2:

Figure-1: Swelling of the hand and fingers resulting from compression by the tight splint applied directly over the fracture site in a 6 year old child with two days old distal radius and ulna fracture.

Figure-2: Tight wooden sticks applied directly over forearm in a 6 year old child with both bone forearm fracture.

Figure-3: Splintage with sticks, bandage, and ropes wrapped over herbal concoction.

Osteomyelitis of phalanx of thumb was seen in 1 case. Figure 8 shows photograph of a 6 year old child with 10 days old open dislocation of interphalangeal (IP) joint of thumb treated by TBS resulting into osteomyelitis of proximal phalanx and septic sequale of IP joint.

Osteomyelitis of distal radius was seen in 1 case. Diagrammatic illustrations of type of injuries of upper limb in children treated by TBS is shown in figure 1, 2, 3, 4, 5, 6, 7, 8.

S. No.	Age (in Years)	Sex	Side involved	Type of injury	Time since injury (in days)
1	6	M	L	Radius Ulna fracture	3
2	6	F	L	Supracondylar humerus fracture	4
3	12	M	R	Distal radius fracture	3
4	8	M	R	Malunited radius ulna fracture	16
5	5	M	R	Radius Ulna fracture	3
6	8	M	L	Radius Ulna fracture	5
7	5	F	L	Radius Ulna fracture	3
8	6	M	L	Malunited radius ulna fracture	20
9	11	M	R	Distal radius fracture	4
10	13	F	R	Osteomyelitis of distal radius	6
11	6	M	L	Radius Ulna fracture	2
12	5	F	R	Supracondylar humerus fracture	3
13	8	M	R	Malunited Radius Ulna fracture	18
14	7	F	L	Radius Ulna fracture	3
15	6	F	L	Malunited radius ulna fracture	21
16	11	M	R	Radius Ulna fracture	5
17	5	M	R	Radius Ulna fracture	5
18	12	M	L	Distal radius fracture	2
19	7	M	R	Radius Ulna fracture	4
20	8	M	L	Radius Ulna fracture	5
21	11	F	R	Radius Ulna fracture	4
22	9	M	L	Radius Ulna fracture	2
23	6	F	R	Distal radius fracture	1
24	7	M	L	Radius Ulna fracture	1
25	11	M	R	Radius Ulna fracture	2
26	11	F	L	Malunited radius ulna fracture	16
27	5	M	L	Supracondylar humerus fracture	2
28	8	M	R	Supracondylar humerus fracture	14
29	11	F	R	Radius Ulna fracture	4
30	6	M	R	Supracondylar humerus fracture	15
31	7	M	R	Radius Ulna fracture	4
32	6	M	L	Osteomyelitis of proximal phalanx and septic arthritis of IP joint thumb	10
33	11	F	L	Radius Ulna fracture	4
34	10	F	R	Radius Ulna fracture	3
35	8	M	L	Distal radius fracture	4
36	7	F	R	Malunited radius ulna fracture	20
37	8	F	L	Radius Ulna fracture	3
38	12	M	R	Radius Ulna fracture	4
39	7	M	R	Distal radius physeal injuries	3
40	5	F	L	Supracondylar humerus fracture	14
41	8	M	R	Distal radius physeal injuries	3
42	10	M	L	Radius Ulna fracture	3
43	6	M	R	Distal radius physeal injuries	4
44	8	F	L	Malunited radius ulna fracture	18
45	13	M	R	Radius Ulna fracture	2
46	12	M	R	Distal radius fracture	5
47	9	F	R	Radius Ulna fracture	1
48	6	M	L	Distal radius physeal injuries	4
49	11	M	L	Distal radius fracture	3
50	5	F	R	Radius Ulna fracture	1

Table–3: Type of injuries

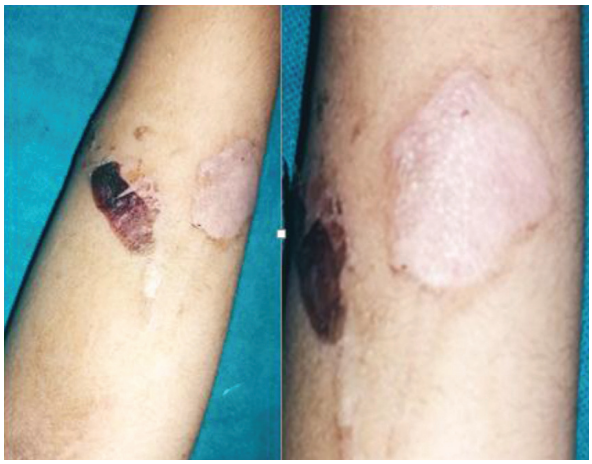

Figure-4: Healed blisters over forearm in an eight year boy with undisplaced type 1 supracondylar humerus fracture treated by tight splint around elbow.

Figure-5: Eighteen days old malunited fracture of distal radius and ulna treated by TBS. The child was sent to hospital for x ray by TBS after 18 days of fracture.

Figure-6: Twenty days old malunited fracture of distal radius and ulna treated by TBS.

DISCUSSION

In many parts of the developing world, large proportion of fractures continue to be treated by traditional bone setters (TBS) who are readily available and often have a good local reputation.[4] The practice is usually passed on from generation

Figure-7: Compartment syndrome of forearm and hand after application of tight traditional splint by a TBS in an eight year old boy with fracture of both bones of forearm.

Figure-8: Ten days old open dislocation of interphalangeal (IP) joint of thumb in a 6 year old child treated by TBS resulting into osteomyelitis of proximal phalanx and septic sequale of IP joint.

to generation along family lines but some outsiders also receive their training via apprenticeship.[5,6] There is usually no formal training curriculum, no basic qualification and the level of competence varies widely which accounts for most of the problems encountered with their practice. The usual practice of bonesetters is to apply herbal concoctions on the injured limb followed by application of improper splints using sticks, wood pieces, tight bandages, ropes and wires.

Complications arising from the practice of traditional bone setting significantly contribute to the challenges facing the orthopaedic practitioner.[7] These complications range from less severe ones like minor limb length discrepancies, malunion of fractures with minimal effect on function, to major ones like cellulitis, osteomyelitis, nonunion, nerve injuries, compartment syndrome and limb gangrene.

The complication of traditional bone setting treatment is usually a function of the method applied. Where splints have been applied, nerve compression, compartment syndrome, extremity gangrene and Volkmann ischaemia are known and regularly occurring complications[8,9,10] and where massaging and pulling are the preferred treatment option, they usually lead to hetrotophic ossification, non-union and infections

like cellulitis, osteomylitis, sepsis and tetanus.[11]

One serious complication resulting from TBS treatment is compartment syndrome and limb gangrene. The TBS apply traditional fracture splint to an injured limb whether there is fracture or not because radiological examination is not usually done. When splint is applied to the injured area, the post traumatic inflammmatory response to injury with accompanying swelling ensues, the inexpensible splint resists the swelling thus producing torniquet effect. This results into compartment syndrome which if not interfered with leads to distal limb gangrene. The blisters arising during the compartment syndrome phase rupture to leave raw surfaces, which gets infected from herbal concoctions usually applied with dirty hands as a part of treatment resulting in wet gangrene (Figure 7).

Compartment syndrome is rare after closed forearm fractures in children. Yuan et al.[12] found no compartment syndromes in 205 closed forearm injuries, and Jones and Weiner[13] reported no compartment syndromes in their series of 730 closed forearm injuries. A single compartment syndrome that developed during cast treatment of a 12-year-old female with a closed both-bone forearm fracture was reported by Cullen et al.[14]

In our study, one case of compartment syndrome of forearm was reported in an eight year old child with both bone forearm fracture resulting from a traditional tight splint applied by bonesetter. (Figure 7).

In our study, the fracture of both bones of forearm was observed in 31 (62%) cases, with malunited fractures of 2-4 weeks duration in 7 (14%) cases. Distal radius physeal injuries were seen in 4 (8%) cases and distal radius fracures of less than 1 week duration were found in 7 (14%) cases.

Fortunately, with significant growth remaining, many angular malunions of the distal radius will remodel.[15] The younger the patient, the less the deformity, and the closer the fracture is to the physis, the greater the potential for remodeling.[15] Distal radial fractures are most often juxtaphyseal, the malunion typically is in the plane of motion of the wrist joint (dorsal displacement with apex volar angulation) (Figure 5 and Figure 6), and the distal radius accounts for 60% to 80% of the growth of the radius. All these factors favor remodeling of a malunion. These malunited fracture should be monitored over the next 6 to 12 months for remodeling.[15] The malunion of radius and ulna shaft fractures can lead to an aesthetic deformity and loss of motion. Although paediatric bones have tendency of remodelling, which is more favorable in fracture which are near to the epiphysis, early malunited forearm shaft fractures in older children need surgical treatment. These malunited fractures are more difficult to treat as compared to fresh forearm fractures. Some authors have recommended more aggressive efforts at correction of forearm fracture malunions.[16,17] Early malunions (up to 4 or 5 weeks after injury) can be treated with closed osteoclasis under anesthesia. If closed osteoclasis fails to adequately mobilize the fracture, a minimally invasive drill osteoclasis can be done.[18] In our malunited forearm fractures, the level of malunion was near to the distal physis (Figure 5 and Figure 6). Although the loss of forearm supination of about 20 degrees was seen in one child with fracture of forearm bones, the resulting deformity was in acceptable criteria range as per the level of the fracture and age of children.

Supracondylar humerus fracture of less than 1 week duration was seen in 3 (6%) cases and were treated by closed methods while supracondylar fractures of 2-3 weeks old with elbow stiffness, were seen in 3 (6%) cases. The treatment of supracondylar fracture depends upon the fracture type. In our cases, these fractures were type 1 and type 2 supracondylar fractures. The fractures less than 1 weeks duration were treated conservatively by plaster splints with elbow in 90 degree flexion. While type 2 supracondylar fractures of more than 2 weeeks were observed and range of motion was started. Little has been written about how long after injury a fracture can still be closed reduced. Silva et al. reported on 42 type II SCH fractures which were treated 7 to 15 days after injury. They found closed anatomic reduction was achieved in all fractures, with equal outcomes to fractures treated within 7 days of injury.[19] The malunited supracondylar fractures leads to cubitus valgus or varus deformity, with loss of elbow range of motion depending upon the displacemet of fracture fragments.

Swelling of the distal portions of the limb with blister formation was most common findings seen in our cases. Osteomyelitis of phalanx of thumb with septic sequalae of interphalangeal (IP) joint of thumb occurred in one child with maltreated open dislocation of IP joint of thumb while osteomyelitis of distal radius was also noted in one case.

Despite the complications resulting from TBS treatment, there is a great demand for TBS services, and in fact some patients elect to leave orthodox hospitals in favor of treatment by a TBS. Possible reasons for this include cultural beliefs, ignorance, third-party advice, quicker and cheaper services by TBS, the nonavailability of orthopaedic centre in the vicinity, the fear of high cost of treatment and fear of amputation at an orthodox hospital.[6]

Although the study was carried out in a rural background and the level of orthopedic care available at our rural hospitals is less developed, the occurance of such spectrum of complications can be avoided by the educational programs via the health department. Instructional courses can be organized for the bone setters with visual images on splints, their complications and techniques of proper splint application. The orthopedic practitioners and other health care professionals posted at peripheral rural hospitals can play a significant role in these educational programmes. The traditional bone setters can be educated through such programs and such complications can be avoided. The education is to be given to common people living in these rural communities as well.

CONCLUSION

In remote hilly regions of north kashmir, different types of bone and soft tissue injuries of upper limb in children are frequently being maltreated by TBS. The majority of these cases report to the hospital with tight splints applied, resulting

in complications or they report to hospitals after a few weeks with malunited fractures. The complications resulting from TBS treatment can be avoided by the educational programs by orthopedic practitioners via the health department. The traditional bone setters can be trained through such programs. The orthopedic practitioners and other health care professionals posted at peripheral rural hospitals can play a significant role in these educational programmes.

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