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Use of Spoon As A Splint In the Management of Fracture of Distal Radius, In An Underprivileged Patient in General Practice Set Up : A Case Report With Brief Review of Literature.

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ABSTRACT: Fractures of distal radius account for up to 20% of all fractures treated in emergency department. Initial assessment includes a history of mechanism of injury, associated injury and appropriate radiological evaluation. Treatment options include conservative management, and surgical intervention by various methods.[1]

In medical practice, sometimes we face problems for which we do not have an answer or solution or we are very much helpless at that situation. Such problems arise not only in rural areas but in urban areas also. These problems are mostly associated with patients with poverty.

We report a Simple Splint designed as an alternative procedure when conventional application of plaster cast / slab for fracture at wrist, is not possible due to circumstances like non-affordability of the patient or non willingness due to lack of money or some personal reasons.

KEYWORDS- Splint for fracture at wrist, reverse Colle's fracture, Smith's Fracture

I. INTRODUCTION –

Distal radius fractures are one of the most common injuries encountered in orthopedic practice. They make up 8%−15% of all bony injuries in adults.[1]

Sir Abraham Colles, an Ireland surgeon, classically described the fracture in the Edinburgh Medical Surgical journal in 1814. He classically described the 'Dinner fork deformity' and the six displacements: dorsal displacement, dorsal angulation, lateral displacement, lateral angulation, impaction and supination. He also described the management of the fracture by closed reduction and cast application. The first description of this fracture has been attributed to Pouteau , the French surgeon. He described the fracture in 1783. In some parts of the world the fracture of the distal radius is called Pouteau's fracture. [2]

Sir Astley Cooper produced the first book to describe wrist injuries. ' Dislocations and Fractures of Joints' in 1822. [2]

Smith in 1854 described a volar angulated fracture of the distal radius with a 'Garden Spade' deformity. In the reverse Colle's fracture the hand and wrist are displaced volarly with respect to forearm. This fracture pattern included both extra articular as well as intra articular involvement and also formed part of the fracture dislocation of the wrist. [2]

Barton in 1838 described a fracture dislocation or subluxation in which the rim of the distal radius is displaced dorsally or volarly along with the hand and carpus.[2]

Chauffer's fracture was described as originally occurring due to backfire of the car starter handles in older models. It involves an intra-articular fracture of radial styloid of variable size. [1]

II. CASE REPORT-

A young boy of the age of 8-10 years was brought to the General Practice clinic of author (VLR) by a lady i.e. patient's mother with history of accidental fall, at a nearby construction site about an hour ago. The Lady was a labourer at that construction site. On clinical examination, the patient had swelling, tenderness and deformity at the left wrist joint. Probable clinical diagnosis of fracture of lower end of radius, (reverse Colle's fracture) without any significant displacement, was made. The fact was explained to patient's mother and they were advised to get X-rays of the left wrist, for confirmation of clinical diagnosis. They were further explained that, the reduction of the fracture and a plaster cast / slab would be necessary to relieve the patient's swelling and pain.

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However, the main problem arose / started there. The patient's mother was neither ready for any X-rays nor for any plaster cast / slab, because of lack of money. And she requested to do whatever could be done, to relieve her son. Due to this economical problem, , anti-inflammatory medicines, analgesics were given to patient from the author's (VLR) clinic itself and they were advised to go to Government Hospital or Civil hospital, or nearby Medical College hospital, for favour of free treatment. Despite this advise, she was not ready to take the patient to any of these places, not only for fear of expenses, but due to loss of wages. With tearful eyes, she requested repeatedly to do something as the management in the author's (VLR) clinic itself, and to give relief to her son.

After mindful thinking and applying knowledge in orthopaedics, that after reduction of the fracture, placement of fractured wrist / hand in normal resting position in a splint, (in case of fracture at wrist) would relieve the patient. To achieve such splintage, she was asked to bring a Tablespoon from her house.

Purpose of splint in fracture-

- To keep the fracture in normal resting position
- To reduce pain,
- To prevent movement of broken bone,
- To prevent further damage to muscles, nerves and / or blood vessels.

Preparation of splint –

- Material used for preparation of splint in this case was a Tablespoon, hard card board sheet, cotton ball or handkerchief ball or any cloth ball, gamjee roll, and adhesive tape (Fig. 1).
- The Tablespoon was bent in such a way that it took the angle of normal resting wrist, (i.e. dorsiflexion in this case) with the forearm (Fig. 2). The hard cardboard sheet was cut to the appropriate size as required so that it took the length and width of volar surface of the forearm.
- The bent spoon was then placed over one end of cut cardboard sheet and adhesive tape was applied around it, so that it got fixed, and did not slip or move from the cardboard sheet. The splint was then ready for application. (Fig. 3, 4 and 5).

Application of splint-

- After reduction of the fracture with gentle traction, the forearm was covered with gamjee upto wrist, then the splint was placed over it, so that the head of the spoon rested on the centre of palm.
- The cotton or cloth or handkerchief ball was placed over the head of the spoon / palm. Then roller bandage was applied around to stabilize the splint.
- Then the splinted forearm / limb was placed in a sling in supination. (Fig. 6).
- After application of this splint, patient's mother was instructed to get the X-rays of the wrist done and get plaster cast / slab applied from some hospital or consult orthopaedic surgeon as early as possible, as this was not complete treatment / procedure and plaster cast / slab was necessary and plaster should be kept in position at least for a month for proper recovery.

Objectives achieved by spoon splint-

- Wrist was immobilised in dorsiflexion and supination
- Keeping the forearm / limb in a sling with splint in position achieved the supination and elevation of the wrist / hand.

Results and Follow up –

- After about a month or more , the same lady & her son came in clinic with smile over face. She told that she kept that splint in position for three weeks and then removed it herself. Because of workload, she was unable to follow up, but then her son was well and there was no swelling at wrist or no problem for movements at wrist joint. Only little bit of pain was there on pressure.

Advantages of spoon splint-

- Easy availability of material,
- No extra cost of plaster cast / slab / readymade splints,
- Preparation and Application of the spoon splint was / is simple / easy.
-It can be prepared and used by any individual, after simple proper training.

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Fig. 1: Material used for preparation of Spoon splint.

Fig. 2 : The Tablespoon was bent in such a way that it took the angle of normal resting wrist, (i.e. dorsiflexion in this case) with the forearm.

Fig. 3,4,5 : The bent spoon was then placed over one end of cut cardboard sheet and adhesive tape was applied around it.
The splint was then ready for application.

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Fig.6: Clinical Photo (Demo) With Spoon Splint application.

III. DISCUSSION

Distal radius fractures are one of the most common injuries encountered in orthopedic practice. They make up 8%−15% of all bony injuries in adults.[1] Various types of fractures occurring at distal end of radius are as described above.

Every family care physician / General Practitioner see this fracture day in and day out and must have a basic knowledge regarding this fracture so as to provide effective treatment when appropriate.[1]

Mechanism of fractures –

Most of the fractures are caused by a fall on the outstretched hand with the wrist in dorsiflexion. The form and severity of fracture of distal radius as well as the concomitant injury of disco-ligamentary structures of the wrist also depend on the position of the wrist at the moment of hitting the ground.

The width of this angle influences the localization of the fracture. Pronation, supination and abduction determine the direction of the force and the compression of carpus and different appearances of ligamentary injuries.[1]

Classification of Fractures –

Earliest attempts at classification were made during the 1930s, foremost being by Nissen-lie. Gartland and Werley in 1951 and Lidstrom in 1959 developed systems of classification that were based on the presence of, not extent of, displacement at the site of fracture and involvement of radio-carpal joint.[1]

Frykman established a system of classification that identified involvement of radio-ulnar and radio-carpal joints along with the presence or absence of the fracture of ulnar styloid process. (Table 1).[3]

Melone reflected on both the mechanism and degree of injury to distal radius (excluding distal ulna) and the classification for selection of treatment. (Table 2).[4]

In 1993, Fernandez published a specified classification that separates the fractures of the distal end of the radius according to the mechanism of injury (Table 3).[5]

Radiographic Evaluation :-

1. **Plain radiographs -**

- Radiographic imaging is important in diagnosis, classification, treatment and follow- up assessment of these fractures.
- The routine minimal evaluation for distal radius fractures must include two views,

a postero- anterior (PA) view and lateral view. The PA view should be obtained with the humerus abducted 90 degrees from the chest wall, so that the elbow is at the same level as the shoulder and flexed 90 degrees. The palm is maintained flat against the cassette.

For lateral view, the humerus is adducted against the chest wall and elbow is flexed to 90 degrees. The wrist and hand are maintained in neutral rotation and held perpendicular to film cassette.[1]

2. **Computed Tomography –**

- CT may be useful and can give significant information in comparison with that obtained with conventional radiography in evaluation of complex or occult fractures.[1]

3. **Magnetic Resonance Imaging**

- Although this modality is not the first choice in evaluating acute distal radius fractures, it is a powerful diagnostic tool to assess bony, ligamentous and soft tissue abnormalities associated with these fractures.[1]

Treatment Options : -

The basic principle of fracture treatment is to obtain accurate fracture reduction and then to use a method of immobilization that will maintain and hold that reduction.

While the goal of treatment in fracture distal end of radius is restoration of normal function, the precise methods to achieve that desired outcome are controversial. Intra-articular fractures of distal end of the radius can be difficult to treat, at times, with traditional conservative method.

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A number of options for treatment are available to prevent the loss of reduction in an unstable fracture of the distal end of the radius.[1]

- **Closed reduction and casting** -

All fractures characterized by minor comminution, without or with minimal displacements can be considered for closed reduction and cast immobilization. Mainly type I and type IIA Melone's fracture can be managed conservatively. The fracture should be kept under closed observation to look for any re-displacement.

Despite the widespread acceptance of immobilization in a plaster cast, questions remain regarding the optimum position, the duration of immobilization and the need to extend the cast proximal to elbow. No clear consensus exists as to the best position for immobilizing the wrist in plaster.[1]

Sarmiento et al. advocated immobilization in a position of supination to decrease the deforming force of the brachioradialis, which may cause loss of reduction. In contrast, Wahlstrom recommended immobilization in pronation because he claimed that the pronator quadratus causes the deforming force most responsible for the loss of reduction. [1]

Most surgeons immobilize distal radius fractures in some amount of palmar flexion on the principle that dorsal periosteal hinge provides stability. However, the optimal position of hand function is with the wrist in dorsiflexion. Immobilization of the wrist in palmar flexion has a detrimental effect on hand function because dorsiflexion at the wrist is needed for proper rehabilitation of fingers. [1]

Other treatment modalities are :-

- **Pins and plaster technique** -

Placement of pins in the metacarpals and forearm was initially advocated by Bohler in 1923, but it gained popularity after the report by Green, who showed good or excellent results in 86% of his patients. However, he noted a high incidence of minor or major complications. [1]

- **Percutaneous pinning** -

Extra-articular fractures of the distal end of the radius with extensive comminution or the fractures that have no more than two articular fragments, in which anatomical reduction is obtainable, are amenable to percutaneous pinning of the fracture fragments and application of a plaster cast. A single pin placed through the radial styloid as a means of stabilizing the displaced fracture fragment was first suggested by Lambotte in 1908.[1]

Later, Depalma introduced the concept of large pin ulnar-radial pin fixation for the fractures of distal end of the radius with articular surface involvement.

Kapandji double intra-focal pinning and triple intra-focal pinning are the only methods that place 2 mm pins directly into fracture surface and then into the proximal radius. In effect distal fragments are never directly engaged but rather are buttressed in place. This is a safe, simple and effective method for treatment of unstable fractures of the distal radius.[1]

- **External fixation** -

External fixation is generally accepted as superior to plaster immobilization in the young patients with an intra-articular comminuted fracture of the distal radius. External fixation relies upon the principle of ligamentotaxis to apply traction and restore displacements.[1]

- **Limited open reduction** -

A new technique of combining external fixation with open reduction of the displaced lunate fossa through a small, longitudinal incision and elevation of the impacted fragment without direct visualization of the surface of the joint has been described. [1]

- **Open reduction and internal fixation**

One of the recent advances in treatment of distal radius fractures is the more frequent application of open reduction and internal fixation, especially for intra-articular fractures.

There are two groups of fractures for which open reduction and internal fixation is advisable. The first group includes the two-part shear fracture (Barton fracture), which actually is a radio-carpal fracture dislocation. The second group includes complex intra-articular fractures in which the articular fragments are displaced, rotated or impacted and are not amenable to reduction through a limited operative exposure.

- **Arthroscopic-Assisted Fracture Reduction**

Intra-articular fractures of the radius can be arthroscopically assessed, and reduction of the articular components and assessment and repair of ligamentous injury can then be undertaken.

The ideal timing for arthroscopically assisted distal radius surgery is 3 to 7 days after injury.

IV. CONCLUSION :-

Though it is recommended to use best treatment modalities available, we do face situations where it is not possible to apply knowledge given in the standard textbooks.

In such situations , out of the box or out of the textbook thinking may become a Necessity in order to tackle the crisis.

In our case of fracture of distal Radius, Splint from easily available materials like, Tablespoon, hard card board, roller bandages, etc was prepared and applied / used after reduction of the fracture.

The results in terms of healing of fracture were satisfactory.

Simple and low cost splints like this, Spoon splint and / or few other appliances (from same authors,) like, :- Zero Cost Abdominal Binder [6] ; Zero Cost Wrist Belt for Tying Head Injury Patients [7]; Zero Cost Scrotal Support / Scrotal bag [8] and Zero Cost Soft Cervical Collar [9] ; may come to rescue of the medical practitioner or healthcare worker who work as primary healthcare provider, in such a helpless situation as narrated above.

V. REFERENCES :-

[1]. Meena S, Sharma P, Sambharia AK, Dawar A. Fractures of distal radius: An overview. J Fam Med Primary Care 2014;3 (4) :325-32.

[2]. Namdev June, Ajay MB . Clinical profile of patients with fractures of distal end of radius International Journal of Orthopaedics Sciences2017; 3(1): 435-437.
DOI:
http://dx.doi.org/10.22271/ortho.2017.v3.i1f.63.

[3]. Frykman G. Fractures of the distal radius, including sequelae - shoulder-hand-finger syndrome, disturbance in the distal radio-ulnar joint and impairment of nerve function: A clinical and experimental study. Acta Orthop Scand 1967;108:3+.

[4]. Melone CP Jr. Articular fractures of the distal radius. Orthop Clin North Am 1984;15:217-36.

[5]. Fernandez DL. Fractures of the distal radius: Operative treatment. Instr Course Lect 1993;42:73-88. 15. Metz VM, Gilula LA. Imaging techniques for distal radius fractures and related injuries. Orthop Clin North Am 1993;24:217-28.

[6]. Yatindra Kashid, Vijay Renuke**.** Zero Cost Abdominal Binder. Rural Surgery. 2009; 5.2:17.

[7]. Yatindra Kashid, Vijay Renuke**,** Chetan Rathod, Chirag Sadiwala**.** Zero Cost Wrist Belt for Tying Head Injury Patients**.** Rural Surgery. 2010 (July); 6.3 : 22-23.

[8]. Vijay Renuke, Yatindra Kashid, Nazia Shaikh. Zero Cost Scrotal Support / Scrotal bag. Rural Surgery. 2011(Jan); 7.1: 21-22.

[9]. Yatindra Kashid, Vijay Renuke. Zero Cost Soft Cervical Collar. Journal of Surgical Specialties and Rural Practice. 2021 (Accepted for publication). Journal Homepage : http://www.jssrp.org/

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Table 1: Frykman classification of distal radius fractures

Fractures	Distal ulna fracture present	Distal ulna fracture absent
Extra-articular :	I	II
Intra-articular :		
*Radio-carpal joint involved	III	IV
* Radio-ulnar joint involved	V	VI
* *Radio-carpal+radio-ulnar joint involved	VII	VIII

Table 2: Melone's classification of intra-articular distal radius fractures

Fracture	Description
Type I	Four components (radial shaft, radial styloid, dorsal medial and volar medial fragment) are undisplaced or show variable displacement of the medial complex as a unit. Such fractures show minimal comminution and are stable after closed reduction.
Type II	There is significant displacement of the medial complex as a unit with a comminution of radial metaphysis and instability (die punch fracture) .
Type III	Displacement and instability are similar to type II, with the spike fragment of the radial shaft component often projecting into the flexor compartment (spike fractures).
Type IV	There is severe disruption of the radial articular surface and the dorsal and volar medial fragments show wide separation or rotation. There are extensive soft tissue damage and nerve injury (split fractures).
Type V	Fracture results from a severe force comprising both compression and crush that cause extensive comminution, often extending from the articular surface to the diaphysis.

Table 3: Fernandez classification of distal end of radius fractures :-

Mechanism of injury	Fracture type
Bending	Metaphysis fails due to tensile stress (Colles' and Smith fracture)
Compression	Fracture of the surface of the joint with impaction of subchondral and metaphyseal bone (die punch fracture)
Shearing	Fracture of surface of the joint (Barton fracture and fracture of radial styloid process)
Avulsion	Fracture of ligamentous attachments (fracture of ulnar and radial styloid process)
Combination	Combination of (1) - (4) and high-velocity injury