

STUDY OF COMPLICATIONS OF COLLES FRACTURE TO FIND OUT THE TRUE INCIDENCE OF EXTENSOR POLLICIS LONGUS TENDON RUPTURE AND CARPAL TUNNEL SYNDROME IN INDIAN POPULATION

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ABSTRACT: Colles' fracture is confined to adult and usually is seen in women over the age of fifty who have fallen on the outstretched hand. EPL tendon is the most common extensor tendon to rupture after colles' fracture. To our belief the incidence of median nerve injury and EPL tendon rupture given in literature are much higher than what we see now a days, so with this aim we carried this study to find out the true incidence of CTS and EPL tendon rupture in Indian population. **AIMS AND OBJECTIVES:** To study 100 patients with colles' fracture for true incidence of Extensor Pollicis Longus (EPL) Tendon rupture and Carpal Tunnel Syndrome (CTS) in Indian Population. **MATERIALS AND METHODS:** In our study 100 patients with colles fracture were followed up at regular intervals and were evaluated clinically and radiographically to rule out complications like EPL tendon rupture and CTS. **OBSERVATION AND RESULTS:** In our study, we found 0% incidence of CTS and EPL tendon rupture. **CONCLUSION:** Proper division of patients into displaced and un displaced fracture and treatment of displaced fracture being closed reduction and internal fixation with 'K' wires and then cast application in neutral position i.e. supination without flexion at wrist joint and properly advised physiotherapy after cast removal at one and half month should be advocated.

KEYWORDS: Colles Fracture, Extensor Pollicis Longus (EPL) Tendon rupture, Carpal Tunnel Syndrome (CTS).

INTRODUCTION: In 1814 Abraham Colles' described the fracture at the wrist which has since borne his name. He defined the injury as "a displaced fracture of lower end of the radius within one and half inches of the joint." The advent of radiography has confirmed that this description was accurate. Colles' fracture is confined to adult and usually is seen in women over the age of fifty who have fallen on the outstretched hand. The finding includes one or more of the following: dorsal angulation, dorsal displacement, radial displacement, supination, impaction, comminution, fracture of ulnar styloid (or rupture of the ulnar collateral ligament), with disruption of the lower radio ulnar joint. Stable fracture are treated by closed reduction and immobilization in plaster cast. Sarmiento advocated immobilization of the fracture with the forearm in supination position which keeps the distal radio ulnar joint in reduced position and minimizing the tendency of brachioradialis to cause the distal fragment to displace in a radial deviation.¹ Unstable fracture are treated by various methods such as percutaneous pinning of distal fragment, immobilization of

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the limb with pins incorporated in the plaster, metal external skeletal fixation devices, limited open reduction with or without bone grafting and extensive open reduction and internal fixation.² It is generally agreed that early reorganization and treatment of median nerve dysfunction is important in prevention of long term disability.³ Also, EPL tendon is the most common extensor tendon to rupture after colles' fracture. The site of EPL tendon rupture following colles' fracture is proximal to extensor hood. The time interval between fracture and rupture is usually 1 to 12 months. Its a known fact that the EPL in the region of lister's tubercle is poorly vascularized. Disruption is seen to be due to attritional and occurred at the distal edge of the retinaculum. In displaced fracture the extensor retinaculum is usually from the radius, which allows the tendon to be separated from the fracture site.³ To our belief the incidence of median nerve injury and EPL tendon rupture given in literature are much higher than what we see now a days, so with this aim we carried this study to find out the true incidence of CTS and EPL tendon rupture in Indian population.

AIMS AND OBJECTIVES: To study 100 patients with colles' fracture for true incidence of following complications -

1. Extensor Pollicis Longus (EPL) Tendon rupture.
2. Carpal Tunnel Syndrome (CTS) in Indian Population.

MATERIAL AND METHODS: The study is conducted over 100 cases of closed colles' fracture who attended Orthopaedic OPD. Patients of colles' fracture attended Orthopaedics OPD were assessed clinically and x rays were taken before reduction, pre operatively. All 100 patients were divided into two groups on the basis of whether the fracture is displaced or un displaced. Un displaced fractures were treated with closed reduction under C arm guidance and above elbow cast in neutral position. Displaced fractures are treated with closed reduction and internal fixation with 'K' wire. Both the procedures are done in the operation theatre under short general anesthesia. All the patients are discharged on the same day after giving instruction for follow up at 6 weeks, 12 weeks, and 24 weeks. After 3 weeks above elbow cast is converted into below elbow cast for elbow joint ROM (range of movement). After 6 weeks plaster cast or 'K' wire are removed and X ray was taken and was collected for analysis. At 6 weeks tingling/ numbness in finger tips and median nerve compression test are assessed for CTS. Thumb lift test is assessed for EPL tendon rupture. At 6 weeks phalens' test cannot be performed due to stiffness of wrist joint. After 6 weeks physiotherapy for wrist joint and fingers ROM was advised. At 12 weeks all the above mentioned test included phalens' test are performed and x rays are done for further analysis. At 24 weeks all tests and x rays are done. Patients showing positive clinical results for presence of CTS will be confirmed with EMG-NCV studies at 12 weeks. Patients with compound colles' fracture, associated ipsilateral wrist dislocation; Patients with Diabetes Mellitus, Myxoedema, Rheumatoid Arthritis were excluded from the study.

OBSERVATIONS AND RESULTS: Analysis is given according to age, sex and complication as seen during follow up.

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| AGE | MALE | FEMALE |
|-------|------|--------|
| 20-30 | 10 | 3 |
| 31-40 | 2 | 8 |
| 41-50 | 9 | 17 |
| 51-60 | 11 | 20 |
| 61-70 | 9 | 10 |
| >71 | 0 | 1 |

Table 1: Distribution of cases by age and sex

In our study 41 male and 59 female patients were seen youngest of the patient is 20 yrs old and oldest one is 73 yrs of age.

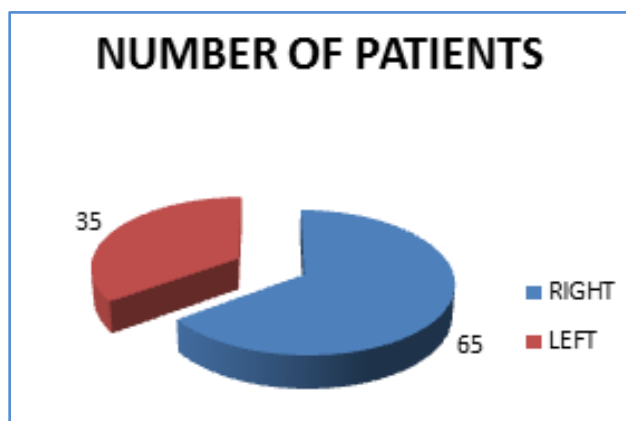


Fig. 1: Pie diagram showing the side of fracture

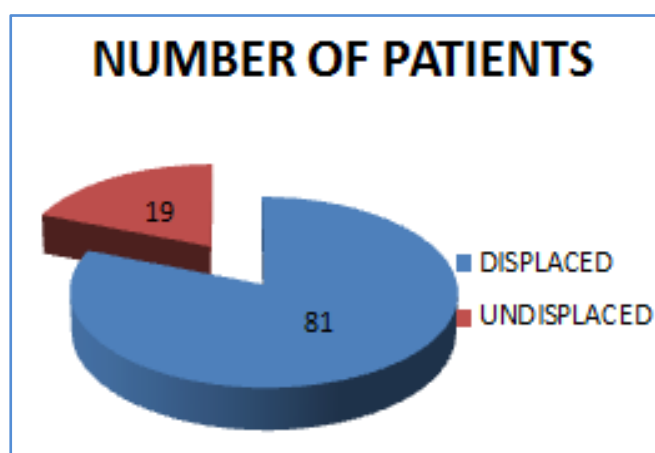


Fig. 2: Pie diagram showing the type of displacement of fracture

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| COMPLICATIONS | PERCENTAGE |
|--------------------|------------|
| CTS | 0% |
| EPL TENDON RUPTURE | 0% |

Table 2: Shows the rate of complications

In our study, we found 0% incidence of CTS and EPL tendon rupture.



Fig. 3a: Pre-operative X-ray of a case

Displaced colles fracture managed by CR and internal fixation by k wire and above elbow cast.

FOLLOW UP AT 6 WEEKS:

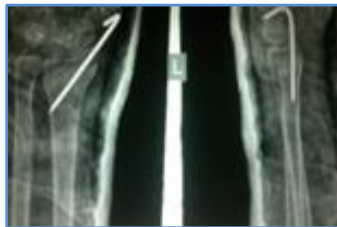


Fig. 3b: Post-operative X-ray of a case at 6 weeks follow up

TESTS AT 6 WEEKS:

- Phalen test: not done due to wrist joint stiffness.
- Median nerve compression test: negative.
- Thumb lift off test: negative.
- Tingling/ numbness in finger tips: negative.



Fig. 3c: Showing thumb lift off test at 6 weeks follow up

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TESTS AT 12 WEEKS:

- Phalen test: negative.
- Median nerve compression test: negative.
- Thumb lift off test: negative.
- Tingling/ numbness in finger tips: negative.



Fig. 3d: Showing thumb lift off test at 12 weeks follow up

TESTS AT 24 WEEKS:

- Phalen test: negative.
- Median nerve compression test: negative.
- Thumb lift off test: negative.
- Tingling/ numbness in finger tips: negative.



Fig. 3e: Showing thumb lift off test at 24 weeks follow up

DISCUSSION: Important pitfalls in the management of colles' fracture are loss of reduction and improper immobilization, lack of check radiographs at 7 to 10 days for the position of the fracture; palmar flexion beyond 20% in a splint or cast, and lack of advice to the patients about active movement of fingers and thumb, the elbow and the shoulder. There is certainly room for improvement in managing this common injury, but even its proper management cannot always lead to an acceptable result, especially in the middle aged and elderly women with osteoporotic bones.⁴ In our present study we are concerned about two common complications of colles'

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fracture i.e. CTS and EPL tendon rupture. Incidence of both these complications may be lower than previous studies which may be due to application of Colles' cast in neutral position of forearm in supination without palmar flexion at wrist. The other reasons may be no use of hematoma block or tight bandages and proper physiotherapy, early mobilization at one and half month. Immobilization of forearm in supination rather than pronation provides better position for maintaining normal alignment and minimizes deforming forces. The distal radio ulnar joint is unstable usually in displaced fracture and any radio ulnar subluxation or dislocation that exists is only increased by immobilizing the hand in full pronation. In the present study, we have divided patients into displaced and undisplaced Colles' fracture. Patients with displaced Colles' fracture were treated with closed reduction internal fixation with one or more 'K' wire and above elbow cast in neutral position under GA under C-Arm. Other patients with undisplaced Colles' fracture treated with closed reduction and above elbow cast in neutral position under GA under C-Arm. In previous studies, all Colles' fractures displaced and undisplaced were treated with closed reduction and below elbow cast application in palmar flexion and ulnar deviation i.e. cotton loder position. This position leads to median nerve compression. This may be the reason for higher incidence of complications in previous studies as compared to present study.

Colles' cast application do not always prevent these complications so use of 'K' wire for unstable fracture fixation is beneficial. Definite criteria for open reduction of Colles' fracture have not been completely formulated but for young adults having unstable fracture it should be opened.⁵ The incidence of CTS and EPL tendon rupture after Colles' fracture in various previous studies are as follows; Frymann noted peripheral neuropathy 3.5% in his series of 430 cases. He found that symptoms at the distal radio ulnar joint were most frequently related to fracture into joint combined with dorsal angulation and shortening of distal end of radius.⁶ Lidstrom believed that nerve injuries are rare after fractures of distal end of radius (slightly more than 1%).⁵ Bacorn and Kurtzke reported an incident of 0.2% and Schlesinger and Liss noted only one case per 1000 fractures.⁷ Stewart HD studied 245 patients with displaced Colles' fracture and found incidence of 17% CTS at 3 months which regressed to 12% at 6 months.⁸ Wainapel SF studied 33 patients with unilateral Colles fracture by clinical and electrodiagnostic methods and found incidence of 12.1% CTS.⁹ In our study incidence of CTS is found to be 0%. In 2007, Owers KL was reported it to be 0.2 to 3% after Colles fracture.¹⁰ Roth KM, Blazar PE has done a retrospective study of distal end radius fracture between 2006 and 2009 using their sequential radiographs. He identified 3 EPL ruptures out of 61 non-displaced fracture with incidence of about 5%. These occurred at an average of 6.6 weeks after distal end radius fractures.¹¹ Our present study does not correlate with the above mentioned studies and the incidence of rupture of EPL is found to be 0%.

SUMMARY AND CONCLUSION: Sir Abraham Colles' first described in 1814, most commonly occurring fracture of lower end of radius, so it is named as the Colles' fracture. All that time he described and managed it by closed reduction in splintage, such as plaster cast, till today we follow him. Later on many medical people, carried out study on this fracture and found out, various complications, while treating. They published papers on the various complications they found in their study. The percentage of complications, they published, till not uniform in number, might be due to the different types of treatment modalities and facilities. In our study, patients

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selected were on OPD basis and divided into displaced and un displaced and treated accordingly by 'K' wire with cast application and closed reduction cast respectively.

In present study we have studied only two complications of colles' fracture i.e. CTS and EPL tendon rupture. The incidence that we have found is 0% for CTS and 0% for EPL tendon rupture which are lower than the previously recorded incidences. This may be due to proper division of patients into displaced and undisplaced and treatment of displaced fracture being closed reduction and internal fixation with 'K' wires and then cast application. The reason for lower incidence may be application of cast in neutral position i.e. supination without flexion at wrist joint and properly advised physiotherapy after cast removal at one and half month and thereafter.

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