

Incidence of early complications of close reduction & manipulation of Colles' fracture, Our experience

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ABSTRACT:

Objectives: The objective of our study was to determine the frequency rate of early complications of the closed treatment of Colles' fracture and assess the common factors responsible for these complications.

Methods: Our study was a descriptive prospective study. The study was conducted in Jinnah Postgraduate Medical Centre Karachi Pakistan, from June 2018 to May 2019. We included 150 patients of Colles' fracture with an age range between 40 to 70 years. One hundred fifty patients of Colles' fracture were managed by close manipulation under local hematoma block and intravenous sedation and below elbow dorsoradial slab was applied and after reduction again X-rays were taken. Patients were sent home with the advice that if they develop swelling of finger or change in color or increase in pain, numbness in hand they should report immediately to the orthopedic department for management. They were called weekly for the first two weeks then after two weeks for a total period of six weeks. The complete POP cast was applied after one week and Re - manipulation was done if required during follow-up visits.

Results: Out of 150 cases reduced by close manipulations under local hematoma block, thirty-six (24%) patients after one week of follow up had loss of reduction and these patients were given trial of re-manipulation. Fifteen (10%) patients developed reflex sympathetic dystrophy, aggressive Physiotherapy and sympathetic blockers and analgesia resolved this problem in all patients. Five (3.3%) patients developed acute carpal tunnel syndrome after one week and managed with an immediate change in the position of the wrist and active physiotherapy. Ten (6.66%) patients developed plaster sore, managed by debridement, and extra padding over the pressure area. One (0.6%) patient developed impending compartment syndrome of forearm, on the 3rd day and was managed by loosening of constricting bandage and elevation off hand.

Conclusion: To evaluate the factors leading to an early complication during the closed treatment of Colles' fracture. Prompt recognition of complications and immediate intervention can minimize the functional loss, diminishes disability and improve all outcomes of the of injured limb.

Keywords: Colles' fracture, Close manipulation, complications, wrist fracture

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INTRODUCTION:

Distal radius fractures within 2 cm of the articular surface of the radius with dorsal angulation in adults are named as of Colles' fracture¹. It was described by Poteau in 1783 and Abraham Colles' in 1814², who described it as having as characteristics dinner fork deformity on clinical presentation⁴. Colles' fracture affects commonly 17% of postmenopausal women over the age of 50

years and it is considered the commonest among osteoporotic fracture⁵. Initially thought to be simple, it is now recognized as a complex injury with a high percentage of long-term complications⁷. That includes malunion, stiffness and painful wrist. Such patients have difficulties in carrying out normal activities of daily living⁷. The basic treatment principle is to reduce fracture accurately and maintain the reduction with

plaster in normal physiological way so that hand can be rehabilitated. There are various options available for distal radius fracture treatment ranging from back slab / cast to various forms of operative fixation⁸. In United States, “a study was carried out to compare the results of conventional manipulation with those finger trap traction for close reduction of the Colles’ fracture on the radiograph outcome measure in a prospective randomized trial. In conclusion, they failed to demonstrate differences in the radiographic outcome of Colles fracture treated with both methods i.e. manual manipulation as opposed to reduction with finger trap traction. Loss of reduction during the period of cast immobilization is common in both methods”⁹. The complications from Colles’ conservative management are being recognized and reported with increasing frequency. The prevalence of early complications following Colles’ fracture ranged from 20-31%^{10, 11, 12} and includes displacement of fracture fragment, after initial close reduction. The common complications are soft tissue complications like pressure sores, stenosing synovitis, rupture of extensor pollicis longus tendon, contusion, entrapment and compression of nerves. Compartment syndrome, vessel laceration and reflex sympathetic dystrophy¹⁴. The purpose of our study is to evaluate the factors leading to an early complication during conservative management of Colles’ fracture.

Methods:

This was a hospital based descriptive prospective study and was conducted in Jinnah Postgraduate Medical Centre Karachi Pakistan, the duration of study was from June 2018 to May 2019. We included 150 patients of Colles’ fracture with age range between 40 to 70 years. Patients with isolated Colles’ fracture, patients with above 40 years age, presented within 7 days (one-week) after injury were included in the study. Those patients with more than one fracture, open fractures, neglected fractures more than one week were not included in the study. All those who presented in our Emergency department with distal radius trauma were sent for x-rays. Anteroposterior and lateral view x-rays were taken and fracture distal radius with dorsal angulation was diagnosed as Colles’ fracture. The x-rays different angles were measured in a standard way to measure the degree of reduction and radiological follow-up. The radial height 13mm, radial inclination 23 degree and volar tilt 11 degree were used as normal measurements. Patients were initially followed up weekly basis for the first two visits. On every follow-up visit, they were assessed for early complications and change

of dorsoradial below elbow back slab to complete cast. Every patient was informed about plaster related complications. After applying complete cast at first visit patients were instructed to report after 2 weeks up to 6 weeks. After this time plaster was removed and patients were instructed for wrist mobilized by active movements, strengthening of grip, and physiotherapy. Patients were followed up further on 3rd and 6th month to see the clinical condition and radiological movement. In our study the qualitative variables were measured by their percentage, frequencies and compared with chi-square test. 95% confidence interval of various extents were also calculated.

Results:

A total number of 150 patients entered the study from June 2018 to May 2019. A study included patients with Colles’ fracture of either sex between 40-71 years of age. Out of 150 patients, 105 (70%) were female and 45 (30%) were male and 110 (73.3%) patients had universal type I and 120 (80%) patients had universal type II. At the time of initial presentation skin changes (pressure sores) over the fracture site presents in 6 (4%), swelling in 140 (93.3%) tenderness in 150 (100%), restricted movements of wrist in 135 (90%), median neuropathy in 2 (1.33%). Mean age was 55.44 + - 8.69. All patients underwent close reduction and dorso radial slab application for one week followed by plaster cast below elbow. There were 36 (24%) patients who develop loss reduction after one week follow up. The fractures were re-manipulated and new plaster cast was applied. 15 (10%) patients develop reflex sympathetic dystrophy after 5 weeks and intensive active physiotherapy, sympathetic blockers and analgesics resolved. This complication in all patients is within 4 weeks after initial recognition. 5 (3.3%) patients develop with clinical features acute carpal tunnel syndrome after one week, which was managed with an immediate change in the immobilization position and the wrist and active physiotherapy. 10 (6.6%) patients had pressure sores due to plaster cast, were managed by applying extra cotton padding over the pressure areas. 1 (0.6%) patient presented with symptoms and signs of impending compartment syndrome of forearm on day of reduction which was managed by removal of plaster cast constructing bandages, elevation, active physiotherapy and analgesia.

Table 1: Gender		
	Frequency	Percentage
Male	45	30
Female	105	70
Total	150	100

Table 2: Different parameters of study	
Universal Type I	110 (73.3%)
Universal Type II	120 (80%)
Pressure Sores	6 (4%)
Median Neuropathy	2 (1.33%).
Restricted Movements	135 (90%),
Tenderness	150 (100%),
Loss Reduction	36 (24%)
Reflex Sympathetic Dystrophy	15 (10%)
Acute Carpal Tunnel Syndrome	5 (3.3%)
Pressure Sores	10 (6.6%)
Compartment Syndrome	1 (0.6%)

Discussions:

“Colles’ fracture is common injury affecting 17% of women over the age of 50 years”¹⁵. The characteristic of this type of fractures is dorsal and radial angulation with shortening of height of radius at the wrist. If they are allowed to unite in this malposition functional outcome will be very poor¹⁷. “Nevertheless, it seems age, as well as geography, influence the selection of treatment methods for distal radius fractures”^{15, 16}. “The optimal treatment for osteoporotic DRFs is controversial. These fractures may be comminuted and associated with several fracture fragments”⁶. The most common treatment is closed reduction to restore fracture alignment. The mechanism of this fracture is usually fall on outstretched hand. The exact mechanism of this fracture is not clear but usually bending movement induces compression stress on palmar surface resulting in the comminution of the dorsal cortex. This explains why there is generally a sharp fracture line on palmar aspect as compared to dorsal cortex, which is usually comminuted¹⁸. In closed reduction, the fracture is unwedged and reduced by reversing the mechanism of injury and immobilized in appropriate position. Cast immobilization relies on the principle of three points loading. This is accomplished by placing the wrist in palmar flexion and ulnar deviation, while molding the plaster over poster-lateral surface of

wrist and antero-medial forearm. In this study 36 (34%) patients develop loss of reduction within one week. However, Colbert and Isacon²¹ report 87% of fracture displaced again and require re-manipulation between 1 and 15 days. Whereas 2nd re-manipulation after reduction in 24% case was not required in our cases. Older⁵ found a small change distal radius height after complete treatment. The prevalence of reflex sympathetic dystrophy after Colles’ fracture is between 0.1%-26%²¹. Fifteen (10%) patients develop reflex sympathetic dystrophy after five weeks follow up, intensive physiotherapy, analgesic and sympathetic blockers frequently resolve this complication. According to Kopylov¹⁴ reflex sympathetic dystrophy is a syndrome with severe pain, stiffness and tenderness, early vasomotor instability. Joint contractures may develop after atrophy of skin and subcutaneous tissue in later stages of reflex sympathetic dystrophy, this condition is also associated with regional osteoporosis. They confirmed it with dolorimetry, which determines the quantitative index of pain threshold¹⁷. The risk of acute carpal tunnel syndrome when immobilizing Colles’ fracture wrist in 40 degree of flexion is 43% and risk in 20 degree of flexion 13%⁶. The incidence of median neuropathy after Colles’ fracture is seen from 0.7 to 79%³. In this study 5 (3.3%) patients having acute carpal tunnel syndrome after a week follow up, which was

managed with an immediate change in the immobilization position of wrist and active physiotherapy. Median nerve is most commonly involved in neurological complications. It is in close to the distal part of the radius and its internment within the carpal tunnel predisposes injury to median nerve. Anatomical studies have documented the nerve to be located 3mm away from the anterior surface of radius close to wrist. Following Colles' fracture, it was observed that nerve was close within 2mm of the distal fractured part of the radius and to be angulated over the proximal fragment and causing compression and carpal tunnel syndrome after Colles' fracture. Ten (6.6%) patients having pressure sores after 5th day of dorsoradial slab, which was managed by applying extra cotton padding over the pressure area. The prevalence of compartment syndrome following Collis's fracture is less than 1%¹³ Technique of immobilization can also contribute in increasing chances of compartment syndrome. Physical examination reveals swelling and tense compartment, paresthesia in the fingers and hand over median nerve distribution area. There is increase in pain in passive extension of the digits or wrist. If patient presents with early signs of compartment syndrome immediately all bandages should be removed and assessed properly. If speedy improvement does not occur, fasciotomy is necessary¹⁴. Niaz¹³ suggested fasciotomy when the pressure exceeds 40 Hg as measured using a continuous infusion technique.

Conclusion:

The descriptive randomized study shows that bony and soft tissue complications can result from Colles' fracture, so it is very important to know early possible complications. The prompt recognition with early intervention can save the limb and minimize functional loss, diminishes disability and improves the overall outcome of the injured extremity. The Abraham Colles' about Colles' fracture stated: "One consolation only remains, that the limb will at some remote period again enjoy perfect freedom in all its motions and be completely exempt from pain, the deformity however, will remain undiminished throughout life"².

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