REHABILITATION AFTER COLLES' FRACTURE

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SUMMARY: Colles' fracture is a common type of injury. In order to improve hand, wrist and elbow functions appropriate rehabilitation program should be applied soon after the orthopedic intervention. In the present study, physical treatment was given to 55 patients with Colles' fracture. The treatment procedure consisted of physical exercise and paraffin application. We compared pretreatment and post-treatment degrees of flexion, extension, radial and ulnar deviation, supination and pronation of the wrist. We achieved satisfactory results following physical therapy of the wrist. Rehabilitation program is of utmost importance in Colles' fracture so it should be applied soon after the orthopedic manipulation.

Key Words: Colles' fracture, rehabilitation.

INTRODUCTION

The extension fracture occurring 2 cm below the radioulnar joint is referred to as Colles' fracture. It is a very common injury, where the styloid of ulna is broken in approximately 50% of the patients. The X-ray roentgenograms reveal fork-back deformity on the lateral view, whereas the distal part of the joint is laterally displaced on the dorsal aspect. Pronation and supination of the wrist is very restrictive and painful (1,2).

The conservative treatment consisting of closed reduction and application of circular cast brace below elbow to metacarpal joint for a period of 6 weeks gives promising results. Operative treatment is indicated for patients with widely displaced fractures or with loss of reduction and mobility to reestablish joint congruity by closed treatment. Cast brace of forearm is applied for 6 weeks (1,3).

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Flexion fracture of forearm is called as Smith' fracture or reverse Colles' fracture, where distal fragment is angulated volary. It is rarely seen. Open and close reduction techniques produce similar results in treatment of Colles' fracture.

Reflex sympathetic dystrophy, lesion of the n. medianus and m. abductor pollicis longus, luxation of the radioulnar joint are the complications of both types of fractures. Epyphysolysis can be observed in young adults and it interferes with bone growth (1,2,4). Rehabilitation is of spectacular importance in Colles' fracture.

The aim of the present study was to evince the importance of the early rehabilitation program in patients with Colles' fracture.

MATERIALS AND METHODS

Our study included 55 outpatients (25 males, 30 females) attending to Ankara Numune Hospital with Colles' fracture. The mean age for male and female was 39 $\pm$ 26 and 37 $\pm$ 12

respectively. Routine laboratory tests and x-ray roentgenograms were made in all patients.

All patients were treated by closed reduction and the application of an below dorsal elbow cast immobilizing the wrist in 20° palmar flexion and in 20° ulnar deviation for 6 weeks.

Physical treatment was applied for all patients 7-8 weeks after the Colles' fracture had occurred. All patients were treated with paraffin for 15 minutes and exercise for 15 minutes Flexion, extension, radial and ulnar deviation, supination and pronation of the wrist were recorded before and after the physical examination.

RESULTS

-Flexion of the wrist after physical treatment increased significantly compared to pretreatment degrees ($p<0.001$).

-Extension of the wrist after physical treatment increased significantly compared to pretreatment degrees ($p<0.001$).

-Radial deviation of the wrist after physical therapy increased significantly compared to pretreatment degrees ($p<0.001$).

-Ulnar deviation of the wrist after physical treatment increased significantly compared to pretreatment degrees ($p<0.001$).

-Supination of the wrist after physical treatment increased significantly compared to pretreatment degrees ($p<0.001$).

-Pronation of the wrist after physical treatment increased significantly compared to pretreatment degrees ($p<0.001$).

When the wrist functions of the patients were compared for sex and age, no correlation was noted between pretreatment and post-treatment values ($p>0.05$). Wilcoxon test, Correlation Analysis, Mann-Whitney-U test (for sex) and Student's t test (for sex and age) have been used for statistical analysis.

DISCUSSION

Colles' fracture is frequently encountered in clinical setting. A wide variety of methods have been described, including reduction and immobilization of the wrist and forearm in various positions, external fixation and open reduction with internal fixation. However, the best therapeutic option still remains controversial. Immobilization of the wrist in Colles' fracture consists of three different ways; immobilization in palmar flexion, neutral position and dorsal flexion. When the wrist is immobilized in palmar flexion, stiffness seems likely to occur in fingers especially in the metacarpo-phalangeal joints (5-8).

Axial shortening may be the result of Colles' fracture. Warvick *et. al.* demonstrated a correlation between shortening of the radius and functions. Lindstrom and Smail found no change in functions after 3 months (7,9,10).

Axial shortening in the radius is one of the major complications in Colles' fracture. 1-2 mm shortening usually occurs. Minor relative shortening of the radius alternates the axial forces passing through the wrist to a marked extent (7,11-13). Shortening of the radius is the most significant radiographic finding one week after the reduction. Bacorn and Kurtzke supported this idea and they demonstrated impairment of disc functions of the joint. Involvement of radio-ulnar joints indeed results in weakness of grip functions rather than loss of range of motion. The greater is the shortness in radius, the greater is the chance of developing weakness in grasping function (12-14). In our study shortening of the radius was observed in 18 patients.

The physical therapy program of the Colles' fracture consists of muscle strengthening, recovery of range of motion, wound healing and scar adhesion. Early reduction of oedema is of primary importance in determining hand functions. Elevation of the hand higher than the heart and active range of motion exercises were instructed to facilitate the pumping action of hand muscles to decrease swelling.

Flexion and extension movements of the hand 15 minutes for each are rendered. The hand is kept in both cold and hot water in order to augment venous return. Exercises help decrease musculotendinous stiffness and joint capsule contractures. The joint should be kept in neutral position. Heating and paraffin application are also necessary. The hand is wrapped up with paraffin

for 20 minutes of treatment. Exercise programs seek strengthening both extrinsic and intrinsic muscle groups of the hand (6,15).

Scarring or tendon adhesion often complicates progress in rehabilitation. Deep transverse friction massage is very useful in improving mobility of the scar tissue and increasing range of motion. Exercise programs are very important in rehabilitation. Exercise programs consists of passive range of motion, transverse scar massage, progressive resistive exercise, massage and active range of motion exercises. Exercise combining shoulder-elbow and thumb range of motion should also be included in the program. Treatment also may include graded active motion, clinics and home activities and splinting.

Activities include the 'Wall walking' with the fingers, bilateral paper ripping, circular 'dusting', simple 'blackboard writing' and drawing tasks, various opposition and pinching exercises. These activities are graded according to resistance, type of motion and grasp strength. Generally rehabilitation programs begin 7-8 weeks after the injury (6,5,16). Splinting helps develop the range of motion.

In our study patients attend to the rehabilitation program at 7th week of the injury. Hand stiffness occurs commonly after the fracture of distal ulnar extremities, but it is not of great concern (17,18). In our study 16 patients had hand stiffness, we eliminated this problem with rehabilitation.

Besides resistive exercises, passive range of motion exercises are given for wrist, elbow and hand to patients. Physical therapy is followed by occupational therapy for 3 weeks (7,12,15). In our study we applied physical and occupational therapy together. Early wrist motions provides functional improvement in wrist and hand functions (2,19). In our study oedema was reduced with exercise.

Algodistrophy may be seen after Colles' fracture (9) while in our study it occurred 3 months after the fracture. Evaluation of the hand functions is rendered by 4 movements:

1) Pinch movement,

2) Grasp,

3) Target occurrency,

4) Activities of daily living.

Activities of daily living consists of writing, turning over cards, manipulating small objects, simulated eating, stacking checkers, manipulating large light objects, manipulating large heavy objects, toileting, dressing, grooming, buttoning, shoe lacing, buckling, burdening.

All patients were treated with a long wrist elbow plaster splint. This causes release of swelling and oedema. Finger exercises begin just following the first day of operation. Long wrist elbow plaster is used for one week after operation (3,21).

Functional status in our study is evaluated according to the wrist range of motions and grasp strength. There was no correlation between age and functional capacity (21).

REFERENCES

1. Korkusuz Z : Upper extremity fractures-Colles' and Smith' Fracture. Orthopedy -Traumatology, Ankara University Medicine Faculty, 435:160-161, 1983.

2. Roumen RMM, Hesp W and Bruglish ED : Unstable Colles' and Smith' Fracture in elderly patients. Journal of Bone Joint Surgery, 73B:307, 1991.

3. Coney WF and Berger RA : Treatment of complex fractures of the distal radius : Combined use of internal and external fixation and atroscopic reduction. Hand Clin, 9:603-612, 1993.

4. Drefakis EC, Kontakis GM, Steriopoulos, et al : Decreased broad hand ultrasound attenuation of the calcaneus in woman with fragility fracture. Acta Orthop, Scand, 65:305-308, 1994.

5. Gupta A : The treatment of Colles' fracture. The Journal of Bone and Joint Surgery, 79:312-315, 1991.

6. Aspenberg P and Kopilov P : Hidroxyapatite spacer for open reduction of Colles' fracture. Scand J Plast Recons Hand Surgery, 28:157-159, 1994.

7. Kopilov P, Johnell O, Beagaer, et. al. : Fractures of the distal end of the radius in young adults: A thirty year follow up. Journal of Hand Surgery, 18:45-49, 1993.

8. Jakins I, Preterse H and Sweet MBE : External fixation of the intra-articular fractures of the distal radius. J Bone Joint Surgery, 73:302, 1991.

9. Warvick D, Field J, Prothera D, et. al. : Function ten years after Colles' fracture. Clinics Orthopedics and Releated Research, 295:270-274, 1993.

10. Adolpson P, Abbaszadegan H, Jonsson, et. al. : Computer assisted prediction of the instability of Colles' fractures. International, Orthopedics, 17:13-15, 1993.

11. Aro HT and Kouvinen T : Minor axial shortening of the radis affects outcome of Colles' fracture treatment. The Journal of Hand Surgery, 16:392-398, 1991.

12. Roysam GS : The distal radio-ulnar joint in Colles' fracture. The Journal of Bone and Joint Surgery, 75:58-60, 1993.

13. Warren PJ and Ferris BD : Colles' fracture: The use of metacarpal index as a prognostic indicator investigated. JR Coll Surgery Edinburgh, 38:373-375, 1993.

14. Villar RN, Marsh D, Rushton N, et. al. : Three years of the Colles' fracture. The Journal of Bone and Joint Surgery, 69:635-638, 1987.

15. Morey KR and Watson AH : Team approach to treatment of the posttraumatic stiff hand. Physical Therapy, 66:225-228, 1986.

16. Jones LA : The assessment of hand function: A critical review of techniques, Journal of Hand Surgery, 14:221-228, 1989.

17. Leibovic SJ and Geissler WB : Treatment of complex intra-articular distal radius fractures, Orthop Clin North Am, 25:685-706, 1994.

18. Altissimi M, Mancini GB, Azzara, et. al. : Early and late displacement of fractures of the distal radius: The prediction of instability. Int Orthop, 18:61-65, 1994.

19. Dias J, Wray J, Jones JM, et. al. : The value of early mobilization in the treatment of Colles' fractures. The Journal of Bone and Joint Surgery, 69:463-467, 1987.

20. Jarus T and Paremba R : Hand function evaluation: A factor analyst study. The American Journal of Occupational Therapy, 47:439-442, 1993.

21. Trumble T, Schmitt S, Vedder N, et. al. : Factors affecting functional outcome of displaced intra-articular distal radius fractures. The Journal of Hand Surgery, 19:325-340, 1994.

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