

Case Study – Post Operative Rehabilitation of Fracture of Distal End of Radius

Jyoti Dahiya

Abstract: Introduction: Fracture of the distal end radius constitutes one of the most common skeletal injuries treated by the orthopedic surgeon. Wide arrays of techniques have been described including closed reduction, percutaneous fixation and open methods of reduction, and stabilization. Open reduction and internal fixation of distal radial fractures with an angular stable locking plate applied to the volar surface has gained vast popularity recently. Methodology: This case study was conducted on Mr D.S.Dahiya during the first week of November 2016 to last week of february 2016 in total 4months. The patient came to me with a post operative closed fracture distal end of radius the process of the therapy started with initial kinesiological examination followed by 4 months long therapy session and a final kinesiological examination. Therapy Process: The patient got a treatment with passive interventions to improve circulation and prevent immobilization adhesion formation. These treatments included application of an ice pack to reduce edema followed by application of a wax bath on the affected wrist. Gentle range of motion mobilizations were then introduced that could only be performed in flexion and extension to the patient's pain tolerance. Final Kinesiological Examination Conclusion: Daily wrist and hand ROM was measured prior and post treatment. The final kinesiological was performed on 28th Feb 2017 and showed the patient's improvement to the therapy applied. The patient came for physiotherapy for lack of muscular strength and limited mobility in the affected area. The final examination shows patients improvement in muscular strength, mobility and muscle shortness after 4 months of therapy. Conclusion: During the 4 months of Physiotherapy sessions, we had with the patient, we both could see the improvement from day 1 until our last session together. He improved greatly during the course of 4months the rapid improvement came after functional training with mobilizations and Sustained Stretching of wrist flexors with the pillow underneath

Keywords: distal radius fracture, rehabilitation, open reduction internal fixation

1. Introduction

Fracture of the distal end radius constitutes one of the most common skeletal injuries treated by the orthopedic surgeon. Wide arrays of techniques have been described including closed reduction, percutaneous fixation and open methods of reduction, and stabilization. Open reduction and internal fixation of distal radial fractures with an angular stable locking plate applied to the volar surface has gained vast popularity recently .It provides a stable fixation of osteoporotic bones, leading to anatomical restoration of the articular surface and extra-articular alignment. It also facilitates immediate free mobilization of the wrist joint. However, there are few systematic studies in the literature evaluating the efficacy of locking plate fixation using objective and subjective assessments. As open reduction and volar plating ensures more consistent correction of displacement and maintenance of reduction. This study evaluates the anatomical and functional outcome of open reduction and plate fixation in the management of fracture distal end radius and its comparison with other modalities of treatment.

2. Methodology

This case study was conducted on Mr D.S.Dahiya during the first week of November 2016 to last week of february 2016 in total 4months. The patient came to me with a post operative closed fracture distal end of radius the process of the therapy started with initial kinesiological examination followed by 4 months long therapy session and a final kinesiological examination. During the examinations and therapies we used the following equipment: - Therapeutic Paraffin Wax Bath, hot water fomentation pads, treatment table, measurement tape, neurological hammer, goniometer,

various sized pillows , grip exerciser . Name of the patient: Mr D.S .Dahiya

Age: 58 years Diagnosis fracture

Chief Complaints Patient complained about limited mobility (Inability to perform Namaz), lack of power in right lower extremity and pain during walking.

History of present problem -Patient suffered a closed fracture on distal radius of left arm on 31st October 2016. Patient was hit by an car and he fell down in outstretched position. After seeing an orthopedic surgeon, X-Ray was done, it revealed close fracture of distal radius Patient received surgical treatment, open reduction and internal fixation was done on 2nd November 2016. Bandage was worn until 09/011/2016 as pins were their to secure stitches .After removal of stitches on 17th /03/2015, physical therapy was started from 20th November 2016

Problem – patient was having stiffness and swelling around left forearm ,wrist and hand , grip strength is also reduced, patient was also having pain and swelling and was not able to perform exercises initially

Present State

Height: 5.10 ft

Weight: 82 kg

BMI: 24.9 kg/m²

Psychosocial History Work Living Conditions: Patient lives in a 2nd floor house with stairs and good accessibility to his house.

Family Has a wife and lives in a nuclear Family with his children

Personal and Medical History- Mr Dahiya was apparently alright until he met with an RTA 4 months back ,when he fell on outstretched hand due to hit on left upper limb . patient immediately went to base hospital Delhi Cant. Patient underwent full body radiological examination where he was diagnosed with fracture of distal end radius of left upper limb . Temporary bandaging was done. Patient underwent surgery on 2nd November 2016

Operations - The patient had open reduction internal fixation

Medications- patient took analgesics for one week post surgery

Abuses- Non-smoker, Non-Alcoholic, No Drug Abuse
Differential considerations- Patient's complaint of lack of mobility, weakness and swelling in left wrist, it can be caused by due to immobilization and injury to soft tissues. Reduced power of muscle is due to muscle weakness

3. Initial Kinesiological Examination

Patient was having lot of swelling around left wrist, arm and forearm. Scar was healed well, non adherent in nature.

Range of motion (ROM) Measurement

S.no	Motion	Active ROM	Passive ROM
1	Wrist flexion	40	45
2	Wrist extension	35	40
3	Radial deviation	10	13
4	Ulnar deviation	15	18
5	Finger PIP flexion	50	55
6	Finger PIP extension	0	0
7	Finger DIP flexion	45	50
8	Finger DIP extension	0	0

Strength measurement

S.no	Muscle	Muscle strength
1	Wrist flexors	3 ⁺
2	Wrist extensors	3
3	Radial deviators	3
4	Ulnar deviators	3 ⁺
5	Finger PIP flexors	3 ⁺
6	Finger PIP extensors	3 ⁺
7	Finger DIP flexors	3 ⁺
8	Finger DIP extensors	3 ⁺

Neurological Examinations: Romberg's Test – Negative (Only done as orientational) Subjective Light Touch – Normal sensation Deep tendon reflexes normal : biceps reflex 2+, brachioradialis reflex 2+ and triceps reflex 2+

4. Conclusion of examination

The initial kinesiological examination shows the patient has both muscular and structural restrictions. Tightness of muscles surrounding the wrist joint, mainly wrist flexors - Flexor Digitorum Superficialis and Flexor Digitorum Profundus was shown by muscle length test. The structural restrictions around the wrist joint, mainly restriction of wrist movement, was shown by joint play examination as well as strength testing showed lot of muscle weakness, wrist flexors and extensors are grossly affected, Flexor Digitorum

Superficialis and Flexor Digitorum Profundus being main muscle group .wrist extensors were weaker as compared to flexors. Muscle strength test shows loss of strength of muscles around wrist , main muscle group being Extensor Carpi Radialis Longus, Extensor Carpi Radialis Brevis, Flexor Carpi Radialis as radial deviation is more affected

Short and long term Rehabilitation

Short-term rehabilitation plan: Short term plan was to stretch shortened muscles and gain muscle strength and ROM in wrist joint as well as remove the blockage on radius.

Long-term rehabilitation plan: Long term plan was to maintain strength and stability in wrist joint

5. Therapy Process

The patient got a treatment with passive interventions to improve circulation and prevent immobilization adhesion formation. These treatments included application of an ice pack to reduce edema followed by application of a wax bath on the affected wrist. Gentle range of motion mobilizations were then introduced that could only be performed in flexion and extension to the patient's pain tolerance. Three sets of 5 flexion/extension repetitions were performed on the affected wrist. The joint was also mobilized in circumduction, ulnar flexion and radial flexion to the patient's level of tolerance.Early mobilization resulted in rapid recovery of both movement and strength without causing more discomfort or adversely influencing the progression of the deformity. Early mobilization would ensure rapid recovery of wrist and hand function while avoiding the complications of a conventional plaster cast.

Supervised Active rehabilitation program:

1) Isometric Exercise

- Wrist flexors and extensors

2) Active Range Of Motion Exercise

- Assisted stretch to forearm flexors and extensor musculature and radial/ulnar deviation
- Weight bearing wrist extension exercise(hand on the table with the patient leaning forward on them) to patient tolerance
- Active stretch to shoulder girdle and rotator cuff musculature

- Active stretch to elbow flexor and extensor musculature

3) Intrinsic Hand Muscle Exercise

- Thumb/digit opposition
- Repetitive squeezing of theraputty
- Repetitive towel wringing exercise

4) Strengthening Routine

- Biceps curl with 1,5-2 pound weights bilaterally
- Shoulder abduction, flexion and extension reps with 2 pound weights bilaterally
- Repetitive squeezing of rubber ball in affected wrist
- Flexion and extension of wrist using 1,5 pound weights increasing as tolerated

5) Functional Activities

- Patient is encouraged to resume pre-accident activities that involve the affected extremity (eg. writing, typing, cooking, etc.)

In addition the patient in this case study was encouraged to resume functional activities that involve the wrist and hand such as writing, cooking and sewing.

6. Final Kinesiological Examination Conclusion

Daily wrist and hand ROM was measured prior and post treatment. The final kinesiological was performed on 28th Feb 2017 and showed the patient's improvement to the therapy applied. The patient came for physiotherapy for lack of muscular strength and limited mobility in the affected area. The final examination shows patients improvement in muscular strength, mobility and muscle shortness after 4 months of therapy. There was better mobility of wrist flexors, extensors and deviators and increase in strength of wrist flexors and radial deviators. There was huge improvement in ROM of wrist flexion, extension and radial deviation. Most noticeable being wrist flexion to 70° though he has improved, still end range is need to be achieved.. Strengthening part of the treatment was done by isometric contraction, therabands, wrist cuffs.

7. Conclusion

During the 4 months of Physiotherapy sessions, we had with the patient, we both could see the improvement from day 1 until our last session together. He improved greatly during the course of 4months the rapid improvement came after functional training with mobilizations and Sustained Stretching of wrist flexors with the pillow underneath.

8. Acknowledgement

I would like to thank our patient Mr D.S.Dahiya, Who Participated whole heartedly in the assessment and treatment process, without him this case study would not have been done.

References

- [1] Jorge L Orbay ,Diego L Fernandez, Volar fixed-angle plate fixation for unstable distal radius fractures in the elderly patient The Journal of Hand Surgery Volume 29, Issue 1, January 2004, Pages 96–102
- [2] Andermahr J, Lozano-Calderón S, Trafton T, et al: The volar extension of the lunate facet of the distal radius: a quantitative anatomic study, J Hand Surg 31:892-895, 2006
- [3] Benson LS, Miniham KP, Stern LD, et al: The outcome of intra-articular distal radius fractures treated with fragment-specific fixation, J Hand Surg [Am] 31:1333-1339, 2006
- [4] Cassidy C, Jupiter JB, Cohen M, et al: Norian SRS cement compared with conventional fixation in distal radial fractures. A randomized study, J Bone Joint Surg Am 85:2127-2137, 2003.
- [5] Kathy E Brou, Mark H Henry, Fixation of unstable dorsally displaced distal radius fractures with a fixed angle plate provides sufficient stability with minimal loss of reduction Journal of Hand Therapy, Volume 17, Issue 1, January–March 2004, Pages 43–4

- [6] Orbay, Jorge L MD; Touhami, Amel MD Current Concepts in Volar Fixed-angle Fixation of Unstable Distal Radius Fractures. Clinical Orthopaedics & Related Research: April 2006 - Volume 445 - Issue - pp 58-67
- [7] MD David Ring et al The Treatment of unstable distal radius fractures with volar fixation, The Journal of Hand Surgery Volume 22, Issue 5, September 1997, Pages 777-784