

Effective physiotherapeutic intervention in post-operative radial head excision: A case report

Asawari Patil¹, Tajuddin Chitapure², Rinkle Hotwani^{3*}

Affiliations-

1. Student, MGM School of Physiotherapy, MGM School of Physiotherapy Aurangabad, a constituent unit of MGMIHS, Navi Mumbai, Maharashtra, India.
2. Assistant Professor, Department of Orthopaedic Physiotherapy, MGM School of Physiotherapy Aurangabad, a constituent unit of MGMIHS, Navi Mumbai, Maharashtra, India.
3. Professor & Principal, MGM School of Physiotherapy Aurangabad, a constituent unit of MGMIHS, Navi Mumbai, Maharashtra, India.

Corresponding author: RinkleHotwani, Professor & Principal, MGM School of Physiotherapy Aurangabad, a constituent unit of MGMIHS, Navi Mumbai, Maharashtra, India.

dr.rinklemalani@gmail.com

ABSTRACT

Radial head fracture are very common in very young age population because of fall on out stretch hand, radial head excision in young adult is very rarely done due to stability and after removal of radial head, patient had findings like elbow stiffness, pain & affect overall activity of daily living (ADLs). The most common complications are post traumatic arthritis and myositis ossificans has been seen in supracondylar fracture or fracture around the elbow joint which involves radial head or olecranon bone. Rehabilitation of this type of cases are challenging needs holistic approach to get good outcome. There have been very few publications are seen on rehabilitation after removal of radial head. So to manage this condition the application of physical therapy which includes manual therapy & therapeutic exercises are helpful to reduced symptoms and to restore normal function. Therefore, the aim of this case report is to present the evaluation and treatment of a 17-year-old boy following a complicated radial head fracture. The rehabilitation conducted over a month and the benefits of joint specific manual therapy along with strength training with functional movement specific in the rehabilitation are highlighted. Post-operative radial head excision can be treated by physical therapy.

Keywords: Radial head excision, Rehabilitation, Elbow, contracture

Introduction:

Radial head fractures are one of the most common fractures of the elbow and the mechanism of injury involves fall on an outstretched arm. Research has suggested that non-displaced fractures have minimal residual deficits; however, displaced fractures tend to display a non-favorable outcome even if short-term follow-up does not reveal functional deficits (Herbertsson et al., 2004). As per the previous researches radial head fracture reported four types which are Type 1 which include undisplaced fracture, Type 2 include displaced fracture, type 3 include comminuted & Type 4 is comminuted & elbow dislocation (Bano and Kahlon, 2006) (Shetty et al., 2017). In comminuted & displaced fracture radial head excision was advised (van Riet et al., 2005), the most common complaint after radial head excision patient faced is post traumatic elbow stiffness.

The most common complications are post traumatic arthritis and myositis ossificans has been seen in supracondylar fracture or fracture around the elbow joint which involves radial head or olecranon bone. Rehabilitation of this type of cases is challenging needs holistic approach to get good outcome (Faldini et al., 2012). Rehabilitation following elbow fracture treated conservatively or surgically is limited although most protocols recommend both active and passive range of motion (ROM) exercises.

This case report presents the evaluation of a post-traumatic radial head fracture with subsequent excision of radial head, followed by holistic approach used during the rehabilitation process, and the outcomes of treatment. More specifically, this case report highlights the addition of joint specific manual therapy to restore mobility and full elbow extension without any extension lag with the help of eccentric loading.

Patient Presentation:

A 17 year old student with right hand dominant was referred to physiotherapy for evaluation and treatment for post-operative stiffness and pain in the elbow with the history of fall on out stretch hand after injury he felt dizziness and blackout. The pain is more in the evening and for that he went to local hospital where orthopedics gave some medication, on next day he noticed swelling on affected portion and he underwent some investigation like radiography & he diagnosed with radial head fracture.

He underwent surgery for the same. After surgery he came to the physiotherapy department. But before coming to physiotherapy 4 days back he felt the pain stiffness over elbow complex and also restriction in all the elbow movements. And it was difficult to perform his all daily activities like holding object, wearing cloth, eating, writing, combing hair, personal hygiene, primary component of were restricted in all direction range of movements & weakness in upper right proximal extremity.

The pain was gradual & he was complaining dull aching type of pain, it was intermittent in nature. He initially rated his pain 8/10 on activity & during assessment 5/10 (activity) on NPRS & 1/10 (rest) on NPRS. Pain is increase in early morning & during activity and feel relief by rest & after exercise. Therapy goal for this patient are to regain his daily activity & reduced pain, stiffness.

In addition in this case of radial head excision, collateral ligament is not involved as surgical history suggest so he did not have any contraindication for physical manual therapy & the only thing we have to keep in mind is that the passive range of motion should be gentle & not vigorous in this case because of complication of excision e.g. myositis ossification.

Clinical examination:

When patient was came to OPD, his carrying angle was increased & deformity was seen which is cubitus valgus, also it warmth as compare to normal side. The grade 1 tenderness present on olecranon region. Scar present lateral side of elbow complex that healed & non-discharging by size it was 3 inches. The initial examination range of motion for right elbow active & passive movement both were painful & limited (Table 1) due to post-operative stiffness & end feel was hard capsular, there were reduced gliding in humeroulnar & radioulnar joint. His score on the Mayo Elbow Performance Index

was 55, according to reliability of the mayo elbow performance score <60 score shows poor functional outcome. During manual muscle testing the positive finding seen by using MRC grading score was grade 4 for elbow flexors, extensors, supinator and pronators in available ranges. On investigation he came with radiograph (fig1) according to this head of radius was removed.

Table 1:-Outcome of initial physical examination: - Elbow Active ROM at base line (1st day on 1st week)

	Right	Left
Carrying angle	25°	10°
Elbow Active ROM		
Flexion	100°	135°
Extension	30°	0°
Supination	35°	80°
Pronation	60°	90°

Table 2:- Outcome of initial physical examination: - Elbow Passive ROM at base line (1st day on 1st week)

	Right	Left
Elbow Passive ROM		
Flexion	100°	135°
Extension	20°	0°
Supination	40°	80°
Pronation	70°	90°

Table 3:- Muscle testing by using MRC Muscle Scale at base line (1st day on 1st week)

Elbow	Grade	Grade
Flexors	4	5
Extensors	4	5
Supinator	4	5
Pronator	4	5



(a) Post-operative radiograph showing removal of radial head

Interpretation of clinical examination findings & diagnosis:

Based on all the clinical finding, patient with hard capsular end feel pattern of postoperative stiffness, which is due to immobilization due to pain, & stiffness, huge difference seen in elbow complex movement, which is restriction of elbow flexion, extension, supination, pronation & strength of muscle, which present in arm & forearm, are affected & elbow deformity seen.

Prognosis & plan of care:

Prognosis for the patient was good, he is adolescent boy, he is highly co-operative & well educated; also willingly participate in rehabilitation protocol.

Plan of care –In this type of case the patient education, to reduced pain, to improve functional activity, improve ranges this all are primary goals & the secondary goals are to improve strength & follow ups.

Interventions:

After radial head excision patient was treated by physical therapist for one month, During day one patient was not able to perform ROM exercise due to pain, so initially we gave therapeutic modality like paraffin wax bath, moist pack to reduced his pain & muscle gardening. On second third day we incorporated mobilization grade 1 & 2, which were humeroulnar distraction, humeroulnar distal glide (scoping), distal radioulnar dorsal glide started {Figure (b),(c),(d)}. We also started muscle energy technique (MET) {Figure (e)}. In 2nd week we continue with same protocol & we started strengthening exercises for shoulder complex muscle, biceps, triceps, pronator, supinator & intrinsic muscles of hand by using theraband.

In 3rd & 4th week of management we continue with paraffin & Maitland mobilization grade 3 & 4, then by using progressive resisted exercise of delorme principle we started progressing. We also started eccentric loading exercise {figure (f),(g),(h)}. Especially in this case when we were targeting to

strengthen the arm muscle & postural correction means overall biomechanics of patient it was ultimately help to improve his ranges & all the ADLs.



(b)

(c)

(d)



(e)

(f)

(g)



(h)

Fig
 b)Humeroulnar distraction
 c) Distraction with distal glide (scoop motion)

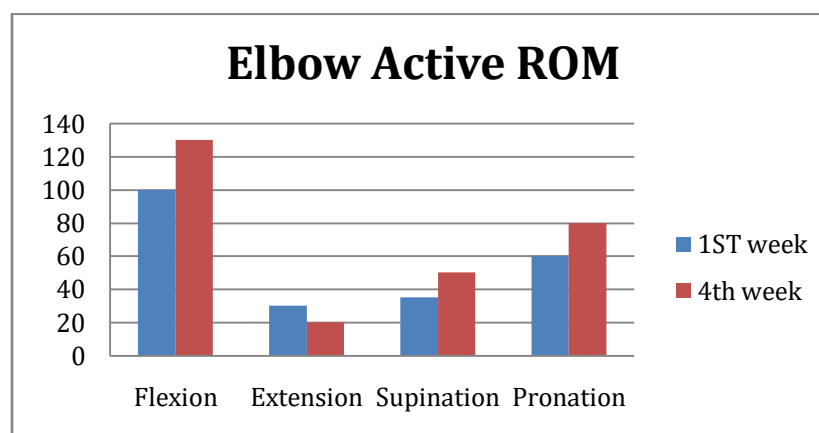
- d) Proximal radioulnar joint dorsal & volar glides
- e) MET (muscle energy technique)
- f) Concentric& eccentric strengthening of elbow extensors
- g) Concentric& eccentric strengthening of elbow flexors occurs as a weight lifted & lowered
- h) Lowload, long duration stretch for elbow extension which is performed by using resistance

Outcomes:

At patients last visit ,he achieve full elbow flexion [135⁰] & extension lack also improve[15⁰],as we started working on shoulder ,elbow, wrist muscles action ,patients joint ranges also improve. The intensity of pain is also reduced its 0/10 but after exercise its 2/10. Daily activity of patient are all improve now patient can perform all daily activity & the mayo elbow performance score is 80 which is good, also elbow deformity decreases.

Table 4:- Outcome of Final physical examination: - Elbow Active ROM (last day on 4th week)

	Right	Left
Carrying angle	20°	10°
Elbow Active ROM		
Flexion	130°	135°
Extension	20°	0°
Supination	50°	80°
Pronation	80°	90°

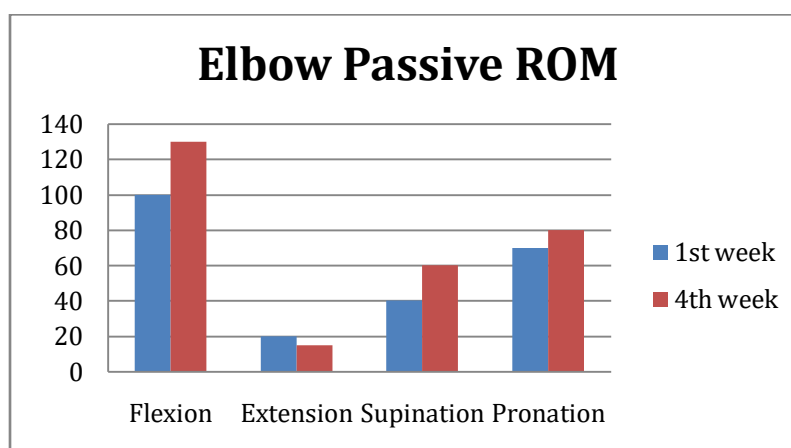


Graph1.1 Elbow active ROM (1st week and 4 week): shows difference between 1st& 4th week outcome of elbow active ROM

Table 5:- Outcome of Final physical examination: - Elbow Passive ROM (last day on 4th week)

	Right	Left
--	-------	------

Elbow Passive ROM		
Flexion	130°	135°
Extension	15°	0°
Supination	60°	80°
Pronation	80°	90°



Graph1.2 Elbow passive ROM (1st week and 4 week): shows difference between 1st& 4th week outcome of elbow passive ROM

Table 6:- Muscle testing by using MRC Muscle Scale(last day on 4th week)

Elbow	Grade	Grade
Flexors	5	5
Extensors	5	5
Supinator	5	5
Pronator	5	5

Discussion:

In our report radial head fracture surgically excised, according to Faldini c. et al 2012(Faldini et al., 2012),case of displaced & comminuted fracture the radial head excision was indicate suitable option & after surgery by using early intervention therapy & long term follow up they improve complication which was seen after post operatively ,this study also shows good result with patient satisfaction.In this current case report after receiving our therapeutic intervention patient was recover rapidly & started his daily activity pain free, because of that not only patient but also his family satisfied with patient recovery(Harding et al., 2011). Implementing physical therapy in early stage can prevent secondary complication in radial head excision & which is very important to prevent in early age group. Singh AK et al 2019 (Singh et al. 2019), there study proposed that on the basis of mayo elbow score radial head excision are more better option compared to arthroplasty in dominant hand.

According to Santacreu E.S. et al 2016 (Santacreu et al., 2016) reported that the combine intervention include paraffin, manual therapy pegboard & splinting used intensive treatment for stiffness in post-traumatic hand. The post-operative radial head excisions are very challenging to achieve normal ranges & function. Kumar R et al 2020 (Kumar et al, 2020) strengthening, intensive functional exercise, electrotherapy intervention & advanced technique this standard & optimal physiotherapeutic intervention was used to achieve short term long term goals in knee postoperative stiffness. And also case report of Stump MD et al 2014 (Stump et al., 2014) reported that the joint specific manual therapy management in complicated immobilized radial head fracture & elbow stiffness was beneficial, the generalized or typical rehabilitation protocol.

According to Faqih Al et al 2019 (Faqih et al., 2019) reported the muscle energy technique was used in rehabilitation protocol to treat elbow stiffness & which is managed post-operative elbow stiffness, so effect of muscle energy technique (MET) in early stage was safe, so we started muscle energy technique for early rehabilitation & the result was good with this strengthening effect of eccentric loading is very effective in post-operative radial head excision condition, which is helpful to improve strength as well as elbow ranges. according to Wilk KE et al 2012 (Wilk et al. 2012), the elbow rehabilitation include entire kinetic chain (shoulder, scapula, hand hip legs) to ensure, in this study they used low-load, long-duration stretch 15 min stretch 4 times per day, which is beneficial for patients with elbow stiffness & in our patient we used same technique which was extremely beneficial to regain the normal ranges of affected elbows.

Conclusion:

The radial head fracture is most common fracture in early age group, when it is displaced which shows negative outcome over function after removal of radio humeral fracture segment there were mismatch between proximal radioulnar segment of elbow joint which ultimately affect mobility of joint, hence by providing proper education to patient about condition & prognosis along with the land rehabilitation approach to improve his joint function gave us positive functional outcome. The rehabilitation was conducted 4 weeks with inclusion of manual therapy, strengthening exercise, especially eccentric loading & function specific range of motion exercise gave positive results in radial head excision condition.

Future scope:

In radial head excision technique the important thing is to providing proper education to patient about condition & prognosis along with the rehabilitation approach to improve his joint function give us positive functional outcome. Most of the studies do not have standardized physiotherapy & rehabilitation protocol & also no one can focus the importance of post traumatic complication to improve the function.

Author's Contribution: All authors contributed equally to the case report.

Conflict of Interest: The authors declare no conflict of interest.

Acknowledgement: We thank the patient who participated and contributed to the study.

Informed Consent: Written & Oral informed consent was obtained from patient included in the study.

References

- [1] Bano, K.Y., Kahlon, R.S. Radial head fractures--advanced techniques in surgical management and rehabilitation. *J. Hand Ther. Off. J. Am. Soc. Hand Ther.* 19, 114–135, 2006.
- [2] Faldini, C., Nanni, M., Leonetti, D., Capra, P., Bonomo, M., Persiani, V., Galante, C., Giannini, S. Early radial head excision for displaced and comminuted radial head fractures: considerations and concerns at long-term follow-up. *J. Orthop. Trauma* 26, 236–240, 2012.
- [3] Harding, P., Rasekaba, T., Smirneos, L., Holland, A.E. Early mobilisation for elbow fractures in adults. *Cochrane Database Syst. Rev.* CD008130, 2011.
- [4] Herbertsson, P., Josefsson, P.O., Hasselius, R., Besjakov, J., Nyqvist, F., Karlsson, M.K. Fractures of the radial head and neck treated with radial head excision. *J. Bone Joint Surg. Am.* 86, 1925–1930, 2004.
- [5] Shetty, S.K., Shetty, A., Balan, B., Ballal, A., Rai, H.R., Hegde, A. Excision Versus Fixation of the Radial Head: A Comparative Study of the Functional Outcomes of the Two Techniques. *J. Clin. Diagn. Res. JCDR* 11, RC01–RC03, 2017.
- [6] van Riet, R.P., Morrey, B.F., O'Driscoll, S.W., Van Glabbeek, F. Associated injuries complicating radial head fractures: a demographic study. *Clin. Orthop.* 441, 351–355, 2005.
- [7] Singh AK, Jidge A, Ramteke U, Venkateswaran N, Rokade H, Mulje SM, Mukherjee S, Kotian A. Functional Outcome of Elbow Kinematics in Radial Head Excision Versus Radial Head Replacement: A Comparative Study. *Open Access Maced J Med Sci.* May 15;7(9):1505-1508, 2019.
- [8] Santacreu, E.S., Cabezas, N.V. & Graupera, A.B. Combined treatment with paraffin, manual therapy, pegboard and splinting in a patient with post-traumatic stiff hand. *Arch Physiother* 6, 14, 2016.
- [9] Kumar R, Kaushal K, Kaur S. Role of physiotherapy in post-operative knee stiffness: A literature review. *Adesh Univ J Med Sci Res.* 2(1):31-5, 2020.
- [10] Stump MD, Sizer PS, Brismée JM. Rehabilitation Including Manual Therapy Management Following Complicated Immobilized Radial Head Fracture and Elbow Stiffness: A Case Report. *International Journal of Clinical Medicine.* Apr 25, 2014.
- [11] Faqih AI, Bedekar N, Shyam A, Sancheti P. Effects of muscle energy technique on pain, range of motion and function in patients with post-surgical elbow stiffness: A randomized controlled trial. *Hong Kong Physiother J.* Jun;39(1):25-33, 2019.
- [12] Wilk KE, Macrina LC, Cain EL, Dugas JR, Andrews JR. Rehabilitation of the Overhead Athlete's Elbow. *Sports Health.* Sep;4(5):404-14, 2012.