

Old Monteggia Fracture-Dislocation Treated with Plating and Forearm Fascial Slip Annular Ligament Reconstruction: A Rare Method of Treatment and Review of Literature

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Learning Point of the Article:

Complex traumas such as Neglected Monteggia fractures can be treated with a single incision surgery along with deep fascial ALR reconstruction with excellent results and outcomes.

Abstract

Introduction: Chronic radial head dislocation in old standing or neglected Monteggia fracture is a devastating complication. We present our case regarding managing such a case using plating and fascial slip annular ligament reconstruction (ALR).

Case Report: A 40-year-old male patient, farmer by profession presented with a 4-month-old neglected Monteggia fracture. He was treated with open reduction and internal fixation of fracture ulna with ALR using forearm deep fascial slip. The patient underwent regular physiotherapy post-operatively after 2 weeks of surgery. The patient was followed for 6 months, and DASH score was used to evaluate functional outcome.

Conclusion: Excellent results were obtained as regards to pain, wrist range of motion, fracture union, and resuming routine activities at the follow-ups.

Keywords: Monteggia, fracture, annular ligament reconstruction.

Introduction

Neglected Monteggia fractures are fractures of the proximal ulna with the dislocation of the radial head presenting after 4 weeks of the injury [1]. These chronic conditions are often associated with devastating complications such as ulnar displacement, malunion, or disruption leading to angulation and shortening of affected arm [2] as the radius follows the lower fragment due to the pull of the interosseous membranes [3].

The proximal radius and ulna along with the interosseous membrane and the annular ligament have a closed ring-like anatomy that predisposes to this condition. It is crucial to note that, unless proven otherwise by radiological or clinical survey, a single bone fracture of the forearm is to be treated as fracture

dislocation, more often than not requiring surgical management. Various alternatives exist such as open or closed reduction of the radial head, transarticular fixation, ulnar or radial osteotomies, repair or reconstruction of the annular ligament, or some amalgamation of these techniques. Here, we present a case of a 4-month-old Monteggia fracture dislocation treated with annular ligament reconstruction (ALR) using forearm fascia which is a rare and less described procedure.

Case Report

The Patient is a 40-years-old male farmer presented to our OPD with complaints of pain and deformity over RT elbow joint. He

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Author's Photo Gallery



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Figure 1: Presenting X-ray of the patient, 3 months after sustaining the trauma.

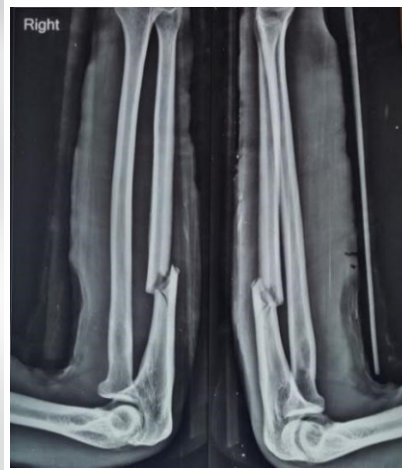


Figure 2: Immediate post trauma X-ray.

had a history of injury to right forearm due to fall from height with outstretched hand 4 month back, for which he received treatment from a local bone setter. He was not a known case of DM or HTN. Clinically, he had a varus deformity in his right elbow with restricted pronation and supination of the elbow. There was a palpable bony swelling over the lateral aspect just distal to elbow joint which tended to move upon forceful pronation and supination. The flexion and extension were up to full extent. There was no distal NVD. On measurement, right forearm was 2 cm shortened. He also had severe pain over the DRUJ. AP and lateral X-ray revealed a BADO Type 2 Monteggia fracture dislocation with the delayed union of ulna and anteriorly dislocated radial head (Fig. 1 and 2).

The fracture was approached through extended BOYD'S

approach. The deep fascia of the fore arm was identified. A strip of fascia around 14 cm in length and 1 cm in breadth was harvested carefully using a 15 mm BP blade with intact base over the olecranon (Fig. 3). Joint was approached through ECU and anconeus muscle. The annular ligament was found to be completely disrupted. The radial head was carefully delivered. The soft tissues attached with the head and neck part were kept intact for ALR. Radial groove of ulna and capitulum was cleared. Radial head was relocated, and congruency was confirmed. Next, the fracture site was cleared and refreshed. The fracture ends were assembled and fixed with a 7-hole LCDCP after putting bone grafts at the fracture sites from ipsilateral iliac bone. After fixation of

the bone and length restoration, the fascial sling was bound over the radial neck region keeping adequate tension and re-enforced with 3-0 proline (Fig. 3). An additional transcapsular k-wire was applied at 90° elbow flexion. Wound was closed in layered over 12-size Romo Vac drain. Sterile dressing and above-elbow slab were given. After 1 month, slab and k-wire was removed, and gradual mobilization was started. The full extension and flexion, around 75° of external and internal rotation was restored within 2 months of gradual supervised physiotherapy (Fig. 4). Good bony union was achieved (Figs. 5 and 6), and the patient is now able to do all his daily living activities. The DASH score has improved to 56 and we are hopeful for gradual recovery and full restoration of movements with aggressive physiotherapy within the next 2-3 months.

Regular follow-up was kept of the patient. At the end of 1 year, his DASH score improved to 74 with complete radiological union of the fractures (Fig. 7). He is currently able to perform his daily activities and livelihood without much difficulty.

Discussion

Giovanni Battista Monteggia In 1814, in his paper printed in *Instituzioni Chirurgiche*, first narrated an injury distinguished by the anterior dislocation of the radial head associated with ulnar diaphyseal fractures [5]. The



Figure 3: Intraoperative pictures.



Figure 4: Functions at 4-month follow-up.

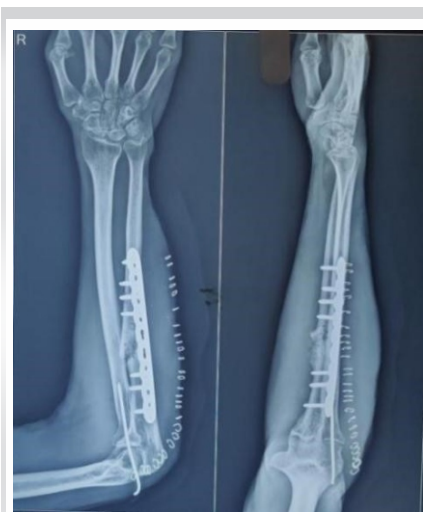


Figure 5: POD 2 post op X-ray.



Figure 6: 1-year Followup X-rays.



Figure 7: Post-operative X-ray at 6-months follow-up.

complexity of this injury was not to be fully appreciated until it was coined in English as “Monteggia lesion” by Bado [6]. Subsequently, it has been realized that Monteggia fracture dislocations are complex injuries, accounting for nearly 13% of all forearm fractures [6]. Dislocation of the radial head that is still present 4 weeks after injury is recognized as chronic Monteggia fracture. Such a circumstance may lead to decreased range of motion associated elbow affliction, neurologic deficits, and valgus deformity [7, 8, 9]. In such a scenario, in order for the proximal radioulnar joint to be reduced, rigid anatomic reduction, and fixation of the ulnar diaphyseal fracture is advocated. It is also essential to maintain $<10^\circ$ angulation to ensure optimal proximal radioulnar joint stability and functionality. Nevertheless, complex Monteggia fracture–dislocations even after proper surgical treatment may be riddled with have a high rate of low clinical outcomes associated with numerous complications [12, 13, 14]. A probable cause can be due to either the residual ulnar deformity even after internal fixation (secondary to non-union or non-anatomic reduction) or the failure of spontaneous healing of the annular ligament. In 1965 Tawse et al., in their paper narrated a technique where using the triceps tendon, the annular ligament was reconstructed [15]. The authors had proposed that any interposed capsule if any should be first removed before anatomic reduction of the radial head. Following this, the tendon strip that was left attached to the ulna was brought forward from the posterior to the anterior side, made to go around the radial head before being fixed to the proximal ulna with the help of a drill hole. Such similar ALR techniques using triceps tendon were also described by other authors [16, 17].

Lloyd-Roberts and Bucknill suggested a modification to the original Tawse technique where ALR was done using lateral part of the triceps tendon bundle [17]. Steel and Peterson suggested

using interference screws instead for ligament reconstruction or repair using triceps tendon at the level of the origin of the annular ligament [18]. Some authors even have proposed using the superficial head of the Brachialis muscle ALR [19, 20].

Using fascial sling for ALR is a relatively new technique and has not been very well described in literatures. When compared with Tawse and other described techniques of ALR, this method requires single incision for both fracture fixation and graft harvesting. Obviously, it has easier learning curve, less donor side morbidity, and shorter operative time. Furthermore, early mobilization and physiotherapy can be allowed which leads to early functional recovery and return to work.

Conclusion

It is absolutely crucial to achieve bony alignment of the ulna to effectively manage chronic Monteggia fractures. However, ALR is critical for stability of radial head in these neglected injuries. Forearm fascia is a novel and ideal graft to be used as sling around radial neck. In good hands, excellent results are expected. However, further studies on more number of patients are required in this regard.

Clinical Message

Owing to the poor clinical outcomes in neglected Monteggia fractures, the use of triceps tendon for ALR was suggested by Tawse, modified later by Lloyd-Roberts and Bucknill where only the lateral part of the tendon was used. Using deep fascia instead is a newer and novel technique not much explored. Advantages include single incision, less donor side morbidity, and shorter operative time. Bony alignment of Ulna and ALR is crucial for the stability of the radial head, elbow joint, and eventually favorable clinical outcomes.

Declaration of patient consent: The authors certify that they have obtained all appropriate patient consent forms. In the form, the patient has given the consent for his/ her images and other clinical information to be reported in the journal. The patient understands that his/ her names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

Conflict of interest: Nil **Source of support:** None

References

- Goh SH. Monteggia 'fracture'-dislocation with bowing of the ulna: A pitfall for the unwary emergency physician. *Eur J Emerg Med* 2008;15:281-2.
- Nakamura K, Hirachi K, Uchiyama S, Takahara M, Minami A, Imaeda T, et al. Long-Term clinical and radiographic outcomes after open reduction for missed monteggia fracture-dislocations in children. *J Bone Joint Surg Am* 2009;91:1394-404.
- Cunnighan SR. Fracture of ulna with dislocation of head of radius. *J Bone Joint Surg Am* 1934;16:351-4.
- Korner J, Hansen M, Weinberg A, Hessmann M, Rommens PM. Monteggia fractures in childhood diagnosis and management in acute and chronic cases. *Eur J Trauma* 2004;30:361-70. Kenintz S, De Schnyver F, De Snet L. Radial head dislocation with plastic deformation of ulna in children. A rare frequently missed lesion. *Acta Orthop Belg* 2000;66:359-62.
- Beaty JH, Kasser JR. Monteggia fracture-dislocation in children. In: Rockwood and Wilkins' Fractures in Children. 6th ed. Riverwoods, IL: Lippincott Williams and Wilkins; 2006. p. 447-551.
- Bado JL. The monteggia lesion. Springfield, IL: Charles C Thomas; 1962.
- Olney BW, Menelaus MB. Monteggia and equivalent lesions in childhood. *J Pediatr Orthop* 1989;9:219-23.
- Peiró A, Andres F, Fernandez-Esteve F. Acute monteggia lesions in children. *J Bone Joint Surg Am* 1977;59:92-7.
- Reckling FW. Unstable fracture-dislocations of the forearm: Monteggia and galeazzi lesions. *J Bone Joint Surg Am* 1982;64:857-63.
- Dormans JP, Rang M. The problem of monteggia fracture-dislocations in children. *Orthop Clin North Am* 1990;21:251-6.
- Letts M, Loch R, Wiens J. Monteggia fracture-dislocations in children. *J Bone Joint Surg Br* 1985;67:724-7.
- Wiley JJ, Galey JP. Monteggia injuries in children. *J Bone Joint Surg Br* 1985;67:728-31.
- Bryan RS. Monteggia fracture of the forearm. *J Trauma* 1971;11:992-8.
- Fowles JV, Sliman N, Kassab MT. The monteggia lesion in children. Fracture of the ulna and dislocation of the radial head. *J Bone Joint Surg Am* 1983;65:1276-82.
- Tawse AB. The treatment of malunited anterior Monteggia fractures in children. *J Bone Joint Surg Am* 1965;47:718-23.
- Boyd HB, Boals JC. The Monteggia lesion: A review of 159 cases. *Clin Orthop Relat Res* 1969;66:94-100.
- Lloyd-Roberts GC, Bucknill TM. Anterior dislocation of the radial head in children: Etiology, natural history and management. *J Bone Joint Surg Br* 1977;59:402-7.
- Seel MJ, Peterson HA. Management of chronic posttraumatic radial head dislocation in children. *J Pediatr Orthop* 1999;19:306-12.
- Leonello DT, Galley IJ, Bain GI, Carter CD. Brachialis muscle anatomy: A study in cadavers. *J Bone Joint Surg Am* 2007;89:1293-7.
- Nwoko OE, Patel PP, Richard MJ, Leversedge FJ. Annular ligament reconstruction using the distal tendon of the superficial head of the brachialis muscle: An anatomical feasibility study. *J Hand Surg Am* 2013;38:1315-9.

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