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Case Report

Distal humerus fractures caused during amateur arm wrestling - a case report and literature review

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ABSTRACT

Arm wrestling is a popular game played worldwide due to its basic nature and though many sports injuries can be associated with arm wrestling, humeral shaft fractures are the most common in adults. These injuries are more common in amateur arm wrestlers due to improper technique and lack of experience. This generates an axial torque on the humerus with shoulder stabilized and elbow fixed in flexion, which can lead to humeral fractures. We present such a case of 21-year-old young man presenting to our department of orthopaedics, GMC Kota with complaints of pain, swelling and deformity in right arm following an arm-wrestling match. We planned for operative intervention by open reduction and internal fixation with locking compression plate (LCP) based on the patient's choice and preference after explaining consent and all treatment modalities. Good union and post op recovery was achieved.

Keywords: Arm wrestling, Case report, Distal humerus fractures

INTRODUCTION

Arm wrestling is a popular sport and recreational game practiced worldwide by both men and women of all ages.[1] Its popularity is based on the fact that its rules are simple and it doesn't require specialised equipment or place and is an open source for boosting the ego of the winner. Two contestants sit or stand with their hands gripped while trying to pull each other away by positioning a fixed, flexed elbow on a table with the goal being to force the opponents arm onto the table surface.[2,3] Though a simple activity, arm wrestling is not as harmless as it seems with a variety of literature reporting different kinds of injuries, including humeral shaft fractures with or without wedge fragments, radial nerve injury.[4,5] Other serious injuries as described in systematic review by Ogawa et al, such as scapular neck fracture, rupture of the subscapularis, rupture of the medial collateral ligament of the elbow, anterior dislocation of the elbow with or without olecranon fracture, olecranon fracture, anterior dislocation or fracture-dislocation of the radial head, radial shaft fracture or neck fracture, recurrent subluxation of the extensor carpi ulnaris tendon, triangular fibrocartilage complex injury, rupture of the ulnar collateral ligament of the thumb, and proximal phalanx fracture. Epiphyseal fracture-separation of the medial humeral epicondyle may occur in teenagers.[1] Humeral shaft fractures account for the largest proportion of injuries sustained in arm wrestling.[2,5] Several researchers have attempted to identify the potential risk factors and mechanisms of forces involved in causation of these injuries, there is still no proper theory, with several risk factors including forceful internal rotation at shoulder joint with fixed elbow creating large torsional forces, kinetic forces of wrestlers body weight or an unbalanced posture during the activity.[6,7]

As the mechanism of injury, the treatment modalities also remain controversial. Historically many surgeons have opted for conservative management but growing evidence supports internal fixation to be the gold standard for treating fracture humerus related to arm wrestling.[8,9]

We present a case of distal humeral shaft fracture in a 21-year old young man, moderately built, non-athletic who presented to the orthopaedics department of GMC Kota,

NMCH hospital, after participating in an amateur arm-wrestling match.

CASE REPORT

We present a case of a 21-year old young man, right hand dominant, moderately built and well-nourished who presented to our Government New Medical College hospital emergency department with injury sustained in right upper arm, his dominant side, during unsupervised arm wrestling with his fellow colleague during their gym session. The patient was not a professional arm wrestler and was performing the activity only for recreational purposes. He was moderately built, a student by profession and had recently started going to gym for weight training. His colleague was also of similar body shape and build and injury was sustained during the losing phase of the match.

On examination there was swelling, tenderness and deformity at the lower right arm showing signs of fracture shaft humerus. No external injury or wound present. Distal neurovascular examination was normal, no deficit, no weakness in wrist extension, finger extension.

After primary stabilization via splint, patient was sent for an X-ray which revealed a long oblique fracture of distal third humerus, extra-articular with no communition AO-OTA 12-A2 (Figure 1).

Figure 1: Preoperative X-ray showing fracture distal humerus AO-OTA 12-A2.

After X-rays, patient was given a high above elbow back slab and all the treatment options with future prognosis were discussed with the patient. He opted for surgical intervention in comparison to conservative for early mobilization and weight bearing as he had college examinations in one-month duration. After routine investigations and pre anaesthetic clearance, the patient was planned for operation. Under supraclavicular regional block with sedation, the patient was taken into lateral position on OT table. Triceps splitting posterior approach to shaft humerus was used to expose the fracture site after exploring and tagging the radial nerve which was intact in its continuity. Interposed soft tissue was cleared of the margins, reduction was achieved with the help of two bone-clamps and fixed with the help of two lag screws. A long extra articular distal humerus locking plate was spanned along the fracture in neutralization mode with appropriately sized screws and closure was done in layers.

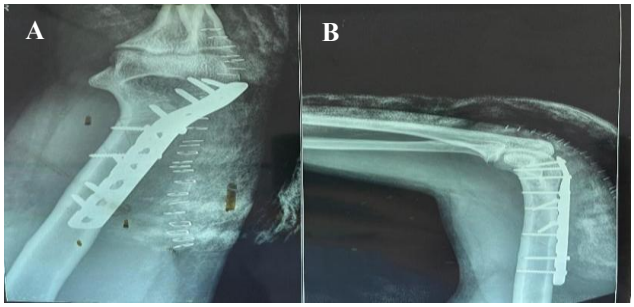

Figure 2 (A and B): Post-operative X-rays showing good reduction and fixation.

Figure 3 (A-D): X-rays at subsequent monthly follow ups.

Figure 4 (A-D): Final follow-up showing good clinical and functional outcome.

A high above elbow back slab was applied for two weeks till suture removal and after which passive range of motion physiotherapy for elbow and shoulder were started. The patient was followed up 2 weekly, with union achieved

clinical and radiological after 2.5 months, with full range of motion.

At his 6 months follow up examination, the patient reported full clinical and functional recovery and returned to gym though cautious with the heavy weights.

DISCUSSION

Arm wrestling is a popular sport all around the globe from early times and injuries due to arm wrestling have been reported from all around the world with most common injury being the spiral fracture of middle to distal third humerus for which several case series and reports are available. The other injuries of the upper limb associated with arm wrestling included fractures of the medial epicondyle humerus, radial neck, radial shaft, and the olecranon and the rupture of the subscapularis.[10-15] Fracture medial epicodyle humerus was usually observed in skeletally immature patients. Amateurs are more prone to get these injuries due to their weak techniques for stabilisation of arm at glenohumeral joint.[16] The pattern of fracture most often seen is a spiral fracture of the distal humerus (12-A1) with other most common being spiral with wedge fragment (12-B1). The types of fractures that occur at the middle and distal thirds of the humeral shaft are related to the anatomic and materialistic features of the bone.[3] Location wise studies have shown that the traumatic fracture site of the humeral shaft is the proximal third in 15-25% of cases, middle third in 49-68%, and distal third in 11-35%.[1] Fractures of the middle third and the junction between the middle and distal thirds had a significantly greater association with radial nerve palsy than fractures in other parts (0-2% of fractures in the proximal third, 7.5-15.2% of fractures in the middle third, and 13-23% of fractures in the distal third). Regarding the fracture configuration, radial nerve palsy is more likely in patients with transverse and spiral fractures than in those with oblique and comminuted fractures.[1]

In Ogawa et al's study, an analysis 30 patients with humeral shaft fractures due to arm wrestling of competitors' strength advantage is considered with conclusion being opponents' strength does not influence the occurrence of humeral fractures but it is a combination of multiple anatomic and physiological factors including bone density, may directly cause or predispose a patient to fractures in arm wrestling.[17] The active forceful internal rotation of shoulder joint against the opponent while the elbow is fixed in flexion, results in enormous violent torque forces across the humeral shaft, thus the bone is more prone to fracture when it is rotated, twisted, and subjected to a lot of axial pressure.[2] During arm wrestling, two muscle groups are responsible for a static or stable dynamic: the internally rotating shoulder muscles (pectoralis major, latissimus dorsi, teres major, and subscapularis) serve to turn the arm inward against the opponent, while the biceps brachii, brachialis, and brachioradialis serve to maintain arm flexion. The geometric structure of the humerus also contributes to injury. The humerus is cylindrical in its proximal half and becomes flattened and triangular distally. It is believed that the fracture mostly occurs at the site of biomechanical weakness.[5,18] Kruczynski et al discovered that the position 115 mm above the elbow on the posteromedial side of the humerus receives the maximum bone stress load resulting from torsional forces upto 60 Mpa.[16] In addition to these factors, other factors that can lead to the humerus fracture include poor posture, inadequate training, hypertrophy of muscles and inefficient motor control, anabolic steroid usage.[19] Though a combination of various factors predisposes to causation of humeral fractures during arm wrestling, the two most widely studied causes are anatomical and material properties of distal humerus and variety of forces generated by various muscles, typically the shoulder internal rotators.

The management of these fractures mainly depend on patient preferences as from earlier times fracture shaft humerus mostly can be treated conservatively using splints, casts and functional braces. A previous study reported that for patients with a closed humeral shaft fracture, internal fixation surgery did not significantly improve functional outcomes when assessed 12 months after surgery as compared with conservative treatment.[20] Researchers reported good outcomes with conservative treatment of humeral shaft fractures during arm wrestling.[4] Surgical treatment is recommended for the following reasons. First, arm-wrestling fractures are spiral and unstable; therefore, they can easily develop into displaced, angulated, or shortened fractures. Two retrospective studies reviewing the non-surgical treatment of humeral shaft fractures reported that fractures in the middle and distal thirds of the humerus had a high union rate.[5,21,22] Surgical management would also be indicated for neurovascular insult, open fractures, multiple fractures, and pathologic fractures, depending on the informed consent of the patient. Surgical plating strategies for internal fixation are important when treating spiral fractures in young individuals. Posterior plating has biomechanical advantages because the plate is applied on the tension side of the humerus, and lateral plating is also widely used for humeral shaft fractures.[23] Given that the patients are young and likely had adequate bone mass, single-plate fixation translates into a shorter operative time and less soft tissue dissection; therefore, single-lateral plating is sufficient for the fixation of arm-wrestling fractures and allows the patient to return to work sooner which also was in our case.[5]

CONCLUSION

Shaft humerus fractures seen in arm wrestling are common in amateurs which result from a rotation torque, axial loading and bending forces during varous phases of the game. The typical spiral to oblique pattern of fracture noted is due to the anatomical, and material characteristics of the humerus at the middle and distal one-third and the tension exerted by the internal rotators at shoulder when elbow is fixed in flexion. Internal fixation of fracture

allows for early mobilisation, avoids residual deformity and a full return of movements and functional capacity. We described a similar case of closed fracture shaft humerus, long spiral in mid to distal part in a 21-year old young amateur arm wrestler which was opted to be fixed surgically using a single long extra articular plate and reported good union and functional outcome.

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REFERENCES

1. Ogawa K, Yoshida A, Matsumura N, Inokuchi W. Fractures of the humeral shaft caused by arm wrestling: a systematic review. JSES Rev Rep Tech. 2022;2(4):505-12.
2. Wael M, Mahmoud Jaber MM, Abdullah MA, Atyani S, Jaber A, Halta NH, et al. Spiral Humeral Fracture During Arm Wrestling: A Case Report and Literature Review. Cureus. 2022;14(9):e29540.
3. Pande K, Nishat N, Afzal S, Ishak L. Humeral shaft fracture sustained during arm wrestling with review of factors contributing to its causation. Malays Orthop J. 2021;15:15-20.
4. Moloney DP, Feeley I, Hughes AJ, Merghani K, Sheehan E, Kennedy M. Injuries associated with arm wrestling: A narrative review. J Clin Orthop Trauma. 2021;18:30-7.
5. Shen J, Yu P, Yang R, Li G, Sun Q, Cai M, et al. Clinical Characteristics, Mechanism, and Outcome of Humeral Shaft Fractures Sustained during Arm Wrestling in Young Men: A Retrospective Study. Orthop Surg. 2023;15(6):1627-35.
6. Karadeniz E, Demiroz S, Oktem F, Memisoglu K, Kesemenli CC. Humeral fractures sustained during arm wrestling. Eur J Trauma Emerg Surg. 2022;48:3109-14.
7. Bumbasirevic MZ, Lesic AR, Andjelkovic SZ, Palibrk TD, Milutinovic SM. Fractures of the humerus during arm wrestling. Vojnosanit Pregl. 2014;71(12):1144-6.
8. Updegrove GF, Mourad W, Abboud JA. Humeral shaft fractures. J Shoulder Elbow Surg. 2018;27(4):e87-97.
9. Lode I, Nordviste V, Erichsen JL, Schmal H, Viberg B. Operative versus nonoperative treatment of humeral shaft fractures: a systematic review and metaanalysis. J Shoulder Elbow Surg. 2020;29:2495-504.
10. Nyska M, Peiser J, Lukiec F, Katz T, Liberman N. Avulsion fracture of the medial epicondyle caused by armwrestling. Am J Sports Med. 1992;20(3):347-50.
11. Yoon YH, Ha J, Choi KE, Lee KH, Shin SJ. The fractures of humerus shaft and medial epicondyle by arm wrestling. J Korean Fract Soc. 2006;19(4):437-42.
12. Fallis G, Ferguson K, Malcolm B. An unusual fracture in arm wrestling. Phys Sportsmed. 1990;18(4):93-6.
13. Citak M, Backhaus M, Seybold D, Muhr G, Roetman B. Arm wrestling injuries – report on 11 cases with different injuries. Sportverletz Sportschaden. 2010;24(2):107-10.
14. Pasquina PF, O'Connor FG. Olecranon fracture sustained in arm wrestling. Phys Sportsmed. 1999;27(4):81-7.
15. Biondi J, Bear TF. Isolated rupture of the subscapularis tendon in an arm wrestler. Orthopaedics. 1988;11(4):647-9.
16. Kruczynski J, Nowicki JJ, Topolinski T, Srokowski G, Mariko G, Chantsoulis M, et al. Radiological and biomechanical analysis of humeral fractures occurring during arm wrestling. Med Sci Monit. 2012;18(5):303-7.
17. Ogawa K, Uil M. Humeral shaft fracture sustained during arm wrestling: report on 30 cases and review of the literature. J Trauma. 1997;42:243-6.
18. Updegrove GF, Mourad W, Abboud JA. Humeral shaft fractures. J Shoulder Elbow Surg. 2018;27(4):e87-97.
19. Pedrazzini A, Pedrazzoni M, De Filipo M, Nicoletto G, Govoni R, Caccarelli F. Humeral fractures by arm wrestling in adults: a biomechanical study. Acta Biomed. 2012;83(2):122-6.
20. Rämö L, Sumrein BO, Lepola V, Lähdeoja T, Ranstam J, Paavola M, et al. Effect of surgery vs functional bracing on functional outcome among patients with closed displaced humeral shaft fractures: the FISH randomized clinical trial. JAMA. 2020;323(18):1792-801.
21. Mayfield CK, Egol KA. Humeral fractures sustained during arm wrestling: A retrospective cohort analysis and review of the literature. Orthopedics. 2018;41(2):e207-10.
22. Ali E, Griffiths D, Obi N, Tytherleigh-Strong G, Van Rensburg L. Nonoperative treatment of humeral shaft fractures revisited. J Shoulder Elbow Surg. 2015;24(2):210-4.
23. Lotzien S, Hoberg C, Rausch V, Rosteius T, Schildhauer TA, Gessmann J. Open reduction and internal fixation of humeral midshaft fractures: anterior versus posterior plate fixation. BMC Musculoskelet Disord. 2019;20(1):527.

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