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CASE REPORT

Ipsilateral combined monteggia and galeazzi injuries presenting late: A case report

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Case report

A 40-year-old labourer presented with a closed injury to her right (dominant) forearm, 20 days after she had fallen down stairs from 6 ft high. She tried to break her fall on the outstretched hand. The exact position of the wrist and elbow could not be ascertained. She was treated with a plaster of Paris (POP) back slab and was referred from a general practitioner to us. She presented with a severely deformed forearm. She did not have any nerve injuries. Plain radiographs of the right forearm revealed a fracture of the ulnar diaphysis, with mild communition and lateral dislocation of radial head. The same forearm has a distal third radial fracture with a distal radio-ulnar joint (DRUJ) subluxation. Systemic examination was normal. Based on the radiographs a diagnosis of ipsilateral Monteggia and Galeazzi injuries was made (Fig. 1). Other investigations were within acceptable limits. The patient was scheduled to undergo elective open reduction and internal fixation of fractures.

Under general anaesthesia, using a tourniquet, the proximal ulna and proximal radioulnar joint were exposed through Boyd's approach. The fracture of the ulna was exposed, reduced and fixed with a seven-hole, 3.5 mm dynamic compression plate (DCP). Employing only six holes, the fracture communition was packed with bone graft from the olecranon process. The radial head was approached through the same incision and was found to be irreducible. After incising the annular ligament, the radial head could be reduced but was found to be unstable; therefore, a fascial sling, made of deep fascia was constructed around the radial neck (Fig. 2). The wound was then closed in layers.

Through a separate lower incision, on the radial fracture was exposed via a dorsal Thompson's approach and fixed with six-hole 3.5 mm DCP plate (employing only five holes). The inferior radio-ulnar joint reduced satisfactorily. The stability of the joint was assessed peroperatively in various positions of rotation under image intensification. The wound was then closed. The patient's forearm was immobilized in a posterior, above elbow back slab in neutral rotation for 4 weeks. The patient made a satisfactory recovery, and was discharged on the fifth postoperative day.

After 12 days her sutures were removed and her elbow was moved under controlled conditions to check for any subluxation. At this point, pain prevented any real motion and objective assessment of the subluxations.

After 4 weeks, the process was repeated, with additional radiographs of her elbow and wrist (Figs. 3—6). No subluxation was noted. She was

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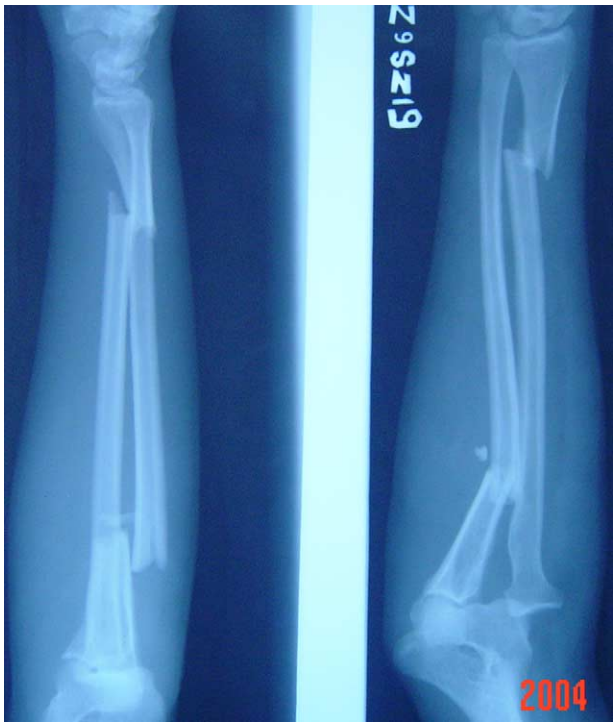

Figure 1 Preoperative radiograph of the right forearm showing both galeazzi and monteggia fractures.

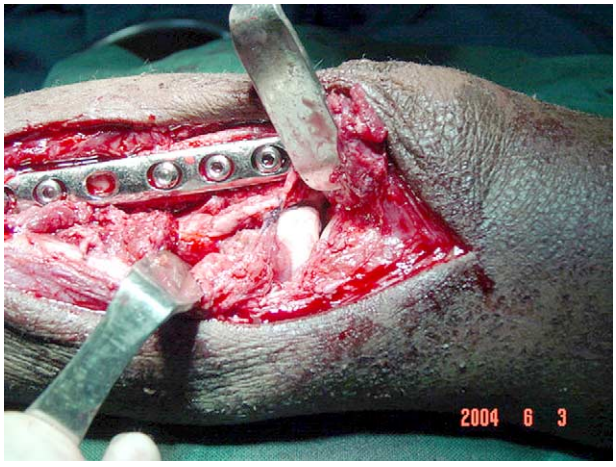

Figure 2 Intraoperative photograph of the elbow with Speed and Boyd approach showing a fascial sling around the reduced radial head.

subjected to supervised physiotherapy and at 10 weeks she had active flexion from 40 to 120 degrees, but had a supination block of 20 degrees. If the supination does not improve in the future, a radial head excision will be considered.

Discussion

Monteggia injuries classically have been defined as ''radial head dislocation with ulnar fracture located between the proximal third and base of the olecranon''. Bado[2] extended the scope by using the term ''Monteggia lesion'' to include injuries with a dislocation of the radiohumeral joint associated with fracture of ulna at any level. Galeazzi fractures are fractures of the distal radial shaft with distal radioulnar joint disruption.

A review of literature reveals that these are rare injuries. Monteggia lesions constitute 1–2% and Galeazzi 3–6% of all forearm fractures.[4] Though there are reports of complex combinations of these injuries, most of the reports are only of single cases, ipsilateral Monteggia injury with distal radius fracture[11] and with distal radial epiphyseal injury (in a child)[5] are reported. Galeazzi injury with distal ulnar epiphyseal injury in a child[10] and with fracture of radial head, i.e. Essex-lopresti[9] is also reported. A combined Galeazzi fracture and Monteggia lesion in the same arm is an exceedingly rare injury; eight cases have been reported to date (six adults and two children).[12]

The mechanism causing a Galeazzi injury is generally believed to be a fall onto the outstretched hand with hyperpronation.[13] Despite a number of biomechanical studies, an artificial Galeazzi fracture has never been produced experimentally.[14] By varying degrees of rotation and using axial loading, disruptions at the distal radioulnar joint can be duplicated.

However, the effects of normal laxity of the joint capsule and the collateral ligaments have not been clearly defined, as yet.[15] Giangarra and Chandler[6] believe that a Galeazzi injury can also result from a forced supination on a fixed wrist coupled with an axial load, when it produces a volar dislocation of distal radio ulnar joint. In contrast to the Galeazzi lesion, the mechanisms causing the various types of Monteggia lesions are the subjects of several theories.

Our case resembles a Bado type 3, in which the mechanism is believed an abduction force at the elbow, with the forearm rotation determining the direction of displacement of the radial head.[7] The X-ray showed the dislocated radial head to be lying lateral to its normal articulation. The radial head had not moved anteriorly or posteriorly on a lateral X-ray. Therefore, in our patient the Monteggia lesion is nearest to Bado type 3. Since the radial head dislocation is neither anterior nor posterior, we presume the forearm to have been midprone at the time of injury, as postulated by Mullick.[16] The elbow was probably locked in extension, causing the radial head to have been forced out laterally. The same forces on a fixed wrist, which was loaded axially, with a midprone forearm could have caused the Galeazzi component. It is interesting to note

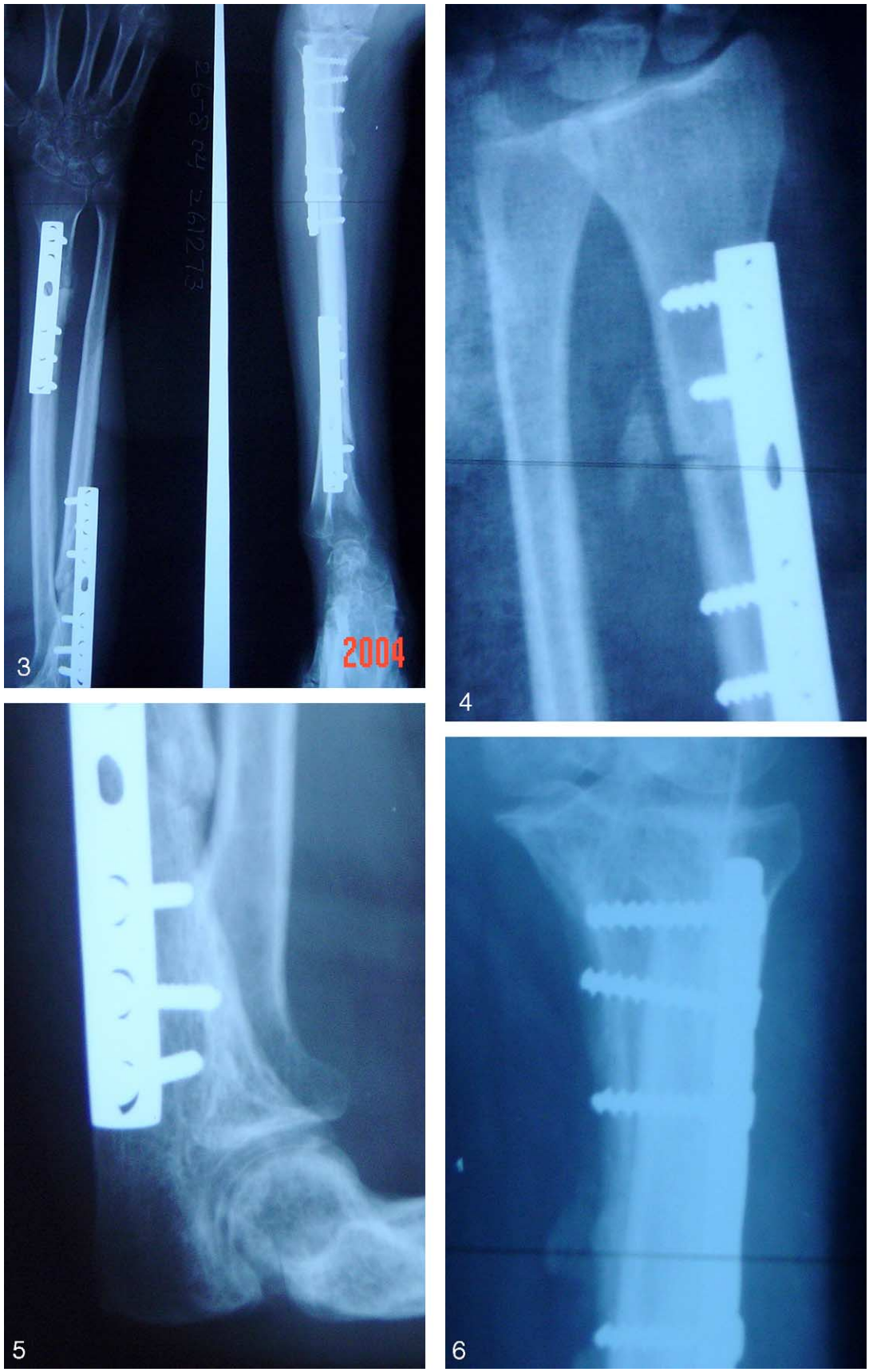

Figure 3—6 Postoperative radiograph showing well aligned and reduced fractures.

that obliquity of the fibres of interosseous membrane have been implicated in the pulling mechanism causing the distal radioulnar joint disruption in Galeazzi lesions and the radial head dislocation in Monteggia lesions.[16] This explains axial loading of a midprone forearm causing the Galeazzi lesion, the same forces moving proximally against the locked hyperextended elbow could have forced out the radial head, and interosseous membrane pull with the axial load could have fractured the ulna.

The first step in the management of these injuries lies essentially in their diagnosis. This is more so in case of Galeazzi lesions, where the wrist injury can easily be missed. This is compounded by different degrees of ulnar variance in different individuals. Moore et al.[15] believe that the exact clinico-radiological criteria for a Galeazzi fracture are not clearly established. They list 4 reliable radiographic signs of distal radio-ulnar joint disruption: (1) basal fracture of the ulnar styloid, (2) widening of the joint space of the distal radio-ulnar articulation, as shown on an antero-posterior radiograph, (3) dislocation of the radius relative to the ulna as shown on a lateral radiograph, and (4) more than 5 millimetres of shortening of the radius. Two of these criteria that is the first and the last, were used to diagnose Galeazzi injury in the patient reported here. By comparison, Monteggia lesions present less diagnostic difficulty.

Reviewing the literature of the six cases of combined injuries reported in adult patients from 1991 to 2002, it was noted that all had undergone open reduction and internal fixation.[12] Good results following Monteggia injuries depend on the following [1] (1) early accurate diagnosis (2) rigid fixation of the ulna (3) accurate reduction of the radial head and (4) postoperative immobilization in appropriate forearm rotation to allow ligamentous healing around the dislocated radial head. Rigid ulnar fixation is currently defined as accurate reduction with plate and screw fixation.[18] Malalignment after surgical treatment of posterior Monteggia injuries often is associated with unstable fixation. Dorsal contoured plating of the ulna, in combination with other procedures, can help to salvage a malaligned posterior Monteggia fracture and restore satisfactory function.[19] Campbell[20] advocates for old injuries (6 weeks or more), in which the dislocation of the radial head has never been reduced, or in which angulation of the fracture has caused redislocation of the radial head, that the radial head be excised. In old injuries if the ulna is sufficiently angulated, or is ununited, it should be rigidly fixed (usually with a compression plate) and supplemented by cancellous bone grafts. They[20] reserve open reduction of the radial head, or reconstruction of the annular ligament, for those fresh injuries in which satisfactory closed reduction is not achieved. In our case, the dilemma was in deciding between excising, or trying to preserve the head. We decided initially to preserve the head and to excise it later, if required. Broberg and Morrey[3] have studied the result of delayed excision of radial head; they report 90% subjective relief after late excision. In their series of 21 patients there were two with Monteggia injuries and five with type 4 radial head fractures; and the mean excision time was 31 months. In their view, these are the patients who could be expected to benefit most from the stability afforded by leaving the radial head in place, whilst the associated injuries heal.

Speed and Boyd[21] have described an operation for irreducible radial head dislocation, in Monteggia lesions, in which the radial head and ulnar fracture can be approached through the same incision. They have also described the use of a fascial sling around the neck of radius after open reduction of the head and fixation of the fracture. In their experience, the annular ligament is too damaged to provide an adequate amount of tissue for repair. We have employed this method in past for late presenting Monteggia lesions and we reserve radial head excision if it fails.

Galeazzi injuries, once diagnosed should be treated only surgically. The reasons for failure of close reduction are well discussed by Hugston.[8] They are the deforming forces of gravity acting on the hand unit and the rotation and shortening caused by pronator quadratus and brachioradialis actions. By relaxing the radial collateral ligaments, the abductors and the extensors of the thumb cause the distal fragment to drift radially. Open reduction of distal radius is conventionally through a volar Henry's approach. Moore et al.[15] after reviewing a very large series, felt that a dorsal Thomson's approach is equally good. In their experience, volar plating of fractures in the distal half of the radius (through the Henry approach) is technically easier and results in better soft-tissue coverage. However, a plate in this location may mechanically limit pronation. As time progressed they came to prefer the dorsal Thompson approach. They also believe that early compression plating with a six-hole plate will give a satisfactory result for most fractures. Grafting is usually not necessary, and 4 weeks of immobilization in neutral pronation-supination, or mild supination, is adequate. Resection of the distal end of the ulna,[8] or temporary fixation of the distal radio-ulnar joint[13] with a pin through the radius and ulna, is rarely, if ever, required after plating an acute fracture. Open reduction and temporary fixation of DRUJ should be reserved only for irreducible, locked or unstable

joints.[1] This was not so in our case, in which stability was checked intraoperatively, using an image intensifier in various positions of rotation. Immobilisation in supination is the standard practice, but a neutral position apparently resulted in satisfactory long-term soft-tissue healing, with less risk of a disabling supination contracture in the series of Moore et al.[15]

We believe that a comparable view of the contralateral side is a judicious option, if there is the slightest doubt, in investigating these injuries. Therefore, it is advisable to bear these injuries in mind and always to include both distal and proximal radioulnar joints in the radiographs. Occult dislocations at the wrist and elbow frequently accompany forearm fractures. When left unrecognized and untreated, they lead to a high incidence of long-term functional impairment and chronic pain.[17]

Treatment of complex forearm fractures depends on the expertise, experience and available resources. Presenting early, these are best managed with open reduction and internal fixation, since the dislocation of the radial head does not pose a serious challenge at that stage in most of the cases. If, however, they have to be managed late, the above-described method can be used.

References

1. Anderson LE, Meyer FN. Fracture of the shaft radius and ulna. In: Rockwood CA, Green DP, Buchloz R, editors. third ed., Fracture in adults, vol. 1, third ed. Philadelphia JB: Lippincott; 1991. p. 719—28.
2. Bado JL. The Monteggia lesion. Clin Orthop 1967;50:71.
3. Broberg MA, Morrey BF. Results of delayed excision of the radial head after fracture. J Bone Joint Surg (A) 1986;68:669—74.
4. Clare DJ, Corley FG, Wirth MA. Ipsilateral combination Monteggia and Galeazzi injuries in an adult patient: a case report. J Orthop Trauma 2002;16:130—4.
5. Deshpande S, O'Doherty D. Type I Monteggia fracture dislocation associated with ipsilateral distal radial epiphyseal injury. J Orthop Trauma 2001;15:373—5.
6. Giangarra CE, Chandler RW. Complex volar distal radioulnar joint dislocation occurring in a Galeazzi fracture. J Orthop Trauma 1989;3:76—9.
7. Hughston JC. Fractures of the forearm. J Bone Joint Surg (A) 1962;42:1664.
8. Hugston JC. Fractures of the distal radial shaft, mistakes in management. J Bone Joint Surg (A) 1957;39:249—64.
9. Khurana JS, Kattapuram SV, Becker S, Mayo-Smith W. Galeazzi injury with an associated fracture of the radial head. Clin Orthop 1988;234:70—1.
10. Landfried MJ, Stenclik M, Susi JG. Variant of Galeazzi fracture-dislocation in children. J Pediatr Orthop 1991;11:332—5.
11. Lee PC, Su JY, Yeh WL. Adult Monteggia fracture with ipsilateral distal radius fracture: case report. Changgeng Yi Xue Za Zhi 2000;23:38—42.
12. Maeda H, Yoshida K, Doi R, Omori O. Combined Monteggia and Galeazzi fractures in a child: a case report and review of the literature. J Orthop Trauma 2003;17:128—31.
13. Mikik ZDJ. Galaezzi fracture dislocation. J Bone Joint Surg (A) 1975;57:1071—80.
14. Moore TM, Lester DK, Sarmiento A. The stabilising effect of soft-tissue constraints in artificial Galeazzi fractures. Clin Orthop 1985;194:189.
15. Moore TM, Klein JP, Patzakis MJ, Harvey JP. Results of compression plating of closed Galeazzi fractures. J Bone Joint Surg (A) 1985;67:1015.
16. Mullick S. The lateral Monteggia fracture. J Bone Joint Surg (A) 1977;9:543—5.
17. Perron AD, Hersh RE, Brady WJ, Keats TE. Orthopedic pitfalls in the ED: Galeazzi and Monteggia fracture-dislocation. Am J Emerg Med 2001;19:225—8.
18. Ring D, Jupiter JB, Simpson NS. Monteggia fractures in adults. J Bone Joint Surg (A) 1998;80:1733—44.
19. Ring D, Tavakolian J, Kloen P, Helfet D, Jupiter JB. Loss of alignment after surgical treatment of posterior monteggia fractures: salvage with dorsal contoured plating. J Hand Surg (A) 2004;29:694—702.
20. Sisk DT. Fractures of shoulder girdle and upper extremity. In: Crenshaw AH, editor. seventh ed., Campbell's operative orthopaedics Chapter 46, vol. 3, seventh ed. St. Louis CV: Mosby; 1987. p. 1813.
21. Speed JS, Boyd HB. Treatment of fractures of the ulna with dislocation of head of radius (Monteggia fracture). JAMA 1940;115:1900.