CASE STUDY

Ortopedia *Traumatologia* **Rehabilitacja**
© MEDSPORTPRESS, 2013; 2(6); Vol. 15, 169-174
DOI: 10.5604/15093492.1045948

Percutaneous K-Wire Buttress Technique for Displaced Radial Neck Fracture

Saket Tibrewal[A,B,D,E,F], Suman Saha[B,D], Omar Haddo[A,D,E,F]

Department of Trauma & Orthopaedics, The Whittington Hospital, London

SUMMARY

Radial neck fractures are uncommon injuries in adults and more often found in children, where they account for 5-8.5% of elbow injuries. It is generally agreed that an angulation of less than 30 degrees is acceptable. However, anything greater than this should be improved in an attempt to restore normal anatomy and maximize the range of movement.

We describe our management of a radial neck fracture in a young lady which was significantly angulated, resulting in a restriction of movements. Attempts at a closed reduction failed and hence we proceeded with percutaneous reduction and buttressing with a K-wire. Post-operatively the patient regained a full range of movements with normal elbow function.

We outline our surgical technique, which has not been previously described. We suggest that it is a safe and easy option in cases of failed closed reduction and should be considered prior to proceeding with an open reduction.

Key words: radial neck fracture, K-wire, buttress

BACKGROUND

Radial neck fractures are uncommon injuries in adults and more often found in children where they account for 5-8.5% of elbow injuries [1]. They are usually the result of a fall onto an extended and supinated forearm, which fractures the neck of the radius and leads to angulation of the radial head. It is generally agreed that an angulation of less than 30 degrees is acceptable [1-4]. However, anything greater than this should be improved in an attempt to restore normal anatomy and maximize the range of movement.

CASE REPORT

A 20 year-old old woman sustained an injury to her left non-dominant elbow after slipping on the street. She presented with pain and restriction of movements to the elbow. On examination there was marked swelling and tenderness. She had an active range of movement between 15 and 100 degrees with a loss of full extension, supination and pronation. Radiographs confirmed a radial neck fracture with angulation of 35° (Fig. 1,2).

Examination under general anaesthesia demonstrated a full range of flexion and extension. However, there was a block to normal supination. Attempts at a closed manipulation using both Patterson's and Kaufman's techniques failed to achieve reduction of the fracture and restoration of movements [5,6]. We, therefore, decided to proceed with percutaneous Kirschner wire reduction and buttressing using the following technique.

Fig. 1. Radial neck fracture, lateral x-ray

Fig. 2. Radial neck fracture, AP x-ray

SURGICAL TECHNIQUE

The patient was placed in the supine position and an arm board was used. A tourniquet was applied but not inflated. The arm was prepared and draped in the standard way. In order to mark the entry point for the wire we adapted a technique described by Wenger for the fixation of slipped capital femoral epiphyses [7]. Firstly, in the anteroposterior view, the wire was placed in line with the fracture site and this line drawn with a sterile skin marker. Then, in the lateral view, the wire was placed in the longitudinal axis of the radius and this was again marked on the skin. The entry point for the wire was at the intersection of these two skin markings (Fig. 3).

A small skin incision was made and an artery clip was used to bluntly dissect down to bone to ensure the safety of the posterior interosseous nerve. A 1.6 mm Kirschner wire was then introduced by hand under fluoroscopic control and the wire was guided through the fracture site. At this stage the wire was used to lever the radial head and neck back into the correct alignment and then advanced by gentle tapping with a small mallet to gain purchase in the opposite cortex (no power tool was used at any stage). The wire thus buttressed the radial neck fracture restoring anatomical alignment with the use of minimal force and soft tissue stripping (Fig. 4,5,6,7).

A plaster was applied for a period of 2 weeks, at which point the wire was removed and the elbow mobilized. At 6 months following the surgery, the patient had a normal range of movements and normal function of the elbow with no signs of adverse sequelae (Fig. 8,9).

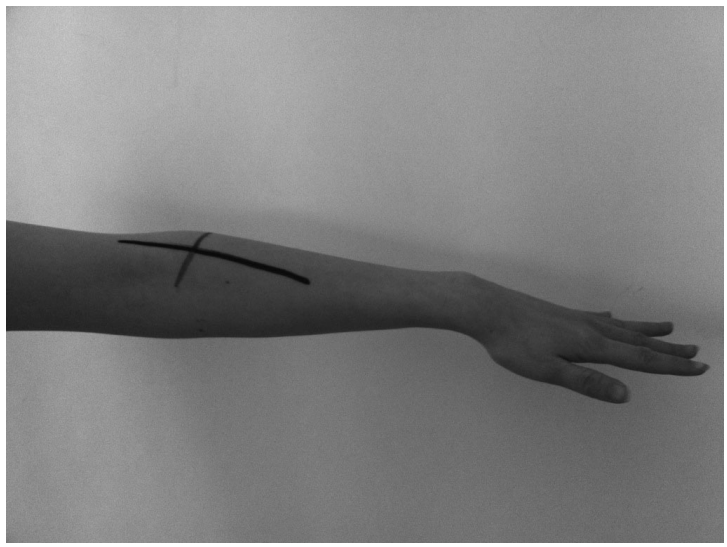

Fig. 3. Marking entry point for the wire

Fig. 4. Intra-operative, lateral x-ray

Fig. 5. Intra-operative, AP x-ray

Fig. 6. Intra-operative, AP x-ray

Fig. 7. Intra-operative, lateral x-ray

Fig. 8. Post-operative, AP x-ray

Fig. 9. Post-operative, lateral x-ray

DISCUSSION

Radial neck fractures in adults are rarely found in isolation and are usually associated with a radial head fracture. They are far more common in children, accounting for 5-8.5% of elbow injuries. We feel that an angulation of greater than 30 degrees or a loss of normal supination and pronation are indications for intervention. In the first instance, closed manipulation should be attempted but, commonly due to soft tissue swelling around the elbow or body habitus, this can be unsuccessful.

The majority of the literature focuses on the surgical management of these cases in the paediatric patient. Several techniques for percutaneous reduction of radial neck fractures have been described [8-11]. However without fixation these can be associated with re-angulation leading to poor outcomes [8]. Percutaneous reduction with fixation prevents subsequent displacement and different methods have been reported including K-wire transfixion, and intramedullary fixation [12-17].

Our method of percutaneous reduction and buttressing, modifying the Kapandji technique, has not been previously described. It is simple to perform and does not require the use of any power tools. This avoids significant damage to the soft tissues around the elbow, in particular the extensor origin, which is at risk in other described techniques [12]. It also avoids disruption of the blood supply to the radial head and annular ligament, which are at risk in other procedures [13,14]. Marking of the skin allows for accurate wire insertion, again minimizing the risks of the procedure.

CONCLUSION

In cases of failed closed manipulation of isolated radial neck fracture with significant angulation or loss of normal supination, we suggest our technique, which is easy, safe and can be used in both adults and children. This treatment is a satisfactory option for orthopaedic trainees and general orthopaedic surgeons and should be considered before open reduction and internal fixation, which involves significant soft tissue disruption and greater risks.

REFERENCES

1. Wilkins KE. Fractures of the neck and head of the radius. In: Fractures in children (Ed. Rockwood C A) J.B. Lippincott Cp. Philadelphia 1984:502-21
2. Newman JH. Displaced radial neck fractures in children. Injury 1977; 9:114-21
3. Vahvanen V, Gripenberg L. Fracture of the radial neck in children. Acta Orthop Scand 1978; 49:32-8
4. Tachdjian MO. Fractures involving the proximal radial physis and radial neck. In: Paediatric Orthopaedics (Ed. Tachdjian MO). W.B. Saunders Philadelphia 1990:3137-45.
5. Patterson RF. Treatment of displaced transverse fractures of the neck of the radius in children. J Bone Joint Surg 1934; 16: 695-8
6. Kaufman B, Rinott MG, Tanzman M. Closed reduction of fractures of the proximal radius in children. J Bone Joint Surg 1989; 71B: 66-7
7. Wenger DR. Slipped capital femoral epiphysis. In: The art and practice of children's orthopaedics. (Eds. Wenger DR, Rang M). Raven Press, New York 1992: 348-52
8. Steel JA, Graham HK. Angulated radial neck fractures in children. A prospective study of percutaneous reduction. J Bone Joint Surg (Br) 1992 Sept; 74(5):760-4
9. Van Rhijn LW, Schuppers HA, van der Eijken JW. Reposition of a radial neck fracture by a percutaneous Kirschner wire. Acta Orthop Scand 1995; 66(2): 177-9
10. Futami T, Tsukamoto Y, Itoman M. Percutaneous reduction of displaced radial neck fractures. J Shoulder Elbow Surg. 1995 May-Jun;4(3):162-7.
11. Monson R, Black B, Reed M. A new closed reduction technique for the treatment of radial neck fractures in children. J Paediatr Orthop. 2009 Apr-May; 29(3):243-7.
12. Biyani A, Mehara A, Bhan S. Percutaneous pinning for radial neck fractures. Injury 1994; 25(3): 169-71
13. Metaizeau JP, Lascombes P, Lemello JL, Finlayson D, Prevot J. Reduction and fixation of displaced radial neck fractures by closed intramedullary technique. J Paediatr Orthop 1993; 13(3): 355-60
14. Keller HW, Rehm ER, Helling J. Intramedullary reduction and stabilisation of adult radial neck fractures. J Bone Joint Surg (Br) 1994; 76B: 406-8
15. Ugutmen E, Ozkan K, Ozkan FU, Eceviz E, Altintas F, Unay K. Reduction and fixation of radius neck fractures in children with intramedullary pin. J Paediatr Orthop B. 2010 Jul; 19(4):289-93.
16. Matuszewski L, Kalakucki J, Ciszewski A. Operative treatment of radial neck fractures in children. Ortop Traumatol Rehabil. 2012 May-Jun; 14(3):261-8.
17. Brandao GF, Soares CB, Teixeira LE, Boechat Lde C. Displaced radial neck fractures in children: association of the Métaizeau and Böhler surgical techniques. J Pediatr Orthop. 2010 Mar; 30(2): 110-4.

Liczba słów/Word count: 1455 **Tabele/Tables:** 0 **Ryciny/Figures:** 9 **Piśmiennictwo/References:** 17

Adres do korespondencji / Address for correspondence
Mr S Tibrewal
59 Elmstead Lane, Chislehurst, Kent BR7 5EQ.
07931767811, e-mail: sak11@hotmail.com

Otrzymano / Received *25.01.2013 r.*
Zaakceptowano / Accepted *28.03.2013 r.*