

Monteggia Equivalent with Posterior Interosseous Nerve Palsy in a Child

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Abstract

Monteggia fracture dislocation is not an uncommon paediatric forearm injury. There exists four types of Monteggia fractures as classified by Bado and as many Monteggia variants have been described in literature. Accurate and early diagnosis and management leads to excellent results. Neurological complications associated with this injury have been described in the form of anterior and posterior interosseous nerve injuries. But these are extremely rare, and most are associated with neglected and missed injuries. We present a case of fresh Monteggia variant type 1 Injury having greenstick fracture of Ulna and Salter Harris type I injury to proximal radial epiphysis with posterior interosseous nerve palsy which was managed successfully with excellent function outcome. This unique combination has never been reported earlier.

Keywords: Monteggia fracture dislocation; Monteggia variant; Proximal radial epiphysis; Salter Harris injury; Posterior interosseous nerve; Green stick fracture

Introduction

Monteggia fracture is an infrequent lesion, which involves a combination of ulna fracture and radial head dislocation. Monteggia equivalent fractures include associated fractures of radial head/proximal radial physal injury, radial neck or olecranon fractures [1]. Such variants are even rarer. It is not uncommon to see missed or neglected injuries of this type leading to suboptimal function. A careful clinical examination and radiological assessment is warranted while managing such injuries. Posterior interosseous nerve (PIN), a branch of radial nerve is susceptible to injury in such fractures owing to its proximity to proximal radius. This pattern of injury has very few reports due to its rarity. Posterior interosseous nerve injury is very rare association in fresh Monteggia lesions. It's mostly reported in neglected Monteggia fracture dislocations. There is only one report of fresh Monteggia variants type 2 associated with growth plate injury but without PIN palsy. This injury included anterior dislocation of radial head with displaced ulna fracture. We report an unusual case of Monteggia variant type I fracture with Salter Harris type I growth plate radial head injury with epiphyseal lateral dislocation with PIN palsy. It was successfully managed and had good Functional outcome at one year. This unusual association with PIN palsy has never been reported earlier [2].

Case Report

An 8-year-old girl presented to the clinic with 8 hours history of fall from stairs on to the outstretched dominant hand while in school. She had a severe pain, swelling and inability to use the right elbow joint. On examination swelling at elbow arm and hand was noted. Radial pulse was palpable. Range of motion at wrist was full but she was unable to extend the fingers at MCP joints. Sensations were intact. Roentgenographic examination of elbow and forearm revealed fracture of the proximal ulna, a green stick fracture, with Salter Harris type I lateral dislocation of radial head (Figure 1).

The injury pattern was classified as Monteggia fracture dislocation variant type I with PIN palsy. Plan was made for closed reduction and stabilization with Kirschner wires. After investigations and informed consent from parents, patient was taken up for surgery under general anaesthesia. Ulna was stabilized with one 2 mm Kirschner-wire and radial head epiphysis was successfully reduced using a percutaneous

Kirschner wire as a joystick inserted from postero-lateral aspect of elbow while applying traction and varus stress to elbow under fluoroscopic control. The reduction was stabilized using a retromedullary long smooth 1.5 mm Kirschner wire in the radius after piercing the growth plate. Reduction was stable in pronation and supination. Wires were cut, bent and buried under the skin and a long arm cast was applied in supination (Figure 2).

No intervention was carried out for PIN palsy assuming it to be a neurapraxia. Post-operative period was uneventful. Patient was examined at weekly intervals for recovery of posterior interosseous nerve for 6 weeks. She started regaining finger extension through the mid third week onwards and she was able to fully extend the fingers at the end of five weeks. X-rays were done at 4 weeks which revealed union of ulna fracture (Figure 3). She was allowed to mobilize the elbow and wrist joints after 6 weeks after removal of slab. Both the wires were removed after 6 weeks when the ulnar wire punctured the skin. At 8 weeks she regained full elbow motion with full pronation



Figure 1: Pre-operative radiographs.

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Figure 2: Post-operative radiographs.

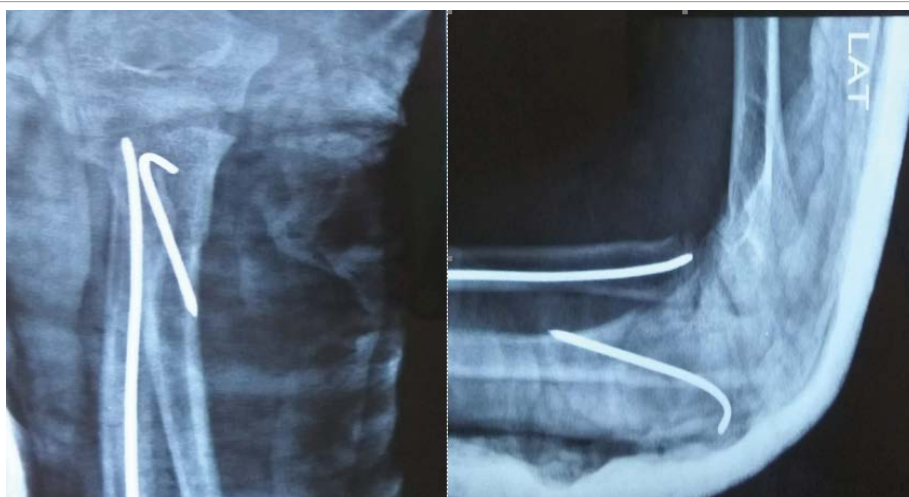


Figure 3: Follow up radiographs at 6 weeks.



Figure 4: Follow up radiographs at 3 months.



Figure 5: Follow up radiographs at 6 months.



Figure 6: Final range of motion at the end of 1 year.

and supination at wrist. Gradual elbow, wrist and grip strengthening exercises were carried out. Repeat X-rays at 6 months and one year revealed fracture union (Figures 4 and 5). She had full range of motion at elbow, wrist and complete recovery of PIN (Figure 6).

Discussion

Monteggia fracture dislocation is a relatively rare injury representing 1% of all upper limb fractures [3]. In 1814 Goviani Battista Monteggia an Italian surgeon first described radial head dislocation associated with fracture of proximal 1/3rd of ulna in two adults [4]. The earliest description of this injury was in Monteggia's book 'Istuzioni Chirurgiche' published in 1814 [5]. Baado in 1962 classified such injuries into four distinct types based basically on the location of radial head dislocation Type I Anterior, Type II Posterior Type III Lateral and type IV also has associated radial neck fracture. Onley and Menelaus in 1989 found a type I equivalent (ulnar fracture associated with radial neck fracture or separation of the proximal radial epiphysis) in 14 of their 102 patients [4]. Monteggia Variants have been classified into Type I (Ulnar fracture with radial neck fracture or Proximal radial epiphyseal dislocation) Type II (Posterior elbow dislocation with radial neck fracture or Proximal radial epiphyseal dislocation) Type III (Ulnar fracture and/or olecranon fracture with humeral lateral condylar fracture and type IV (fracture of the radius and ulna with radial neck fracture or Proximal radial epiphyseal dislocation) [6]. In this case the ulnar fracture was a green stick fracture. The mechanism of injury was hyperextension at elbow joint leading to anterior dislocation

of radial head and bottle opening effect on the radial epiphysis when the radial head tried to relocate and struck the capitulum which forced its separation which led to anterior dislocation of proximal radial epiphysis which later migrate laterally. The posterior interosseous nerve is usually stretched in lateral dislocation of radial head.. The Overall incidence of nerve injuries following Monteggia lesions ranges from 3.1% to 31.4% and almost all resolve without operative treatment [7]. Treatment for such injuries should be done as early as possible and require anatomical restoration of length, rotation and alignment. Here ulna fracture was green stick fracture to which varus stress along with longitudinal traction was given and radial head was gently reduced back using a K wire joystick technique. Associated PIN injuries have been reported to resolve well in children [8]. Dharamshaktu et al. reported a case of Monteggia equivalent lesion with PIN palsy where they reported short oblique proximal radius fracture above the junction of middle and proximal third along with spiral comminuted ulna fracture distal to the level of radius fracture with PIN palsy where they did open reduction of Ulna and stabilization with titanium elastic nail and radius was reduced closed stabilized similar to ulna. PIN recovered fully after 3 months period [9]. Reina et al. in 2015 reported a similar case of Monteggia equivalent fracture associated with Salter I Fracture of the radial head but without PIN palsy. They fixed the ulna using a DCP plate and openly reduced the radial head. Posterior interosseous nerve injuries are reported in Monteggia lesions but this particular case is being reported for its unique set of combination and its successful outcome after early diagnosis and operative intervention [1].

Conclusion

Monteggia equivalent lesions associated with PIN palsy are rare injuries. Knowledge of such rare patterns helps in the early diagnosis of injury. Prompt operative treatment in the form of closed reduction to achieve anatomical reduction is successful. Early physiotherapy is required for optimal functional outcomes. Most nerve injuries associated with such lesions are neurapraxias and recover spontaneously.

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Competing Interests

The authors declare that they have no competing interests.

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