

Chronic acquired radial head dislocations associated with ulnar bowing in children. Report of three cases

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Abstract The most common cause of chronic radial head dislocations is Monteggia lesions. Although acute, Monteggia fractures in children are easy to treat; complex reconstruction techniques may be required to reduce and stabilize chronic radial head dislocations. Early, accurate diagnosis and appropriate treatment remain the key factors for successful results in Monteggia or equivalent lesions in children.

Keywords Monteggia lesions · Radial head · Dislocation · Ulnar osteotomy

Luxation chronique de la tête radiale associée à une courbure ulnaire chez l'enfant. A propos de trois cas

Résumé La cause la plus commune des luxations chroniques de la tête radiale sont les lésions de Monteggia. Bien qu'il soit facile de traiter les fractures fraîches de Monteggia chez les enfants, des techniques complexes de reconstruction peuvent être exigées pour réduire et stabiliser des luxations chroniques de la tête radiale. Le diagnostic précoce et précis et le traitement approprié demeurent les facteurs principaux de succès dans les fractures de Monteggia ou dans les lésions équivalentes chez les enfants.

Mots clés Lésions de Monteggia · Tête radiale · Luxation · Ostéotomie ulnaire

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Introduction

Chronic radial head dislocations most commonly result from Monteggia lesions, which were either unnoticed initially or treated inadequately for more than 1 month after the injury [1]. Congenital problems, multiple exostoses, cerebral palsy and obstetric brachial plexus palsy may also cause chronic dislocations of the radial head [2]. Whatever the cause, surgical reconstruction for a chronic radial head dislocation is controversial. Some studies document problems in patients with unreduced dislocations, while others report unfavorable results with attempted reconstructions. Also, our knowledge on the natural history of missed Monteggia lesions is based on papers reporting symptomatic patients treated surgically and anecdotes of untreated cases with no or minor complaints. Several surgical

options, each with proposed advantages and potential risks, further obscure the picture [2–4].

As children are known to adapt well to chronic dislocations, they usually remain asymptomatic in the short term. Therefore, there is a dilemma to either wait until symptoms occur or to operate in order to prevent possible symptoms in the long term.

In this report, we describe three asymptomatic patients, two with anterior type and one with lateral type of chronic radial head dislocations associated with ulnar bowing, in whom we chose to intervene due to concern for possible future problems.

Case reports

All cases were asymptomatic with regard to loss of function and pain. Two cases were the result of traumatic injuries. One case with an anterior dislocation had a history of obstetrical brachial plexus injury and no history of trauma. Parents were advised of limited expectations and possible risks of surgical intervention.

Case 1

A 3-year-old boy who had sustained a fall on the right hand had first been seen by a local orthopedic surgeon and diagnosed as having a simple fissure at the proximal ulna. A long arm cast had been applied and the dislocation of the radial head had been missed. Three months after the cast removal the child was asymptomatic but the mother was concerned about an anterior bony prominence at the elbow. He had 0–100° flexion, 80° supination and 60° pronation when he was brought in for further evaluation at our department. His radiographs confirmed that he originally had had a Bado type 1 Monteggia fracture-dislocation (Figs. 1, 2).

A short incision parallel to the ulnar crest was used for direct posterior approach to the ulna. Multiple drill holes were made in the ulna at the site of the original fracture and a low-energy osteotomy was done. The osteotomy was opened so that a posterior angular overcorrection was achieved. Corticocancellous graft taken from the ilium was inserted and the osteotomy was stabilized with a reconstruction plate fixed with four screws. After the osteotomy, intraoperative radiography showed that the radial head had reduced spontaneously. Hence, no open reduction or annular ligament reconstruction was attempted. A long arm cast was applied keeping the forearm in supination and the elbow in 90° flexion. The cast was molded anteriorly maintaining a slight dorsal tilt of the ulna (Figs. 3, 4).



Fig. 1 Pre-operative anteroposterior roentgenography of case 1



Fig. 2 Pre-operative lateral roentgenography of case 1

Case 2

A 9-year-old boy had sustained a fall injuring the right forearm. He had been seen by a local orthopedic surgeon and diagnosed as having diaphyseal fractures of both the radius and the ulna. He had a long arm cast following fracture reduction, but the dislocation of the radial head had been missed. After cast removal, the

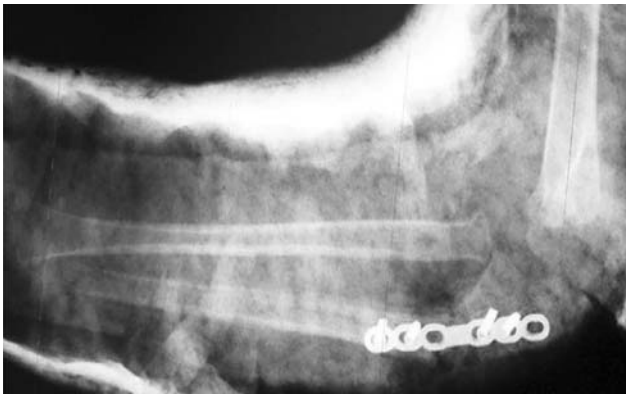


Fig. 3 Post-operative lateral roentgenography of case 1(early)



Fig. 4 Post-operative lateral roentgenography of case 1(late)

parents noticed an anterior bony prominence at the elbow. He was admitted to our hospital 13 months after the injury. The radiographs showed that the radial head was dislocated anterolaterally and there were deformities in both the radius and the ulna, the ulnar deformity being a posterolateral bowing. Therefore, the initial injury was considered as a Bado type 4 variant. The elbow and forearm had full ranges of motion before the operation.

Simple corrective osteotomies were made at the apex of deformities in the radius and the ulna. The radial osteotomy was stabilized with a plate and the ulna with a Rush pin. The annular ligament was observed to be torn and was reconstructed with the Bell-Tawse technique, using the palmaris longus autograft.

Case 3

A 6-year-old girl with a history of obstetric brachial plexus palsy and forceful exercises was admitted to our hospital for anterior bony prominence in the elbow which the parents noticed 6 months ago. The child had

no history of injury to her forearm. On physical examination it felt that the dislocated radial head could be reduced by pushing it while the elbow was held in flexion and supination. She had no contracture or functional loss in the upper extremity. Her lateral radiograph showed a positive “ulnar bow sign” as described by Lincoln and Mubarak [5].

Under general anesthesia, dorsally angulated proximal ulnar osteotomy with acute lengthening was performed. An autograft taken from the ipsilateral fibula was put into the osteotomy site and the osteotomy was fixed with a plate. At that stage, the radial head was easily reduced into its anatomic position. Therefore, annular ligament was not exposed. The cast was molded anteriorly, maintaining a slight dorsal tilt of the ulna.

Postoperative courses

In all three cases the osteotomies healed in the cast within 6 weeks. However, in cases 1 and 3, radiographs showed redislocation of the radial head 1 month post-operatively while still being immobilized in the cast. These cases did not have any pain or functional loss, and forearm motions were the same as before the operations at 12 and 34 months follow-up, respectively. Reduction of the radial head could only be maintained in case 2. However, this case had 25° flexion contracture and almost complete loss of pronation at 12 months of follow-up.

Discussion

Acute Monteggia fractures in children are easy to treat. Stable anatomic reduction of the ulna is usually sufficient to achieve reduction and stabilization of the radial head. However, complex reconstruction techniques may be required to reduce and stabilize chronic radial head dislocations [2–5]. This is considered to be due to dysplastic and adaptive changes in both the soft tissues and bones around the elbow secondary to distorted anatomy in a growing child [6].

The only case we managed to achieve a stable reduction was case 2 for whom we performed open reduction, osteotomy of both forearm bones and annular ligament reconstruction. However, this was at the expense of complete loss of pronation in the forearm.

In the two cases who did not have open reductions the radial heads redislocated. In these cases, we had performed ulnar osteotomies only. After the osteotomies, intraoperative radiographs suggested that the radial heads were reduced as evidenced by radio-

capitellar lines. Open reduction or reconstruction of the radio-ulnar joint was therefore not performed. Although we avoided serious complications in these cases, we were unable to achieve stable reduction. When reviewed retrospectively, we noticed intraoperative radiographs showed no overlapping of the radial head and the proximal ulna implying that the radial heads had probably not been anatomically reduced in the ulnar notch. We observed that radio-capitellar lines can be misleading to evaluate reduction in chronic cases. Although, our experience supports that closed reduction with only acute lengthening may not be attempted because pathologic changes already present would make successful reduction nearly impossible [7, 8], reduction of the radial head using an external fixator can be an alternative method before open reduction because it gives the opportunity of controlled gradual lengthening and angulation of the ulna with restoration of the ulnar length unless reduction occurs with preservation of the axes of both forearm bones and enables roentgenographic control during patient follow-up [9, 10].

Hoffer and Phipps [11] reported their experience in surgery about the elbow for brachial palsy. Five patients in their series had anterior dislocations of the radial heads and supination contractures. Without attempting reduction of the radial head, they performed transfers of the biceps to the ulna in order to improve elbow flexion. Unlike their cases, our patient did not have either functional loss or contracture in the upper extremity. She even had a feeling of relocation when manipulated preoperatively. Forceful supination exercises were thought to be responsible for radial head dislocation and ulnar bowing which is known to occur in children with brachial plexus palsy [12]. Therefore, we had hypothesized that she could have benefited from an ulnar osteotomy as the only procedure. We think active biceps pull along with instability of reduction may have played a role in redislocation.

Recently, good results without serious complications were reported with complex reconstructions [7, 13–15]. Hasler et al. [13] reported good results in 15 patients they treated by ulnar osteotomy, external fixation and open reconstruction but without repair of the annular ligament. Gyr et al. reported 15 children whom they treated with the Bell-Tawse procedure. They recommended annular ligament reconstruction for most chronic Monteggia fractures to improve long-term function and prevent the need for late excision of the painful, chronically dislocated radial head [14]. Degreef and De Smet treated six children with missed dislocations in association with ulnar deformation for whom they performed open reduction and ulnar oste-

otomy. The outcome was excellent as determined by the mobility of the elbow and maintenance of radial head relocation [15].

However, some studies reported a less favorable outcome with attempted reconstruction of an unreduced radial head [16–18]. Others reported late reconstruction to be complicated and unpredictable [4] and recommend that surgery should be reserved for symptomatic patients [19]. Gunther and Wessel [16] emphasized that Monteggia fractures should not be overlooked, as secondary operations always had a less favorable outcome. Rodgers et al. reported their results of reconstruction in 7 patients with chronic Monteggia lesions, in whom they observed 14 complications. They found the results to be unpredictable and associated with serious complications other than loss of rotation. They underlined that operations for the treatment of chronic Monteggia lesions were salvage procedures and would likely lead to some residual functional limitation [18]. Our experience correlates better with these studies reporting less optimistic results.

Ideally, surgical reconstruction in children with asymptomatic chronic radial head dislocations can only be justified if the indications are clear and the results predictable. However, currently the decision to perform surgery is based on concerns for future problems. In conclusion, our experience in three consecutive cases supports the less favorable outcome of reconstructive surgery. The authors believe that further research in the pathological and functional anatomy may help clarify the indications for surgery. Meanwhile, early, accurate diagnosis and appropriate treatment remain the key factors for successful results in Monteggia or equivalent lesions in children.

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