



FUNCTIONAL OUTCOME OF SURGICAL PROCEDURES OF CHRONIC RADIAL HEAD DISLOCATION IN MISSED MONTEGGIA FRACTURE IN PAEDIATRIC GROUP .

Orthopedics

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KEYWORDS

Introduction

In our country a missed Monteggia fracture is a frequent occurrence and leads to a persistent radial head dislocation. The neglected radial head dislocation is diagnosed several months after the injury when the patient complains of slight or moderate elbow pain, decreased elbow flexion, valgus deformity of the elbow, and neurologic problems. If left untreated, the dislocated radial head loses its concave articular surface and displays hypertrophic changes and the humeral capitellum configuration flattens, thereby limiting the range of motion. In this study we evaluate the results of open reduction by various techniques and try to find out the advantages and disadvantages of each.

Materials and methods

15 missed Monteggia fractures were selected for operation from our OPDs from June 2009 to June 2012 depending on the functional and cosmetic demand of the patient and age of the patient and duration of injury.

Our inclusion criteria was all missed Monteggia fractures (diagnosed by clinical history and radiographs) with a persistent radial head dislocation in patients less than 18 years and wanting operation for better functional or cosmetic results.

All 15 patients were counselled about the missed fracture, and the treatment we were offering, its effectiveness and complications and all of them agreed for the operation.

Thorough clinico-radiological examination was conducted. The following parameters were noted 1) Range of motion 2) Mayo elbow performance index (MEPI).

We performed 4 combinations of operation

- GROUP I (5 patients) - modified Hiramaya ulnar osteotomy plus annular ligament reconstruction with free Palmaris longus graft
- GROUP II (2 patients) - modified Hiramaya ulnar osteotomy plus annular ligament reconstruction by bell tawse's procedure
- GROUP III (4 patients) - only modified Hiramaya's osteotomy
- GROUP IV (4 patients) – Transverse osteotomy of ulna , plus annular ligament reconstruction by bell tawse's procedure.

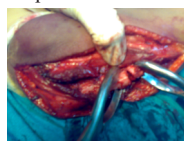
The groups were assigned randomly and the same surgeon performed all the operations. The results were assessed by a different set of doctors. Results were assessed on basis of range of motion achieved, time of surgery, complications and Mayo elbow performance index (MEPI).

Surgical technique

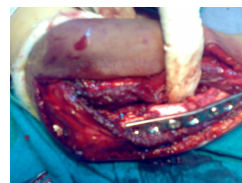
Skin incision was made beginning at the lateral epicondyle of the humerus continuing medially on the proximal metaphysis of the ulna, and extending to the middle part of the posterior aspect of the ulna. The radial head joint was approached between the extensor carpi ulnaris and anconeus while the ulna was then approached between the flexor carpi ulnaris and the anconeus or the extensor carpi ulnaris. In all cases, an ulnar osteotomy was performed first, and then the radial head was reduced.

Ulnar Osteotomy: A transverse osteotomy of ulna and fixation with a plate or rush nail was done in the first 4 cases which comprised our group IV patients. The rest of them had a modified Hiramaya's osteotomy done which is described below:-

Modified Hiramaya's osteotomy: it is a posterior bending osteotomy of the ulnar shaft using a pre bent plate with the degree and site determined by pre operative drawings from the lateral radiographs. After the osteotomy at the proposed site, the pre bent plate was made to sit over the posterior surface of ulna and a corticocancellous wedge shaped graft from the iliac crest was inserted in the gap thus created and the plate fixed in situ. This creates a posterior bend of around 15° and an elongation of around 1 cm in most cases when we used a 7 hole plate. This correction leads to an inherent stability of the radius head to its original position.



Hiramaya's osteotomy : posterior bending osteotomy with iliac crest wedge graft



Fixation with pre bent plate

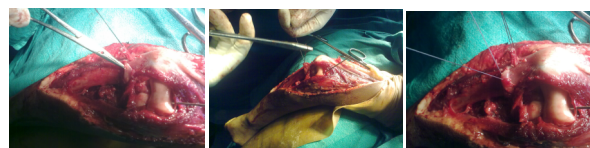


Pre op x ray



Post op x ray

Annular ligament reconstruction: Annular ligament reconstruction was performed for all groups except group II. We used two methods of reconstruction: - First one is the well known bell tawse's procedure where a new annular ligament is reconstructed from a strip of the triceps fascia.



Bell tawse's procedure : annular ligament reconstruction with strip of triceps fascia

The second procedure is reconstruction of the remnant of the annular ligament with free Palmaris longus graft . It requires identification of the remains of the torn annular ligament, clearance and then reconstruction with a small free Palmaris longus graft harvested from the same hand.

Wound was closed in layers over a drain and immobilised for 2 weeks in a plaster cast at 90° flexion in supination. We always fix the radius with a transcapitular k wire which was removed after 2 weeks after which gradual exercises are begun in order to achieve a good range of motion in 6 weeks.



Harvesting Palmaris longus graft Reduction of the head Reconstruction of the remnants

Results

The 15 patient were followed up for an average duration of 19 months through clinical examination, radiographs, questionnaires and telephonic conversations.

They were assessed on the following parameters: - range on motion, mayo elbow performance index (MEPI), time of surgery, radiographic findings and complications.

There was radiological union of all the osteotomies with a mean duration of 8.6 weeks. There was one case of frank dislocation in group III while 2 cases of subluxation one each in group III and IV.

Average time of surgery for both group I and II was about 80 mins while that of group IV 70 mins and was the least for group III – only 40 mins.

Amongst other complications were 3 superficial infections one each in group I, II and IV, especially at the radial pin site which recovered after proper antibiotics and removal of pin not leading to much impairment of functional result. Also there was tourniquet palsy in a group I patient which recovered fully in 3 months but might have led to some loss of range of motion.

The mean range of motion was increased by 45° in both group I and III while it increased only by 30° in group II while even less, 20° in group IV. The average increase in the MEPI scores were also almost on the same lines, being the maximum for Group III (33 points) then Group II and III (27 each) and the least for Group IV (18 only).

Group III had a case of dislocation of radial head after 8 weeks post op which decreased its average range of motion; else the group had the best results for range of motion per se. Also noteworthy was that all the patients of group II and IV (bell tawse group) had a significant extension lag contributing to the lower range of motion. We conclude that annular ligament reconstruction led to some restriction of mobility of the elbow and increased operative time but not significant enough to risk the re-dislocation/subluxation of the radial head as it happened in two of the group II patients. Also the Hirayama's osteotomy, which certainly takes more operative time, was inherently more stable than the simple transverse osteotomy as evident by comparing group II and IV. Amongst the two procedures for annular ligament reconstruction, Palmaris longus free graft augmentation of the remnant is a more physiological procedure leading to better results ,in not only containing the head, but also providing better range of motion due to no morbidity of the triceps causing an extension lag in most of the bell tawse cases.

Discussion and conclusion

Chronic radial head dislocation due to a missed Monteggia fracture is not that uncommon a finding in our country primarily due to inadequate or no primary treatment at the time of injury. The neglected radial head dislocation is diagnosed several months after the injury when the patient complains of slight or moderate elbow pain, decreased elbow flexion, valgus deformity of the elbow, and neurologic

problems. If left untreated, the dislocated radial head loses its concave articular surface and displays hypertrophic changes and the humeral capitellum configuration flattens, thereby limiting the range of motion. It also hampers the normal growth of the radius and distal radio ulnar instability. For these reasons an open reduction of the head is required. But such late cases have their bag of troubles together in the package. We here tried to find the best possible way to manage these injuries.

The study conclusively proves that an anatomical osteotomy of the ulna like Hirayama's osteotomy not only provide for an easier and more stable reduction of the radial head than a simple transverse osteotomy, but also provides better long term results. This osteotomy takes up a little more operative time than the transverse one , but we found that pre op planning with line drawing and cuts reduced the time to almost the same. Pre op planning also helps in accurate placement of the osteotomy and screws at the proper angle leading to a more anatomical, easier and better reduction of the radial head.

As we always performed the ulnar osteotomy first a common finding after the first few operations was that the radial head was reduced automatically and stable just after fixing the plate without any direct intervention. This led us to believe falsely that this anatomical reduction leads to correction of the deformity and takes away the dislocation forces on the radial head. We skipped the annular ligament reconstruction in one group or patients only to realise our mistake that soft tissue forces also need to be counteracted by reconstruction of the ligament.

Historically there have been numerous methods of reconstruction of the annular ligament using the forearm fascia, triceps fascia and most recently the Palmaris longus graft. We used both triceps fascia and Palmaris longus graft for this reconstruction. But the material of the ling isn't the only difference in the two procedures. The bell tawse's procedure involves using a triceps sling attached on the ulna to go around the radial head and forming a new sling around it by re attaching it with the ulna. But the Palmaris longus is a free graft , where we actually use the remnants of the annular ligament and just bridging the gap or defect with the free graft. This procedure is more anatomical and most original like for the radial head. We therefore avoid the too tight slings leading to notching and restriction of moment which is so common with the sling procedures. We also found them to be technically easier than the bell tawse's procedure especially after identification of the remnants. Our follow up functional results also favour this group of patients. One exception to this operation is bilateral absence of Palmaris longus which we fortunately didn't face yet which compels the surgeon to use some other method.

On the whole after comparing all these four groups we found that Modified Hirayama's osteotomy with annular ligament reconstruction with Palmaris longus free graft serves as an attractive option for chronic radial head dislocation in children with missed monteggia fractures.

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