Section: Orthopedics

Original Research Article

EFFECTIVENESS OF THE METAIZEAU TECHNIQUE FOR PEDIATRIC RADIAL NECK FRACTURES

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ABSTRACT

Background: Displaced radial neck fractures in the pediatric population can be treated with retrograde intramedullary nailing of the radius (the Métaizeau technique). Present Study has been designed with the primary objective of determining whether or not the Metaizeau technique is effective in the treatment of radial neck fractures in children.

Materials and Methods: At Zydus Hospital in Dahod, we performed a retrospective analysis of the clinical records and radiographs of 20 pediatric patients who received treatment for displaced radial neck fractures. Fractures were classified according to Metaizeau classification. The subjects were classified into four groups based on the Mayo elbow performance score (MEPS). Radiographs were taken at the time of the initial management, after six weeks (the time of consolidation), and at the time of the most recent follow-up (the final follow-up).

Results: Thirteen patients had Judet type 3 fractures and seven patients had Judet type 4a. Based on the clinical evaluation criteria mentioned above, we recorded 8 excellent, 5 good, 1 fair results for type 3 fractures at the final follow up. For type 4 fractures, we had 5 excellent, 2 good and 1 fair results. At final follow-up, there were 19 (95%) excellent or good results, and 1 (5%) fair result.

Conclusion: Through the utilization of the Métaizeau technique, with the elastic stable intramedullary nailing method, it is possible to fulfill all of the requirements for minimally invasive bone surgery.

Keywords: Intramedullary nail, Mayo elbow performance score, Metaizeau Technique, Pediatric Radial Neck Fractures.

INTRODUCTION

A radial neck fracture is responsible for approximately one percent of all paediatric fractures, and it accounts for approximately five to ten percent of all elbow injuries. Radial neck fractures are an extremely common injury. The children who are most likely to be affected by them are those who are between the ages of four and fourteen, with the highest incidence occurring between the ages of eight and ten respectively.[1,2]

A radial neck fracture is an intra-articular fracture that occurs on a bone that is still growing in children. This type of fracture is diagnosed in children. As a result of an attack on the growth cartilage, it is possible that its evolutionary risk is the cause of major anatomical and functional sequelae. These sequelae are caused by the development of malunion or abnormalities of growth, which necessitates a specific treatment. It is also possible that this risk is the cause of the development of malunion.[3,4]

Surgical procedures such as open reduction with or without internal fixation and percutaneous joystick reduction with Kirschner wires are two examples of the surgical techniques that have been utilised in the treatment of radial neck fractures in children. The technique of stabilisation by elastic stable intramedullary pinning, which was initially described by Metaizeau in 1980 and subsequently developed in 1993, has been demonstrated to significantly improve the outcomes of surgical procedures. This technique was initially developed in 1993.[5,6]

In order to fulfill the objectives of this study, we carried out a retrospective investigation of 20

instances of radial neck fractures that were treated using the Métaizeau technique. It is possible that the functional outcome will be significantly improved by using this technique, which allows for early movement.[7] Present Study has been designed with the primary objective of determining whether or not the Metaizeau technique is effective in the treatment of radial neck fractures in children.

MATERIALS AND METHODS

At Zydus Hospital in Dahod, we performed a retrospective analysis of the clinical records and radiographs of 20 pediatric patients who received treatment for displaced radial neck fractures. Prior to the patients' participation in the study, they were provided with comprehensive information regarding the study, and they signed a consent form indicating that they had been informed of the study. The following criteria were used to determine who was included and who was not included:

The criteria for inclusion were as follows: all patients with an open growth plate of the proximal radius at the time of injury; fracture tilts greater than twenty degrees; associated lesions were present or absent; and a minimum follow-up period of six months was required.

Open fractures, incomplete medical or radiographic records, orthopaedic treatment, and associated head or diaphyseal fractures were the criteria that were used to exclude patients from an investigation. Fractures were classified according to Metaizeau classification,[8]

Grade 1: translation less than 3 millimeters or epiphysis tilt less than 20°;

Grade 2: tilt between 20° and 45°;

Grade 3: tilt between 45° and 80°;

Grade 4: more than 80° of epiphyseal tilt.

Every single patient who was a part of the study was given treatment using the Métaizeau intramedullary nail technique. When we reached the final follow-up, we analyzed the clinical and radiographic findings.

Clinical Evaluation

The subjects were separated into four groups based on the Mayo elbow performance score (MEPS) that was administered. The pain, range of motion, stability, and daily function are the four components that make up this framework. The results are evaluated using a maximum of 100 points and are classified into four distinct groups: excellent, which is greater than 90 points; good, which is between 75 and 89 points; fair, which is between 60 and 74 points; and poor, which is less than 60 points.

Radiography Evaluation

There were standardized anteroposterior and lateral elbow radiographs available for each and every patient. These radiographs were taken at the time of the initial management, after six weeks (the time of consolidation), and at the time of the most recent follow-up (the final follow-up).

All of the results were evaluated according to the following criteria: excellent if the reduction was anatomic; good if a simple shift or inclination that did not exceed 20 degrees persisted; fair if the tilt was between 20 and 40 degrees; and poor if the tilt was greater than 40 degrees or if bone changes such as avascular necrosis and nonunion were present. In addition to nonunion, avascular necrosis of the radial head, and radio-ulnar synostosis and infections were another type of complication that was investigated.

RESULTS

There were total of 20 patients who participated in the study that was being conducted. One of the findings of the study was that the average age of the patients who participated in the research was 9 years. The mechanism of radial neck fractures in our research was indirect; it was a valgus forced elbow that occurred as a result of a fall on the outstretched hand with the elbow extended and the forearm supinated. The elbow was forced into a valgus position.

All patients were treated by a single surgeon at a single facility using the same metaizeau technique. This surgeon was responsible for all of the patients' care. Thirteen patients had Judet type 3 fractures and seven patients had Judet type 4a. Based on the clinical evaluation criteria mentioned above, we recorded 8 excellent, 5 good, 1 fair results for type 3 fractures at the final follow up. For type 4 fractures, we had 5 excellent, 2 good and 1 fair results. At final follow-up, there were 19 (95%) excellent or good results, and 1 (5%) fair result. Additionally, the final radiographs showed that there was no degree of angulation in any of the patients, which is a very positive result.

There was not a single instance of any complications being recorded in any of the cases. The amount of blood that was lost was less than 10 millilitres. Forty-five minutes was the period of time that was recorded as having been the average duration.

Table 1: Demographic Distribution of Study Participants

Variable	Number	Percentage (%)
Gender		
Male	12	60
Female	8	40
Site		
Right	9	45
Left	11	55

DISCUSSION

Recent discussions have focused on the functional outcomes of radial neck fractures in children, particularly in relation to the various treatment methods employed. A non-operative approach involving cast immobilization is recommended for fractures that are minimally displaced or non-displaced. The appropriate angulation for nonsurgical treatment is determined by the patient's age, typically falling within the range of 30–60° in the majority of discussions.[9,10]

Radial head and neck fractures often occur due to a specific type of trauma mechanism known as valgus loading, particularly when the elbow is extended. This commonly happens during incidents like falling on an outstretched hand. The force applied to the lateral capitellum exerts pressure on the radial head, leading to a fracture at its most vulnerable area, typically the radial neck at the metaphysis. Another injury mechanism to consider is a radial head dislocation, which frequently occurs in conjunction with radial head fractures.[9,11]

There are various treatment options that you can consider. Various methods can be employed for treatment, including closed reduction without fixation, closed reduction with intramedullary pinning, which may involve pin rotation, K-wire leverage, K-wire pinning, and open reduction. Combinations of these techniques may also be utilized. Currently, there is no agreement on the specific angulation threshold for fractures that would necessitate surgical intervention, nor is there a standardised surgical technique that should be employed.[12]

The findings from our research indicate that fractures with a reduction deemed good or average, characterized by a residual angulation between 0° and 20°, have the potential to progress positively towards achieving an excellent radiological outcome. Multiple authors have documented this information. Metaizeau observed that remodelling does not occur when the angulation surpasses 10° to 15° in children older than 10 years and 20° to 30° in younger children.

CONCLUSION

Through the utilization of the Métaizeau technique, with the elastic stable intramedullary nailing method, it is possible to fulfill all of the requirements for minimally invasive bone surgery. When it comes to treating radial head fractures in children, this method is not only straightforward and dependable, but it also yields favorable outcomes and poses insignificant risks of complications.

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