

Femoral Neck Fracture in Children- Decompression, Anatomic Reduction and Use of Kirchner Wires to the Rescue?

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Abstract— Femoral neck fracture in children is very rare. Whenever it occurs, it presents a challenge to the orthopaedic surgeon. There are schools of thought on immediate capsular aspiration and surgery. However, some do not believe that capsular decompression and immediate surgery prevent avascular necrosis of the femur. This is the reason for this report, to lend my findings to the debate.

This patient is a 7year old female child. She was a victim of truck-pedestrian injury. It was a high energy trauma with resultant displaced intertrochanteric femoral neck fracture(Delbert type IV). There was mild head injury which she recovered from. She did not have capsular decompression. She had open reduction and internal fixation 8 days after injury. We used smooth Kirchner wires for fixation. She was kept on strict bed rest.

6weeks after surgery, she had radiological union and commenced guarded ambulation with a walker(Zimmer frame). Six months post injury, there is no sign of avascular necrosis and patient walks full weight bearing without pain.

Conclusion: Delayed surgery in a displaced femoral fracture in children did not affect surgery outcome. Open arthrotomy and immediate decompression may not be necessary in displaced femoral neck fracture. Open and anatomic reduction may be a way to reduced poor outcome.

Index Terms— Decompression, Femoral neck fracture in children, K- wire fixation, Anatomic reduction.

I. INTRODUCTION

Femoral neck fracture in children is an uncommon fracture. Whenever it occurs, it could be because of high energy injury. This could have associated injuries like head injury and other fractures. The management presents a lot of challenge to Orthopaedic surgeons due to the complications that arise following treatment, the most prominent of which are AVN and non-union. Delbert classified femoral neck fracture in children into 4 types. These include type I which is a subcapital fracture, type II which is a transcervical, type III is cervico-trochanteric while type IV is pertrochanteric fracture.

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It is said that the risk of avascular necrosis(AVN) decreases with increase in the type of fracture[6]. There has been a lot of debate on the reason for avascular necrosis of the head of femur in children following surgery and the possible ways to prevent them.

Some surgeons have postulated that early aggressive aspiration of capsule and early surgery prevents AVN[1]. Others have found that AVN occurred following femoral neck fracture in children is directly related to the degrees of displacement of the fracture at the time of injury[2]. There are other scholars who saw that the quality of reduction affects the outcome of the fixation viz the developed of AVN and non-union[3].

The norm in management of femoral neck fracture has been early arthrotomy and closed reduction (gentle manipulation) with or without fixation or application of hip spica depending on the degree of displacement of the fracture. If close reduction fails, then open reduction is employed [10].

This, however, has been studied by many researchers who found that open reduction is better than closed reduction due to the fact that open reduction allows for better anatomic reduction than closed reduction[4][7]. This because many have also found that the quality of fixation influences the possible outcome[3][5].

In this report, we are looking at a type IV Delbert fracture in a 7year old whose surgery was delayed due to financial issues. She also had open reduction and internal fixation with smooth K wires. We want to find out the outcome of this method of treatment.

II. METHODOLOGY

Patient was a 7-year-old girl, a victim of pedestrian truck accident. She sustained mild head injury and left type IV femoral neck fracture. X-ray showed a displaced inter-tronchanteric fracture of the left femur. She was operated on 8 days after injury due to lack of finance. She had an open reduction and internal fixation through a wide 12cm incision made longitudinally over the left hip. The internal fixation was done with 3 smooth 1.8mm Kirchner wires. They were place anteriorly, posteriorly and superiorly around the trochanters. The capsule was already torn inferiorly through which we insinuated our fingers into the joint while trying to achieve anatomic reduction. The reduction was achieved, and the K wires were fixed as was noted earlier.

Patient was kept on strict bed rest for 6 weeks and ambulation commenced thereafter.

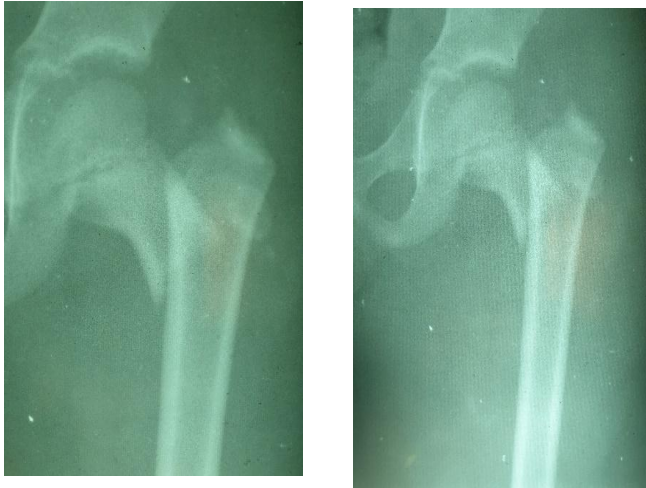
Outcome of surgery was rated using Ratliff's criteria.

III. RESULTS

The result was assessed using Ratliff’s criteria which included pain, movement, activity and radiographic findings. They were all rated good.

X-rays were taken at 2weeks, 18weeks and 24week as was convenient. The serial X-rays show progressive healing of the fracture with no sign of osteosclerosis or necrosis.

She had a broken K wire noted on the 24week x-ray following ambulation. She will be admitted for removal of both the migrating pin and the pins on the left hip as soon as possible.



Pre-operative X-ray



X-ray at 2weeks



X-ray at 18weeks



X-ray at 24weeks showing restoration trabeculae. It also shows the broken and migrated pin, The lucency at the superior aspect of the head is where the broken pin was.

IV. DISCUSSION

With the diversity of opinions and findings on the outcome of treatment of femoral neck fracture in children, it is obvious that noparticular pattern of treatment has been considered the best option. However,many researchers presently favor internal fixation for the treatment of femoral neck fracture in children. Capsular decompression, closed reduction and internal fixation seems to be practice of many surgeons. This is believed to preserve the neck vessels due to absence of dissections which are considered invasive. However, this

method has been proven to be less precise in achieving anatomic reduction which is said to contributed largely to the prevention of osteonecrosis. There is also an argument that instead of prevention of vascular compromise, closed reduction contributes to more vascular damage due to the process of manipulations in the course of trying to achieve reduction. Open reduction as against close reduction seems to be gaining ground among many surgeons[4][7].

This is because this affords the surgeon the opportunity of reducing the fracture without the needless manipulations and therefore preserves the remaining vessels. This gives largely anatomical reduction and internal fixation under direct vision. Many literatures have reported a higher number of anatomical reduction with open surgery. The other aspect is the implant used for the nature of fixation implant.

Many a surgeon use cannulated screws to fix the fracture. Other implants used are Knowles pins and solid screws. In this study we reported the use of Kirchner wires(K wires)[Radiographs3,4&5].

In this report, this patient fits into some of the parameters of bad outcome. First, she had a major trauma, with severe displacement. Her surgery was delayed for 8 days due to lack of finance for surgery since she had no insurance cover. All these, according to many a researcher, will confine her to osteonecrosis of the femoral head[1].

The only favorable parameter is the fracture type-Delbert type IV fracture[2]. Her surgery was open reduction and internal fixation with smooth pins(k-wires). There was no external immobilization device used, however, patient was left on bed for 6weeks.

Note a few things from the methodology: the incision was wide enough to allow for easy navigation. Since the capsule was torn inferiorly, no new capsular incision was made. That inferior defect was used in palpating for step during reduction of the fracture. The rest of the capsule was not disturbed.

Three smooth pins were fixed at 3 different points which included: the anterior, the posterior and the superior area of the neck. This was to maintain stability without the use of big cannulated or solid screws which could worsenthe vascular supply to the already partially de-vascularized femoral head and the patient was kept on bed rest for 6weeks.

The delay in operation did not affect the outcome of this surgery. Capsular decompression though not necessary in this case due to the fact that it was torn during the injury, lent credence to the fact that capsular decompression is necessary for a good outcome contrary to finding by Shrader[5]. Timing of surgery of which delay is considered a factor for poor outcome did not affect the outcome of this case. For those who considered timing of surgery important, capsular decompression was not done and that could have affected the outcome[11]. Good anatomic reduction which was done on this case could have contributed to good outcome. Young age has been considered to contribute to favorable outcome femoral neck fracture in children[6]. This patient was seven years of age. This a favorableparameter because being below the age of 12years is good prognosis[6][10].

The broken and migrated pin shows that before full weight bearing the pins should have been removed to avoid it causing major problem at a distant site.

V. CONCLUSION

The outcome of this case was not affected by degree of displacement, delayed surgery and method of fixation which was open reduction and internal fixation with smooth pins (K-wires). Young age, arthrotomy(torn capsule), anatomic reduction and prolonged bed rest support a good outcome.

Smooths pins are to be removed before full ambulation is commenced.

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