

# Delayed Onset Iatrogenic Femur fracture in a Child Primarily treated with Cerclage Wires: Unrecorded Complications of an Unconventional Treatment Method

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## Abstract

Paediatric femur shaft fractures are common bony injuries in children. Although there are set protocol for these fractures, sometimes a deviation from standard methods may lead to unpredicted consequences. We report a case of femoral shaft fracture in a 8 years old boy which was primarily treated with 3 cerclage wires. The fracture healed over next few months but the child presented with refracture at the same site 11 months post first surgery. There was vascular compromise at the cerclage site which caused the fracture. This was treated with plate fixation and fracture finally healed. In this case report we highlight how not following the basic principles of treatment and management can lead to further complications. We also bring to light a previously unreported complication of one such unfavoured and rather unconventional method of fixation

**Keywords:** Pediatric Femur Fracture, Cerclage, Nonunion, iatrogenic

## Introduction

Paediatric femur shaft fractures are common, constituting about 1.6% [1] of bony injuries in children including subtrochanteric and supracondylar fractures. These fractures are generally a result of fall from height or road traffic accidents. However, as mentioned, a serious incident of abuse has been noted in such injuries therefore this aspect must be identified and dealt with by means of a social healthcare worker if needed. These fractures may also occur as a result of low energy or trivial injury, particularly in association with conditions per training to the femur like fibrous dysplasia, bone lesions or local cyst, etc.[2]

There is a set age-wise protocol of treatment with observed prognosis for each paediatric

condition and the same applies for paediatric femur shaft fractures.[3] However as there is no consensus on a set protocol for fractures in the age group of 5-10 years, sometimes a deviation from standard methods may lead to unpredicted consequences. This makes it necessary to have enough literature on tried methods of fixation which proved to be unfavourable in terms of functional outcomes, specially those causing more harm than good. In this case report we highlight how not following the basic principles of treatment and management can lead to further complications. We also bring to light a previously unreported complication of one such unfavoured and rather unconventional method of fixation followed in a case of a femur shaft fracture in an eight year old boy.

## Case Report

An eight year old boy presented to the orthopaedic opd with chief complaints of pain and inability to bear weight on the right leg. Parents also were also

concerned about a visible deformity in the right thigh. The child was apparently alright one year ago, when he had a history of trauma. He sustained an upper two-third shaft of femur fracture of the right side as seen on old AP and lateral radiographs. (Fig 1).

On detailed history and observation of old radiographs, it was noted that the child had immediately undergone surgery after trauma, in the form of open reduction and fixation using 3 circlage wires ( Fig 2). The available radiographs taken two months post op period shows a united fracture in an immobilising cast (Figure 3). The recovery from the surgery was uneventful with no fresh history of trauma. The patient was apparently alright for eleven months post op with no episode of trauma or injury when he suddenly started to complain of pain and inability to bear weight. He now presented to the opd with an above knee plaster of Paris cast, in situ since three weeks which was applied at an outside healthcare facility. The cast was removed and the patient was examined.

.There was a vertical scar seen over the upper two thirds of the thigh on inspection. The area around the scar was tender on

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**Figure 1:** (a and b) Anterior-posterior view and lateral view showing fracture in upper two thirds of right femur.



**Figure 2:** Immediate post-operative A.P. view of old initial surgery with drain in situ and with closely spaced proximal cerclage wires and inadequate immobilisation with cast edge at the fracture site



**Figure 3:** AP Lateral view at 2 months post-surgery shows callus formation

palpation. There was a true shortening of 2cm noted with a flexion deformity of 30 degrees and a varus deformity of 40 degrees with post-immobilization knee stiffness. Radiographs taken now suggested, an angular deformity, a deforming callus and displacement and fracture with cerclage wires in situ as seen in Fig 4.

#### Problems at hand:

Deformity with 2 centimeters. of true shortening, deforming callus & problem of nonunion, cerclage wires put about a year ago, Post-immobilization knee stiffness

**Management:** Removal of cerclage wiring long with open reduction and internal fixation with 12-hole narrow locking compression plate with hybrid screw pattern was done with partial minimally invasive plate osteosynthesis technique incorporated to allow optimum size plate [4] with

minimum length scar. Most important intra-operative finding was sclerosis at fracture site with fibrous tissue interposition. The medullary canal at fracture ends had to be opened before plate fixation. There was a translation deformity created as straight plate was applied to femur in the anterior bow region. Patient was advised non-weight bearing mobilization for 6 weeks at 6 weeks the x-ray showed implant in-situ as evidenced in Fig 5. Patient was then advised to gradually increase weight bearing and follow up at 3 months. At 6 months post-surgery patient had complete union with good function as evidenced by Fig 6-7.

#### Discussion

Paediatric femur shaft fractures have been observed and studied over the years. The paediatric femur bone has a very high remodelling potential with wide acceptable angulation range depending on the age of the patient. [5, 6]. Hence it is quite forgiving fracture which can be managed by methods ranging from conservative to minimally invasive surgeries. Use of cerclage in pediatric age group has deleterious effect on periosteal blood supply [7] which is robust in this age group and aids in union and appositional growth in these age group. Cerclage wiring is never used in isolation for fixation of fractures [8] more so of femur in 8 year old specially with length unstable fracture pattern where plating is usually better [9].

It becomes clear from Fig 3. That proximal most 2 cerclage wires did not have adequate spacing of 1 cm [7]. The cerclage wires got tighter as appositional growth [7] [8] happened and led to devascularization [8] over time which caused weakening of the bone. As the child was carrying about his daily activities as normal and was loading the bone, it eventually fractured between two wire with each at end of two fracture fragments as seen in figure 6 which explains the delayed onset. Apart from split fracture as a complication of cerclage wiring and non-union [10] such a delayed complication has never been reported. The sclerosis at fracture site corroborates with devascularization as pathogenic cause of the fracture. Locking plate was chosen to preserve biology [9] and because proximal fragment was too short to take 3 screws. The optimum screw density of 50% or less in diaphyseal fracture [6] [9] was achieved with 5 screws in 12 hole plate. Minimally invasive plate osteosynthesis was chosen to put such along plate through smallest possible incision. A separate incision distally was made to put last screw into metaphyseal region [9]. The last screw was nonlocking [10], bicortical and was inserted obliquely to prevent it from becoming a stress riser.

The aid of cerclage wires in a certain fixation can be allowed in adult fractures, however, as reported usage of pure cerclage wires for fixation of fractures may further lead to iatrogenic fractures in paediatric fractures. Such delayed onset iatrogenic femur fracture has never been described in literature. This could be due to bone strangulation caused by



**Figure 4:** Radiograph at presentation to us showing fracture between two proximal cerclage wires with one wire at one end of each fracture fragment.



**Figure 5:** Anterior-posterior and lateral view of post-operative radiographs showing a plate fixation and satisfactory reduction.



**Figure 6:** Six months post surgery radiograph showing good union



**Figure 7:** Six months follow up with good clinical outcome

the tight wires further leading to the vascular insult[2]. Lack of cortical perfusion will eventually land the bone into necrosis. This kind of a complication can be detrimental for the limb as it will weaken the bone even further with multiple surgeries in the formative years. This may ultimately lead to limb deformities and affected gait for life. The

importance of this case lies in learning from mistakes instead of making them. The awareness to work towards following fixed principles of treatment and knowing what would go wrong if deviating from the original path is important. This is a classic example of what not to do.

### Conclusion

Case report makes us aware of a serious complication of use of cerclage wires in pediatric fractures. Hopefully publication of this report will help in avoiding such events in future.

**Declaration of patient consent:** The authors certify that they have obtained all appropriate patient consent forms. In the form, the patient has given his consent for his images and other clinical information to be reported in the Journal. The patient understands that his name and initials will not be published, and due efforts will be made to conceal his identity, but anonymity cannot be guaranteed.

**Conflict of Interest:** NIL; **Source of Support:** NIL

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