

**CASE REPORT**

**TRAUMATIC BILATERAL FEMORAL FRACTURE AND CONCURRENT VASCULAR INJURY IN A 2-YEAR-OLD CHILD - A RARE CASE REPORT**

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Fractures are an ordinary consequence of trauma. Paediatric fractures are rather uncommon because the bony framework is still in its growth phase and therefore compliant to such traumas. The incidence of vascular injuries is also low lying (<1%) in this age group. Nevertheless, management and recovery continue to be a challenge. In this case report, we discuss a 2-year-old child with a traumatic bilateral femoral fracture, a tibial fracture with added vascular injury. Delayed management may give rise to a variety of complications in such a peculiar case. Fortunately, this child is healthy, leading a normal life with no complications.

**Keywords:** Femoral Fracture; Blunt Trauma; Paediatric vascular injury; Orthopaedic Surgery; Graft repair

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**INTRODUCTION**

The incidence of femoral fractures in the age group of 2-5 years is reported to be 21%<sup>1</sup>, however, rarely (<1%) associated with vascular injury<sup>2</sup>. Commonly injured vessel in children is the femoral artery (25%) followed by the brachial artery (22.7%).<sup>3</sup> These are often due to blunt trauma e.g., fall from height or motor accidents.<sup>4</sup> These injuries are complex because of their specific characteristics and often their management requires a multidisciplinary team. In this case report, we present an atypical case of bilateral femoral fracture in a 2-year-old associated with vascular injury.

**CASE PRESENTATION**

We report a case of a 2-year-old who fell from a height of 10 feet. Initial management was done at a nearby hospital and then he was referred to Sukkur where bilateral limb back slabs were applied. For adequate management, he was referred from Daharki to Civil Hospital, Karachi (CHK), which is 580 km away and takes more than 8 hours of travel. Both back slabs were unwrapped after receiving ATLS protocol in CHK. On examination, both limbs were swollen and tender at the thigh. The skin was intact with a bruise at the right popliteal fossa. Capillary refill time of both limbs was normal. The pulses of the dorsalis pedis artery (DPA) and the posterior tibial artery (PTA) were palpable on the left side but absent on the right side.

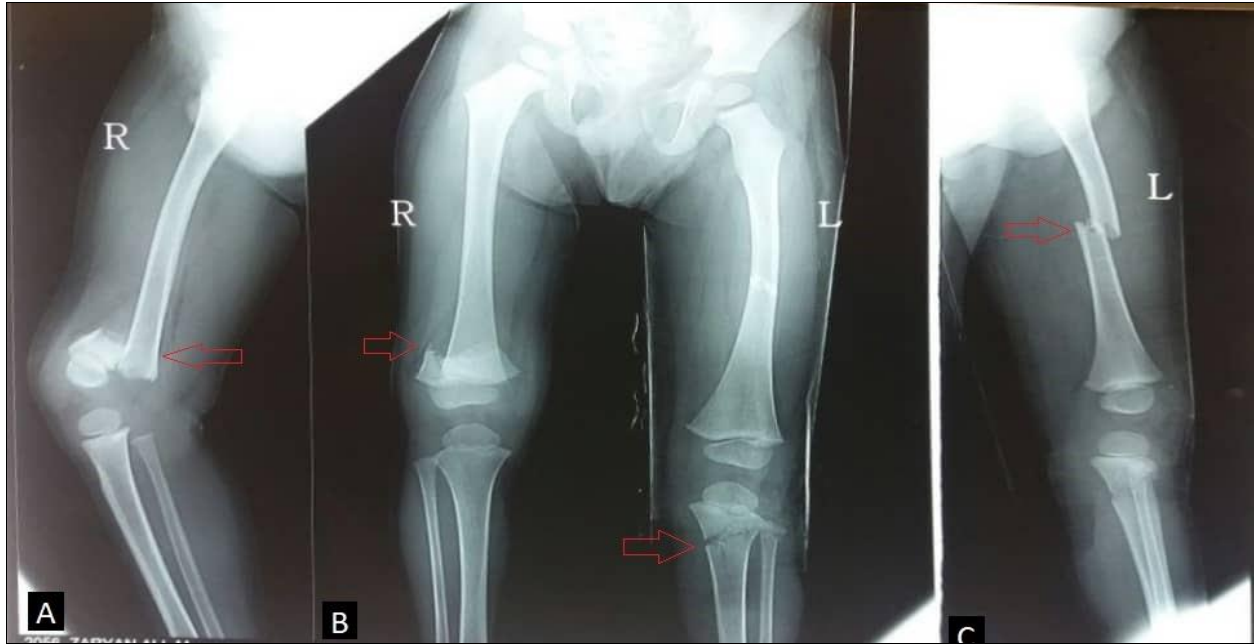
X-Ray full pelvis anteroposterior (AP) view and X-Ray of both femurs, AP and lateral views, showed displaced, transverse supracondylar fracture of the right femur and displaced transverse midshaft fracture of the left femur. X-Ray tibia and fibula of both sides (AP and lateral view) showed a proximal metaphyseal fracture of the left tibia Figure-1. An injury to the right femoral artery was suspected. Doppler ultrasound of right leg showed no blood flow down the distal thigh whereas the left leg scan was normal. CT angiogram showed right femoral artery transection and hematoma at distal femur fracture level with collateral vessels running downward to popliteal artery so DPA and PTA were visible figure-2.

Right femoral fracture was fixed with K-Wire and left femoral fracture was fixed by Closed Reduction Internal Fixation (CRIF) with a flexible nail and K-Wire was used for left proximal tibia fracture figure-3.

For vascular injury, the affected side was opened and both ends of the vessel were identified. The femoral artery was transected and bruised, so an ipsilateral great saphenous vein graft was taken that was reversed and used, both ends were repaired with 6-0. The wound was closed in layers and back slabs were applied. Post-operative 20mg Clexane sub-cutaneously for 3 days was given and vascularity was assessed simultaneously. Stitches were removed at 2 weeks. K-Wire and back slabs were removed after six weeks. The patient started walking after 3 months and was running at 6 months.

**Table-1. Literature review of Paediatric cases with femoral fracture and associated vascular injury.<sup>5,6</sup>**

Case	Closed Femoral Shaft Fracture Associated with Superficial Femoral Artery Thrombosis in a Child <sup>5</sup>	Repair of a Vascular Injury Associated With a Paediatric Femur Fracture <sup>6</sup>
Age	5 years	12 years
Sex	male	male
Trauma Aetiology	traffic accident (indirect blunt trauma)	traffic accident (indirect blunt trauma)
Fracture Type	right femoral shaft fracture	distal-third, short-oblique femoral shaft fracture
Vascular Injury	thrombus on the superficial femoral artery on the injury site	acute thrombosis (intimal tear with a small, elevated intimal flap)
Surgery	closed reduction	external fixation
Follow-Up Time	6 months	2 weeks, 1 month, 4 months
Complications	none	none



**Figure-1: Plain radiograph images: (A) Right femur lateral view showing a, displaced, transverse supracondylar fracture. (B) Bilateral anteroposterior view of femur and proximal tibia showing the supracondylar fracture of right femur and a proximal metaphyseal fracture of the left tibia. (C) Left femur lateral view showing a displaced transverse midshaft fracture.**



**Figure-2: CT Angiogram showing loss of opacification of right femoral artery at level of distal femoral fracture, with distal reconstitution of arterial opacification showing collateral blood supply.**



**Figure-3: Post-operative plain radiograph of bilateral lower extremities in AP view showing right sided supracondylar femur fracture and left sided proximal tibial fracture fixed with K-Wires and left sided femur fracture fixed by CRIF with a flexible nail**

## DISCUSSION

In the paediatric age group, the skeleton is rather adaptable to endure forces due to its immaturity and flexibility.<sup>3</sup> Few cases of serious bilateral femoral neck and pelvic fractures are witnessed in children following a consequential history of trauma. However, our case discusses atypical fractures for this age group. Only two similar cases have been reported in the literature till now, those too in children of older age group, discussed for comparison in Table-1. Contributing factors encompass high energy blunt trauma typically inflicted from a vehicle collapse, a fall from height, etc.<sup>3</sup> Latter also being the mechanism of injury in our case. Femoral fractures have a high risk of allied complications like avascular necrosis of the head of the femur, non-union and infection.<sup>3</sup> In addition to the concomitant fractures, the child in our case also presented with suspected injury of the right femoral artery.

In the paediatric population, traumatic vascular injuries associated with distal extremity fractures have a low-lying incidence (<1%) but these can be highly morbid.<sup>2</sup> Paediatric vascular injuries are distinct from adult vascular injuries because these are complicated by their specific anatomic and physiological characteristics. The major vessels of the lower limb are placed close to the femoral shaft and are vulnerable to injury.<sup>5</sup> Absent pulses, enlarging hematoma and acute ischemia are some signs that point towards a vascular injury and warrant investigations to assess the site and extent of the injury.<sup>5</sup> Just like in our case, where the transected right femoral artery presented with absent distal pulses, and CT angiogram showed transected right femoral artery with hematoma and collateral vessels.

Injuries of major vessels pose a profound risk of developing acute limb ischemia, if not managed in time and can cause functional consequences or limb loss.<sup>5</sup> In previous studies, longer transit duration in cases of vascular trauma was associated with poor outcomes.<sup>2</sup> But with our patient, despite a 12-hour delay, no such complications were observed. This different outcome

can be explained by satisfactory collateral circulation in our case, as seen on the CT scan. Open surgical repair is the management of choice for vascular injuries in children.<sup>2</sup> In our case, open surgical repair of the right femoral artery was done using a saphenous vein graft. This intervention led to great outcomes, the child started walking after 3 months and was running and jumping in 6 months.

## CONCLUSION

The spotlight on this case is that paediatric femoral fractures with vascular injury are extremely rare, especially in a 2-year-old. Advanced management of such cases is usually a time-sensitive and resource-intensive issue.

However, in our case, delayed adequate management did not have any unfavourable outcomes. On a 2-year follow-up, the boy is healthy, running with no complications.

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