

Slipped Capital Femoral Epiphysis Following a Delbet Type 3 Intertrochanteric Fracture Fixation

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Abstract

Slipped capital femoral epiphysis (SCFE) is the most common hip disorder affecting the adolescent population, usually between 10 and 15 years old, with some multifactorial etiologies may include obesity, trauma, and some endocrinal causes. We reported a 10-year-old boy who presented with unilateral SCFE following intertrochanteric fracture, which was fixed by dynamic compression plate 1 year before the SCFE. The SCFE fixed by a 6.5 mm cannulated screw. In the 1-year postoperative follow-up, the patient achieved the union and the physis did not displace. The patient had not any pain and his gait and function were normal in both sides.

Keywords: Delbet type 3, intertrochanteric fracture, slipped capital femoral epiphysis

INTRODUCTION

Slipped capital femoral epiphysis (SCFE) is the most common hip disorder affecting the adolescent population, usually between 10 and 15 years old, with some multifactorial etiologies may include obesity and trauma.^[1] In some instances, endocrine pathologies comprising hypothyroidism, hypogonadism, and pan-hypopituitarism cause SCFE.^[1] SCFE, after the union of previously fixed intertrochanteric (IT) fixation is a rare condition that poses essential issues (2). We presented a 10-year-old boy as a rare case of SCFE following IT fracture fixation.

Statement of informed consent

The patient was informed that data concerning the case would be submitted for publication, and he provided consent.

CASE REPORT

We describe a 10-year-old boy who presented with left side hip pain, limited range of motion, and occasional limping 1 year ago with a history of IT fracture (Delbet type 3) 2 years ago. The fracture was closely reduced and fixed by 6-hole 3.5 mm dynamic compression plate (DCP) with six

screws and achieved an appropriate union in the fracture site [Figures 1 and 2].

The physical examination at presentation revealed limited and painful abduction and internal rotation of the left hip. The patient had a body mass index (BMI) of 25.8 kg/m² (weight: 59 kg and height: 1.51 m). Initial X-ray examination showed a moderate SCFE (Southwick scale) with a 41° angle, as well as the presence of an opening of the left femoral head physis [Figures 3 and 4]. We evaluated the thyroid profile and Vitamin D level as common causes of SCFE, which showed the normal values, as seen in Table 1.

The patient was treated with an *in situ* fixation technique by one 6.5 mm diameter cannulated screw after device removal by the femoral lateral approach incision on the left side. Furthermore, prophylactically the right side closely fixed by a 6.5 mm

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Figure 1: The patient presented with left intertrochanteric fracture 1 year ago



Figure 2: The fracture was fixed by 6-hole 3.5 mm dynamic compression plate



Figure 3: The patient presented with left hip pain and limping, and slipped capital femoral epiphysis was diagnosed

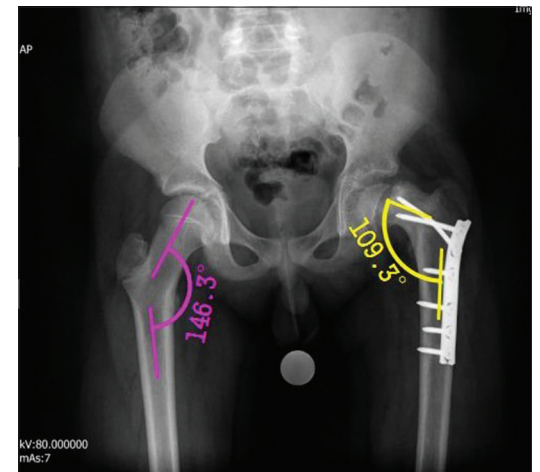


Figure 4: The X-ray shows decrease of neck shaft angle in the left side

cannulated screw [Figure 5]. In the 1-year postoperative follow-up, the patient achieved the union and the physis did not displace [Figure 6]. The patient had not any pain and his gait and function were normal.

DISCUSSION

We reported a rare case of SCFE following IT fracture fixation. SCFE after treatment of proximal femoral fracture can be caused by inadequate treatment of the fracture. Orthopedic surgeons should be aware of this unusual complication, so that they can promptly recognize this complication and urgently treat it.^[2]

Previous reports showed that the quality of proximal femoral fracture fixation and complications such as malunion, nonunion, varus deformity, and avascular necrosis might be associated with SCFE following the fixation.^[2-5] Ok *et al.* reported a case of a 6-year-old boy who developed SCFE following malunion of the femoral subtrochanteric fracture. They recognized the alteration of shear force on the epiphyseal plate responsible

Table 1: Laboratory evaluation of thyroid profile and Vitamin D level

Lab test	Value	Reference range
Vitamin D level	40 ng/ml	30–70
Serum TSH	3.2 mIU/l	0.3–5
Serum T4	8.7 ug/dl	5.2–127
Serum T3	186 ng/dl	69–215

TSH: Thyroid-stimulating hormone

for the development of SCFE.^[5] Li *et al.* presented two cases, a 12-year-old girl and a 6-year-old girl, who developed SCFE at five months and nine months, respectively, following screw fixation of a femoral neck fracture. They identified clinical factors such as implant irritation, early return to weight-bearing, delayed union or nonunion, coxa vara, and avascular necrosis to be possibly related to the development of the subsequent slip.^[3]

It is important to avoid malalignment in proximal femoral fractures as a possible cause of SCFE following the fixation

described by Chinoy *et al.*^[2] They described a 5-year-old case presented with a diagnosis of SCFE following femoral neck fracture, which was closely reduced and fixed by Spica casting. They identified varus deformity after femoral neck fracture as a possible factor related to SCFE.^[2]

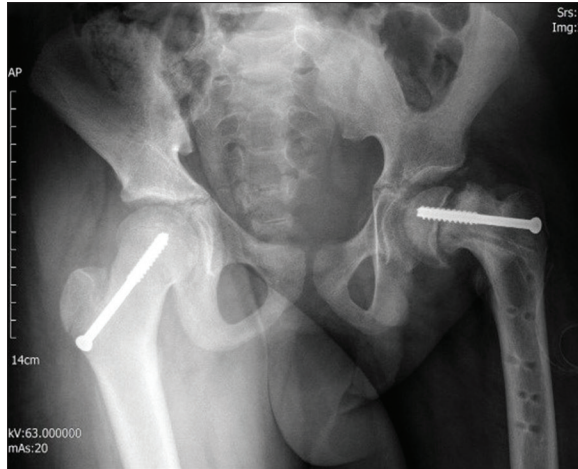


Figure 5: Bilateral hips were fixed by one 6.5 mm cannulated screw



Figure 6: The last follow-up X-ray 1 year postoperative

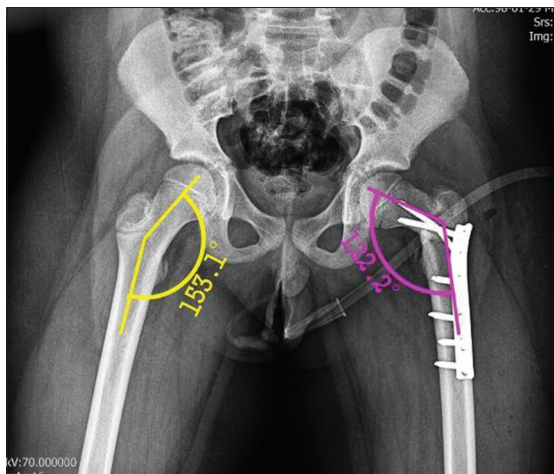


Figure 7: The X-ray immediately the following fixation showed that there is normal neck shaft angle after fixation

Our patient was a healthy normal boy without any endocrine or genetic disorder. Furthermore, there was no evidence of SCFE on the X-ray taken at the time of the initial fracture. Thus, in our case, fracture union had been established, and fracture-related complications such as coxa vara secondary to fracture as the main contributing factor in the development of epiphyseal slip could be ruled out. In our case, the anatomic reduction was achieved perioperatively [Figure 7] and secondarily coxa vara was developed. It is may be due to obesity or other factors that were not obvious [Figure 4].

Manukaran and Abdul Hamid reported a case of SCFE in a 9-year-old boy 14 months after internal fixation of femur neck fracture by cancellous screws. They identified the tip of the implant at the epiphyseal plate to be responsible for the slip.^[4] In our case, the IT fracture fixed by DCP that precontoured operatively. It is possible that the bent plate developed SCFE subsequently, and it is suggestable using the anatomical proximal femoral plate in pediatrics IT fractures.

Previous studies showed that there are some predicting risks for contralateral unaffected hip SCFE such as higher epiphyseal tilt more than 10 degrees,^[6] high BMI, younger patient age, and endocrine abnormality.^[7,8] Because of obesity, high epiphyseal tilt angle, and the young age of our patient, we decided to fix the contralateral hip prophylactically. However, a normal thyroid function test could exclude endocrinologic problems due to SCFE.

In conclusion, the proximal femoral fracture is a possible risk for SCFE following fixation. It is important preventing SCFE using appropriate implants and evaluating endocrine profiles following the fracture to reduce the risk of SCFE. Achieving anatomic reduction and alignment is one major component to prevent complications such as SCFE following the proximal femoral fracture.

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 identity, but anonymity cannot be guaranteed.

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Conflicts of interest

There are no conflicts of interest.

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