

# Delayed fixation of an unstable Slipped capital femoral epiphysis: A case report and review of literature

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## Abstract

The management of the unstable slipped upper femoral epiphysis is controversial. Recent evidence suggests that treatment within 24 hours is optimal in terms of outcome. The evidence regarding what to do with those who present later than this is less conclusive. There has been some recent discussion in the literature about leaving the late presenters for at least a week and then performing surgery. This case study describes the experience and outcome of a young man who presented outside the ideal window of 24 hours and was managed at 7 days following his slip. He is now four years on and has a viable femoral head.

## INTRODUCTION

Unstable slipped upper femoral epiphysis (SUFE) is a rare but potentially devastating condition. 95% of SUFEs are stable with a very minimal complication rate. 5% of SUFEs that are unstable have a much more significant complication rate which has been reported in the literature as being as high as 84%(1). The optimum treatment pathway of these slips is unclear in the literature due to the rarity of the condition. It has recently become widely recognised that the ideal time for treatment, in terms of the lowest rate of avascular necrosis, is within 24 hours of the slip itself (2,3,4). Controversy remains regarding the treatment of those unstable slips that could not be treated for whatever reason within 24 hours.

The purpose of the present study was to highlight the case of a patient that presented 4 days following his unstable slip. This patient has been followed up for over 4 years since the slip and has no radiographic evidence of avascular necrosis, despite early predictions of a poor outcome. It is hoped that this case will contribute to the minimal evidence available regarding treatment of the unstable slip that presents after 24 hours.

## CLINICAL CASE HISTORY

### PRESENTATION

15 years and 11 month old male, presented with sudden onset extreme pain in the left hip and inability to weight bear. He had been cycling up a hill 4 days previously when he first noted the pain in his groin which worsened rapidly.

He could not weight bear from this point. He was treated at home with analgesia. As the pain persisted, he was brought to the hospital four days later.

He had a past medical history of grade I spondylolisthesis at L5/S1. He had undergone physiotherapy for this one year earlier and was currently asymptomatic. There was no history of an endocrine disorder. The patient was at the appropriate stage of puberty for his age (confirmed by x rays of his elbows and wrists) and he was not obese. He reported no hip pain previously.

At presentation, he was unable to move his left leg in any direction due to extreme pain and the left leg was shortened and externally rotated. Neuro-vascular status of the limb was normal.

### RADIOLOGY

An AP radiograph of his pelvis was taken and confirmed a grade II (5) slip of left upper femoral epiphysis (Figure 1).

**Figure 1**



A bone scan was performed which showed avascularity of the left femoral head and absent osteoblastic activity, suggesting a poor prognosis (6).

### **DIAGNOSIS**

As the slip was less than 3 weeks old, it was classified as acute slipped capital femoral epiphysis (7, 8). Due to the patient's inability to weight bear, this slip met the Loder et al classification criteria for an unstable slip (9), another sign of a poor prognosis.

### **SURGICAL TREATMENT**

The patient was put on traction as the optimal window of time for treatment (within 24 hours) had passed (2, 10, 11). Cannulated screw fixation of the left upper femoral epiphysis was performed 7 days after the onset of symptoms. It was thought this would allow time for the initial inflammation to settle. Positioning of the patient's affected limb in slight flexion and internal rotation on fracture table resulted in an incidental relative reduction was achieved. The hip was fixed in that position with a single 7 mm cannulated screw (Figure 2).

**Figure 2**



The patient was discharged the next day, non weight bearing for the near future and close follow up was arranged.

### **CLINICAL COURSE**

The patient was followed up regularly in the paediatric fracture clinic. At 6 weeks following his slip, he had a good range of movement that was free of discomfort. X-Ray at this time showed reduction satisfactorily held by the screw.

A bone scan at 3 months following the slip demonstrated residual deformity with some defective vascularity of femoral head. There was however some evidence of regained osteoblastic activity.

Unfortunately, the patient developed similar pain in the right hip 4 months after the left slip. This was investigated and regarded as a pre slip. Cannulated screw fixation was performed. This relieved his symptoms.

At one year following the initial slip, X-Ray demonstrated a slowly progressing avascular necrosis in the left hip but no evidence of collapse. The patient was complaining of pain in the right hip and the AP radiograph of the pelvis demonstrated that he was growing off the screw. This was revised with a longer screw and his symptoms resolved.

A bone scan at 15 months following the left slip showed revascularisation of the left femoral head at previous sites of avascular necrosis.

Physical examination of the left hip 18 months following the slip showed a good range of pain free movement with limitation of internal rotation beyond neutral and external rotation beyond 20 degrees.

2 years on from the left slip, the patient was allowed to start

to partial weight bear on the left hip with the assistance of crutches because of the reassuring X-Ray features that suggested the head was no longer avascular. An X-Ray performed 6 weeks later showed no collapse of the femoral head [ Boyer et al (12) , grade 0].

The patient continued with partial weight bearing on the left hip for 18 months. He reported no pain except on long distances and cold days.

Both screws were removed when radiographs showed the growth plates to have fused at 3 and a half years after the original slip. 2 weeks later, the patient was finally allowed to discard his crutches.

The patient at the latest follow up i.e. 4 years following his unstable acute left slipped upper femoral epiphysis, shows excellent result according to criteria of Heyman and Herndon (13). He walks independently without a limp and has an excellent range of pain free movement bilaterally. He has no radiographic evidence of avascular necrosis or degenerative changes (Figures 3 and 4).

**Figure 3**



**Figure 4**



## DISCUSSION

Although the acute unstable slipped upper femoral epiphysis is rare, it poses a significant challenge in terms of management. Progress has been made in the management of this problematic slip. Treatment within 24 hours of symptom onset has been shown to decrease the rate of avascular necrosis in a number of papers (2, 3, 4, 14).

Studies performed by Gordon et al (15) and Kalogrianitis et al (4) have demonstrated a more favourable outcome in the hip of those children with unstable SUFEs treated within 24 hours compared to those treated beyond that. Phillips et al p also demonstrated that in treating a group of 14 unstable SUFEs within 24 hours, none of them developed AVN. This is the most conclusive evidence available. The usefulness of this data is limited because there is no comparison group treated after 24 hours within this particular study (16).

The proposed reason for the difference in rates of AVN in those treated within 24 hours and those treated after 24 hours of symptom onset is due to the inflammatory process that occurs within the hip. The slip causes an inflammatory response, including an effusion. The slip itself may have already disrupted some of the blood supply to the femoral head. The resultant effusion further contributes to this disruption via having a tamponade effect within the joint capsule. The inflammation and effusion takes some time to develop which is why the group that are treated earlier have a more favourable outcome (4).

One has to consider if there are any possible differences between the early treatment and delayed treatment groups of unstable SUFEs beyond those described above relating to the inflammatory process. Loder et al (9) hypothesised more severe slips possibly present earlier due to more severe

symptoms. If this is true of all studies, the slips that present early enough to allow treatment within 24 hours of symptom onset are more likely to be more severe and therefore inherently have an increased risk of AVN. In the aforementioned studies, treatment within 24 hours definitely decreases the risk of AVN as you would expect the more severe slips to have a greater degree of AVN, but they actually have a lower AVN rate. It may be that early treatment of these counteracts this increase in risk.

The question remains of what to do with late presenters. Evidence is especially scarce with regards to these patients. Kalogrianitis et al (4) recently published results of a study focusing on the timing of stabilisation of unstable slips. Their overall conclusion was that treatment within 24 hours is ideal. Of those in whom treatment within 24 hours was not possible, 7 were treated between 24 and 72 hours: All 7 developed AVN. A further 3 patients underwent stabilisation at 8 days following symptom onset: None of these developed AVN. This has led to development of the concept of the 'unsafe window'. The recommendations made by Kalogrianitis et al (4) are that if an unstable slip cannot be managed within 24 hours, management should be delayed for at least a week to allow the effusion that has developed and contributes to the compromise of the vascular supply to the head to resolve. This takes at least 1 week to settle. Surgery carries its own risk of vascular compromise and to perform surgery at a time when the vascular supply is especially fragile would be inappropriate (4).

## CONCLUSION

This patient presented with a left unstable slipped upper femoral epiphysis 4 days after his onset of being unable to weight bear. An initial bone scan confirmed avascularity of the femoral head which suggested a poor prognosis. Surgical treatment was performed a week following the slip. Despite the initial avascularity, the patient has progressed extremely well. He now has no evidence of avascular necrosis or articular degeneration at his 4 year follow up.

This case adds to the minimal body of evidence to suggest that if unstable slips cannot be treated within 24 hours, stabilisation should be left until at least 1 week if one is to be hopeful about the long term condition of the femoral head.

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