

# Southwick Osteotomy Stabilised with External Fixator

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## ABSTRACT

**Introduction** Epiphysiolysis of the femoral head is the most common accident occurring towards the end of pre-puberty and puberty growth. **Case report** The author describes the experience in the treatment of chronic epiphysiolysis in two patients treated by Southwick osteotomy. The site is accessed by way of a 15-cm long lateral skin incision and the trochanteric region is reached through the layers. The osteotomy angles prepared beforehand on a thin aluminium model are used to mark the Southwick osteotomy site on the anterior and lateral sides at the level of the lesser trochanter. Before performing the trochanteric osteotomy, two Mitković convergent pins type M20 are applied distally and proximally, above the planned osteotomy site. A tenotomy of the iliopsoas muscle is performed, and then the previously marked bone triangle is redissected up to three quarters of the width of the femur. The distal part of the femur is rotated inwards, so that the patella is turned towards the ceiling. The osteotomised fragments of the femur are adapted, repositioned and fixated by installing an external fixator on the previously placed pins. Two more pins are placed, one proximally and one distally, with a view to adequately stabilising the femur. The patient was mobile from day two after the surgery. If, after the surgery, the lead surgeon realises that there is a requirement to make a correction of 5, 10 and 15 degrees of the valgus, varus, anteversion or retroversion deformity, the correction shall be performed without surgically opening the patient, using the fixator pins. **Conclusion** After performing a Southwick osteotomy it is easier to adapt, reposition and fixate the osteotomised fragments of the femur using a fixator type M20. Adequate stability allows regaining mobility quickly, which in turn is the best prevention of chondrolysis of the hip. It is possible to make post-operative valgus, varus, anteversion and retroversion corrections of 5, 10 and 15 degrees without performing a surgery. Once the osteotomy is healed, the fixator type M20 is removed without any additional surgery.

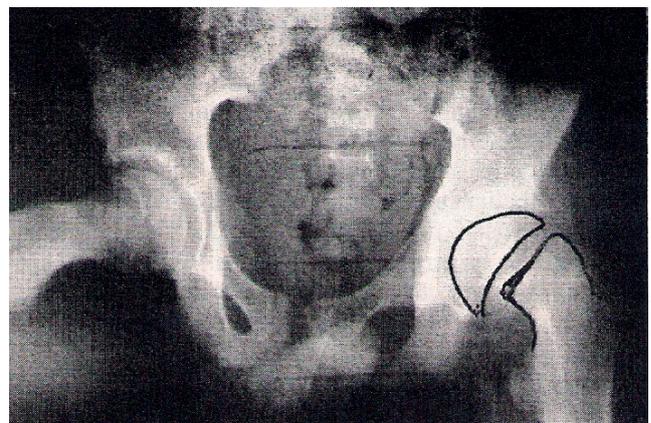
**Key words:** Southwick osteotomy, , external fixator.

## 1. INTRODUCTION

Epiphysiolysis of the femoral head (EFH) is the most common accident occurring towards the end of pre-puberty and puberty growth (1). It is clinically manifested by a sudden or gradual pain in the hip or the knee, cautious weight bearing or walking with a heavy or light limp. It evolves, more quickly or more slowly, into a progressive dislocation of the femoral head, i.e. into epiphysis. A clinical examination will, at an early stage, show restricted movement (abduction and internal rotation) in the hip (1).

There are a number of theories about the incidence of the disease: mechanical, anatomical, hereditary, endocrine, metabolic,... It occurs more often in boys, and it is mainly unilateral EFH in the left hip (2).

EFH diagnosis: in addition to anamnestic and clinical signs, it is confirmed by an ultrasound examination and radiographs of the pelvis of both hips in the anteroposterior and Lauenstein positions (Figure 1) Computerised tomography scan and nuclear magnetic resonance provide precise data on EFH (1, 2).



**Figure 1.** Epiphysis capitis femoris type 2 before surgery

A number of authors are of the opinion that acute epiphysiolysis of the femoral head should be treated conservatively (2, 3). Anatomic repositioning should not be insisted on at all cost, in order not to compromise the vascularisation of the hip and to create the conditions for vascular necrosis of the femoral head (2, 4). If con-

servative treatment fails to provide a satisfactory result, acute EFH progresses to the chronic form. In that case the majority of authors propose treatment with a Southwick corrective osteotomy (2, 4).

## 2. CASE STUDY

There are few orthopaedic surgeons with a lot of experience in treating epiphysiolysis of the femoral head with a Southwick osteotomy.

I hereby present the experience with two patients treated for chronic EFH with a Southwick osteotomy (4). These were two boys, 16.9 years of age. They both had EFH on the left hip. One had EFH with second-degree shear and the other one third-degree shear. Once they were diagnosed with EFH, a supracondylar extension was installed, with weight bearing at 1/7 of the body weight and with controlled internal rotation. The first radiography was performed after 24 hours, with the weight bearing reduced to 1/10. The patients spent six weeks each in traction. The radiograph showed that the condition of the patient with third-degree shear improved to second-degree shear, and the other patient's findings remained unchanged.

A Southwick corrective osteotomy was performed two months after the conservative treatment of chronic EFH (Figure 2).



**Figure 2.** Postoperative radiograph of epiphysis capitis femoris after Southwick corrective osteotomy and stabilisation with external fixator type M20

Radiographs were taken from the posteroanterior view of the pelvis with both hips and in the Lauenstein position. The correction angle in the anteroposterior plane and the second retroversion angle (Lauenstein radiograph) were determined. The angles of the affected hip were compared against those of the healthy hip. The correction triangle model was made on paper and the same model was then made of aluminium sheets and sterilised. It was used for easier intra-surgical verification of the size of the osteotomised pin (4).

It is difficult for an inexperienced orthopaedic surgeon to make adequate intra-surgical modelling of the AO plate in order for it to 'sit' on the Southwick osteotomy and keep the correction. By placing the screws, there is a possibility that a badly modelled plate does not maintain the proper correction. The plate requires excessive deperiostation of the femur. The inexperience of the orthopaedic surgeon requires an intra-surgical radiographic control or

capsulotomy which compromises the vascularisation of the hip joint.

All this can be avoided by stabilising the Southwick osteotomy with an external fixator with convergent pins, which has the best biomechanical stability in all plains (5). I used a Mitković's external fixator type M20 (M20).

The site is accessed by way of a 15-cm long lateral skin incision and the trochanteric region is reached through the layers. The osteotomy angles prepared beforehand on a thin aluminium model are used to mark the Southwick osteotomy site on the anterior and lateral sides at the level of the lesser trochanter. Before performing the trochanteric osteotomy, two Mitković convergent pins type M20 are applied distally and proximally, above the planned osteotomy site. A tenotomy of the iliopsoas muscle is performed, and then the previously marked bone triangle is redissected up to three quarters of the width of the femur. The distal part of the femur is rotated inwards, so that the patella is turned towards the ceiling. The osteotomised fragments of the femur are adapted, repositioned and fixated by installing an external fixator on the previously placed pins. Two more pins are placed, one proximally and one distally, with a view to adequately stabilising the femur. The patient was mobile from day two after the surgery (Figure 3).

If, after the surgery, the lead surgeon realises that there is a requirement to make a correction of 5, 10 or 15 degrees of the valgus, varus, anteversion or retroversion deformity, the correction shall be performed without surgically opening the patient, using the fixator pins. The correction can be made in the operating theatre, radiographic cabinet, or even in the patient's room.

We remove the pins partially, depending on callus formation. The patients were verticalised on day two after the surgery, they were walking with axillary crutches, with the weight-bearing capacity of up to 5 kg. They wore an M20 for 100 days on average (Figure 4). Physical therapy was performed after the consolidation of the osteotomy. Both patients were monitored for a period of two years.

After the treatment was finalised, the patients were graded using Gadeu's scheme: mobility index approximately 75 points, 1-centimetre shortening of the operated leg, and hip radiography showed incipient degenerative changes. This is a good result.

## 3. DISCUSSION

A conclusion one cannot escape when observing the treatment of the patients is that the use of bone traction represents a safe method for good repositioning of acute



**Figure 3.** Day two after surgery - standing up with weight bearing of up to 5 kg



**Figure 4.** Two months after Southwick osteotomy

shear of the femoral head [3]. The degree of the head shear depends on the duration (6).

Plötz G.M. *et al.*, in a series of two patients proposes surgical treatment of acute EFH. Epiphysis is stabilised using two strong wires after open repositioning (7). They think that two wires do not damage the growth plate and that they provide good stabilisation. They believe that the wires should not be removed until the epiphyseal plates are closed (7).

De Jong A. *et al.* reposition EFH under the control of the arthroscope and fixate it using one canalicular screw. The patient was monitored for a period of 2.5 years. The clinical result is excellent, and the radiological findings are acceptable (7). Their case shows that hip arthroscopy, though demanding, has its advantages, both in diagnosing and treating EFH (8).

Different osteotomy techniques are used in treating EFH. Mamisch T.C. *et al.* were testing one- and two-plane trochanteric osteotomies on a 3D-CT scan in 19 patients with a moderate or severe form of EFH. They came to the conclusion that a one-plane osteotomy did not provide satisfactory clinical solutions (9).

By using glycosaminoglycans, Zilkens C. *et al.* detected some degenerative hip changes in middle-aged patients with EFH, even when the patients experienced neither clinical nor radiographic changes in the hip (10).

#### 4. CONCLUSION

- After performing a Southwick osteotomy it is easier to adapt, reposition and fixate the osteotomised fragments of the femur using a fixator type M20.
- Adequate stability allows regaining mobility quickly, which in turn is the best prevention of chondrolysis of the hip.
- It is possible to make post-operative valgus, varus, anteversion and retroversion corrections of 5, 10 and 15 degrees without performing a surgery.
- Once the osteotomy is healed, the fixator type M20 is removed without any additional surgery.

#### CONFLICT OF INTEREST: NONE DECLARED

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