

Painless period after Spitzzy shelf operation for residual hip dysplasia—A long-term study of 47 children and young adults

Anne Guro Vreim Holm^{a,b,*}, Olav Reikerås^{a,b}, Terje Terjesen^{a,b}

^a Oslo University Hospital, Department of Orthopaedics, Oslo, Norway

^b University of Oslo, Norway

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ABSTRACT

Objective: To study the effects of the Spitzzy shelf operation on hip pain.

Method: A modified Spitzzy shelf procedure was performed in 60 hips with residual hip dysplasia. The mean age at surgery was 11.7 years (range 5.5–22.4 years).

Results: Twenty-one hips had pain preoperatively. One year postoperatively 57 hips (95%) were painless. The mean postoperative painless period in patients with > 10 years follow-up was 24.1 years (range 5.0–51.5 years). The only independent predictor of long duration of painlessness was preoperative CE angle $\geq 10^\circ$.

Conclusion: The Spitzzy procedure had favorable short- and long-term effects on hip pain.

1. Introduction

Hip shelf operation is a procedure aimed at correcting residual acetabular dysplasia and subluxation in patients with developmental dysplasia of the hip (DDH). The intention is to improve hip stability and avoid deterioration of residual dysplasia, thus postponing the occurrence of secondary hip osteoarthritis (OA). Another intention is to eliminate or reduce hip pain in patients who have such complaints. Multiple surgical techniques of the shelf operation have been described. In our hospital a modification of the technique described by Spitzzy¹ was the preferred method for joint-preserving surgery during several decades. Most of the primary radiographs and case records were still available for this long-term study.

There is no consensus with regard to the usefulness of the shelf operation. Whereas the operation is considered merely a salvage procedure by some authors,^{2,3} other studies in children and adolescents have shown good clinical and radiographic results in 70–80% of the patients at short-term and medium-term follow-up.^{4,5} No studies on children with a follow-up longer than 17 years have been published,⁶ apart from a recent report which focused on the need of total hip replacement (THR) after the Spitzzy procedure.⁷ In the present study the long-term clinical effects, especially on pain, were analyzed. We asked the following questions:

1. What are the short- and long-term effects of the Spitzzy shelf operation on hip pain?
2. Which clinical and radiographic factors are predictors for the

duration of painless period postoperatively?

2. Methods

The patients for this retrospective study were recruited from a search through the protocols of surgical procedures at Sophies Minde Orthopaedic Hospital (now Orthopedic Department, Oslo University Hospital) for the period 1954–1976. Sixty-one patients who had undergone hip shelf operation were identified. Fourteen patients were not included because there was no clinical information for 9 patients, another procedure than the Spitzzy technique had been performed in 4 patients, and one patient had been operated for a femoral head cyst 3 years after Spitzzy operation. Of the remaining 47 patients, 42 were girls (89%) and 5 were boys. Their mean age at surgery was 11.7 years (range, 5.5–22.4 years). Age at surgery was < 8 years in 15 hips, 8–14.⁹ years in 34 hips and ≥ 15 years in 11 hips. A bilateral shelf procedure had been performed in 13 patients. The study was approved by the hospital's privacy and data protection officer, and informed consent was received from all patients.

All patients had developmental dysplasia or dislocation of the hip (DDH), but no other congenital or neurological disorders. 42 patients had previously been treated for DDH (total dislocation in 43 hips and subluxation in 7 hips; missing information in 4 hips). Mean age at hip reduction was 2.2 years (range, 0.7–5.4 years). In the remaining 5 patients (6 hips) subluxation had been detected at a mean age of 11.8 years (range, 7–20 years) and they had not had any previous treatment. Before the shelf operation, 16 of the hips that had previous

* Corresponding author at: Oslo University Hospital, Postbox 4950 Nydalen, NO-0424 Oslo, Norway.
E-mail address: holman@ous-hf.no (A.G.V. Holm).

treatment developed avascular necrosis of the femoral epiphysis (AVN), Groups II–IV.⁸ In 9 hips a femoral varus and derotation osteotomy had been performed before or after the shelf operation, at a mean patient age of 16.3 years (range, 16–23 years).

Indication for Spitzzy shelf operation was acetabular dysplasia, defined as CE angle⁹ below 20°, with or without subluxation and hip pain. Because the old radiographs of some of the patients had disappeared over the years, exact information on preoperative femoral head coverage was available in 40 hips.

2.1. Surgical technique

A technique modified from Spitzzy¹ was employed. A Smith-Petersen anterior skin incision approach was used. The outer surface of the iliac bone was exposed subperiosteally down to the lateral joint capsule. The reflected head of the rectus femoris tendon was divided to expose the underlying joint capsule. The lateral capsule was usually thick and was made somewhat thinner by partial resection. A broad osteotome was used to make a slot for the shelf in the iliac bone, just proximal to the acetabular labrum and in a medial and slightly proximal direction. A trapezoid cortico-cancellous bone graft was obtained from the anterolateral iliac crest. The bone graft (approximately 4 and 2 cm long, 4 cm deep and 3–5 mm thick) was impacted into the slot with the slightly concave cortical side downwards. It was aimed at placing the graft as near the joint capsule over the lateral femoral head as possible (Fig. 1). No internal fixation was used. Cancellous bone chips from the iliac wing were packed into the triangular space between the shelf and lateral iliac surface. The reflected rectus femoris tendon was sutured to the anterolateral aspect of the capsule. The postoperative regime was skin traction for 10 weeks followed by partial weight-bearing with crutches for 4 weeks. Full weight-bearing walking was allowed approximately 3 months postoperatively.

2.2. Follow-up evaluation

Information on pre- and postoperative pain was obtained from the case records. Most patients were followed by routine clinical and radiographic examinations for many years. However, some patients had only a few years follow-up, usually because they had no complaints about their hips and lived long away from the hospital.

Long-term follow-up included information on total hip replacement (THR), which was provided from The Norwegian Arthroplasty Register. Patients who had not undergone THR were invited to a long-term follow-up examination including radiographic examination and evaluation by the Harris hip score (HHS).¹⁰ Those who refused to attend this examination were contacted by telephone and evaluated by HHS.

2.3. Statistics

SPSS software, version 21 (IBM, Armonk, NY, USA) was used for statistical analysis. Continuous variables were analyzed with the *t*-test for independent samples and categorical variables were assessed by Pearson's chi-squared test. Potential factors associated with painless period postoperatively were first assessed by univariable analysis. Variables with *p*-value < 0.05 were tested by multivariable linear regression. The Kaplan-Meier product-limit method was used for survival analysis, with length of painless period postoperatively as "survival". All tests were 2-sided. Differences were considered significant when the *P*-value was < 0.05.

3. Results

3.1. Short-term results

Preoperative hip pain was present in 21 hips (35%), whereas 39 hips had no pain. The mean duration of pain was 2.5 years (range, 1–8

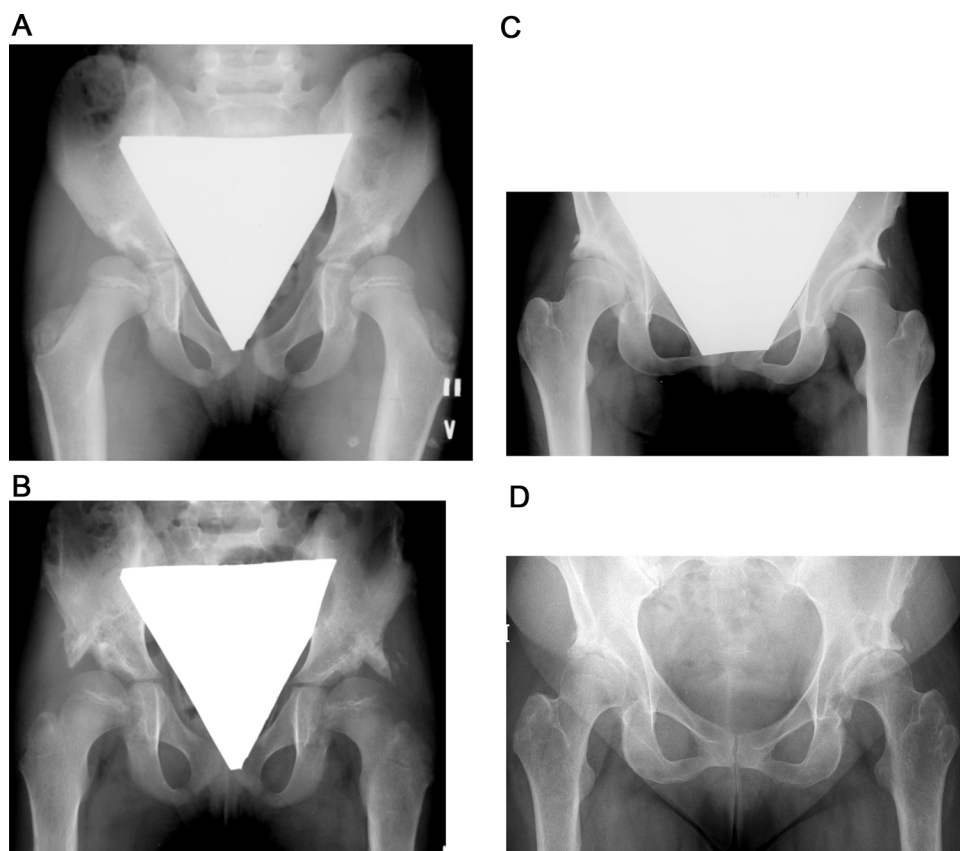


Fig. 1. A–D Radiographs of a girl who underwent bilateral Spitzzy shelf operation. (A) Preoperative radiograph at patient age 8.4 years shows bilateral acetabular dysplasia (CE angle 8° in the right hip and 11° in the left). Bilateral Spitzzy procedures were performed at an interval of 3 weeks. (B) Radiograph 3 months postoperatively show that the shelves have been very steeply placed, but considerably increase in femoral head coverage occurred. (C) At age 18 years good remodeling of the shelf has taken place bilaterally. (D) Radiograph 44 years postoperatively shows bilateral osteoarthritis (Harris Hip Score was 76 on the right side and 45 on the left).

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