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Original article

Does prior conservative surgery affect survivorship and functional outcome in total hip arthroplasty for congenital dislocation of the hip? A case-control study in 159 hips

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ABSTRACT

Introduction: The results of total hip arthroplasty (THA) in congenital dislocation of the hip (CDH) are well known, but such is not the case for the impact of prior conservative surgery on THA function and survivorship. The present study compared THA in CDH with prior conservative bone surgery (BS group) versus no prior bone surgery (NBS group), to (1) assess the impact of prior conservative surgery on function and survivorship after THA, and (2) determine whether a particular type of conservative surgery affected function or survivorship.
Hypothesis: Prior conservative surgery for CDH does not affect function or survivorship of subsequent THA.
Patients and methods: A multicenter retrospective case-control study analyzed 430 THAs in CDH patients (332 patients: 269 female, 63 male; mean age, 56 years [range, 17–80 years]) at a mean 13.2 ± 5.4 years' follow-up (range, 1–29 years). The BS group included 159 hips (37%) (64 pelvic, 81 femoral and 14 combined pelvic and femoral osteotomies), and the NBS group 271 (63%). Groups were comparable for gender, age at surgery, Devane activity score, preoperative Postel Merle d'Aubigné (PMA) functional score and CDH radiographic type following Crowe.
Results: At follow-up, PMA scores were comparable: BS, 16.8 ± 1.4 (11–18); NBS, 16.9 ± 1.5 (7–18). Fifteen-year survivorship censored for implant revision for whatever reason did not significantly differ: BS, 87% (95% CI: 83–91%); NBS, 89% (95% CI: 86–92%). Ten-year survivorship on the same criterion did not significantly differ according to type of prior surgery: hip shelf arthroplasty, 97% (95% CI: 95–99%); Chiari osteotomy, 100%; femoral osteotomy, 95% (95% CI: 92–98%); and Milch osteotomy 96% (95% CI: 93–99%).
Discussion/Conclusion: Conservative surgery for CDH does not impair the functional results or survivorship of subsequent THA.
Level of evidence: III, case-control study.

1. Introduction

Long-term outcome is well known in total hip arthroplasty (THA) for congenital dislocation of the hip (CDH) [1–3]. Most reports highlight the importance of hip alignment [2–5]. Several series have included hips that had undergone prior conservative surgery, but none analyzed its impact on THA outcome [1–3].

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Table 1
Types of prior surgery in the Bone Surgery (BS) group.

	n
Pelvic bone surgery	**64**
Hip shelf	46
Chiari osteotomy	16
Salter osteotomy	2
Femoral bone surgery	**81**
Milch osteotomy	36
Other femoral osteotomy	45
Pelvic plus femoral bone surgery	**14**
Shelf + Milch	1
Shelf + femoral osteotomy	4
Chiari + femoral osteotomy	6
Salter + femoral osteotomy	1
Chiari + shelf	1
Femoral osteotomy + arthrodesis	1

n = 159 hips.

The 2007 symposium of the French Orthopedic and Traumatologic Surgery Society (SoFCOT) devoted to arthroplasty in under 30-year-olds identified prior surgery, and femoral osteotomy in particular, as a factor of earlier revision surgery [6]. These findings, however, did not focus exclusively on the sequelae of CDH, which accounted for only 10% of indications [6]. Several other studies reported that prior osteotomy for hip dysplasia had little or no impact on THA outcome [7–10], but most of these cases of dysplasia involved non-dislocated or at most subluxated hips. Only Eskelinen et al. series [11] exclusively concerned THA after Schanz osteotomy for CDH, but had no control group.

The principal objective of the present study was to use a case-control design, comparing THA in CDH with versus without prior conservative bone surgery, to assess the impact of conservative surgery on THA function and survivorship. The hypothesis was that conservative surgery would not affect THA function or survivorship. Secondary objectives were:

- to determine whether a particular type of conservative surgery affected THA function or survivorship;
- to determine whether rates of complication and surgical revision were affected by prior conservative surgery.

2. Material and methods

2.1. Patients

A multicenter retrospective study analyzed a continuous series of 430 THAs (332 patients: 269 female, 63 male) in CDH operated on between 1983 and 2001. Prior bone surgery had been performed in 159 hips (37%: bone surgery [BS] group) and not in 271 (63%: no bone surgery [NBS] group). Forty-six of the 98 patients with bilateral THA had had prior osteotomy (21 unilateral, 25 bilateral: i.e., 71 hips) and 52 not. Eighty-eight of the 234 unilateral THA patients had had prior osteotomy and 146 not.

Sixty-four of the 159 BS group hips (40%) had had pelvic osteotomies, 81 (51%) femoral osteotomies and 14 (9%) pelvic plus femoral osteotomies (Table 1). Preoperatively, the BS group (159 hips, 128 patients) and NBS group (271 hips, 204 patients) were comparable for gender, age at surgery, Devane activity score [12] and Charnley hip score [13] (Table 2).

2.2. Surgical method

The surgical approach was trochanteric in 219 cases, anterolateral in 51, transfemoral according to Pont L'Abbé (mostly through the former Milch osteotomy) in 27 [14] and posterolateral in 78. Femoral osteotomy for stem insertion was required in 64 cases, with greater frequency in the femoral BS subgroup (42%) than in the rest of the series without prior femoral osteotomy (11%) ($P < 0.0001$). Likewise, acetabular reconstruction was required in 221 cases, with greater frequency in the pelvic BS subgroup (80% versus 62%: $P = 0.009$). Dysplasia grade on the Crowe classification [15] correlated strongly with rates of complementary bone surgery associated to THA implantation:

- at the time of THA insertion pelvic surgery rates were 55% for grade I, 74% for grade II, 85% for grade II and 54% for grade IV ($P < 0.0001$);
- similarly femoral surgery rates were 3% for grade I, 6% for grade II, 10% for grade III and 41% for grade IV ($P < 0.0001$).

2.3. Assessment

Patients were assessed at a mean 13.2 ± 5.4 years' follow-up (range, 1–29 years), with a consultation and radiography scheduled for the study. In all, 337 hips were assessed clinically and radiographically and 16 by telephone or mail; 35 patients had died and 42 were lost to follow-up. Functional assessment comprised Postel Merle d'Aubigné (PMA) [16] and Harris [17] scores; preoperative scores did not significantly differ between groups (Table 3). Likewise, there was no significant difference in preoperative range of motion except for extension, which was greater in the NBS group (Table 3), accounting for the correspondingly higher PMA motion score (Table 3). Postoperative neurologic complications, implant dislocations, revision surgeries and implant replacements were noted. Hip position was classified following Crowe et al. [15]. THA outcome was assessed as PMA score gain.

2.4. Statistics

Data were entered in an Excel™ spreadsheet (Microsoft™, Redmond, WA, USA) and analyzed on JMP software (SAS, Cary, NC, USA). Chi^2 and Fisher Exact tests were used for intergroup comparison of quantitative variables (gender, Crowe CDH grade, Devane and Charnley scores, revision and complications rates). Analysis of variance and Kruskall and Wallis tests were used to compare mean values between groups and between preoperative and follow-up status (age, BMI, Harris and PMA scores and PMA score gain). Finally, survivorship analysis was performed with any revision surgery leading to implant change as end point, with 95% confidence intervals, analysis stopping in the last interval containing at least 30 hips; survivorship was compared on log-rank test. The first-order risk threshold was set at 5%.

3. Results

PMA and Harris scores for the 430 hips showed significant improvement: PMA score rose from 9.8 ± 2.8 (2–17) to 16.9 ± 1.5 (7–18), $P < 0.0001$; Harris score rose from 45.8 ± 15.5 (2–85) to 75.4 ± 25.1 (11–100), $P < 0.0001$. At last follow-up, they did not significantly differ between groups (Table 3). Likewise, PMA score gain did not significantly differ between groups: BS, 7.2 ± 3 (−1 to 14); NBS, 7.1 ± 2.7 (0 to 17); $P = 0.4$. Although there was preoperatively a mean 4° extension deficit in the BS group, ranges of motion did not significantly differ at follow-up (Table 3). Location of prior bone surgery did not affect follow-up PMA score: pelvis, 16.8 ± 1.6; femur, 16.9 ± 1.2; femur plus pelvis, 16.7 ± 1.4; and no osteotomy, 16.9 ± 1.5 ($P = 0.8$). In contrast, mean PMA score at follow-up was significantly poorer after prior Milch osteotomy (16.4 ± 1 [14–18]) or hip shelf arthroplasty (16.5 ± 1.6 [12–18]) than after femoral osteotomy (17.3 ± 1.2 [13–18]) or Chiari osteotomy (17.1 ± 1.6 [11–18]) ($P = 0.04$).