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ORIGINAL ARTICLE

Primary aseptic revision of the femoral component of a cemented total hip arthroplasty using a cemented technique without bone graft

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KEYWORDS
Total hip arthroplasty;
Revision;
Femoral stem;
Cement

Summary
Background: Primary revisions using cement without bone graft reconstruction are less frequently used because of their supposed higher failure rate. The results, in fact, depend on multiple parameters: number of prior revisions, cementing technique quality, and residual bone stock; these intricate factors are rarely taken together into account when analyzing this treatment method.
Hypothesis: Femoral component fixation with cement can be a valid option in total hip arthroplasty primary revision.
Objectives: The objective of this investigation was to study the long-term results of cemented femoral stems in total hip arthroplasty primary revisions in terms of the quality of the cementing technique and the residual bone stock.
Patients and methods: This is a retrospective study of a series of 80-cemented primary femoral stems revised for aseptic loosening using a new-cemented femoral stem without bone graft. Seventy implants were analyzed at the longest follow-up. The Postel Merle D'Aubigné and the Harris Hip Scores were used for clinical assessment. The French Academy SOFCOT 99 bone loss grading system was used to classify preoperative bone compromise severity. The Barrack classification assessed the quality of the postoperative cementation. The radiographic study at the last follow-up sought signs of femoral implant loosening classified according to Harris.
Results: The mean follow-up was 10 years and 10 months. The functional evaluation of the hip showed a significant overall gain ($p < 0.0001$) after surgical revision. In our series, the existence of severe grade III or IV bone loss on the SOFCOT 99 classification exposed the patient to a significant risk of intraoperative complications ($p = 0.03$). The grade III and IV femurs had a significantly higher risk ($p = 0.0001$) of having type C or D cementation according to the Barrack classification. Type D cementation was a risk factor for significant iterative radiographic loosening ($p = 0.005$) compared to A, B or C cementations. The 10-year survival rate of the femoral implant was 90% (95% confidence interval [95% CI]: 79.2—94.9%). This survival rate was significantly better

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($p = 0.0016$) for revisions with type A or B cementations on the Barrack scale (96% survival; 95% CI: 85.1—99%) than for type C or D (70% survival; 95% CI: 41.4—86.1%).
Conclusion: This study shows that revised cemented femoral stems without bone graft added are a valid therapeutic option in primary cemented total hip arthroplasty revisions provided that a good-quality cement technique can be achieved. Sufficient bone stock (SOFCOT 99 grade 0, I or II) was indispensable for good cementation.
Level of evidence: IV: therapeutic retrospective study.

Introduction

In the 1980s, the results published on total hip arthroplasty revisions with a cemented femoral stem showed a survival rate for the femoral implant that was much lower than for primary implants, with 30% failure for revision or loosening at 8 years [1,2]. At the end of the 1990s, new cementing techniques [3] made it possible to obtain better results with survival rates greater than 90% at 10 years [4]. The objective of this study was to investigate the long-term results of the cemented femoral stem in the primary revisions of total hip arthroplasties in light of cementation quality and bone stock.

Patients and methods

Patients

This was a retrospective study of a series of cemented femoral stem revisions of cemented total hip arthroplasties. One hundred and fifty-five revisions of total hip arthroplasties for aseptic loosening were performed in our department between 1993 and 1996. Revisions for fracture, revisions of cementless femoral stems, revisions with placement of cementless femoral stems, as well as repeated revisions were excluded.

The series therefore comprised 80 implants for 74 patients (six patients had bilateral revision): 50 women and 24 men. The mean age at the time of the intervention was 68 years (range: 41—83 years), with a mean body mass index of 25.7 (range: 18.8—34.3).

The initial hip arthroplasty was performed for idiopathic osteoarthritis in 45 cases (56%), arthosis secondary to dysplasia in 21 cases, osteonecrosis of the femoral head in four cases, ankylosing spondylarthritis in both hips of one patient, acetabulum fracture in one case, revised hip arthrodesis in one case, and in six cases the etiology was unknown (absence of initial radiograph). The time between implantation of the former femoral stem and its revision was a mean 11 years and 3 months, with a standard deviation (S.D.) of 5.5 years (range: 3—26 years).

The causes for arthroplasty revision were 41 cases of bipolar loosening, 25 cases of isolated femoral loosening, and 14 cases of acetabular loosening (with the decision to change the femoral implant as a matter of principle made during the preoperative planning stage because of the long follow-up of the femoral implant or upon observation of stem loosening during the procedure).

The severity of bone loss was judged on preoperative Antero-Posterior (AP) radiographs of the pelvis and AP and lateral radiographs of the full femur using the SOFCOT 99 classification, which clearly established cortex thickness by individualizing the lateral and medial cortex as well as the Merkel area and lesions of the greater trochanter rated by adding ''T0 to T2'' to the femoral score [5]. Likewise, deformties of the femoral shaft were rated by adding ''V'' to the femoral score [5]. The series comprised 12 stage 0, 36 stage I (two T1), 16 stage II (four T1, one V T0 with 8° varus deformation of the femur shaft) patients, 14 stage III (three T1, three T2, one V T0 with 10° varus deformation of the femur at the distal end of the stem) patients, and two stage IV (one T1, one T2) patients (Fig. 1).

Evaluation methods

Stem extraction and its complications, cement ablation and its complications, any bone grafts, the type and length of the implanted stems, the cementing technique, the duration of surgery and the quantity of blood loss, the complications occurring during hospitalization, and the time to weightbearing were noted. Clinical assessment was based on preoperative consultation reports, 6 months after the

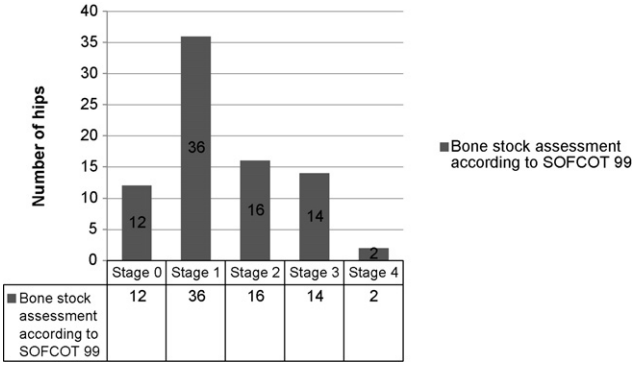

Figure 1 Distribution of bone substance loss according to the SOFCOT 99 criteria [5]. Stage 0: no lesion; stage I: thinned but satisfactory cortex with more or less severe lysis of the Merkel cells; stage II: lateral cortex highly thinned, medial cortex thinned but satisfactory; stage III: lateral cortex highly thinned, medial cortex partially destroyed under the lesser trochanter; stage IV: femur pellucid or disappeared. Complementary lesions with suffix: T0: trochanter intact, T1: fractured trochanter consolidated, T2: trochanter fractured or nonunion, V: presence of diaphyseal varus greater than 5°.