Total hip arthroplasty in failed pertrochanteric osteosynthesis. Safe and effective.

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Abstract

Total hip arthroplasty is a recommended option to treat the failure of fixation of pertrochanteric, however it is no clear which implant should be selected. The purpose is show how to manage this common complication using a simplified approach.

Retrospective study of 884 patients treated for pertrochanteric fracture from which we select those who required reoperation for failure. Sociodemographic data, implant selection, complications, mortality and surgical technique were analysed. Preoperative and postoperative functional test were collected. The decision making process was carried out taking into account the functional status of the patient as well as the femoral and acetabular bone stock.

Twenty two cases (2.48%) out of 884 fractures were identified as osteosynthesis failure treated with arthroplasty. The mean follow up was 5 years. An important improvement in functional test at one year follow-up was observed achieving about 60% of the sample able to walk with a cane or less. In three cases there were complications but one year mortality after surgery was low (2 cases).

In conclusion, the appropriate implant selection provides an efficient surgical technique therefore good results can be obtained in these fragile patients.

Keywords

Total Hip Arthroplasty, Pertrochanteric complications, Outcome.

Introduction

Proximal femoral fractures treated by osteosynthesis, particularly pertrochanteric fractures in elderly people may fail because of the initial fracture pattern, comminution, suboptimal fracture fixation, or poor bone quality (1). This represents a significant cause of hospitalisation and morbidity despite the efforts of integral orthogeriatric units on improving treatment of these fractures, it can be expected up to 56% osteosynthesis failure at worst scenario (2).

In cases of failure of osteosynthesis, the realisation of a new osteosynthesis versus arthroplasty has been a preferred choice for orthopaedic surgeon allegedly that it is technically low demanding procedure and preserves the femoral head (3). Nevertheless it implies a long period without full weight bearing and the possibility of nonunion. Considering that in these cases the destruction of the trochanter, cartilage low viability of the femoral head, it is suggested that arthroplasty responds better to this challenge (4).

Different rates of complications with the joint replacement in the failure of the osteosynthesis in proximal femoral fractures are described. However with proper implant selection and preventing potential difficulties in the surgery, correct results can be obtained (5).

The aim of the study is to show how to manage the failure of osteosynthesis in pertrochanteric fractures using hip arthroplasty in elderly patients.

Patients and Methods

Retrospective study includes all patients older than 60 years operated for pertrochanteric fracture with an osteosynthesis method from January 2006 to December 2012.
in a single department. The criteria to consider failed osteosynthesis was the presence of “cutting-out”, osteonecrosis of the femoral head, malposition consolidation or breakage of osteosynthesis material (6). All patients treated with arthroplasty as a salvage method were collected.

Sociodemographic data, implant selection, complications, mortality and functional tests (preoperative and postoperative Barthel, postoperative Merle d’Aubigné) were collected.

In preoperative planning to choose the implant, the functional level prior to the initial fracture of the patient, the state of the acetabulum, the state of the trochanter and the femoral shaft were evaluated. In patients previously independent for daily activities we performed a total hip arthroplasty (U2, United Orthopedic Corporation, Taiwan). For patients with low functional demand or severe cognitive impairment we used a bipolar prosthesis (U2 United Orthopedic Corporation, Taiwan) or an unipolar hemiarthroplasty (Austin-Moore, Howmedica, Rutherford NJ) in cases of indemnity of the acetabular cartilage by study with CT (Figure 1).

Surgical technique is done under epidural anaesthesia and antibiotic prophylaxis. Usually the Hardinge anterolateral approach is the most used in our department. Firstly, we did the dislocation of the hip with osteosynthesis material placed in order to avoid an intraoperative fracture. Secondly, we removed the material. Thirdly, in cases of THA, the preparation of the acetabulum depended on the local damage in order to choose a press-fit component in well conserved bone quality or a cemented implant in cases with poor bone quality. Lastly, we performed the femoral preparation with cemented stem and reconstruction of the trochanter with Dall-Miles grip or grip plate system (Howmedica, Rutherford NJ) or tension band wiring. Only in cases of severe destruction of the acetabulum or femur other implants as trabecular metal acetabular revision system cup cage construct (TMARS – Zimmer, Warsaw) or modular revision stem systems with distal fixation (Revitan, Zimmer, Warsaw) were performed.

The rehabilitation program consisted in the progressive incorporation of the patient to their basic activities of daily living. Patients usually started by sitting on the second postoperative day. Subsequently, a physical therapist taught muscle strengthening exercises and gradually the patients began ambulation with crutches allowing full weight bearing. Finally at 3 months ambulation is allowed without technical support.

The follow up was conducted at first, third, sixth, and twelfth postoperative month where clinical examinations, radiographic control and functional tests were performed. Statistical analysis was performed by using the SPSS version 15.0 (SPSS Inc, Chicago, Ill) statistical package. Continuous variables are presented as mean and standard deviation or range and categorical variables as percentages.

Figure 1. Cutting-out of femoral nail in a 78-year old patient with good functional status, treated with a total hip arthroplasty.
Results

Twenty two cases (2.48%) out of 884 fractures were identified as osteosynthesis failure treated with arthroplasty, 16 women and 6 men. Mean age was 78 (SD 8.4) years old. The mean follow-up was 5.6 (1-8) years. Initial types of fracture; 10 cases 31A3, 8 cases 31A2, 4 cases 31 A1 were observed. With regard the method used to treat the initial fracture in 18 cases was an endomedullary nail (Gamma 3, Stryker Trauma, Germany) and in 4 cases was a dynamic hip screw (DHS, Synthes, Switzerland).

Regarding the type of failure; 16 cases of cutting-out, 2 cases osteonecrosis of femoral head and 2 cases of implant breakage (nonunion) were identified. All these patients presented hip pain, lameness and serious difficulty in walking during the postoperative period until the diagnosis of implant failure was made. The average time from the first surgery to the diagnosis of implant failure was 7 months (2-11).

Relative to implants, the system most common used was hybrid THA with a pair friction metal-polyethylene (11 cases) followed by cemented THA (5 cases) (Figure 2). Bipolar and Moore prosthesis were used in 2 cases respectively (Figure 3). Finally, in 2 cases it was necessary to use revision systems; one case with a TMARS due to a severe damage at acetabulum and 1 case with a long stem modular device due to a low quality of metaphyseal bone. The mean surgical time was 133 minutes (80-170).

In three cases there were complications. One case presented an intraoperative fracture Vancouver C which required osteosynthesis with a bridge plate. One case suffered a vascular injury controlled intraoperatively, without the aid of a vascular surgeon. The last case presented an acute infection that was treated with debridement, new polyethylene and antibiotic therapy. The same patient had one episode of dislocation that required closed reduction.

The main Barthel score was observed in these 22 patients before the salvage procedure was 41.2 (SD 12). At one year follow-up, this score improved to 62.8 (SD 18.38). With regard to Merle-D’Aubigné score at one year the mean was 13.4 (12-17).

The ability to walk was 36.3% without assistance (8 cases), 31.8% with one cane (7 cases), 18.1% walker or 2 canes (4 cases), 13.6% of the patients (3 cases) did not walk. The one year mortality after surgery was 9.09% (2 cases). At final follow-up none of the cases showed radiological signs of loosening of the implants according to Gruen criteria (7).

Discussion

The first finding of this study confirmed that arthroplasty is an effective option to manage osteosynthesis failure in proximal femoral fractures. Our second finding is that primary common implants could be used as a salvage procedure for
this complication obtaining acceptable functional outcomes. Last, the low rate of complications and mortality suggest that could be a safe method for these fragile patients.

Total hip replacement is accepted generally as a recognised option to treat pertrochanteric femoral fractures (8) but it is known that it could be involve higher number of complications compared with a primary THA (9). The most common complication is the intraoperative fracture reflected in the study of Zhang (5) up to 31% of cases. In our series, one case presented an intraoperative fracture in the moment of final reduction but as in other studies this means an isolated complication (1). Dislocation is an important complication as several authors indicated in their studies (1,10,11); in our series only 1 case presented this complication probably because we consider mandatory the anatomic re-attachment of the greater trochanter using a Dall Miles cable system (12) even other methods as wiring system could be appropriate to restore it (13).

It is important take into account the mean surgical time in these fragile patients. In our series the mean was 133 minutes, comparable to other studies that have used a similar decision making based on simplifying the surgical technique by selecting primary implants instead of revision implants that shows an increased surgical time and consequently higher possibility of bleeding and infection (14).

The therapeutic decision-making was mostly influenced by the remaining bone stock at the femoral and acetabulum side in order to select the implant. At femoral side there are just a few studies that evaluate the use of a cementless long femoral stems (14,15). The advantages are to bypass the proximal part of the femur and achieve a distal fixation at the diaphysis, but complications are described (16) such as perforation of the cortex, malrotation or difficult soft tissue balancing so that, except cases with a distorted and low quality metaphyseal bone it would be preferable a primary cemented stem in order to avoid these complications. At the acetabular side, hidroxiapatite-coated cups can save time providing a stable fixation as long as the remaining bone presents good quality. When it is not the case, the cemented cup is a preferable option, or TMARS in severely damaged cases as those presenting cervicocephalic medial screw migration (17,18).

Functional scores recorded in these 22 patients showed that these patients maintain an acceptable functionality and independency for daily activities at the final follow-up. However, it was difficult to consider all patients as a homogenous group because the status of each patient previous to the initial fracture was quite different. Nevertheless, regarding other studies we found similar results in the ability to walk achieving about 60% of the sample able to walk with a cane or less (1,15).

Conclusion

In conclusion, the key factors of failed pertrochanteric fractures salvage are appropriate implant selection evaluating risk and benefit, preferably press-fit acetabular cups and cemented femoral stems. Low demand patients may benefit from hemiarthroplasty. It is mandatory avoid complications restoring the greater trochanter and minimising surgical time. Finally, start as soon as possible a rehabilitation program to achieve adequate functional level.

Regarding to the limitations, this is a retrospective study due to the low frequency of this complication and all the conclusions should be interpreted with caution.

References


