HEMIARTHROPLASTY IN ELDERLY, DEBILITATED PATIENTS WITH AN UNSTABLE FEMORAL FRACTURE IN THE TROCHANTERIC REGION

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The purpose of this study was to evaluate the results of patients with an unstable fracture in the trochanteric region who were treated by hemiarthroplasty. During a 10-year period, 154 of the 308 patients with a trochanteric fracture treated in our hospital had an unstable fracture. In patients with severe comminution and osteoporosis an endoprosthesis was inserted : 5 patients with a subtrochanteric and 17 with a pertrochanteric fracture. Ten patients suffered from central nervous system diseases, and in 10 patients cardiovascular or pulmonary disorders were diagnosed. Pre- and postoperative ambulation levels were classified. Seventeen patients (77%) achieved full weight-bearing mobilization. Five patients never walked again (23%) : 2 patients died in the first month (9%). It is concluded that for elderly and debilitated patients with an unstable trochanteric fracture, hemiarthroplasty is an acceptable alternative to osteosynthesis.

Keywords : hemiarthroplasty ; intertrochanteric fractures ; subtrochanteric fractures ; endoprosthesis.
Mots-clés : hémi-arthropastie ; fracture pertrochantérienne ; fracture sous-trochantérienne ; endoprothèse.

INTRODUCTION

Proximal femoral fractures result in high morbidity and mortality in elderly patients. Eight months after the trauma, life expectancy once again equals that of people of the same age (16). During the first month the mortality rate has been found to be 15 times higher, and during the second month 7 times, than the expected rate in the healthy population of the same age (6). When osteosynthesis of a sub- or pertrochanteric femoral fracture does not allow (partial) weight-bearing within a few days, well-known complications of bedridden patients can lead to a fatal outcome.

Fracture fixation with a sliding hip-screw device proved to be an improvement compared to fixed-blade plates and Ender's nails (1, 10, 14, 20). However, even with this device, early full weight-bearing mobilization of unstable fractures can result in rotational deformity and leg length shortening, due to uncontrolled telescoping (10, 13, 17, 27).

Elderly, especially debilitated patients in need of early mobilization pose many problems. For these reasons the insertion of an endoprosthesis was elected for patients with osteoporosis complicated by a severe unstable fracture. With this treatment, immediate postoperative full weight-bearing mobilization is allowed. During a 10-year period (1978-1987) 308 patients, over 70 years old, were treated in our department for a fracture in the trochanteric region. There were 154 patients with an unstable fracture (table I). This paper reports the results of the patients who received a hip endoprosthesis as a primary treatment in cases where the surgeon expected that osteosynthesis would have given an unstable fixation. All patients suffered from osteoporosis in combination with a (multifragmental) unstable fracture.

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Table I. — Number of patients with an unstable inter- or subtrochanteric femoral fracture (n = 154)

	Intertrochanteric	Subtrochanteric
Sex	n	n
Men	31	6
Women	91	26
Total	122	32

METHODS AND MATERIAL

Fracture classifications have been described by Kyle (12), Seinsheimer (22), Evans (9), Jensen (11), and Müller (17). According to these classifications, a fracture is unstable when there is a medial and posterolateral comminution. Twenty-two patients received an endoprosthesis primarily (14% of the patients with an unstable fracture). The intertrochanteric fractures were classified according to Evans (n = 17) : 5 type 1C and 12 type 1D ; the subtrochanteric fractures according to Seinsheimer (n = 5) ; 1 type IIIA and 4 type V. Twenty Monk prostheses (5 with a long stem) and 2 Osteal-type endoprostheses with a long stem were inserted through a lateroventral approach according to Watson Jones (fig. 1), with the patient positioned on the contralateral side. Through a T-shaped incision of

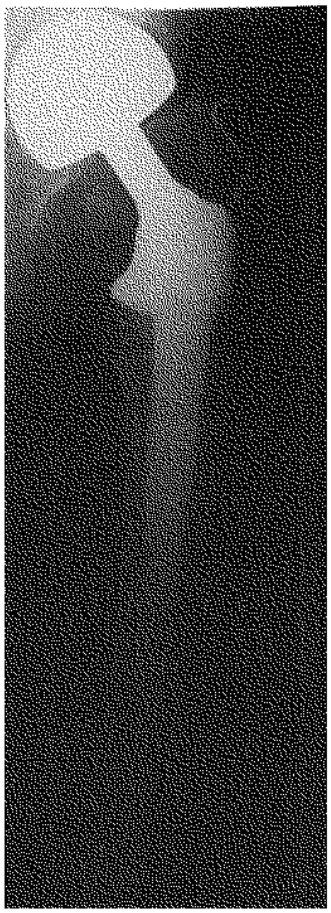

Fig. 1c

Fig. 1a

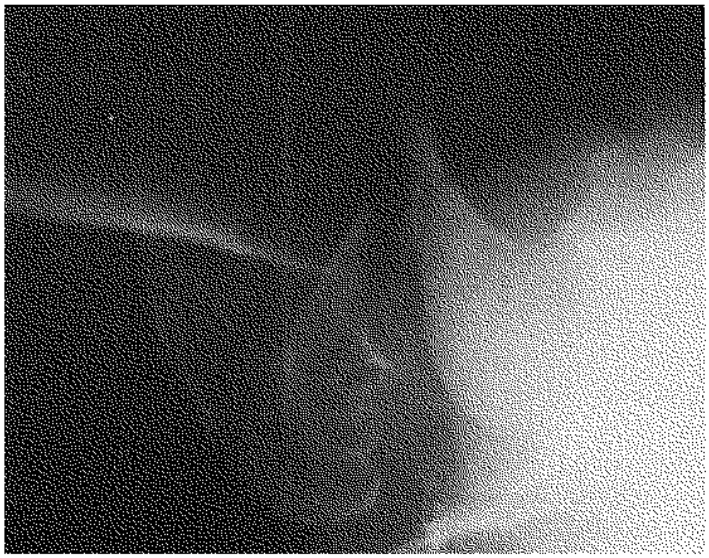

Fig. 1b

Fig. 1. — X-rays of a patient with an unstable intertrochanteric fracture ; a. AP view ; b. Axial view ; c. the endoprosthesis.

the articular capsule loose fragments were extracted, and the endoprosthesis was implanted using cement.

The mean age of the patients was 82 years (70-92). There were 15 women and 7 men. The right-left ratio was 12 to 10. Four patients had associated injuries (18%), such as a fracture of the proximal humerus (n = 2) and a fracture of the distal radius (n = 2). Ten patients suffered from central nervous system diseases (45%), especially Parkinson disease (14%). Cardiovascular (27%), pulmonary (18%) and rheumatic and arthritic diseases (23%) were also common in these patients.

Pre- and postoperative ambulation was classified acording to 4 stages :

— stage I :excellent function ;
— stage II : intermittent pain, sometimes using a cane ;
— stage III : walking ability diminished because of pain ;
— stage IV : poor hip function with total dependency.

RESULTS

Mean anesthesia duration was 150 minutes (90-225 min). Mean blood loss was 600 ml (200-1200 ml). Four patients with an Evans type 1D fracture were found to have subtrochanteric extension of the fracture. In 19 patients the operation was uncomplicated. In one patient a planned osteosynthesis was converted intraoperatively into prosthetic replacement, due to excessive comminution ; in one patient, during preparation of the medullary cavity, a fissure extending to the femoral shaft occurred, and in one patient there was an unstable reposition of the endoprosthesis. All endoprostheses were cemented, and bone defects were also filled with cement. The greater trochanter was fixed to the endoprosthesis 7 times. Leg shortening was accepted in 2 patients.

The average duration of immobilization was 5 days. The mean hospitalization was 22 days. The mortality within one month was 9%. The most frequent complications were mental confusion (18%) and urinary infections (32%). Three or more complications were seen in 27% of the patients. Mean follow-up was 14 months. As an illustration, in table II these figures are compared with those recorded with other methods of treatment of hip fractures during the same period.

Table II. — Duration of hospitalization and immobilization in bed according to the different treatments for unstable fractures in the trochanteric region in our hospital during the period

	Mean hospitalization (days)	Mean immobilization (days)
AO-blade plate	33	14
Mc-Laughlin	28	16
DHS	28	9
Endoprosthesis	22	5

Specific complications included one dislocation of the endoprosthesis. Closed reduction was possible. One wound infection, due to Staphylococcus aureus, was successfully treated by superficial wound drainage. One patient had a leg shortening of 7 cm after insertion of the endoprosthesis because of a very comminuted fracture with an extended subtrochanteric localization. Heterotopic bone formation was diagnosed in one patient, necessitating excision of the ectopic bone.

Ten patients (45%) were able to walk with full weight bearing within 10 days. Five patients (23%) never walked again ; all of them were in stage III or IV preoperatively, 2 of them suffered from Parkinson disease (and died one month after operation) and 2 suffered from dementia. Seventeen patients (of the 20 survivors) achieved full weight-bearing mobilization (85%). Of the survivors only 5 patients (25%) regained their prefracture ambulation level. Seven patients lost one stage (35%), 2 patients two stages (10%) and 6 patients three stages (30%) according to the scale (table III).

Table III. — Mobilization grade of patients with an endoprosthesis (n = 22)

Grade	Prefracture Number	%	Postoperative Number	%
I	13	59	2	9
II	4	18	5	23
III	3	14	1	4
IV	2	9	12	55
Deceased	—	—	2	9
Total	22	100	22	100

There were 10 patients in stage III or IV postoperatively, who walked well (scale I or II) preoperatively (fracture types : 2 Evans 1C, 5 Evans 1D, 1 Seinsheimer IIIA, 1 Seinsheimer V). Two of them were the nonsurvivors. Three patients were treated with bed rest for a maximum of 6 weeks postoperatively, because of an intra operative fissure of the femoral shaft, a postoperative dislocation and the previously mentioned unstable reposition.

DISCUSSION

Treatment of unstable inter- and subtrochanteric femoral fractures in the elderly is difficult. In these patients immediate full weight bearing is inevitable during ambulation. Plate fixation will often result in varus redislocation, implant failure and/or cut-out of the implant. A 25% rate of redislocation has been reported for fractures stabilized by plates (13, 27). Many complications are seen after insertion of Ender's nails such as loosening of the implant, causing knee pain, supracondylar fractures and external rotation deformity.

The introduction of the sliding-screw device offered new therapeutic possibilities for unstable fractures and made the McLaughlin osteosynthesis obsolete. However fracture complications after inserting a sliding-screw device, such as the dynamic hip screw (DHS), are still seen in 4 to 24% of cases (1, 10, 14, 20). In patients with severe osteoporosis and unstable fracture patterns the DHS may cause complications like cutting-out of the femoral neck, rotational deformities and shortening. Medial displacement osteotomy and valgization has been proposed by several authors in order to obtain stable fixation of fracture elements. However this is a demanding technique which should not be performed routinely (7, 8, 26). In a prospective study it has been reported that the dynamic hip screw proved to have better overall results than medial displacement osteotomy (5).

A new promising fracture fixation device for trochanteric fractures is the gamma nail. The first clinical results indicate that it is at least as good as the DHS and probably superior for the treatment of unstable intertrochanteric and subtrochanteric fractures (2, 3). Of course this new device is not without specific complications, especially in cases of severe osteoporosis. Fractures near the distal locking screws or near the tip of the nail have been described after a forced insertion of the gamma nail or after a new fall on the hip. There are no studies comparing the gamma nail with a hemiarthroplasty, but as shown in the literature the mean time to full weight-bearing mobilization is equal. Independent postoperative mobility is achieved in 32% of the patients, which is also comparable with the gamma nail, where an independent mobility of 35 to 48% has been reported (15, 18).

Osteosynthesis with a gamma nail or another similar reconstruction nail after a closed reduction is in our opinion the treatment of choice. However when this is not possible one should consider a hemiarthroplasty, especially in patients with cerebral, cardiovascular and pulmonary dysfunction, with severe osteoporosis, unable to walk without full weight bearing on the fractured leg. A 64 to 94% success rate with a low mortality of 8 to 12% has been reported (3, 4, 19, 21, 23, 24, 25). It is very important to achieve minimally traumatic surgery. Loose bone fragments such as the greater or lesser trochanter must be left in place or can be used, fixed by cerclage, together with bone cement to strengthen the implant.

In the 22 patients with an unstable inter- or subtrochanteric hip fracture who were treated by hemiarthroplasty, even in patients suffering from several associated diseases or injuries, early ambulation was obtained with a short period of hospitalization and an acceptable complication rate. Full weight-bearing mobilization was possible in most patients ; however only 25% regained their preoperative ambulation level.

REFERENCES

1. Bonamo J. J., Accettola A. B. Treatment of intertrochanteric fractures with a sliding nail plate. J. Trauma, 1982, 22, 205-215.
2. Bridle S. H., Patel A. D., Bircher M., Calvert P. T. Fixation of intertrochanteric fractures of the femur. A randomised prospective comparison of the gamma nail and the dynamic hip screw. J. Bone Joint Surg., 1991, 73, 330-334.

3. Broos P. B. In : Marti R. K., Dunki Jacobs P. B., eds. Proximal femoral fractures. Operative techniques and complications. Vol. II, London, Medical Press, 1992, 529-547.
4. Claes H., Broos P., Stappaerts K. Pertrochanteric fractures in elderly patients : treatment with Ender's nails, blade-plate or endoprosthesis ? Injury, 1985, 16, 261-264.
5. Clark D. W., Ribbans W. J. Treatment of unstable intertrochanteric fractures of the femur : a prospective trial comparing anatomical reduction and valgus osteotomy. Injury, 1990, 16, 261.
6. Dahl E. Mortality and life expectancy after hip fractures. Acta Orthop. Scand., 1980, 51, 163-170.
7. Dimon J. H., Hughston J. C. Unstable intertrochanteric fractures of the hip. J. Bone Joint Surg., 1967, 49-A, 440-450.
8. Dimon J. H. The unstable intertrochanteric fracture. Clin. Orthop., 1973, 92, 100-107.
9. Evans E. M. The treatment of trochanteric fractures of the femur. J. Bone Joint Surg., 1949, 31-B, 190.
10. Harper M. C. The treatment of unstable intertrochanteric fractures using a sliding screw medial displacement technique. J. Trauma, 1982, 22, 792-796.
11. Jensen J. S., Michaelsen M. Trochanteric femoral fractures treatment with McLaughlin osteosynthesis. Acta Orthop. Scand., 1975, 46, 795-803.
12. Kyle R. F., Gustilo R. B., Premer R. F. Analysis of six hundred and twenty-two intertrochanteric hip fractures, a retrospective and prospective study. J. Bone Joint Surg., 1979, 61-A, 216-221.
13. Laros G. S., Moore J. F. Complications of fixation in intertrochanteric fractures. Clin. Orthop., 1974, 101, 110-119.
14. Laskin R. S., Gruber M. A., Zimmerman A. J. Intertrochanteric fractures of the hip in the elderly, a retroprospective analysis of 236 cases. Clin. Orthop., 1979, 141, 188-195.
15. Leung K. S., So W. S., Shen W. Y., Hui P. W. Gamma nails and dynamic hip screws for peritrochanteric fractures. J. Bone Joint Surg., 1992, 74-B, 345-351.
16. Miller C. W. Survival and ambulation following hip fracture. J. Bone Joint Surg., 1978, 60-A, 930-934.
17. Müller M. E., Allgöwer M., Schneider R., eds. Manual of internal fixation. Springer-Verlag, Berlin, Heidelberg, New York, 1991, 136-137.
18. Olsman J. G., Vries L. S. de, Clevers G. J. Belastingstabiele Osteosynthese van pertrochantere Femurfracturen met de Gammapen. Ned. Tijdschr. Trauma., 1992, 1, 33-39.
19. Plaue R., Bethke R. O. Differentialindikation und Ergebnisse der operativen Versorgung per — und subtrochanteric Frakture. Unfallheilkd., 1979, 82, 364-368.
20. Rao J. P., Banzon M. T., Weiss A. B., Rayhack J. Treatment of unstable intertrochanteric fractures with anatomic reduction and compression hip screw fixation. Clin. Orthop., 1983, 175, 65-71.
21. Rosenfeld R. T., Schwartz D. R., Alter A. H. Prosthetic replacement for trochanteric fractures of the femur. J. Bone Joint Surg., 1970, 52-A, 420.
22. Seinsheimer F. Subtrochanteric fractures of the femur. J. Bone Joint Surg., 1978, 60-A, 300-306.
23. Stern M. B., Goldstein T. B. The use of the Leinbach prosthesis in intertrochanteric fractures of the hip. Clin. Orthop., 1977, 28, 325-331.
24. Stern M. B., Goldstein T. Primary treatment of comminuted intertrochanteric fractures of the hip with Leinbach prosthesis. Internat. Orthop., 1979, 3, 67-70.
25. Stern M. B., Angerman A. Comminuted intertrochanteric fractures treated with a Leinbach prosthesis. Clin. Orthop., 1987, 218, 75-80.
26. Sarmiento A. Unstable intertrochanteric fractures of the femur. Clin. Orthop., 1973, 92, 77-85.
27. Velasco R. U., Comfort T. H. Analysis of treatment problems in subtrochanteric fractures of the femur. J. Trauma, 1978, 18, 513-523.

SAMENVATTING

A. C. VAHL, P. B. DUNKI JACOBS, P. PATKA, H. J. Th. M. HAARMAN. De kop-hals prothese bij oudere patiënten, in een slechte conditie, met een onstabiele per- of subtrochantere femurfractuur.

Het doel van de studie was om de resultaten van de behandeling dmv een kop-hals prothese bij patiënten met een onstabiele per- of subtrochantere femurfractuur te evalueren. Gedurende een periode van 10 jaar werden 154 patiënten behandeld wegens een instabiele fractuur. Bij 22 patiënten werd primair een kop-hals prothese geplaatst wegens osteoporose in combinatie met een ernstige comminutie : 5 subtrochantere — en 17 pertrochantere fracturen. De frequentste nevenaandoeningen waren gelocaliseerd in het centraal zenuwstelsel (n = 10) en cardiopulmonaal (n = 10).
Bij 17 patiënten (77%) kon uiteindelijk volledig belaste mobilisatie worden bereikt. Vijf patiënten bleven bedstoel patiënt (23%), waarvan er 2 binnen een maand overleden (2/22 : 9%).
Geconcludeerd wordt dat bij oude patiënten in een slechte conditie het plaatsen van een kop-hals prothese een acceptabel alternatief voor osteosynthese kan zijn.

RÉSUMÉ

A. C. VAHL, P. B. DUNKI JACOBS, P. PATKA, H. J. Th. M. HAARMAN. Hémiarthroplastie pour fracture trochantérienne instable chez le vieillard débilité.

Les auteurs se sont proposé d'évaluer le résultat des hémiarthroplasties, pratiquées comme traitement des fractures de la région trochantérienne. Pendant une période de 10 ans, on nota 154 fractures instables chez 308 patients, porteurs d'une fracture de la région trochantérienne, admis dans le service. Chez les patients, porteurs d'une fracture comminutive grave et souffrant d'ostéoporose, une endoprothèse fut placée : il s'agit de 5 fractures sous-trochantériennes et de 17 pertrochantériennes. Dix patients souffraient d'une affection du système nerveux central et 10 autres présentaient une atteinte cardio-vasculaire ou pulmonaire. La qualité de la marche fut évaluée en pré- et post-opératoire. Chez 17 patients (77%) une mobilisation, avec mise en charge complète fut possible. Cinq patients (23%) n'ont pas pu reprendre la marche : on nota 2 décès au cours du premier mois (9%). Les auteurs concluent que chez les malades âgés et débilités, porteurs d'une fracture trochantérienne instable, l'hémiarthroplastie est une alternative acceptable à l'ostéosynthèse.