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Results of treatment of fractures of the femoral neck in adults by intermediate hip Monoblock Prosthesis: About 125 cases

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Abstract

Introduction: Fractures of the upper extremity of the femur (EFSF) occur by far, most frequently in the elderly and are the most serious because of their morbidity, mortality and their economic impact. Partial joint arthroplasty (PIH) is a solution of choice for the management of femoral neck fractures. The objective of our study was to analyze the therapeutic results after monobloc hip joint arthroplasty.

Material and Methods: This is a bi-center retrospective study from January 2014 to June 2017. A total of 125 cases were identified in 73 women and 52 men with a mean age of 68 years +/- 10,12. The average time between the first consultation and the surgery was 12,30 days (extreme: 2- 548 days). The etiologies were dominated by falls (72,2%). The study parameters were the therapeutic data (recent fracture or nonunion, type of anesthesia, approach, type of implant, possible intraoperative complications) and postoperative anatomico-radiological data (stem orientation, femoral offset, ILMI, seal quality, possible complications and functional assessment according to the PMA score).

Results: There were 96 recent fractures and 29 nonunions. The approach was transgluteal (86 patients) and postero-external (39 patients). Prosthesis sizes 46 and 48 were the most used. Cemented stems represented 87,2% of cases. Intraoperative 5 trochanteric cracks, 1 acetabular fracture and one wrong were noted. A notable decrease (mean 16.3 months for extremes of 6 and 42 months), 76% of the stems were medialized against 9% lateralized. The femoral offset was restored in 32%, increased in 36% and decreased in 32% of cases. The lower limbs were iso-equal in 37.6% of cases and an ILMI equal +/- 1cm in 62.4% of patients. Sealing was good in 89%. We observed 20.8% of cases of lameness, 4% of cases of early dislocation, 3.2% of cases of loosening. According to the PMA rating, our results were satisfactory in 74.4% and bad in 7.2%.

Conclusion: In view of our results, PIH ensures, in the short and medium term, satisfactory functional results. A mastery of the technique and a rigor in its realization must make it possible to ensure a satisfactory survival of the implant.

Keywords: Intermediate prosthesis, indications, evaluation

Introduction

Fractures of the upper extremity of the femur (EFSF) occur by far, most frequently in the elderly and are the most serious because of their morbidity, mortality and their economic impact [1]. Femoral fracture is a frequently encountered lesion in Traumatology. The arthroplasty hip has provided solutions in support of care mainly with fractures in the elderly. Intermediate hip prosthesis (PIH) (Figure 1) is a therapeutic choice next to the prosthesis Moore and total arthroplasty. Its simplest embodiment, there is less bleeding as well as good short and medium term results [2].

The objective of our study was to analyze the therapeutic results after monobloc hip joint arthroplasty.

Material and Methods

Equipment

It is retrospective study bi-centric spread over a 46 months period January 2014 to June 2017. In this study, we included patients who had been operated on for articular replacement by a

monobloc PIH with an armored cup following a recent fracture of the femoral neck or complicated nonunion and followed until the last follow-up.

All patients with incomplete, unreviewed or unexamined records (49 files).

A total of 125 files were retained in 125 patients, 73 women for 52 men with a mean age of 68.18 years with extremes of 59 to 90 years. The average time between consultation and surgery was 12, 30 days to two days of extremes and 548 days. The dominions were dominated by falls with 72.2% of cases. The right hip was the most affected with 52% of the lesions. The areas of occurrence were arterial hypertension and diabetes predominating with 32.8% and 10.6%, respectively. There were 96 recent fractures and 29 non-unions.

Methodology

The parameters Studied were

- Therapeutic data we are interested in the classification of Garden for recent fractures or nonunion neck for old fractures, type of anesthesia (ALR and / or AG), the surgical approach (Moore and Hardinge), type of implant (PIH piece shielded with cup sizes), any intraoperative complications (fractures or fissures according to the Vancouver classification [3] and postoperative (infections, dislocations, loosening.....).
- Anatomico-radiological data postoperative femoral offset, the unequal leg length (ILMI), has the quality of scellement, the orientation of the rod and a presence of calcification according to the classification of Brooker (Figure 2) [4].
- The measurements were performed by the same operator postoperatively following the radiographic criteria for implantation of the intermediate hip prosthesis by means of a pelvis face x-ray.
- The postoperative functional evaluation was made using the Postel Merle d'Aubigné score (PMA) [5] at the last follow-up.

Results

The approach was transgluteal in 86 patients compared with 39 cases of the postero-external route. The prosthesis sizes 46 and 48 were the most used. We noted 5 cases of femoral fissures (trochanteric region) type A according to the Vancouver classification, 1 case of acetabular fracture and 1 case of femoral false-tooth

The postoperative evaluation was performed after an average follow-up of 16.3 months for 6 and 42 months extremes.

At the anatomico-radiological level, 76% (95 cases) of the stems were centered, 16% medialized against 9% of lateralized stems; 87.2% (109 cases) were cemented with 89% good sealing. The femoral offset was restored in 32% of cases, increased in 36% of cases and decreased in 32% of cases. The limbs were iso-equal in 37.6% and an ILMI less than or equal to 1 cm was found in 62.4% of patients.

According to the rating of PMA, our results were satisfactory in 74.4% of the cases and bad in 7.2% of the cases.

Postoperative complications were marked by an infectious complication (0.8%), early dislocations (Figure 3) and loosening with respectively 4% and 3.2%.

Discussion

It will mainly focus on the therapeutic results and data from the literature.

Intraoperatively, mechanical complications accounted for

5.6% with 5 cases of trochanteric fissures, one of which was treated by strapping and the other four cases on uncemented PIH were left as they were). A case of perforation of the acetabulum and a false diaphyseal route were noted. They are frequent and occur respectively during the extraction of the femoral head or the reduction of the PIH.



Fig 1: Monobloc intermediate hip prosthesis (Asco®)



Fig 2: Anatomico-radiological data postoperative



Fig 3: Dislocation intermediate hip prosthesis (20 days post-operative)

The fissures of the femur are minor incidents that do not reach the femoral diaphysis without significant repercussions on the function of the hip, especially since there are pathways in which osteotomies are performed. On the other hand, the support will be delayed by about one month [6]. Pourreyron [7] also reports 7 cracks and 3 perforations on a series of 132 prostheses without any repercussions on the function. We did not have perioperative or prosthetic postoperative fractures.

In post-operative, at the *Anatomo-radiological level*, 4 criteria were used: the quality of the seal, the orientation of the stem, the femoral offset and the ILMI.

In our series, we noted a good quality of the cementation in 89% of the cases. Breusch [8] states that with the new so-called second-generation technique, the revision rate can be reduced by 20%. The objectives of the filling are essentially the reinforcement of the bone strength but also the fact of avoiding empty residual spaces, factors favoring complications. The filling must therefore make a real "sealing" of the cavity, the filling material to creep into the slightest crevice. A smooth surface coating is the only criterion retained which guarantees good cementation. The first postoperative image allows to determine the thickness of the cement mantle. A border immediately present postoperatively speaks in favor of insufficient curettage of the cancellous bone [9]. The conditions of a good cementation are: the thickness of the cement mantle (2 to 3 mm at the femoral level), the type of cement, the rigor of the technique, the appreciation of the local conditions and the quality of preparation granted to the making of cement. The main criterion of comparison is the survival time of the implants.

In relation to the orientation of the stem, our series noted a neutral position of the stem in 76% of cases. The principle is to fix the rod in the bone in a good position while respecting the anatomy of the patient. Since the stem is inserted into the medullary canal with 15° anteversion, the femur loses much of its natural elasticity because of the artificial hip stem, the overall system consisting of the femur, stem and the head, then has an unfavorable mechanical rigidity. The neutral or slight valgus position of the implant is among other things among the synthesis of the recommendations given by various authors to minimize the risk of aseptic loosening [10]. The femoral component must be implanted in a neutral position or in a light valgus. Varus implantation is pejorative for the longevity of arthroplasty. The Cervico-Obturator hanger must be respected in order to avoid a desaxation of the lower limb, particularly of the knee. The center of rotation of the hip must also be respected; it must be symmetrical with respect to the other hip. The distal migration of the implant, when it is impacted (0.33mm minimum) in the first 6 months after surgery, is predictive of a need for revision in the coming years. The mechanism evoked is the increase of the pressure in the fluids surrounding the prosthesis. Experiments performed with a moderate increase in pressure around the prosthesis induced necrosis of the osteocytes accompanied by bone resorption [10].

The postoperative femoral offset in our study ranged from 3.4 cm to 5.2 cm, with an average of 5.0 cm on the operated side versus 4.8 and 5.6 with an average of 5.5 contralateral coast. Thus, the offset has been completely restored in 32% (40 patients) cases. The femoral offset must be restored during the establishment of a PIH. It guarantees a good muscular strength so a balanced walking, of good amplitude and a stability of the hip. There is a very good correlation between the offset and the leverage of the abductor muscles of the hip as well as the strength of these [11]. Any change in the

offset affects the angle of attack of the gluteus medius and therefore the force needed to balance the pelvis. The limbs were Iso-equal in 37.6% and an ILMI less than or equal to 1 cm was found in 62.4% of our patients.

Regarding the approximate value of the femoral offset, Massin *et al.* [12] observed an average femoral offset value of 4.10 ± 0.62 cm) on a series of 200 femurs whereas Noble *et al.* [13] identified an average value of 4.3 ± 0.68 cm on 200 femurs. The reproduction of the femoral offset remains a crucial criterion in hip arthroplasty. It reduces the risk of luxation [13] and the wear of polyethylene [14]. Its increase favors the strength of the abductor muscles [15], improves the articular amplitudes [11], decreases the lameness and the use of the canes at the cost of a higher risk of loosening related to an increase of the stresses on the stem according to Cannestra and Olofsson *et al.* [16, 17]. Whence the interest of an irreproachable sealing quality or prefer a cementless fixing which seems less sensitive to the increase of the constraints according to Danesh-Clough *et al.* [18].

Postoperative complications were mechanical in our series by early dislocations and loosening with 4% and 3.2%. Bonneville [19] reported 5% dislocation. Pellegrini [20] reported 17.2% cotyloiditis, 1.7% acetabular perforation and 8.7% loosening at 10 years of follow-up. The placement of a first-line femoral component requires a good metaphyseal bone quality, in order to obtain a primary stability of the implant. The loosening is of varied origin, they can be septic or aseptic. This is an inevitable complication up to the present time. Only better surgical technique and correct implantation can delay its onset. Loosening is a frequent and serious complication, it is the most troublesome evolutionary problem of hip hemiarthroplasty, this failure sooner or later leads to revision made difficult by the degradation of bone support. Aseptic loosening is the most common complication, defining the survival of implants. It can be of two types: mechanical (linked to constraints and fixation) or biological (related to peri-prosthetic osteolysis). Most often, loosening is due to these two interlocking factors, the mechanical failure of implant fixation being favored by peri-prosthetic osteolysis [21]. Intermediate prostheses were created to overcome the acetabular complications of the Moore prosthesis and improve the prognosis of conventional femoral prostheses. It is certain that the intermediate prosthesis reverses the acetabulum degradation and makes it asymptomatic the inequality of length.

The functional evaluation involved 125 patients with a mean follow-up of 496.41 days. Our functional results were satisfactory in 74.4% (excellent and good) according to the rating of Postel-Merle d'Aubigné (PMA). This result is close to those found in the literature [22].

The postoperative evaluation is generally satisfactory, the PIH is a good alternative to other types of arthroplasty of the hip. However, 9 of our patients had a bad result which in part could be explained by the complications that occurred in the postoperative period.

Conclusion

The intermediate hip prosthesis is a therapeutic option for the treatment of recent fractures of femoral neck in the elderly. It allows for a painless hip and also restores the stability and function.

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