

Hip Partial Replacement through Anterior Direct Approach in the Treatment of Femoral Neck Fractures

Trivellin Giacomo*, Elena, Mulone Alessio, Ramella Roberto, Assaker Assad, Meyer Andreas

Abstract

Femoral neck fractures are common injuries among elderly population and represent a significant cause of morbidity and mortality. Hemi Arthroplasty is most frequent choice for elderly patients with different comorbidities and reduced functional demands. The direct anterior approach is believed to accelerate functional recovery by limiting iatrogenic muscle damage. 84 patients were treated from January 2019 to September 2020 for femoral neck fracture and operated by partial hip replacement through direct anterior approach. We compared two groups, the first one was operated by expert hip surgeons and the second new operated by young surgeons. We evaluated for every patient the operating time, the variation between pre-operative and post-operative hemoglobin value, the duration of hospitalization, the blood transfusion rate, the early walking of patients and the eventual presence of per-operative complications. In our two groups, young and senior, there is a difference of operating time, in front of not significant differences in other results. The immediate outcomes are positive, all patients started physiotherapy the day after surgery with a complete weight bearing. We demonstrated that the approach is repeatable even in young surgeons. For this reason AMIS can be preferred to other approaches also in neck fractures, for hemi Arthroplasty and not only by expert's hip surgeons.

Keywords: Neck fractures; Hemiarthroplasty; Orthopedics

Department of Orthopaedics, Ospedale P. Pederzoli, Peschiera del Garda, Italy

*Corresponding author: Trivellin Giacomo

✉ gtrivellin@cdcpederzoli.it

Department of Orthopaedics, Ospedale P. Pederzoli, Peschiera del Garda, Italy

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Introduction

Femoral neck fractures are common injuries among the elderly population [1] and represent a significant cause of morbidity and mortality [2,3]. Displaced femoral neck fractures (Garden type III or IV) generally are treated with hip replacement surgery [4]. Hemiarthroplasty is the most frequent choice for elderly patients with different comorbidities and reduced functional demands. The benefits are early ambulation, short operation time and improved stability [5,6]. In the scientific literature there is a debate about the best surgical approach. A lot of randomized trials and cohort studies compare hemiarthroplasty performed by direct anterior approach versus other surgical accesses (anterior-lateral, lateral, posterior-lateral, posterior) [1-7]. Analyzed outcomes are: postoperative functional mobility, complication rate, perioperative fracture, infection rate, re-operative rate, blood loss, recovery time [1,2]. The direct anterior approach is thought to accelerate functional recovery time for less iatrogenic muscle damage. In our Structure, we performed only AMIS (Anterior Minimally Invasive Surgery), for total hip arthroplasty and hemiarthroplasty. We decided to analyse operative complications, blood loss, functional postoperative outcomes of our patients submitted to hemiarthroplasty with direct anterior approach, we divided into two groups. The first

groups of patients were treated by hip senior surgeons with a high experience level; the second patients were treated by young hip and trauma surgeons.

Surgical Technique

The oblique skin incision is marked approximately from 2 cm to 4 cm distally and laterally to the Anterior Superior Iliac Spine (ASIS) and is directed along the Tensor Fascia Lata (TFL) belly for 7 cm-9 cm. A reported complication of this approach is the proximity to the Lateral Femoral Cutaneous Nerve (LFCN). Blunt dissection through the subcutaneous fat is recommended to further minimize risk of nerve injury, which can result in paresthesia [8]. The interval between the TFL and Sartorius is entered by incision of the fascia over the medial TFL muscle belly, retaining an adequate sleeve of tissue for closure and offering protection to the Lateral Femoral Cutaneous Nerve (LFCN).

Care should be taken to ensure the appropriate interval, as dissection through the lateral TFL and not in the intramuscular portal, may result in damage to the motor branch of the superior Gluteal Nerve. If the exposure is too posterior, blood vessels should be seen entering the fascia. The fascia becomes denser as it overlies the Gluteus Medius, which should prompt recognition

of the improper interval. Conversely, if the plane is developed too medially, dissection into the femoral triangle will occur, risking injury to the femoral neurovascular bundle. Blunt dissection separates the TFL muscle belly from the fascia and facilitates entry into the interval for proper exposure of the hip capsule.

A self-retraining retractor is positioned between the Vastus lateralis and the Rectus Femoralis. By blunt dissection, the ascending branch of the Lateral Femoral Circumflex Nerve (LCFA) is isolated and closed. The retractor is now positioned deeper to expose the capsule. The portion of iliopectus adherent to the capsule is detached and then the capsule is incised with a triangular shape and so is possible to see the fracture. The strip of capsule is preserved. The leg is then extra-rotated so the osteotomy of the femoral neck is performed. Femoral head is removed by corkscrew.

Chanley retractor is positioned to expose the acetabulum. The medial and cranial portion of the great trochanter is exposed by a ligamentous and capsular release until an extra-rotation of 150°-180° and then the leg is extended. During this movement the femur is elevated and the great trochanter is stayed in the acetabulum, avoiding acetabular edge lesion. The femoral canal is prepared until the achievement of correct fit. The lateral proximal portion of the intramedullary canal is enlarged using Luer tongs. X-Rays of the pelvis are useful to control the correct positioning of the stem. The definitive stem and the biarticular head are implanted and external movements are performed to test the stability of the implant. Drains are positioned and soft tissue is sutured in order. Attention should be paid in order to avoid nervous injuries.

Methods

This is a comparative study carried out at the Orthopedic and Traumatology Unit, Pederzoli Hospital, Pescchiera del Garda, Italy. Between January 2019 and September 2020, a total of 84 patients (25 men and 59 women), were treated by hemiarthroplasty for femoral neck fracture (Garden III or IV) All patients were treated through direct anterior approach. Everyone was operated with AMIS system (Medacta International-Switzerland). The operations were performed both by senior surgeons, with more than 10 years' experience with this operation, and by young surgeons, with not more than 2 years' experience. Patients were divided into two groups according the experience of surgeon. The First group (41 patients) was treated by expert surgeons; and the second one (43 patients) was operated by young surgeons. All patients were operated under sub arachnoid anesthesia. To reduce blood loss were subministrated 3 g of tranexamic acid (2 systemic and 1 local) and no one redon was positioned. Pain killer protocol included paracetamol (3 g/day) and ibuprofen (600 mg/day) for three days post-operative. Physiotherapy was started in the first post-operative day and after recovery continued in a dedicated structure for about 2 weeks. All patients aged between 79 and 100 years old. These patients were divided into two groups. The two groups were analyzed to evaluate differences in terms of mean surgery time, blood loss, days of hospitalization, early walking of patients and the incidence of perioperative complications. Statistical analyses were performed using t-student test.

Results

We compared two groups that are homogenous for age ($p < 0,38$). All patients were submitted to spinal anesthesia. The difference is evident in the surgical timing. Senior group has a mean of 48 minutes (range 20 minutes-90 minutes), while young group presents a mean of 60 minutes (range 40 minutes-90 minutes), with a significant difference.

However, there aren't significant differences of transfusion between the two groups, the rate of transfusion is comparable, 21%. The pre-operative haemoglobin is similar between senior (range 8,70-15,80 with mean 12,55 g/dL), and young (range 9,00-16,00 with mean 12,40 g/dL), but even the post-operative results are similar. Senior group has a range of 7,50-13,20 with a mean of 10,25 g/dL, young range is 6,60-14 with a mean of 10,60 g/dL and $p < 0,078$. Another aspect that was evaluated is the hospitalization, that results to be inferior of a day in young group, $p = 0,02$.

The immediate outcomes are positive, all patients started physiotherapy the day after surgery with a complete weight (Table 1).

Discussion

Displaced femoral neck fractures are an important health care burden characterized by increased rates of mobility and mortality with a loss of independence in the elderly population. The muscle sparing AMIS approach to the hip joint for hip Arthroplasty is shown to have good perioperative outcomes in term of minor bloody loss, reduced recovery time, efficacy of rapid functional performance, not only in elective procedures, but even for hip fracture treatments. For this reason in our Unit, we perform only AMIS, even for hemiarthroplasty in neck femur fractures, and we think that this approach conducted to good results, even for young surgeons without long surgery experience [7]. In the two groups, young and senior, there is a difference of operation timing, in front of not significant differences in other results. This confirms our decision to use forever the AMIS technique. The transfusion was performed only in 21% of cases, with a difference blood loss that is not significant between the two groups. Hip

Table 1: Results for operation performed by expert young surgeons.

Patient data and Demographics	Senior Group	Young Group
Number of Patients	40	43
Age (years)	85.2 ± 7 68-100	85.6 ± 6.4 67-97
Male/Female Ratio	14/26	13/30
Operation Length (min)	48 ± 12.11 29-90	60 ± 13.18 40-90
Hb pre so	12.4 ± 1.42 8.70-15.8	12.3 ± 1.55 9.0-16.0
Hb min post so	10.4 ± 1.07 7.5-13.2	10.8 ± 1.61 6.6-14.0
Need for transfusion	8%	21%
Hospital Stay (days)	8.8 ± 3.96 2-18	7.1 ± 3.22 1-16

Parametric data are shown as mean ± SD and range (min-max)

fracture produces surrounding muscle and tissue damages. Our results confirm that Anterior Approach reduces other damages and amount of blood loss during the operation [9-14].

Moreover, AMIS is characterized for literature by few complications like operative fractures or dislocations [15-18]. The repetitiveness of technique is demonstrated by the absence of surgery complications even in young group. Another important aspect is the timing of post-operative functional mobility that is observed to be shorter in Anterior Approach [3,19,20]. All patients started to walk the first day post-operative [21]. This is due to the muscle saving [22] and the absence of lateral femoral cutaneous nerve palsy [23]. This result is confirmed by the shorter recovery

time, without significant differences between the two groups of patients [15-24].

Conclusion

AMIS is confirmed to be a surgical approach characterized by few complications, reduced blood loss, muscle sparing and small incision that allow optimal outcomes and an immediate start of walking with complete load even in hemiarthroplasty in neck fractures of elderly people. Moreover we demonstrated that the approach is simply repeatable even for young surgeons. For this reason AMIS can be preferred to other approaches not only for arthritis, but even in neck fractures, for hemiarthroplasty and not only by expert hip orthopaedic surgeons.

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