Fracture neck of femur in elderly patients—fixation with hemiarthroplasty by anterior approach and outcome

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Abstract
The optimal approach for hemiarthroplasty is hotly debated. We analysed 60 consecutive elderly patients who underwent hemiarthroplasty. Patients were analysed for all complications, during and after surgery. The results were gratifying and were comparable with major series of hemiarthroplasty via the anterior approach. No patient had a post of hip dislocation. 57 patients (95%) had no or minimal pain after the surgery. There were no major intra-operative complications and mean Harris hip score was 86 at one-year follow-up. We conclude that the anterior approach, already known to cause less post op dislocation is safe due to less intra operative and post-operative complication.

Keywords: Hemiarthroplasty, anterior approach, Harris hip score

Introduction
Hip fractures are common injuries in the elderly. There are many risk factors for femoral neck fractures, including female gender, low bone density, and reduced mobility [1, 2]. Hip fractures in the elderly usually result from trivial trauma and often are associated with osteoporosis [3] and other associated medical conditions that may increase the prevalence of falls. In young adults' hip fractures are rare and are due to high velocity trauma [4].

Two factors which must be considered while dealing with displaced femoral neck fractures are early mobilization and minimization of complications. These factors may be affected by selection of surgical approach. The direct anterior approach (DAA) is a good approach for total hip arthroplasty (THA), with ample literature showing its association with decreased risk of dislocation, low postoperative pain, early rehabilitation and lesser hospital stay time compared to other surgical approaches [5, 6].

The aim of this paper is to determine the intra operative and postoperative complications associated with direct anterior approach (Smith Peterson) for hemiarthroplasty.

Anatomy and Classification
The hip is a synovial joint of the ball-and-socket variety formed by the globular femoral head cupped into the acetabular or cotyloid cavity of the hip bone. It plays a major role in the static and dynamic physiology of the locomotor system and, although it is the most stable ball-and-socket joint in the body, it still maintains an extraordinary range of motion [7].

Femoral neck fractures initially were classified by Sir Astley Cooper in 1823 as either intracapsular or extracapsular, which he felt had prognostic implications [8].

Pauwels (1935) [9, 10, 11] introduced first biomechanical classification for femoral neck fractures. This classification calculates the angle between the fracture line of the distal fragment and the horizontal line to determine shearing stress and compressive force (Fig 1). The classification is described as follows

- **Type I**: up to 30°. Compressive forces are dominant.
- **Type II**: 30°–50°. Shearing force occurs and may have a negative effect on bone healing.
- **Type III**: 50° and more. Under these circumstances, shearing force is predominant and is associated with a significant amount of varus force which will more likely result in fracture displacement and varus collapse.
Garden Robert Symon (1961) [12, 13] described a comprehensive classification. The Garden classification incorporates displacement, fracture completeness, and relationship of bony trabeculae in the femoral head and neck (Table 1) (Fig 2).

**Table 1: Garden classification**

| Type | Description                                                                 | Nondisplaced or displaced |
|------|----------------------------------------------------------------------------|--------------------------|
| I    | Valgus impacted incomplete fracture, disruption of the lateral cortex while the medial cortex is preserved | Nondisplaced              |
| II   | Complete fracture                                                          | Nondisplaced              |
| III  | Complete fracture, partial displacement indicated by change in angle of the trabeculae | Displaced                 |
| IV   | Complete fracture, complete displacement leading to parallel orientation of the trabeculae | Displaced                 |

Materials and Methods

60 patients of age >60 yrs. and both sex with fracture neck of femur operated via hemiarthroplasty using Anterior approach with Austin Moore prosthesis between October 2017 to August 2019 were included in this prospective interventional study. Patients without any major hip pathology prior to the fracture were included.

Investigations

Routine examination of blood, radiographic examination and necessary investigation for anaesthetic fitness were done.

Surgical Procedure for Hemiarthroplasty with Anterior Approach (Smith Peterson approach) [14, 15, 16]:

Spinal anaesthesia was given. Patient is in supine position on the conventional fracture table. The hip was positioned at the table break in order to allow extension during the procedure. Site of the surgery was thoroughly painted with iodine and spirit and draped. 8-cm long skin incision starts about 2-cm lateral and inferior to the anterior superior iliac spine pointing distally to the head of the fibula. The deep intermuscular dissection is made between the tensor fasciae latae muscle and the sartorius and rectus femoris muscle, thus respecting a true internervous plane. After accurate ligation of the ascending branches of the medial femoral circumflex artery, the anterolateral joint capsule was incised in the shape of a “V”. The pretrochanteric tubercle was then visible and the osteotomy of the femoral neck was done with an oscillating saw. The femoral head was extracted with a corkscrew. Head size was calculated and appropriate size prosthesis was used. The anterior capsule can either be resected or closed after joint replacement. In our study, it was closed in all patients. Incision was closed in layers after thorough wash. Sterile dressing was done. Blood loss was calculated by counting the number of mops used and volume of suction done. Total time of surgery was counted from time of incision to dressing.
Follow Up: All patients were allowed partial weight bearing as soon as pain subsided. Clinical follow-up was carried out at 1, 6- and 12-months post-surgery. At follow up, after a subjective assessment of quality of life and functional status, patients were evaluated according to Harris hip scoring system [17, 18, 19]. All the details were recorded in the follow up chart. A follow up radiograph of the pelvis was obtained at each follow up. Grading of functional outcome was done as follows.

Table 2: Harris Hip Score Grading

| Category | Harris Hip Score |
|----------|------------------|
| Excellent| 90-100           |
| Good     | 80-89            |
| Fair     | 70-79            |
| Poor     | 69 or less       |
In present study, out of 60 cases of anterior approach group 20 cases (33%) were in the age group of 61-70 years and 40 cases (67%) were in the age group of 71-80 years.

Out of 60 cases of anterior approach group 15 cases (25%) were males and 45 cases (75%) were females.

In present study mean blood loss in anterior approach was around 223.00 ml.

In present in study mean duration of surgery in anterior approach was around 78 minutes.

In present in study mean duration of hospital stay in anterior approach was around 3.75 days.
Anterior approach had no patient of anterior hip dislocation and three patients of surgical site infection.

| Complications            | Total |
|--------------------------|-------|
| Nil                      | 57 (95%) |
| Anterior hip dislocation | nil   |
| Surgical site infection  | 3 (5%) |

### Table 8: Complications

In present study, at first month, 10% patients in anterior approach had mild pain while at 6 months no pain was observed.

### Table 9: Comparing Pain

| Month | Pain    | Total |
|-------|---------|-------|
| 1     | None    | 30 (50%) |
|       | Mild    | 6 (10%) |
|       | Slight  | 21 (35%) |
|       | Severe  | 3 (5%)  |
| 6     | None    | 60 (100%) |
| 12    | None    | 60 (100%) |

In present study it was found that the end of 1 month, 6th month and 12th month, hip range of motion score was 4, 5 and 5 respectively.

### Table 10: Comparing Hip Range of Motion Score

In present study on comparing the Harris hip score it was found that at the end of 1 month, 6th month and 12th month Harris hip score was 75.10, 85.90, 85.90 respectively.

### Table 11: Harris Hip Score

Discussion

This study of 60 cases of fracture neck of femur treated with hemiarthroplasty with Austin Moore Prosthesis in elderly patients of both the sexes using anterior approaches to hip. The observations were made and results were analyzed. The study was also compared with relevant studies of other authors.

The present study shows that mean blood loss in anterior approach is 223 ml. Similarly, studies of Keene G.S. et al. (1993) and Trinh TQ et al. (2015) reported that blood loss during surgery 251 ml and 229 ml respectively. Our results are similar to previous studies. Duration of surgery in anterior approach group was 78 minutes in our study. Similar results were concluded by Keene G.S. et al. (1993) and Trinh TQ et al. (2015). Post op hospital stay is less in anterior approach. Similar results were found in studies of Trinh TQ et al. (2015). Lesser post-operative hospital stay can be attributed to less post op pain in anterior approach group. The present study shows that post op dislocation of hip is not common complication of anterior approach. Similar results were found in studies of Keene G.S. et al. (1993), Unwin A J et al. (1994) and Jean Langlo et al. (2015). Less hip dislocation in anterior approach group can be attributed to repair of anterior capsule which remains intact in the anterior approach group. Also, surgical site infection is 5% in our study consistent with results of Keene G.S. et al. (1993). In present study HHS at 1th month was 75.1, at 6th month 85.9 and at 12th month also 85.9. Similar results were found in studies of Kerstin Schneider et al. (2012) and Chulsomlee K. et al. (2018).

Conclusion

This single centre prospective study concludes that the intra operative complications includes blood loss which is about 225 ml (mean) in anterior approach and postoperative complications includes surgical site infection which is 5%. Mean length of hospital stay is around 4 days and 95% of those do not develop any complication. Also, anterior less post op dislocation compares to the other approaches especially posterior approach. We believe anterior approach is safe due to less intra operative and post-operative complication.

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