Original Research Article

A comparative approach of Direct lateral vs posterolateral approach to hemiarthroplasty for femoral neck fractures

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Abstract

Introduction: Adopting the direct lateral (DL) instead of the posterolateral (PL) approach in hip arthroplasty for femoral neck fracture (FNF) patients could lower the rate of prosthetic dislocation. However, little is known about how the approach influences the functional outcome.
Objective- The evaluate and compare hip function, pain and complication and reoperation rates in fracture neck femur patients operated with HA using the DL and PL approach.**Material and methods**: In a prospective cohort study, we enrolled 185 patients with a displaced femur neck fractue. Subjects were assigned to treatment using DL (n = 102) or PL approach (n = 83) with a hemiarthroplasty (HA). Functional outcome was assessed by Western Ontario and McMaster Universities Arthritis (WOMAC) index, pain numeric rating scale (PNRS) for pain, mortality and hip complications. Patients were followed-up after 1 year. **Results:** We found no difference in WOMAC, PNRS and mortality. Seven patients (6.9%) in the DL group and 11 patients (13.3%) in the PL group had undergone a major reoperation (adjusted OR 0.51; 95% CI, 0.18–2.07; P = 0.23). **Conclusion :** In this prospective cohort study, patients treated with HA for FNF using either the DL or PL approaches had comparable functional outcome after 1 year. The PL approach had a tendency towards a lower reoperation rate.
Keywords: femur fracture, arthroplasty, dislocation, hip reoperation, closed reduction, prosthetic instability.

Introduction

The treatment of displaced femoral neck fractures (FNF) has shifted from reduction and internal fixation to hip arthroplasty, with hemiarthroplasty (HA) as being the most common option[1]. The two main surgical approaches in hip arthroplasty are the direct lateral (DL) and the posterolateral (PL) approach. The DL approach is linked to a lower rate of dislocation and a reduced need for revision surgery in FNF patients[2,3].However, the influence of surgical approach on hip function and quality of life in FNF has rarely been investigated[4,5]. In patients with osteoarthritis (OA) undergoing hip arthroplasty, the PL approach was associated with a better patient-reported outcome compared to the DL[6].This difference has been attributed to the increased incidence of gluteus medius insufficiency and trochanteric tenderness with the DL approach[7]. The presence and the effect of gait disturbances caused by different surgical approaches in FNF operated with hip arthroplasty have not been adequately reported in the literature[8].The rationale behind the study was to compare hip function, pain and complication and reoperation rates in FNF patients operated with HA using the DL and PL approach.

Materials and Methods

This prospective observational cohort study was conducted Conducted at Great eastern medical school and hospital between February 2021 to June 2021. All patients with a FNF admitted to Hospital during the inclusion period were screened for participation in the study. The routine to perform hip arthroplasty for displaced FNF in patients above 65 years of age. Total hip arthroplasty (THA) is used in the relatively young (65 to 79 years) and lucid patients, in those with rheumatoid or osteoarthritic changes in the affected hip, while the HA is used in older (> 79) patients and those with cognitive dysfunction.

The inclusion criteria were: a displaced FNF (Garden III or IV evaluated by the treating surgeon) treated with a HA and age ≥ 65 years. Non-walkers, non-Swedish speaking and those with degenerative joint disease or rheumatoid arthritis of the fractured hip, were excluded.

With a power of 0.80 and a significance level (alpha) of 0.05, a minimum of 52 patients at follow-up was needed in each group to detect a clinically significant 10-points difference (standard deviation[SD] 18)in HHS among the groups. We assumed that a 10-point difference in HHS is the smallest effect that would be clinically relevant. A total of 185 patients were recruited to allow for any loss to follow-up. Written informed consent was taken from each patient prior to the start of the study.

Methodology

Patients were interviewed during the first 2–3 days after the operation to evaluate their preoperative hip status. Hip function was evaluated by Western Ontario and McMaster Universities Arthritis (WOMAC) index[9,10]. An independent research nurse, blinded to the surgical approach, performed follow-up by interview 12 months postoperatively. The primary outcome measure was the HHS and secondary measures were WOMAC and pain numeric rating scale (PNRS). Data from the database was collected regarding surgical approach, the surgeons' experience (resident or consultant), surgical time, comorbidities registered at primary surgery by the ASA-score, early and late postoperative complications, e.g. superficial and deep infection, peri-prosthetic fracture, prosthetic dislocation and mortality. All patients were followed-up with patient-reported outcome measurements at 1 year.

Statistical Analysis

Statistical analysis was performed using SPSS for Mac version 22 (SPSS Inc., Chicago, USA). Before applying parametric methods, the

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data was checked for normality. The Student's t-test was used for normally distributed data. The chi-squared test or Fisher's exact test were used for nominal data. The results were considered significant at $P < 0.05$.

Results

Table 1: Demographic characteristics and Scores as per approach

	DL approach (102)	PL approach (83)
Age	83.3 (± 6.44)	85.31 (± 6.3)
Sex		
Male	32 (33.3%)	24 (26.5%)
Female	66 (66.7.0%)	63 (73.5%)
Side		
Right	51 (46.1%)	40 (43.4%)
Left	46 (53.9%)	48 (56.6%)
ASA		
1–2	47 (44.1%)	39 (49.4%)
3–4	57 (55.9%)	42 (50.6%)
SPMSQ	6.12 (± 3.64)	6.17 (± 3.36)
WOMAC	90.0 (± 13.9)	88.9 (± 12.3)
PNRS	1.35 (± 1.12)	1.42 (± 1.09)

As per table 1 e, 185 patients) met the inclusion criteria (mean age 83.3 years [range, 66–99], 129 female, 56 male) and were recruited to participate in the study. Fifteen consultants and 7 registrars performed the DL approach, while 16 consultants and 6 registrars performed the PL approach. The DL and PL group characteristics were similar at baseline.

Table 2: Outcome Variables as per approach WOMAC and PNRS

Surgical approach	OR	CI (95%)
PL approach	1	Ref
DL approach	−1.25	−9.02 to 6.53 NS
Experience		
Consultant	1	Ref
Resident	−0.569	−8.89 to 7.75 NS
Cognitive dysfunction		
No	1	Ref
Yes	−12.68	−20.47 to −4.90 P = 0.002
Age	−0.51	−1.13 to 0.11 NS
Sex		
Male	1	Ref
Female	5.45	−3.09 to 13.99 NS
ASA 1–2	1	Ref
ASA 3–4	-3.61	−11.43 to 4.18 NS

As per table 2 there was no difference between the two groups regarding WOMAC and PNRS, also when adjusting for confounders. The only factor affecting WOMAC and PNRS was the presence of cognitive dysfunction which was found to be statistically significant.

Table 3: Post operative Complications and Reoperations

	DL APPROACH	PL APPROACH
Hip complications		
Single dislocation	**2**	**1**
Recurrent dislocation	**1**	**6**
Deep infection	**5**	**5**
Acetabular erosion	**0**	**1**
Wound rupture	**0**	**2**
Peri-prosthetic fracture	**1**	**0**
Hip reoperations		
Closed reduction due to dislocation		
Surgical debridement due to deep infection	**2**	**2**
Excision arthroplasty due to deep infection	**5**	**4**
Open reduction and internal fixation of peri-prosthetic fracture	**0**	**1**
	1	**0**

As per table 3 fifteen (10.9%) hips required reoperation at least once including closed reduction due to dislocation. The rate of reoperation was lower in the PL group compared to the DL group (7 hips [8%] vs. 8 [10%]). When adjusted for confounders; this difference showed a tendency for statistical significance (adjusted OR 0.42; 95% Cl, 0.16 to 1.11; P = 0.08).

Discussion

In the present study the PL approach was associated with a tendency towards a lower reoperation rate due to decreased prosthetic instability. The comparison between the PL and DL approaches in THA for OA patients is well documented in the literature[11]. Most studies report no significant difference in functional outcome or postoperative complications between the two approaches[12,13]. However, studies using the National joint registry of England and Wales reported a lower 90-day mortality and a slightly higher functional outcome with the PL approach[14]. In studies using the Swedish hip arthroplasty registry, Hailer et al. found that the PL approach resulted in a higher rate of revision due to dislocation and Lindgren et al. found a lower rate of revision due to aseptic loosening[15]. In hip arthroplasty for FNF patients, these differences

have been studied to a lesser extent. For example, Enocson et al. reported the PL approach to be the major risk factor that increased the dislocation of HA, even when reconstruction of the posterior soft-tissue structures was performed[2]. Also, Sköldenberg et al. showed a significant reduction in prosthetic dislocation rate when they changed their routine of using the PL approach to the DL approach[3].

The present study was not powered to show a difference in dislocation or reoperation but it is of utter importance to avoid complications and reoperations in this population. The difference in dislocation risk might be related to the mechanism of dislocation in the two approaches. The prosthesis seems to mainly dislocate towards the direction of the surgical approach[16]. In the DL approach, dislocation is provoked by excessive extension and external rotation which is more difficult to achieve in comparison to dislocation after the PL approach which usually occurs with increased flexion and internal rotation associated with sitting or leaning forward. In a newly published paper[15], the incidence of the Trendelenburg sign and limp were significantly higher in the DL approach although this seemed not to influence abductor muscle strength or the incidence of trochanteric tenderness or compromise the clinical outcome. This was thought to result from severing the gluteus medius muscle and failure to re-attach the insertion to the greater trochanter, with subsequent abductor insufficiency. The WOMAC index is a patientcentred index and might reflect additional functional details than the clinician-based HHS index. The WOMAC index has recently been validated and shows good reliability; construct validity and responsiveness in patients with FNF[17]. For both indexes, we found no statistical difference between the two approaches.

Conclusion

In this prospective cohort study of HA for FNF, the DL and PL approaches had comparable functional outcome 1 year postoperatively. The authors recommend the DL approach due to the decreased rate of complications, e.g. dislocation and acetabular erosion as reported in the present and previous studies.

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