Research Article

Effect of Patient Positioning with Single Surgical Approach in Total Hip Arthroplasty

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Abstract

Objective: The aim of this study was to evaluate the effect of patient position during surgery using direct lateral approach for total hip arthroplasty.

Methods: Randomized controlled prospective study of patients was done. Total sixty patients were included in the study, of the 60 patients (33 males, 27 females), the mean age was 48.9 ± 12.34 (range 29 to 69) years. Patients were randomized in two groups 'S' & 'L' by lottery method. Study was conducted from January 2018 to June 2019. Outcome parameters were compared in terms of size of incision, timing of surgery, postoperative transfusion, acetabular component inclination and femoral stem position. Harris hip score was used pre and postoperatively and up to 1 year.

Results: The L group 30 patients (17males, 13 females) with a mean age of 47.3 ± 12.98 (range, 20 to 86) years. The S group included 30 patients (16 males, 14 females) with a mean age of 50.63 ± 11.63 (range, 23 to 82) years. Incision length was comparatively smaller in L group, surgery time was shorter is S group, however blood transfusion required post operatively was higher in S group as compared to L group requiring 0.5 pint on an average. In terms of cup inclination ($p = 0.001$) and femoral stem alignment ($p < 0.001$) significant p value was noted with better alignment of cup and stem in L group were found. Harris hip score was comparable in both the groups preoperatively ($p = 0.087$) and 1 year post operatively ($p = 0.572$).

Conclusion: In this study, we conclude that lateral decubitus position has advantages of smaller incision size, better implant position and less blood loss. However, harris hip score was better and almost same in both the groups at one year follow up.

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Key Words: Direct lateral approach, patient positioning, cup inclination, Total hip arthroplasty.

Introduction:

Degenerative hip diseases have increased over the last few decade, the causes include osteoarthritis, inflammatory arthritis, trauma and avascular necrosis, many treatment options have been in discussion but increasing success of total hip arthroplasty is on its way in dealing degenerative hip disease[1]. Increasing success of total hip arthroplasty is on its way. On an average only 7% of patients are dissatisfied after total hip arthroplasty[2]. THA is done with a number of surgical approaches and every approach has its own debatable merits and demerits. Comparison of these approaches is an area of interest in modern orthopaedics[1-3]. Direct lateral approach is the second most common approach being used around the globe at present[1-4]. Kocher first described the lateral approach in 1904 modified. Current DLA is the

modification of DLA by Hardinge that was done in 1982[4]. The other names of this approach are 'Transgluteal' or 'Hadinge'[9]. DLA has the advantage of short learning curve for the surgeons, it can be utilized with the patient in supine as well as lateral decubitus position[4,5]. When using DLA, perioperative and postoperative parameters are influenced by, patient positioning during surgery with each position having advantages and disadvantages[5,6]. No single position among the two has been recommended as superior in the literature[6].

In our study, we compared supine and lateral decubitus position utilizing direct lateral approach for patients in THA to conclude the superiority in terms of perioperative and postoperative parameters.

Methods:

Study design was randomized controlled was conducted in Department of Orthopaedic Surgery and Traumatology, Unit-I of Mayo Hospital from January 2018 to June 2019. The study was approved by the institutional review board, and all patients provided informed consent. All Cases requiring Hip Replacement presented to outdoor departments were included in the study and patients were randomized in two groups 'L' & 'S' by lottery method, each group has 30 patients. Two senior Surgeons performed the operations (RD, FM). Surgeon RD operated in the LD position in all the patients and Surgeon FM operated in the S position in all the patients. Of the 60 patients the reasons for THA were avascular necrosis in 29, osteoarthritis in 28 and neck of femur fractures in 3 patients.

Patients with diagnosis of developmental dysplasia, revision surgery, inflammatory arthropathies and with involvement of both hip joints were excluded. Patients who underwent cemented or hybrid hip arthroplasty were also excluded.

Operative Technique

All the patients were given prophylactic antibiotic 1.5g cefuroxime IV at the time of induction and continued in recommended dose three days post operatively. 1g IV injection transamine was also given before surgery. Epidural or Spinal anaesthesia was given. Proximally porous coated femoral stems were utilized however press fit and line to line acetabular cups were used, screws were used according to surgeon's assessment intraoperatively.

Regular Operation table was used along with a sand bang/ bump under the pelvis of the operating side at the level of anterior superior iliac supine in Supine position. Those who underwent surgery in lateral decubitus position, front and back supports were used snugly and safely fitting the patient in between.

Direct Lateral Approach was used in all the patients with either in supine or lateral decubitus position. The incision starts after identifying the most prominent part of greater trochanter and then start it 3 cm proximal to it (proximal migration of greater troch may affect) and extending for 10-15 cm from the greater trochanter of the femur along the shaft. After securing haemostasis, the fascia is cut in line with the incision. Identify gluteus medius after detaching the deep fascia from underlying structure. Elevate the anterior 1/3 of the gluteus medius muscle and then separate it gently from underlying capsule. Haemostasis is again maintained as transverse branch of lateral femoral circumflex artery is encountered in 2/3 of patients. Capsule is cut in T shape along with external rotation and flexion of the hip to dislocate or expose the joint as per the underlying pathology[1,4,9]. Acetabular cup implanted using free hand technique. Femoral stem is placed after the acetabular component.

The patients were mobilized with non-weight bearing technique with a walker on first postoperative day. Dressing changed and drain removed after one day. Subcutaneous injection of enoxaparin sodium after 24 hours of surgery for prophylaxis for venous thromboembolism was given and continued for 14 days.

Parameters were analysed in terms of size of incision, total surgery time, acetabular component inclination, femoral stem tip alignment, blood transfusion post operatively and Harris Hip score preoperatively and postoperatively 1 year.

Harris hip score having total 100 points assess the mobility as well as functional status of the patient. In the postoperative period, the results were considered to be excellent (90-100), good (80-89), moderate (70-79), and poor (<70).

Results:

Sixty consecutive patients met the eligibility criteria for the study. Of the 60 patients (33 males, 27 females) whose charts were reviewed, the mean age was 48.9 ± 12.34 (range 29 to 69) years. t-test was used as test of significance for p value, all p values < 0.05 were significant.

The L group 30 patients (17males, 13 females) with a mean age of 47.3 ±12.98 (range, 20 to 86) years. The S group included 30 patients (16 males, 14 females) with a mean age of 50.63 ± 11.63 (range, 23 to 82) years. Both groups did not differ from each other by means of gender (p = 0.629) and diagnosis (p = 0.141). Total pints of blood transfused in S group was 1.17 ± 0.38 and in L group 0.93 ± 0.224 with (p = 0.015) making it non-significant. Surgery time was not significantly different in both groups, S group surgery time in minutes 55 ± 13.834 and L group surgery time in minutes 61.5 ± 12.673 with (p = 0.209).

The incision length (p = 0.001) were significantly higher in the S group than in the L group, L group with a mean of 12.50 ± 2.543 cm (10-14cm) compared to 13.83± 2.151 cm (12-16cm) in the S group. There were statistically significant differences between the L and S groups in terms of cup inclination (p = 0.001) and femoral stem alignment (p <0.001) with better alignment of cup and stem in L group. Harris hip score was comparable in both the groups preoperatively (p = 0.087) and one-year post operatively (p = 0.572).

None of the patients in the both groups were lost to follow-up. For unexpected events or complications in the S group, superficial infection was observed in one patient, hip dislocation post operatively in one patient was observed. It was seen that there were more blood transfusion required in S group as compared to L group. On Average 0.5 pint was required in S group.

Group Statistics

	group	N	Mean	Std. Deviation	Significance	Std. Error Mean
Haris hip score pre-op	S	30	.07	.254	.087	.046
	L	30	.13	.346		.063
Incision size	S	30	13.83	2.151	.001	.393
	L	30	12.50	2.543		.464
Surgery time	S	30	55.00	13.834	.209	2.526
	L	30	61.50	12.673		2.314
Blood transfusion	S	30	1.17	.379	.015	.069
	L	30	.93	.254		.046
Acetabular inclination	S	30	47.17	3.869	.001	.706
	L	30	43.50	2.330		.425
Femur stem tip	S	30	2.30	.535	<.001	.098
	L	30	1.93	.254		.046
Haris hip score one year	S	30	2.20	.551	.572	.101
	L	30	2.37	.490		.089

Discussion:

In this study, the aim was to compare the results of L and S groups in terms of parameters like incision size, surgery time, post-operative blood transfusions, acetabular and femoral component positioning and Harris hips score pre-operatively and one year post-operatively.

Mean Incision size was smaller in L group compared to S group and this could be a factor leading to less blood loss and requiring lesser transfusions in L

group. We are of the view that Lateral decubitus positioning gives broader visualisation of surgical field. Although incision size is influenced by surgeon's expertise. Results of the study are consistent in terms of surgical incision in Lateral position with previous studies which reported a smaller surgical incision with lateral approach[7].

Supine position has multiple advantages including better anaesthesia position, less time required for patient positioning and image intensifier can be used with ease (if needed) compared to lateral Position of the patient[5]. In our study, (p = 0.209), the surgery time was increased in L group, we suppose that patient positioning in lateral decubitus can be a time consuming in this approach.

Malpositioning of Cup and stem can lead to complications and revision surgeries. Dislocation is most commonly associated with acetabular cup malposition[12-15]. We concluded that lateral position is better for attaining desired implant positioning however Guleret al6 found no difference in acetabular cup placement in both positions. We believe that intraoperative patient positioning and functional pelvic tilt influence acetabular cup positioning [8,9] and in supine position sand bag placed under the pelvis can mislead by tilting the pelvis. Femoral stem is also better placed neutral/ central in lateral decubitus position in our study compared to supine position. Femoral stem malposition affects the longevity of implant. Neutral and varus position of femoral stem are favourable compared to valgus position in terms of longevity of component[10,11].

It was seen that there were more blood transfusions required in S group as compared to L group requiring 0.5 pint on average. It was most likely due to shorter incision required in L group and potentially less blood loss in lateral position with gravitational factor playing its role. In study by Guleret al[12] the amount of transfusion was less in the lateral position with mean of 1.1 ± 0.7 compared to supine position with mean of 1.6 ± 0.8.

In Goldberg et al study7 Harris hip score improved to good and excellent results in 92 of the patients after follow up of 7 years. Guleret al[12] study showed no statistical difference in Harris hip score at one year follow up in supine and lateral position patients with results of good to excellent in both groups with mean of HHS 90.9 ± 3.4 in Lateral position and mean of 90.6 ± 4.4 in supine position group. Our results were also similar to the previous studies in this regard with no significant difference in both L and S group at one year follow up with good to excellent results in both the groups 91.9 ± 4.4 in Lateral position and mean of 90.9 ± 4.6 in supine position group[13-15].

We recommend lateral position in DLA, as it has better results in terms of shorter incision and implant positioning in THA. This study has limitation of shorter follow up. Further studies with longer follow up, multiple surgeons and CT-based anteversion of acetabular and femoral component is recommended still it's the choice and experience of the surgeon to decide which position.

Conclusion:

Lateral decubitus position is better than supine position while using direct lateral approach for total hip replacement in terms of incision size, surgery time and component positioning.

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Conflict of Interest: The authors declare no conflict of interest
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