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Study on final neck shaft angle achieved after surgical correction of pertrochanteric fractures of femur

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Abstract

Introduction: Pertrochanteric fractures are defined as “Fractures occurring in the region extending from the extracapsular basilar neck region to the region along the lesser trochanter proximal to the development of medullary canal”. Incidence of pertrochanteric fractures increase with increase in the age of population and quite often results in the end of patient’s functional independence. Management of pertrochanteric fracture depends on patient’s medical condition, quality of bone and the fracture biomechanics. The main goal of this study is to assess and compare the NSA in surgically fixed pertrochanteric fracture of femur at time of surgical fixation and compare it with final NSA attained at time of fracture union.

Material & Method: This Observational and prospective study was conducted over a period of 1 year and includes 100 cases of pertrochanteric fractures with mature skeleton. X-ray of pelvis with both hips AP view was taken after fixation of fracture using standard protocol. Measurement of NSAs in the operated hips was done using postoperative digital X - ray films with help of Bersoft image measurement software trial version 8.49. Data was analyzed for NSA in non-fractured limb and the restoration/change in NSA in operated hip after surgical fixation and in follow up period.

Result: In our study, the statistical analysis showed that mean NSA after immediate post op was 130.445 ± 11.1976 , after 6 weeks was 128.586 ± 11.1954 and 127.305 ± 9.9472 at union.

Conclusion: Irrespective of fixation method used (DHS/PFN), NSA significantly changes during first 6 weeks in the post op period and after 6 weeks it remains unaffected and fracture become relatively stable. Therefore it can be concluded that there is no need to delay mobilization past 6 weeks of surgery.

Keywords: Pertrochanteric, neck shaft angle (NSA)

Introduction

The angle between femur neck and the long axis of shaft is known as neck shaft angle (NSA). NSA plays vital role in stability, control of lateral balance; walking and hip movements. Evaluation of NSA of femur is useful in understanding biomechanics of the hip joint. It helps in the planning of treatment of various affections of hip region and also in designing prosthesis for this region [1]. According to a study on Indian population, average femoral neck length in adults is approximately 5 cm long and average NSA is approximately 135 degree [2]. Different ethnic groups have different build; physique, habits and genetic makeup, and possibly anthropometric measurements of proximal femur that are described normal for western population can differ from the measurements seen amongst Indian population [3].

Material and Methods

This study was carried out in the Department of Orthopedics at Himalayan Institute of Medical Sciences, Swami Ram Nagar, Dehradun over a period of 12 months. Total 100 cases of pertrochanteric fractures fulfilling the inclusion criteria are included.

The Exclusion criteria

1. Pertrochanteric fractures in patients with an immature skeleton.
2. Patients with an existing condition affecting NSA e.g. congenital deformity (DDH), Perthe’s disease, old fracture/ operated cases of neck of femur or intertrochanteric fracture, infective and neoplastic pathologies etc.

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Study Protocol

1. X-ray of pelvis with both hips AP view was taken after fixation of fracture using the standardized protocol in 15 degrees of internal rotation of the hips in the supine position with a film-focus distance of 100 cm, and the beam centered on the symphysis pubis.
2. Measurement of NSAs in the operated hips was done using postoperative digital X - ray films with help of Bersoft image measurement software trial version 8.49.
3. NSA on the operated limb was measured during follow up visit at 6 weeks, at 12 weeks/union and mobilization was started if radiological features of union were seen.
4. Data was analyzed for NSA in non-fractured limb and the restoration/change in NSA in operated hip after surgical fixation and in follow up period.
5. Use of implant was at the discretion of the surgeon and no randomization or criteria for implant use were assigned beforehand.

Methods

The data was analyzed with SPSS software version 20.0. Interpretation and analysis of obtained results was carried out using descriptive statistics. Student t- test was used for

comparison of various parameters pertaining to continuous data.

Results

Table 1: No of patients presented in this study (n = 100).

Total No of Patients	100
Presented for 1 st Follow up	58
Presented till union	42
Mortality	06

Table 1 - Total 100 patients of pertrochanteric fractures were operated in the period. Out of 100 patients, 58 patients presented for first follow up and 42 patients completed follow up till union. 6 patients died before presenting for first follow up. 36 patients never presented for follow up after the surgery while 16 patients did not report after first follow up. Although attempts at encouraging patients to report for follow up were made telephonically or by personnel visits but still they felt that since they are doing well after surgery they need not come to the hospital and have themselves evaluated.

Table 2: Age and Gender wise distribution of patients

Age Groups	Female		Male		Mean Age
	Frequency	%	Frequency	%	
20 - 30 yrs	1	1.9%	5	10.9%	64.47 ± 17.94
31 - 40 yrs	2	3.7%	5	10.9%	
41 - 50 yrs	1	1.9%	9	19.6%	
51 - 60 yrs	10	18.5%	6	13.0%	
61 - 70 yrs	10	18.5%	8	17.4%	
71 - 80 yrs	17	31.5%	7	15.2%	
81 - 90 yrs	12	22.2%	4	8.7%	
91 - 100 yrs	1	1.9%	2	4.3%	
Total	54	100.0%	46	100.0%	

Table 2 - Depicts comparative distribution of study population as per age and gender. Out of 100 patients 54 were female and 46 were male. Minimum age of the patient in study population was 20 year and the maximum age was 95 year with mean age of 64.47 ± 0.93. Maximum number of patients i.e. 24 was seen in age group of 71-80 years.

and shows that group 2 i.e. 31A2 are much more common.

Table 3: Distribution of patients by fracture classification (n = 100)

Fracture Type	Frequency	%
31A1.1	20	20.0%
31A1.2	12	12.0%
31A1.3	2	2.0%
31A2.1	11	11.0%
31A2.2	21	21.0%
31A2.3	22	22.0%
31A3.1	2	2.0%
31A3.3	10	10.0%
Total	100	100%

Table 3 - Depicts distribution of patients as per A.O classification

Table 5: Change in NSA with fracture pattern (n = 100)

NSA	NSA	Mean Difference	Std. Error	p value	95% Confidence Interval for Difference ^a	
					Lower Bound	Upper Bound
Immediate Post op	At 6 weeks	1.859*	0.631	0.016	0.283	3.435
	At Union	3.140*	0.936	0.005	0.804	5.476
At 6 weeks	At Union	1.281	0.747	0.281	-0.583	3.145

Table 5 - Depicts comparison of change in mean value of NSA between each visit in the study population and it shows that there is a significant change in the value of NSA between

immediate post op and at 6 weeks, whereas no significant change in the value between 6 weeks and at union.

Table 4: Change in NSA (n = 42)

	Mean	Std. Deviation	N	p value
Neck shaft angle on immediate post op	130.445	11.1976	42	0.001
Neck shaft angle at 6 weeks	128.586	11.1954	42	
Neck shaft angle at union	127.305	9.9472	42	

Table 4 - Depicts change in mean value of NSA in the study population during immediate post op, at 6 weeks and at union. It shows there is a significant change in the value of NSA at the very first follow up i.e. at 6 weeks.

Table 6: Comparison of change in NSA

Fracture Pattern	Immediate Post Op NSA	At 6 weeks	At union	P value
A1	130.76 ± 9.63	129.69 ± 9.49	128.78 ± 8.07	0.027
A2	126.63 ± 8.47	125.70 ± 8.29	125.21 ± 7.93	0.093
A3	125.05 ± 7.86	124.84 ± 7.87	124.78 ± 8.10	0.650

Table 6 - Depicts change in mean value of NSA in different fracture patterns during immediate post op, at 6 weeks and at union.

Discussion

In the present study, the statistical analysis showed that mean age of the study population was 64.47 ± 17.94 with maximum patients (42%) in 61-80 years age group. Pre-operative radiographs were classified as per AO classification and maximum 54 patients (54 %) found to have unstable (31.A2) fractures which are in co-relation with another study conducted by Gadegone WM and Salphale on Indian population (4). Their study population also had a mean age of 69 years with 60 % patients having unstable fractures (31.A2). In the present study, the statistical analysis showed that mean NSA on non-operative side was 126.06 ± 6.35 , after immediate post op was 130.445 ± 11.1976 , after 6 weeks was 128.586 ± 11.1954 and 127.305 ± 9.9472 at union. A significant change in the value of NSA was seen during follow up at each visit with a p value of 0.001. But in assessment of the patients who completed the first follow up (N=58) it was seen that the change in value of NSA was significant only between immediate post op period and at 6 weeks with a p value of 0.016. Whereas, no significant change in the value of NSA was observed between 6 weeks and at union which is in co-relation with the result of the study done by Pajarinen J *et al.* They also concluded that during the first 6 weeks, a significant decrease in the neck-shaft angle of the operated femur was seen in both the groups however no significant change in the measured mean values of NSA was seen during the period from 6 weeks to 4 months irrespective of the implant used (5). In this study, in the assessment of the patients who completed the follow up till union/12 weeks (42 patients), it was observed that the change in the value of NSA was not significantly affected by the fracture fixation method (DHS/PFN). No statistically significant correlation was seen between pattern of change in mean value of NSA when co-related with gender and fracture type.

In DHS group the mean value of NSA on non-operative site was 126.77 ± 7.20 , in immediate post op was 137.605 ± 12.1621 , at 6 week was 135.281 ± 13.3093 and at union was 132.755 ± 10.6818 . The change in value of NSA was found to be not significant with a p value of 0.051. In PFN group the mean value of NSA on non-operative site was 125.63 ± 5.87 , in immediate post op was 126.864 ± 8.9052 , at 6 week was 125.238 ± 8.3771 and at union was 124.579 ± 8.4975 . The change in value of NSA was found to be not significant with a p value of 0.074. The non-significant p value in the individual study group can be explained because of the less no of cases in each study group (14 in DHS group and 28 in PFN group) but the p value become significant when overall comparison was done.

Mean values for NSA of this study can be statistically correlated with the study conducted by Bhandari A and Deane A K S. Their statistical analysis showed the mean NSA of normal side was 122.39 degrees and angle restored after DHS was 129.81 degree. The mean NSA of normal side was 119.45 degrees and angle restored after PFN was 119.42

degree [6].

Most important finding in this study was that the NSA significantly changes during first 6 weeks in the post op period, irrespective of the fixation method, and after 6 weeks it remains unaffected and fracture become relatively stable.

Conclusion

In the present study titled “Study on final neck shaft angle achieved after surgical correction of pertrochanteric fractures of femur” we have concluded the following:

- Irrespective of fixation method used (DHS/PFN), NSA significantly changes during first 6 weeks in the post op period and after 6 weeks it remains unaffected and fracture become relatively stable. Therefore it can be concluded that there is no need to delay mobilization past 6 weeks of surgery.
- It is concluded that by the time of union there is no statistically significant difference in alteration of NSA between PFN and DHS and therefore one cannot be taken as better than the other to maintain NSA in the postoperative period.

References

1. Akbar W, Kalimullah. A radiographic study of NSA in population of Mardan region, Khyber Pukhtonkhoa – Pakistan. *Biomedica*. 2015; 31(2):108-14.
2. Khan SM, Saheb SH. Study on NSA and femoral length of South Indian femur. *International Journal of Anatomy Research*. 2014; 2(4):633-5.
3. Gujar S, Vikani S, Parmar J, Bondre KV. A correlation between femoral NSA to femoral neck length. *International journal of Biomedical and Advanced Research*. 2013; 04:5-11.
4. Gadegone WM, Salphale YS. *Int Orthop*. Proximal femoral nail - an analysis of 100 cases of proximal femoral fractures with an average follow up of 1 year. 2007; 31(3):403-8.
5. Pajarinen J, Lindahl J, Savolainen V, Michelsson O, Hirvensalo E. Femoral shaft medialisation and neck-shaft angle in unstable pertrochanteric femoral fractures. *International Orthopedics*. 2004; 28:347-53.
6. Bhandari A, Deane AKS. Evaluation of the neck shaft angle achieved after surgical fixation of intertrochanteric fracture of femur. *International Journal of Orthopaedics Sciences*. 2018; 4(2):742-744.