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Original Article

Morphometric Study of Length of Intertrochanteric Line and Intertrochanteric Crest of Femur in Bangladeshi Population

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Abstract

Background: Intertrochanteric line and Intertrochanteric crest are important features of the proximal femur provide attachment sites for some muscles and ligaments and holds great clinical significance.

Objectives: The aim of our study is to measure & describe the various morphometric parameters that can throw further light on the existing data. It can serve as a guideline for designing better matched prostheses and implants for hip surgeries in the Bangladeshi population.

Methods: This cross-sectional, descriptive type of study was performed in Department of Anatomy, Mymensingh Medical College, Mymensingh, from January 2019 to December 2019 on 150 dry femora. Sample collection was done by purposive sampling technique. Any damaged, incompletely ossified and fractured bones were excluded. Data were statistically analyzed by using SPSS software, version 27.

Results: The mean(±SD) length of intertrochanteric line of right and left femur was 60.02 (±6.32) mm and 60.49 (±7.16) mm. The mean(±SD) length of intertrochanteric crest of right and left femur was 52.66 (±5.30) mm and 50.09(±5.91) mm. respectively.

Key word: Morphometry Length, Intertrochanteric Line, Intertrochanteric Crest

Introduction

The femur is the longest and strongest bone in the human body. It is morphologically typical long bone, approximately one-fourth of the height of the individual and transmits weight to the tibia.The femur consists of a shaft and two ends, proximal and distal. The proximal end of the femur consists of a head, neck, greater and lesser trochanters. Head articulate with the acetabulum, interrupted postero-inferior to its center by a small, rough fovea or pit. The head is attached to the femoral shaft by the neck, which is approximately 5 cm long. Its anterior surface is intracapsular, the capsular ligament extends laterally attaching to the intertrochanteric line. On the posterior surface the capsule does not reach the intertrochanteric crest, little more than the medial half of the neck is intracapsular.[1]

The site where the neck joins the body anteriorly is indicated by the intertrochanteric line, a roughened ridge running from the greater to the lesser trochanter. A similar but smoother ridge, the intertrochanteric crest, joins the trochanters posteriorly. A little above its center there is a low, rounded elevation on the crest is the quadrate tubercle. It is important and indispensable to know the morphometric characteristics of these, with the intent of minimizing the risk of complications related to surgical procedures executed in the area due to vascular, traumatic or metabolic causes, and to achieve an alignment of prosthesis to be implanted.[2]

Morphometric studies of the intertrochanteric line and intertrochanteric crest were performed in different populations and communities. But the data obtained from these studies demonstrated that femoral morphometry had regional features and social differences which will be helpful for future study.

Materials and Methods

This study was carried out on 150 fully ossified dry human femora, which were collected from 1st year MBBS students and Department of Anatomy of Mymensingh Medical College, Mymensingh. Within 150 femora, 64 belong to right side and 86 belong to left. It was conducted from January to December 2019.

Only fully ossified, dried and thoroughly cleaned femora were included in the study while the femora which were damaged and those having any deformity or pathology

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were excluded from the study.All parameters were measured by using digital Vernier calipers in millimeters. Data was made analysis using SPSS version 27 and mean values presented in tables.

Operational Definitions:

Length of intertrochanteric line: The distance along a straight line from the highest point of greater trochanter to the lowermost point at the level of base of lesser trochanter anteriorly.

Length of intertrochanteric crest: The distance from the postero-superior point of the greater trochanter to the root of lesser trochanter posteriorly.

Procedure:

The intertrochanteric line was measured by placing fixed jaw of digital slide calipers on the highest point of greater trochanter and the sliding jaw on the highest point of the lesser trochanter. Then the distance between them was measured by digital slide calipers and expressed in mm. The intertrochanteric crest was measured by placingthe fixed jaw of digital slide calipers on the postero-superior angle of greater trochanter and the sliding jaw was placed on the base of the lesser trochanter. Then the distance between them was measured by digital slide calipers and expressed in mm.

Figure1: Procedure of Measurement of Length of Intertrochanteric line of femur

Figure 2: Procedure of Measurement of Length of Intertrochanteric Crest of femur.

Results

As shown in table 1, the length of intertrochanteric line on the right and left side varied from 46.34-75.61 mm with the average 60.02±6.32 mm and48.87-76.18 mm with the average 60.49±7.16 mm respectively.

Table-1: Distribution of Length measurement in mm of intertrochanteric line and intertrochanteric crest of femur within the study sample (n=150)

Measurement in mm	Side	Side Frequency (No of sample)		Range (mm)	
		Maximum	Minimum	Maximum	Minimum
Length of intertrochanteric line	Right (n=150)	(15.63) (%)	(1.56) (%)	75.61 Mean (mm)=60.02 ±SD (mm)=6.32	46.34 Mean (mm)=60.02 ±SD (mm)=6.32
	Left (n=150)	(11.63) (%)	(1.16) (%)	76.18 Mean (mm)=60.49 ±SD (mm)=7.16	48.87 Mean (mm)=60.49 ±SD (mm)=7.16
Length of intertrochanteric crest	Right (n=150)	(23.44) (%)	(1.56) (%)	67.44 Mean (mm)=52.66 ±SD (mm)=5.30	42.12 Mean (mm)=52.66 ±SD (mm)=5.30
	Left (n=150)	(16.28) (%)	(1.16) (%)	63.35 Mean (mm)=50.09 ±SD (mm)=5.91	39.70 Mean (mm)=50.09 ±SD (mm)=5.91

Similarly in table 1, the length of intertrochanteric crest was found to be varied from42.12-67.44mm with average distances 52.66±5.30mm and from39.70-63.35mm with average distances 50.09±5.91mm on right and left side respectively.

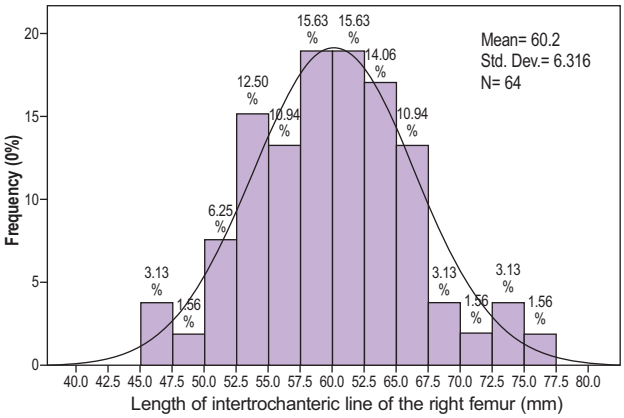

Figure 3: Histogram Showing the Frequency Distribution of Length of Intertrochanteric Line on Right Side

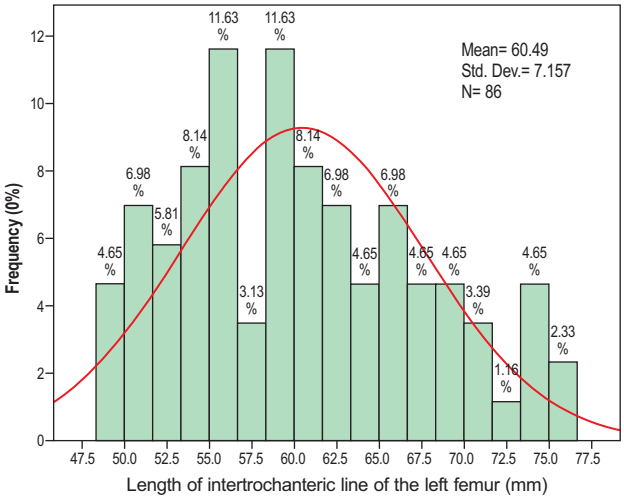

Figure 4: Histogram Showing the Frequency Distribution of Length of Intertrochanteric Line on Left Side

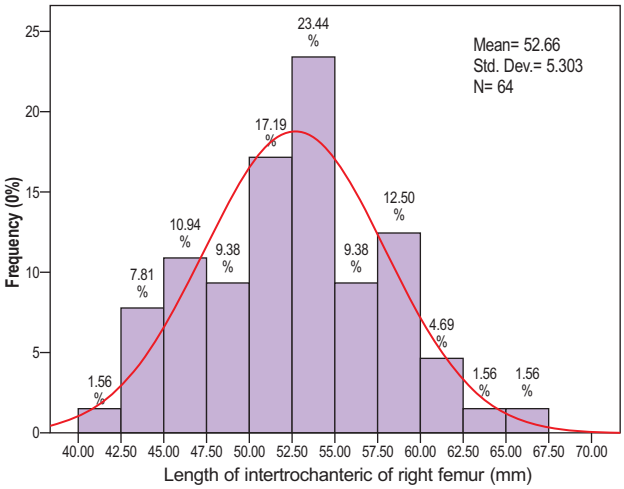

Figure 5: Histogram Showing the Frequency Distribution of Length of Intertrochanteric Crest on Right Side

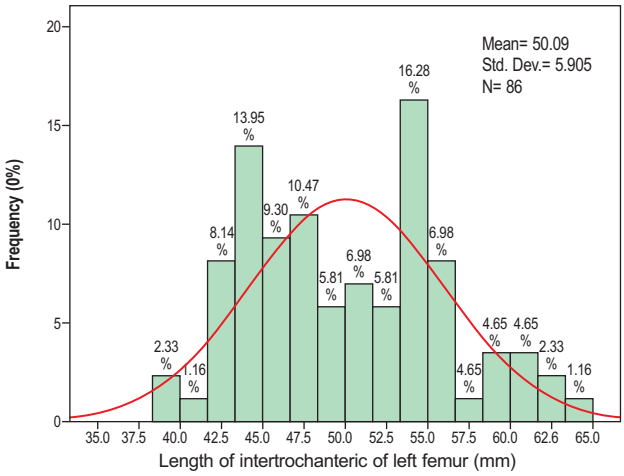

Figure 6: Histogram Showing the Frequency Distribution of Length of Intertrochanteric Crest on Left Side

Discussion

According to the present study, the mean (±SD) length of intertrochanteric line on right femur was 60.02 (±6.32) mm and on left femur was 60.49 (±7.16) mm and the mean (±SD) length of intertrochanteric crest was 52.66 (±5.30) mm for right femur and 50.09 (±5.91) mm for left femur. Caiaffo et al. conducted a study on 120 (58 from male and 62 from female cadavers) femora and found the mean (±SD) length of intertrochanteric line in male as 66.46±0.59 mm and in female as 60.80±0.42 mm[3]. Menezes et al. studied on 29 (11 right and 18 left) dry human femora and found the mean (±SD) length of intertrochanteric line as 47.9±6.2 mm.[2] Khanal, Shah & Koirala (2017) carried out a study on 60 (30 right and 30 left) femora and found the mean (±SD) length of intertrochanteric crest as 50.4±7.1 cm, on right and left sides were 49.8±6.6 mm and 51.0±7.4 mm respectively.[4] Singh et al. (2013) estimated the length of 200 femora and found the mean (±SD) length of intertrochanteric crest as 58.1±4.7 mm.[5] The mean value of present study regarding length of intertrochanteric line was nearly similar to the value described by the Caiaffo et al. But the findings were higher than those of Menezes et al. The mean value of present study regarding length of intertrochanteric crest in case of right side was higher, but in case of left side, it was nearly similar to the value described by the Khanal, Shah & Koirala but the lower than those of Singh et al.

Conclusion

The results of the present study of 150 femora revealed that length of intertrochanteric line & intertrochanteric crest were almost similar on right and left side. Though there is a limitation of study about morphometry of proximal part of femur in Bangladeshi population, this study of the dimensions of intertrochanteric line & intertrochanteric crest will help the radiologists to interpret and identified the location of fracture & their clinical significance. These

various femoral dimensions obtained in this study will also be helpful for future researcher.

Conflict of interest: No

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