ORIGINAL PROF-668

(NECK-SHAFT) ANGLE OF FEMUR IN PAKISTAN POPULATION

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ABSTRACT

Three hundred (150 left and 150 right) dried human femurs were studied for two anthropological parameters i.e. maximum morphological femur length and collodiaphyseal (neck-shaft) angle in Pakistan population. All samples were of adult males between twenty five to seventy years of age. Each femur was studied for its maximum morphological length and collodiaphyseal angle. Mean morphological length of right femur was 44.93 cm with standard deviation of 4.06 and mean collodiaphyseal angle 128.77˚ with standard deviation of 8.72. Mean morphological length of left femur was 44.88cm with standard deviation of 4.63 and mean collodiaphyseal angle 128.37˚ with standard deviation of 8.77. Over all, morphological femur length was 44.91 cm with standard deviation of 4.34 and collodiaphyseal angle 128.57˚ with standard deviation of 8.74. Further correlation between two anthropological parameters was observed. It was found that collodiaphyseal angle of femur bear no definite relationship to its morphological length.

INTRODUCTION

The femur is the longest and strongest bone of the body. Its length is associated with striding gait and its strength with weight and muscular forces[11]. Its shaft, almost cylindrical in most of its length has proximal round articular head projecting medially on its short femoral neck. The femoral neck, about 5 cm long[11], connects head to shaft at an angle of about 125˚[7,11]. This facilitates movemetns at hip joint, enabling the limb to swing clear of the pelvis[10,11] The neck and shaft junction is marked anteriorly by intertrochanteric line and posteriorly by intertrochanteric crest. The upper end of femur also has greater trochanter projecting as upper part of junction of neck with shaft, and lesser trochanter projecting off postero-inferior aspect of its junction with the neck. The distal extremity is more massive (Fig 1), being a double knuckle or condyle articulating with tibia[11].

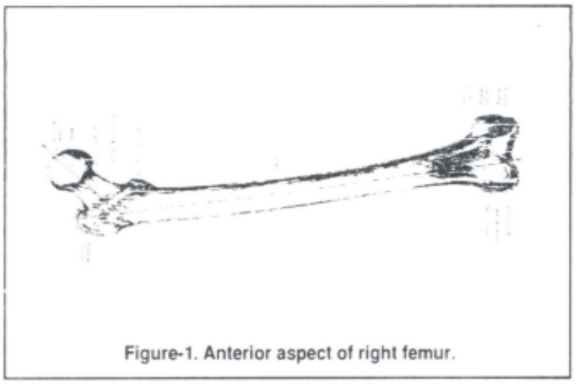

Figure-1. Anterior aspect of right femur.

Fractures of the proximal part of femur, hip and pelvis are among the most often encountered by orthopaedic surgeons[9]. These fractures are associated with substantial morbidity and mortality as approximately 15% to 20% of patients die as a result of fractures[6]. Open reduction and internal fixation are required in majority of fractures of femoral shaft, femoral neck and intertrochanteric region[6].

This study is designed to measure the morphological length and collodiaphyseal (neck-shaft) angle of femur in dried bones of Pakistani population;

1. To help choose the right femur components in replacement of the femoral head and neck after resection of the arthritic or necrotic segment.
2. To help choose the right length of nail in dealing the fractures of femoral shaft.
3. To help restore the optimum femoral neck shaft angle in dealing fracture of upper end of femur.

MATERIALS & METHODS

Three hundred (150 right and 150 left) dried femurs of adult males (25 to 70 years of age) were obtained from anatomy departments of King Edward Medical College Lahore, Fatima Jinnah Medical College Lahore, Allama Iqbal Medical College Lahore and Punjab Medical College Faisalabad.

Maximum morphological length in centimeters and collodiaphyseal (neck-shaft) angle of each femur were measured (Fig 1).

RESULTS

1. Left femurs (n=150). The results are shown in table I, which are as follow; Mean morphological length = *44.88* cm ± 4.63 Mean collodiaphyseal angle= 128.37˚ + 8.77
2. Right femurs (n=150). The results are shown in table II, which are as follow; Mean morphological length = 44.93 cm ± 4.06 Mean collodiaphyseal angle= 128.77˚ ± 8.72
3. Overall mean femur length = 44.91 ± 4.34 Mean collodiaphyseal angle = 128.57˚ ± 8.74
4. The results showed (table I & II) that there is no relation between collodiaphyseal angle and morphological length of femur.

Table-I. Parameters of left femur

S#	No of Samples	Max. Morphological Length n cm	Collodiaphyseal angle range (˚)	Mean (˚)
1	1	37.5	132.5	132.5
2	2	38.7 ± 0.28	122-128	125 ±4.24
3	3	39.7 ± 0.34	122-144	132+11.13
4	7	40.48 ± 0.34	112-145	130.5 ±11. 82
5	6	41.320 ± 0.21	120-128	124.5 + 3.88

6	13	42.440 ± 0.29	113-137	124.46 ±7.28
7	24	43.3916 ± 0.28	110-148	128.5 ±10.04
8	20	44.35 ± 0.25	113-146	129.2 ±10.07
9	18	45.3 ± 0.26	112-148	127.5 ±9.61
10	28	46.380 ± 0.27	115-145	127.64 ±8. 1
11	11	47.45 ± 0.27	113-146	125.63 + 9.38
12	4	48.370 ± 0.35	120-128	126 + 5.71
13	6	49.35 ± 0.26	122-141	128.08+7.85
14	4	50.1 ± 0.2	122-133	129.5±5.11
15	1	51.1	140	140
16	2	52.2 ± 0.28	119-127	123±5.65
Total =150		44.88 ± 4.63	110-148	128.37±8.77

Table-II. Parameters of right femur

S #	No of Samples	Max. Morphological length in cm	Collodiaphyseal angle range (˚)	Mean (˚)
1	2	37.50 ± 0.56	128-132	130.00 ± 2.82
2	4	38.27 ± 0.37	120-130	125.75 ± 4.19
3	4	39.57 ± 0.42	120-134	130.33 ± 7.23
4	4	40.30 + 0.36	126-131	127.60 ±3.69
5	9	41. 43 ±0.1 3	124-130	129.88 ± 3.81
6	15	42.43 ± 0.22	114-140	126.1 3 ± 7.89
7	17	43.33 + 0.25	117-136	129.10 ±4.99
8	21	44.43 + 0.30	116-144	127.99 ± 6.12

9	27	45.32 ± 0.31	118-138	129.77 ± 5.02
10	21	46.36 + 0.26	117-142	130.52 ± 4.23
11	16	47.36 + 0.31	119-138	128.75 + 5.58
12	3	48.33 + 0.15	126-130	129.33 ± 5.75
13	4	49.07 ±0.15	127-130	128.25 ± 2.06
14	2	50.4	129-131	130.00 ± 1.14
15	1	52.41	126	126
Total = 50			114-144	128.77 ± 8.72

DISCUSSION

Fractures of proximal femur[6] and shaft of the femur are among the most common fractures encountered in orthopaedic practice. Since the femur is the largest bone of the body and one of the principal load bearing bones in the lower extremity, fractures may result in prolonged and adequate8,9. Femoral neck fractures and intertrochanteric fractures usually require open reduction and internal fixation[6]. Most fractures of the femoral shaft can be successfully treated using an intramedullary nail. The straight, tubular anatomy of the femur is well suited to intermedullary fixation. The physiologic loading conditions of femur by muscular and gravitational forces are also favourable for intramedullary fixation[8].

For a given betwen neck and femoral shaft, there is specific abduction lever arm. Any change in angle (valgus or varus) will alter the aduction lever arm and thence, the entire biomechanics at hip joint[4].

Prior knowledge of normal different anthropological parameters and their relationships[10], at well as the forces about the area of the skeleton is must prior to attempting fracture reduction and internal fixation5. This will, of course, make easy to choose the fixation material of right dimensions[1].

Variation in the neck shaft angle is common. There is moderate interracial and intergender variations in degrees. In white subjects, the angle in both sexes averages 130˚with a standard deviation of 7˚and overall its value is claimed to be 125 °[711].In the present study on Pakistani population, the angle obst rved was 128˚±8.Since no relationship is found between collodiaphyseal angle and maximum morphological length of femur, the value of angle might have genetic base.

REFERENCES

1. Ahmed I. Management of upper end of femur. The Professional 1997; 4(2):118.

2. Baumgaertner R. Micheal, Higgens F Thomas. Femoral neck fractures. In Rockwood and Green's. Fractures in adults

(eds. Bucholz W. Heckman D. James). 5th ed. Lippincott Williams and Wilkins. Philadelphia. PA.19106 USA 2001: 1589-90.

3. Long DE. G William. JR Subtrochanteric fractures. In Rockwood and Green's Fractures in adults (eds. Bucholz W.Robert, Heckman D.James). 5'" ed. Lippincott Williams and Wilkins. Philadelphia. PA.19106 USA 1969.

4. Harikees W. James. Arthroplasty of hip and pelvis. In Campbell's operative orthopaedics (eds Grenshaw AH) 8th edn. Mosby-year Boo Inc. Boston London. Sydney. 1992: 445-448.

5. Koval J. Kenneth, Zuckerman D. Joseph. Intertrochanteric fractures. In Rockwood and Green's Fractures in adults (eds. Bucholz W. Robert, Heckman D. James). 5lh ed. Lippincott Williams and Wilkins. Philadelphia. PA.19106 USA 2001:1642.

6. Russell A, Thomas. Fractures of the hip and pelvis. In Campbell's operative orthopaedics (eds Grenshaw AH) 8th edn. Mosby-year Boo Inc. Boston London. Sydney. 1992: 895-896.

7. Sinnatamy Chummy S. Femur. In Last's Anatomy (eds. Sinnatamy Chummy S). 10th ed. Churrchill Living stone London N.Y, 1992:163.

8. Starr J. Adam, Bucholz W. Robert, Fractures of the shaft of the femur. In Rockwood and Green's Fractures in adults (eds. Bucholz W. Robert, Heckman D. James). 5th ed. Lippincott Williams and Wilkins. Philadelphia. PA. 19106 USA 2001:1683-1690.

9. Talor J. Charles. Fractures of Lower Extremity. In Campbell's operative orthopaedics (edsGrenshaw AH) 8th edn. Mosby-year Boo Inc. Boston London. Sydney, 1992:858.

10. Tornetta Paul III. Hip dislocations and fractures of the femur Head. In Rockwood and Green's Fractures in adults (eds. Bucholz W. Robert, Heckman D. James). 5th ed. Lippincott Williams and Wilkins. Philadelphia. PA.19106 USA 2001:1558.

11. Williams Petter L, Warwick Roger, Dyson Mary, Bannister Lawrence H. Grayes Anatomy (ds. Williams Peter L, Warwick Roger, Dyson Mary, .Bannister Lawrence H) 37lh ed. Churchill Livingstone London. N.Y. 1989.434.