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MORPHOMETRIC STUDY OF UPPER END OF TIBIA : A STUDY DONE AT SKIMS MEDICAL COLLEGE SRINAGAR

Anatomy

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ABSTRACT

Introduction: Upper end of tibia is an important component of knee joint. The aim of present study is to analyse different morphometric parameters of condylar and intercondylar surface of tibia, so as to formulate a baseline data for future studies with relevance to Indian population and to compare the current data with previous literature. Morphometric study of upper end of tibia can be used to guide treatment and monitor outcome of total knee replacement surgeries.

Material and Method: 30 dried human adult tibia were obtained from Dept. of anatomy SKIMS Medical College bemina Srinagar. Morphometric measurements of medial condyle, lateral condyle and intercondylar area of tibiae were measured with Vernier caliper.

Result: Anteroposterior measurements were found to be greater than transverse measurements for both medial and lateral condyles. Furthermore, both anteroposterior and transverse measurements were greater in medial condyle than in lateral condyle.Racial differences were observed.

Conclusion: The present study is to provide a base line data pertaining to morphometric details of upper end of tibia in Indian population, which aims to provide help for anatomists, anthropologists, and orthopedics, in knee arthroplasty procedures, and meniscal transplantation

KEYWORDS

Lateral condyle, Tibia, Medial condyle, Total knee replacement

INTRODUCTION:

Upper end of tibia is an important component of knee Joint .The proximal end of the tibia is expanded, having medial and lateral, and an intercondylar area. Articular condyles of tibia superiorly form component of knee joint [1]. The knee joint is usually affected by several forms of arthritis such as inflammatory and posttraumatic arthritis. Osteoarthritis is the most common pathological disorder and the treatment for that is usually total knee arthroplasty (TKA) or unicompartmental knee arthroplasty (UKA) [2]. Morphometry of upper end of the tibia is important method of assessing knee deformity. Morphometric parameters of upper end of tibia can be used to guide treatment and monitor outcome of total knee replacement surgeries[3].

MATERIAL AND METHOD:

30 dried human adult tibia were obtained from Dept. of anatomy SKIMS medica college Bemina Srinagar. All bones were fully ossified and had no evidence of fractures,congenital or pathological anomalies .All measurements were obtained using Vernier Caliper. All measurements were taken in cm.

The parameters which were measured are as follows: [4]

1. Anteroposterior measurements of superior articular surface of medial condyle: The maximum distance between anterior and posterior borders of superior articular surface of medial condyle [AB].
2. Transverse measurements of superior articular surface of medial condyle: The maximum transverse diameter of superior articular surface of medial condyle [CD].
3. Anteroposterior measurements of superior articular surface of lateral condyle: The maximum distance between anterior and posterior borders of superior articular surface of lateral condyle [EF].
4. Transverse measurements of superior articular surface of lateral condyle: The maximum transverse diameter of superior articular surface of lateral condyle [GH].
5. Anteroposterior measurements of intercondylar area: The maximum distance between anterior and posterior borders [IJ].
6. Transverse measurements of intercondylar area: The maximum transverse diameter at following three levels:

a) anterior end [KL] .
b) middle narrow part – (at the level of intercondylar eminence) [DG].
c) posterior end [MN].

7. Anteroposterior measurements of anterior intercondylar area: The maximum distance between anterior border of intercondylar area to a line joining intercondylar eminence [OP].
8. Anteroposterior measurements of posterior intercondylar area: The maximum distance between a line joining intercondylar eminence and posterior border [QR].

RESULTS:

Table 1

S.No	Parameter	n	Mean	S.D
1	AB	30	3.91	0.39
2	CD	30	2.61	0.27
3	EF	30	3.51	0.32
4	GH	30	2.54	0.31
5	IJ	30	4.09	0.44
6	KL	30	2.48	0.37
7	DG	30	1.36	0.21
8	MN	30	1.76	0.27
9	OP	30	2.2	0.35
10	QR	30	1.64	0.25

Table 1 shows various parameters of upper end of tibia. AP diameter of articular surface of medial condyle is found greater than the AP diameter of articular surface of lateral condyle, the difference being statistically significant. While the transverse diameter of articular surface of both medial and lateral condyle are almost similar and the difference being insignificant. All the Anteroposterior diameters are statistically greater when compared to corresponding transverse diameters.

DISCUSSION:

Table 2

S.No		Present study	Gupta S et al[4]	Ivan AS[2]	Chaichankul C et al[5]	Kwak DS et al[6]	Surendran S et al[7]	HU Yan-jun et al[8]	Bae DK and Park jy[9]	Servien E et al[10]
1	AB	3.91±0.39	4.45±0.40	4.10±0.42	-	-	4.71±0.41	-	4.80±0.31	5.08±0.33
2	CD	2.61±0.27	2.73±0.20	-	-	-	-	-	-	-
3	EF	3.51±0.32	4.07±0.34	3.61±0.4	-	-	-	-	3.98±0.29	4.72±0.33
4	GH	2.54±0.31	2.79±0.34	-	-	-	-	-	-	-
5	IJ	4.09±0.44	4.57±0.39	4.2±0.43	4.6±0.44	4.73±0.38	4.71±0.41	4.98±0.39	-	-

Table 2 shows comparison of present study data with previously done studies. On comparing the values anteroposterior measurements of superior articular surface of medial condyle (AB) it is found that our measurements are lesser as compared to previous studies , concluding mean AP length of medial condyle is smaller than Korean and French counterpart.

On comparing values of Transverse measurements of superior articular surface of medial condyle of present study with previously done study by Gupta et al on South Indians, it is seen that our diameters are slightly smaller, but the difference is statistically significant.

Anteroposterior measurements of superior articular surface of lateral condyle of present study is almost similar to study done on south Indian's done by Ivan et al however the mean values show considerable difference when compared to Korean and French studies.

Mean of Transverse measurements of superior articular surface of lateral condyle is almost similar to study done by Gupta C et al on south Indians Its seen that AP dimension of intercondylar are strongly correlate with normal gait and height of cadaver, it is also important for flexion extension spacing , Mean of intercondylar AP length in our population is comparatively smaller than Thai, Korean and Chinese population , which is in line with study done by Ivan et al in South Indian population.

CONCLUSION:

1. Anatomical profile of proximal tibial end in Indians is smaller, so that there is need of sizing of prosthesis specific to population.
2. AP dimension of medial condyle is greater than that of lateral condyle, while the transverse diameters being similar.
3. All the Anteroposterior diameters are statistically greater when compared to corresponding transverse diameters.

The data collected in present study will be useful to orthropedic surgeons, anthropologists and forensic expert.

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