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STUDY OF TIBIAL TORSION IN DRY HUMAN TIBIA

Anatomy

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ABSTRACT

The internal tibial torsion which presents as intoeing is a cause of worry to the parents. Medial tibial torsion upto 30 degrees donot cause any functional impairment in an individual. On right side, it was found to be 29.17±4.97 (Range=22.00°-36.00°). The Corresponding values on left side was 28.97±4.55 (Range=22.00°-40.00°). On comparison between the two sides, it was approx. 20 – 30 more on right side. In the present study angle of tibial torsion at distal end was more on right side. The knowledge of tibia torsion is clinically important for gait disturbances characterized by intoeing . Knowledge about this help the orthopedic surgeons , paediatricians, obstetricians, nurses to reassure parents .

KEYWORDS

INTRODUCTION

Tibia is called shinbone or shank bone and is the larger and stronger of the two bones in the leg present on the medial aspect. Tibia is named after the Greek word **"Aulos flute"** recognized as one of the strongest weight bearing bone of the body. The lower limb is primarily adapted for weight bearing and locomotion. This coupled with the attainment of a habitual erect bipedal posture has resulted in a change in both the functional and mechanical requirements of skeletal structures. All these modifications have provided strength and stability for the lower limb compared to upper limb[1].

One of major structural modification in human tibia is the tibial torsion which progresses most rapidly during first year of life and again in late childhood and adolescence, when skeletal maturity is also most rapid[2]. Tibial torsion changes from near neutral at birth to 20^0 of lateral tibial torsion in adulthood. After the age of 5 or 6 , tibial torsion does not change much, as was shown by study of Poscial et al., who measured tibial torsion by ultrasound[3]. Clinical conditions such as congenital talipes equino varus are associated with abnormal degrees of tibial torsion. Intoeing during infancy due to persistence relative medial tibial torsion is a common presenting complaint in the paediatric orthopaedic practice and has been treated by derotation braces[4]. Tibial torsion is the main cause for rotatry malalignment of the lower extremity in childhood[2]. Existence of medial torsion of leg in majority of the studies addresses the difference in tibial torsion between right and left limbs[5]. The knowledge of tibial torsion is clinically important, since pathological degree of tibial torsion is usually manifested by gait disturbances, characterized by out-toeing or in-toeing[6].

MATERIAL AND METHODS

The present study was conducted in Department of Anatomy, Government Medical College, Jammu. The study comprised of 70 dry human adult tibia of adult of unkown age and sex, available in the Department of Anatomy. Bones were labelled from 1-70 and were complete in all aspects. Goniometer was used for measuring the angle of tibial torsion.

Angle of tibial torsion at distal end was described by Eckhoff et al (1994) as the angle between the posterior axis of the proximal axis of the proximal plateau and the transtibial axis of the ankle. The posterior axis of the proximal plateau was defined as the joining of the two most posterior points of the plateau and the transtibial axis of the distal tibias was defined by drawing a line on the distal articular surface of the tibia connecting the distal tip of the medial malleolus to the midpoint of the lateral border. For measuring the angle, the posterior borders of the both the condyles of the plateau were rested on the horizontal surface. Then the angle between the horizontal surface and the line defining trans tibial axis of the distal tibia was measured with the protractor (< AOD in the given figure).

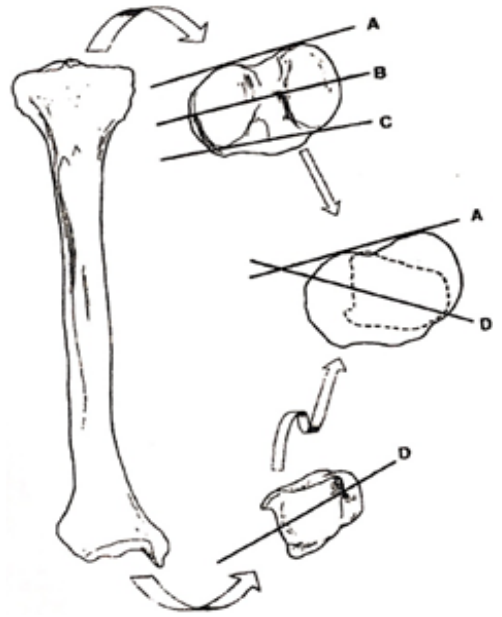

Fig – 1. Measurement of Tibial Torsion

Tibial torsion is measured as the angle between axes at the top and bottom of the tibia as illustrated by lines A and D at the center right.

Proximal condylar axis of the tibia referenced in this study are:

A. Posterior condylar axis of the tibia connecting the two most posterior points of the condyles.
B. Transcondylar axis through the midpoint of each Condyle.
C. anterior Condylar axis joining the anterior margins of the medial and lteral articular surfaces of the plateau.
D. Bimalleolar axis joining the distal tip of the tibial malleous with the midpoint of the lateral border (fibular Sulcus).

RESULTS AND DISCUSION

Angle of tibial torsion at distal end: Table depicts the values of angle of tibial torsion of the present study

COMPARISON OF ANGLE OF TIBIAL TORSION

Method	Mean + SD (degree) (n)		Range	
Goniometer	Right (n)	Left (n)	Right (n)	Left (n)
	29.17+4.97	28.97±4.55	22.00°-36.00°	22.00°-40.00°

On right side, it was found to be 29.17±4.97 (Range=22.00°-36.00°). The Corresponding values on left side was 28.97±4.55 (Range=22.00°- 40.00°). On comparison between the two sides, it was approx. 2^0 – 3^0 more on right side. In the present study angle of tibial torsion at distal

end was more on right side. Earlier study by Eckhoff et al, using goniometer also found it to be more on right side which is in consistent with our study[6]. Clementz and Larsson et al, also found it to be more on right side using C-arm[7,8]. Stuberg et al evaluated the angle of tibial torsion using goniometer and CT-scan in 17 normal subjects. They found a difference of about 5 degree in the two methods. They emphasized that this difference may not be significant clinically, as the range of 5 degree is commonly reported as margin of error for goniometric measurements[9].

COMPARISON OF ANGLE OF TIBIAL TORSION

Authors (years)	Method	Mean +SD (degree)			
		Right		Left	
		Male	Female	Male	Female
Larsson et al (1983)	C-arm	23.5		23.1	
Clementz (1989)	C-arm	30.7 + 7.8		28.6 + 7.6	
Eckhoffet al (1994)	Goniometer	38+11		33 + 9	
	CT	40 + 9		32+10	
Present Study	Goniometer	29.17 + 4.97		28.97 + 4.55	

In toeing due to internal tibial torsion is therefore mainly a physiological phenomena, not requring any treatment and correcting spontaneously in most of the cases[10]. The figures of Staheli shows however that although there is atendency to outward rotation, slight internal tibial torsion can persist at an older age. The deformity is however very rarely severe enough to warrant a derotation osteotomy**.**

CONCLUSION

Angle of tibial torsion was more on right side. The knowledge of tibia torsion is clinically important by gait disturbances characterized by out toeing or intoeing. Tibial torsion changes from near neutral at birth to 20^0 of lateral tibial torsion in adulthood. Clinical conditions, such as congential talipes equino varus are associated with abnormal degrees of tibial torsion. It has been said that intoeing during infancy due to persistent relative medial tibial torsion is a common presenting complaint in pediatric orthopedic practice. Knowledge about this help the orthopedic surgeons to impart preventive information about them to paediatricians. Obstetricians, nurses and parents. Tibial torsion is the main cause for rotator malaligment of the lower extremity in childhood. Existence of medial torsion of the leg of sufficient degree has a clinical importance.

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