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Original Research Article

Morphometric Study of Nutrient Foramen of Human Tibia Bone in Western Rajasthan Population

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Abstract

Nutrient foramen is an opening, which gives passage to the blood vessels of medullary cavity. In lower limb, the lower end of femur and upper end of tibia are the growing ends. The knowledge of nutrient foramen and nutrient artery is of utmost important in surgical procedures like bone grafting, fracture fixation etc. Damage to nutrient artery causes avascular necrosis of bone.

Keywords: Nutrient foramen, Bone growth, Foraminal index, Nutrient artery.

INTRODUCTION

Nutrient foramen of thewas choosen in present as it is the largest foramen in human body. It generally lies near the soleal line, and gives passage to nutrient vessels (usually posterior tibial arterybranch).

MATERIAL AND METHOD

Study was being conducted on total 90-dried Human Tibia of unknown age and sex.

Tibias were collected from the anatomy department of Dr Sampuranand medical college & hospital, Jodhpur and were marked seperately. Various Parameters like size, segmental Position, distance from proximal end, number and direction of nutrient foramen were observed and noted. Size was measured by using hypodermic needle of different sizes. Direction of the nutrient foramen was identified by passing the needle into foramen. Location of nutrient foramen on tibial surface was noted after observation. Segment location of nutrient foramen i.e. whether nutrient foramen is at its upper 1/3, middle1/3, or lower 1/3 was noted and it was determined by using Hughes formula.

$$Foraminal\ (\text{FI}) = (PF \div TL \times 100).$$

Where PF stands for nutrient foramina from the upper end of the tibia,

TL stands for Total length of tibia.

If for aminal index is <33.33 ,nutrient foramina is in upper 1/3 of tibia, if it is in between 33.33 -66.66 nutrient foramina is in middle 1/3 of bone and if it is >66.66 it depicts presence of nutrient foramen in Lower 1/3 segment of bone.

RESULTS

In 83 number of bones single foramen was present, in 7 number of bones double foramen present while in none of bone triple foramen was observed. Direction: all bones had downward directed nutrient foramen.

Location: In 57 numbers of bones Nutrient foramen was situated on posterior surface while in 33 numbers of bones it was situated on lateral surface. In 75number of bones Nutrient foramen was present in upper 1/3 of bone while in 15 bones it was present in middle 1/3.

Maximum length of the tibia obtained was 37 cm and minimum length was 31 cm. Maximum distance of nutrient foramen from upper end was 18.5 cm and minimum length is 10.5 cm.


Samsung Quad Camera
Shot with my Galaxy A51


Shot on realme 1
By Ashish suthar


ANA- 105
Shot on realme 1
By Ashish suthar

Table No.1

•Approximate size of nutrient foramen in gauze , measured by hypodermic needle

Approximate size of foramen in gauze	Right tibia	Left tibia	Total
32 G	2	1	3
28 G	0	0	0
26 G	11	6	17
24 G	0	0	0
22 G	0	0	0
20 G	0	0	0
18 G	28	12	40
16 G	19	11	30

Table 2

- Segmental location of nutrient foramen(Hughes formula)

Segmental location of nutrient foramen	Right tibia	Left tibia	Total
Upper 1/3	51	24	75
Middle 1/3	9	6	15
Lower 1/3	0	0	0

Table 3

- Variation in number of nutrient foramina present in tibia

No.of NF	Right tibia	Left tibia	Total
Single	57	26	83
Double	3	4	7

Table 4

- Variation in direction of nutrient foramen in the tibia

Direction of NF	Right tibia	Left tibia	Total
Downward	60	30	90
Upward	0	0	0

Table 5

- Variation in the presence of nutrient foramen on the Tibial surface

Location of NF	Right tibia	Left tibia	Total
Posterior surface	37	20	57
Lateral surface	23	10	33
Medial surface	0	0	0

DISCUSSION

In the present study,60 right tibias and 30 left tibias were included. The results were compared with the other published studies.

In the present study single nutrient foramen was observed in 92.2% of bone and double nutrient foramina was noted in 8% of bone. Many authors have found single nutrient foramen in most of the bones. Chavda *et al.,* found 100% of bone having single nutrient foramen [5].

In present study nutrient foramen was found downward directed in 100% cases while Chavda et al also found 97.14% of tibia having nutrient foramen in a downward direction and 2.86% upward direction [5]. Kamath *et al.,* also found 100% nutrient foramen in a downward direction [9].

In the present study 63.33% of the tibia exhibited nutrient foramen on the posterior surface, in 36.66% tibia nutrient foramen was present on the lateral surface Kamath *et al.,* found 97.18% of tibia having nutrient foramen on the posterior surface and 2.82% on the medial surface [9]. Chavda *et al.,* found in 97.14% tibia on the posterior surface, in 1.43% on the lateral surface, and in1.43% in the lateral border [5].

In the present study nutrient foramen in upper 83.33%1/3rd and 16.66%in middle 1/3rd. Kamath *et al.,* found 74.65% foramen in upper 1/3rd and 25.35% in middle 1/3rd [9]. Chavda *et al.,* found 74.65% in the upper 1/3rd and 25.35% in the middle 1/3rd [5] Mohan *et al.,* found 42% of the nutrient foramen in the upper 1/3rd and 58% in the middle 1/3rd [11].

CONCLUSION

Precise knowledge and topography of nutrient foramen will help surgeons in minimizing risk of damage to Tibial vasculature during surgeries.

Most of the nutrient foramen was present on posterior surface,with downward direction and present in upper 1/3 of the tibia with maximum size of 18 G.

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