Original Research Article

A study of nutrient and Vascular Foramina of dried adult humerus in cadavar

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Abstract

Background: Nutrient foramen is an opening into the shaft of humerus bone. It leads to oblique nutrient canal passing through cortex and ultimately opens into the medullary cavity. **Aims and Objectives:** To Study Nutrient and Vascular Foramina of Dried Adult Humerus in Cadavar. **Methodology:** This was cross-sectional study carried out in the cadaveric humerus of the both the hands at tertiary health care centre during the one year period i.e. January 2018 to January 2019 so during the one year period there were 15 humerus on left side and 14 humerus on right side Hand lens- used to locate nutrient foramen and vascular foramina. **Result:** All necessary data was entered to excel sheet and analyzed by Excel software for windows 10. In our study we have seen that The most common distribution of the Nutrient foramina on Lt side was in the Zone II i.e. 63.33% , followed by Zone III i.e. 23.33% , and in Zone I was 13.33% , whereas on right side the most common distribution was also in Zone II i.e. 68% followed Zone III was 20% and in Zone I was 12%. On the left side Majority of the Vascular Foramiana were distributed in Zone I were 48.65% followed by Zone III were 34.23% and in Zone II were 17.12 % on the Right side the majority were also distributed on Zone I were 46.85% followed by Zone III were 28.83% and in Zone II were 11.71%. **Conclusion:** It can be concluded from our study that the distribution of nutreient and Vascular foramina is useful for the management of various fractures and wound healing
Key words: Nutrient Foramina, Vascular Foramina, Humerus.

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INTRODUCTION

Nutrient foramen is an opening into the shaft of humerus bone. It leads to oblique nutrient canal passing through cortex and ultimately opens into the medullary cavity. The nutrient artery enters into the medullary cavity through nutrient foramen and the canal which is a rich source of blood supply to the medullary cavity and inner two-third of cortex of the humerus.[1] The nutrient blood supply is crucial for any long bones and it should be preserved in order to promote the fracture healing.[2] Moreover, the presence of preserved nutrient blood supply is essential for the survival of the osteocytes in cases of tumor resection, trauma, and congenital pseudoarthrosis.[3] It is usually single in number and located on the anteromedial surface of the humerus a little below its midpoint close to the medial border. It is usually directed toward the lower end of humeri.[4] The number and location of foramina remains are non-constant feature in long bones.[5] Henderson RG also reported that their location in mammalian bones are variable and may alter during the growth.[6] Knowledge of the number and location of nutrient foramina is useful in certain surgical procedures.[7]

So we have studied the Nutrient and Vascular Foramina of Dried Adult Humerus in Cadavar at tertiary health care centre.

METHODOLOGY

This was cross-sectional study carried out in the cadaveric humerus of the both the hands at tertiary health care centre during the one year period i.e. January 2018 to January 2019 so during the one year period there were 15

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humerus on left side and 14 humerus on right side Hand lens- used to locate nutrient foramen and vascular foramina. Zone I: constitute proximal third of the bone. Zone II: constitute middle third of bone. Zone III: constitute distal third of bone. All necessary data was entered to excel sheet and analyzed by Excel software for windows 10.

RESULT

Table 1: Distribution as per the Nutrient foramina

Zones	Left		Right	
	No.	(%)	No.	(%)
Zone I	4	13.33	3	12
Zone II	19	63.33	17	68
Zone III	7	23.33	5	20
Total	**30**	**100.00**	**25**	**100.00**

The most common distribution of the Nutrient foramina on Lt side was in the Zone II i.e. 63.33% , followed by Zone III i.e. 23.33% , and in Zone I was 13.33% , whereas on right side the most common distribution was also in Zone II i.e. 68% followed Zone III was 20% and in Zone I was 12%.

Table 2: Distribution as per the Vascular Foramina

Zones	Left		Right	
	No.	(%)	No.	(%)
Zone I	54	48.65	52	46.85
Zone II	19	17.12	13	11.71
Zone III	38	34.23	32	28.83
Total	111	100.00	97	100.00

On the left side Majority of the Vascular Foramiana were distributed in Zone I were 48.65% followed by Zone III were 34.23% and in Zone II were 17.12 % on the Right side the majority were also distributed on Zone I were 46.85% followed by Zone III were 28.83% and in Zone II were 11.71%.

DISCUSSION

The humerus is longest and largest bone of upperlimb, it has expanded ends and a shaft. The proximal round end forms the shoulder joint while the lower extremity is flattened from before backward, and curved slightly forward; it ends below in a broad, articular surface. The shaft is almost cylindrical in the upper half of its extent, prismatic and flattened below.[8] Humerus, being a long bone, gets nourished by following arterial systems-nutrient artery, diaphyseal, epiphyseal and periosteal arteries. V.R Mysorekar, 1967, examined diaphyseal nutrient foramina of 179 humeri. Out of which 75 had more than one foramen. He also noted that 41% of the nutrient foramina were found on the anteromedial surface, 40% on the medial border and 19 % in the spiral groove. The reciprocity of sizes of the foramina was observed, i.e. if the foramen on the anteromedial surface or medial border was larger, than that in the spiral groove or vice-versa. Size of the foramina of younger bones was larger. The diaphyseal nutrient foramina in humerus may be two in number.[9] Carroll S.E, 1963, studied nutrient foramina of 71 adult humeri. He noted that the maximum number of foramina is concentrated on the small area on the medial aspect of middle third of the humerus. This region is a common site of non-union.[10] Therefore, it is essential to find the position and number of the vascular foramina. An understanding of position and number of foramina is important in orthopedic surgical procedures such as joint replacement therapy, fracture repair, bone graft and vascularized bone microsurgery.[11] Kate B.R, 1971, studied nutrient foramina of long bones and found that constant nutrient foramina was observed in all humeri, just below the insertion of deltoid, on the supracondylar ridge, a little below the midpoint of the shaft and was directed towards elbow. A record foramen was noted on the ridge between coronoid and radial fossae anteriorly, and was having the same direction as that of the nutrient foramen. Number of vascular foramina was observed to be two or more over surgical neck, three or more in the floor of bicipital groove, three or more over the greater tuberosity and two or more posteriorly towards the head. These foramina have a role to play in avascular necrosis in some cases of fractures.[12] Most of the long bones, one end grows much more than the other resulting in the slant of nutrient canal from the surface to marrow cavity is towards the end that grow less rapidly. Meanwhile, the ends of the long bone usually have many arteries entering them and many veins leaving, so that several vascular foramina are usually visible at the ends of a dry bone.[13] The nutrient artery, a branch of brachial artery, enter the shaft of humerus near the insertion of coracobrachialis tendon, thus exposing itself to damage with some distal shaft fractures or internal fixation and possible predisposition to non-union in the fractures of the middle or distal thirds.[14] In our study we have seen that The most common distribution of the Nutrient foramina on Lt side was in the Zone II i.e. 63.33%, followed by Zone III i.e. 23.33%, and in Zone I was 13.33%, whereas on right side the most common distribution was also in Zone II i.e. 68% followed Zone III was 20% and in Zone I was 12%. On the left side Majority of the Vascular Foramiana were distributed in Zone I were 48.65% followed by Zone III were 34.23% and in Zone II were 17.12 % on the Right side the majority were also distributed on Zone I were 46.85% followed by Zone III were 28.83% and in Zone II were 11.71%. This was similar to Santosh Manohar Bhosale [15] they found Among the segments, upper end shows maximum density of vascular foramina indicating the highest intensity of blood supply. The shaft being,

supplied mainly by nutrient artery, the location and direction of nutrient foramina was thus important to find out. The position of nutrient foramina in most cases is found to be in the middle 1/3rd of the anteromedial surface of the shaft and the direction of nutrient foramina was towards the elbow. Middle 1/3rd of anteromedial surface is more vulnerable to surgical or traumatic injuries that may damage nutrient artery, thus highlights its significance

CONCLUSION

It can be concluded from our study that the distribution of nutrient and Vascular foramina is useful for the management of various fractures and wound healing

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