Original Research Article

Nutrient foramina in clavicles: An anatomical study on preserved dried bones

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Abstract

Background: The clavicle is a peculiar long bone that lies horizontally in the body and is an integral part of the shoulder girdle. Similar to the long bone its majority of blood supply is through the nutrient artery which enters the bone through nutrient foramina. **Objective:** The objective of the study was to study the number, position, location and direction of these foramina in 50 clavicles. **Materials and Methods:** Well preserved 50 human clavicles were studied through naked eyes as well as by magnifying glasses and their characteristics regarding nutrient foramina were noted. **Results:** The study group consisted of 25 clavicles of each side totaling 50 bones. 30 bones had only one nutrient foramen (60%), 16 had 2 foramina (32%) and 4 bones had 3 foramina (8%) present and thus total 74 nutrient foramina were found. 66 of these foramina (89.19%) were present on middle third segment with majority on posterior surface (79.72%) and almost all were directed laterally towards acromial end of bone (95.95%). **Conclusion:** The findings were in agreement with previous studies on clavicle bone. Also, we found two bones which had through and through openings suggestive of subcutaneous nerve piercing bones during life.

Key Words: Clavicle, Nutrient foramina, Nutrient artery

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INTRODUCTION

The Clavicle also known as collar bone lies horizontally in the body and is an integral part of the shoulder girdle. It develops in membrane so called dermal bone on the contrary to other long bones in the body. Clavicle bone gets its vascular supply primarily through nutrient artery that enters the bone through the nutrient foramina. [1] The clavicle is the Latin word which means 'small key' and it acts as connecting link between axial skeleton and upper extremity and by transmitting weight of the upper limb to the axial skeleton it allows later the free mobility.[2] Nutrient foramen is a natural opening in the bones usually in the diaphysis from where blood vessels enters the medullary cavity of a bone and supply its nourishment and growth. [3] Although the clavicle is termed as a peculiar long bone as it has no medullary cavity [4], the nutrient foramen is present on the middle third of diaphysis usually on its posterior surface.

MATERIALS AND METHODS

This study was performed on 50 well preserved, dried clavicle bones in anatomy department of Government medical college, Ratlam in Madhya Pradesh**.** With the help of magnifying glass and colored pins the number, position, location and direction of nutrient foramina were observed. Also collateral significant findings were noted, if any.

RESULT

Out of total 50 clavicle bones studied topographically, 25 were right side and 25 were left side of bones. A total of 74 nutrient foramina were found as many bone showed the presence of multiple foramina. Most of the clavicles showed presence of single foramen (60%), while 32%

bones showed 2 foramina and 8% of bones had 3 foramina. (Table 1) Considering the antero-posteriorly curved shaped, the clavicle is divisible into 3 segments- medial, middle and lateral third. Majority of the nutrient foramina were in the middle 1/3rd segment of the bones (89.19%), with 9.46% of foramina present in the lateral 1/3rd of the clavicle. Only one bone showed the nutrient foramina in its medial 1/3rd segment i.e.; 1.35% of occurrence. (Table 2) The posterior surface of clavicle had nutrient foramina present in 79.72% cases, followed by its inferior surface. The superior and anterior surfaces rarely showed the nutrient foramen as evidenced by 2.7% and 1.36 % incidence respectively. (Table 3) The nutrient foramina were directed laterally towards the acromial end 95.95% times with only 4.05% of foramina directed medially towards the sternal end. (Table 4)

Table 1

Number of foramina present in individual bone	Number of bones (n=50)	Frequency (%)
Single foramen	30	60
Double foramina	16	32
Three foramina	4	8
Four or more foramina	0	0
Total	**50**	**100**

Table 2

Segment of bone where foramina were present	Number of foramina (n)	Frequency (%)
Medial 1/3rd	01	1.35
Middle 1/3rd	66	89.19
Lateral 1/3rd	07	9.46
Total	**74**	**100**

Table 3

Surface of the bone on which foramina were present	Number of foramina (n)	Frequency (%)
Anterior	01	1.36
Posterior	59	79.72
Inferior	12	16.22
Superior	02	2.70
Total	**74**	**100**

Table 4

Direction of foramina	Number of foramina (n= 74)	Frequency (%)
Medially	03	4.05
Laterally	71	95.95
Total	**74**	**100**

DISCUSSION

In our study, we observed that a single nutrient foramen is present in 60% of bones followed by two (32%) and three (8%) foramina. In many studies done before almost similar frequencies were seen. [5, 6] Nutrient foramina were most commonly present on the middle 1/3rd segment of clavicle, on its posterior surface as seen in 89.19% and 79.72% cases respectively. Almost all previous studies on clavicle yielded same results. [7, 8] Direction of nutrient foramina, as was seen by colored pins, was laterally towards acromial end in 95.95% of bones. It was most certainly found in every study previously done on clavicle. [9, 10] It may be due to the fact that medially directed foramina were present as accessory foramen with comparatively larger, dominant foramen directed laterally present on the same bone. In two bones, foramina were present which revealed through and through openings when pins were passed through them. These strengthen the fact that clavicle is pierced by subcutaneous supraclavicular nerves signifying that it is a dermal bone.

CONCLUSION

Clavicle is a modified long bone with exceptions to the principles of long bones such as it undergoes intramembranous ossification and its medullary cavity is absent. Thus, suggesting that chief source of blood supply to the clavicle is its periosteal arteries. The nutrient foramen which is most commonly present on the posterior

surface of middle third of clavicle suggests that the clavicle may be supplied by the neighboring supraclavicular or thoracoacromial arteries. Knowledge of topography of nutrient foramina will be helpful in surgery specially bone grafting, and microsurgical repairs of displaced, malunited or communited fractures of this beauty bone

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