



## NUTRIENT FORAMEN VARIATION IN HUMERUS AND ITS CLINICAL IMPORTANCE.

### Anatomy

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### ABSTRACT

Humerus is the longest bone in the upper limb. Nutrient foramen is an opening in the bone shaft and allows the blood vessels to enter the modularly cavity of the bone to nourishment and growth of bone. It plays very important role in healing of the fracture of the bone. **Objectives:-** to determines the number, direction, location and the length of the nutrient foramen of the humerus. **Material and methods:-** the study was conducted on 100 humeri from the department of anatomy of Karwar institute of medical sciences, Karwar. Measurements were taken by sliding caliper and Osteometric board. Data was noted and statistically analyzed. **Results:-** In the present study 80 % bones have one and 20 % have two nutrient foramina .nutrient foramina on medial border 60% anteromedial surface 30%, on lateral border 5% and posterior surface 5%. The direction f the nutrient foramen is towards the elbow joint. **Conclusion:-** this study provides details about the nutrient foramina that will benefit orthopedic surgeons which will do the bone grafting and fracture reconstruction surgery.

### KEYWORDS

Humerus, Nutrient Foramen, Location, Direction

### INTRODUCTION:-

Humerus is the largest and longest bone of the upper limb. An opening into the shaft of bone for passage of blood vessels for its nourishment and growth is called as nutrient foramen<sup>1</sup>. The nutrient artery enters individual bones obliquely through a nutrient foramen<sup>2</sup>. The nutrient artery is the principal source of blood supply to a long bone and nutrient foramen is an opening in the bone shaft which gives passage to the particularly important during its active growth period in the embryo and fetus, as well as during the early phase of ossification<sup>3</sup>. The fractures of long bones are increasing in number due to an increase in road traffic accidents, industrial accidents, sports injuries and pathological fractures in osteoporotic patients. Nutrient artery is the major source of blood supply to the bone and hence plays an important role in fracture healing. Orthopedic surgical procedures like vascularized bone microsurgery requires the detailed knowledge of the blood supply. In free vascular bone grafting, the blood supply by nutrient artery is extremely important and must be preserved in order to promote fracture healing<sup>4</sup>. The present study was carried out to determine the number, direction and location of nutrient foramen of humerus.

### MATERIALS AND METHODS:-

The study was conducted on 100 humeri from the department of anatomy of Karwar institute of medical sciences, Karwar. Measurements were taken by sliding caliper and Osteometric board.

Damaged bones and pathologically deformed bones were excluded from the study. Length of each humerus bone was measured with the help of Osteometric board. With the help of hand lens bones were observed for the number, direction and location of nutrient foramen with respect to the surface and borders. Data was noted and statistically analyzed.

### RESULTS

**Table 1: Number of nutrient foramen on humerus.**

| Number of nutrient foramen | Right side humerus | Right side humerus | Left side humerus | Left side humerus | Both (%)   |
|----------------------------|--------------------|--------------------|-------------------|-------------------|------------|
|                            | number             | percentage         | Number            | percentage        | percentage |
| 1                          | 60                 | 60                 | 40                | 40                | 100        |
| 2                          |                    |                    |                   |                   |            |

**Table 2: Location of nutrient foramen on humerus.**

| Location of nutrient foramen | Right side humerus | Left side humerus | Both number | Both (%) |
|------------------------------|--------------------|-------------------|-------------|----------|
| Medial border                | 45                 | 15                | 60          | 60%      |
| Anteromedial surface         | 25                 | 05                | 30          | 30%      |

|                   |   |   |   |    |
|-------------------|---|---|---|----|
| Lateral border    | 3 | 2 | 5 | 5% |
| Posterior surface | 2 | 3 | 5 | 5% |

In spite of optimal treatment, some fractures heal slowly or fail to heal. This indolent fracture healing may be related to the severity of the injury, poor blood supply, age and nutritional status of the patient or other factors<sup>4</sup>. The constancy of the main nutrient artery to humeral diaphysis is remarkable. The danger of damaging this artery is greatest in open reduction of the fracture involving the mid-shaft region of the bone<sup>5</sup>. A Ukoha UU et al studied 150 humerii and found that 66% of them had a single nutrient foramen, 18% had double foramina and 26% had no foramen. In their study all foramina except one were directed away from the growing end.[16] Roul B et al in their study observed that nutrient foramen was found in middle 1/3rd in most of the cases and in lower 1/3rd in few cases<sup>6</sup>. This finding was supported by another study done by Chandrasekaran S et. al. The result of the present study also correlates with this. In addition to that the percentage of location of nutrient foramen on the anteromedial surface was 89.92%, on the posterior surface 8.53% and on the anterolateral surface it was 1.55%.

### CONCLUSION

In This Study the majority of the humerus bones have single nutrient foramen and they are mainly located on the anteromedial surface especially in the middle 1/3rd. The direction of these foramina is always constant which is away from the growing ends. An understanding of the position and number of the nutrient foramina in long bones is important in orthopedic surgical procedures such as joint replacement therapy, fracture repair, bone grafts and vascularized bone microsurgery. Orthopedic surgical procedures like vascularized bone microsurgery requires the detailed knowledge about the blood supply of the operating bone. Therefore the anatomical knowledge of nutrient foramen is important for orthopedic surgeons during operations on the humerus like bone grafting and microsurgical bone transplantation.

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