Avoiding the Mandibular Condyle When Approaching the Infratemporal Fossa from the Middle Fossa Approach

## Introduction

When approaching the infratemporal fossa through the middle fossa, the mandibular condyle is an important lateral structure that must be avoided to avoid injury to the temporomandibular joint. The mandibular fossa lies within a triangle with its apex at the foramen spinosum, its anterior arm extending to the root of the zygoma, and its posterior arm extending to the external auditory canal. We describe this imaginary triangle on the floor of the middle fossa, to denote the underlying mandibular fossa where drilling should be avoided.

## Methods

Ten cadaveric heads with 14 dissected middle fossa approaches underwent computed tomography with navigation protocols. The heads were registered using a neuronavigation system and the foramen spinosum was identified. Measurements of the anterior and posterior borders of the mandibular condyle were made to define the boundaries of the triangle. Using these measturments, the angles from the foramen spinosum to the anterior and posterior borders were calculated. The length from the foramen spinosum to the medial and lateral borders of the mandibular fossa were averaged. A rectangle encompassing the mandibular condyle was formed by drawing lines from the defined points at the anterior border to those at the posterior border (Figure 1).

## Figure 1A. Mandibular Fossa Measurments.



The medial border is defined by the medial triangle (anterior, blue; posterior, yellow). The lateral border is defined by a lateral triangle (anterior, green; posterior, red). A line from middle of foramen spinosum to medial border and lateral border is shown in orange.


Figure 1C-D. Mandibular Fossa Measurments.


## Results

The foramen spinosum was an average of 6.1 mm (SD: 2.5 mm ) medial to the medial border of the mandibular fossa. The anterior border of mandibular condyle was on average $39.6^{\circ}$ (SD: $23.7^{\circ}$ ) anterior and $60.2^{\circ}$ (SD $14.3^{\circ}$ ) posterior to the foramen spinosum and the estimated medial border of the mandibular condyle. The anterior border was less than or equal to the angle between the foramen spinosum and the posterior root of the zygoma in all specimens. However, the posterior border of this triangle was larger than the angle between the foramen spinosum and the external ear canal in 4 of 14 sides.

The lateral border of the triangle had a mean anterior angle of $11.5^{\circ}$ (SD $9.3^{\circ}$ ) and a mean posterior angle of $25.1^{\circ}$ (SD $11.2^{\circ}$ ). The mean distance from the foramen spinosum to the lateral border of the mandibular fossa was 26.8 mm (SD: 1.8 mm ). The rectangle formed by the four points had a mean anterior-posterior length of 19.1 mm (SD 2.2 mm ) and a mean mediallateral length of 16.8 mm (SD: 3.4 mm ).

| Table 1. Angles. |  |  |  |
| :--- | :--- | :--- | :--- |
| Triangle borders | Average | SD |  |
| Medial |  |  |  |
| Anterior | $39.6^{\circ}$ | $23.7^{\circ}$ |  |
| Posterior | $60.2^{\circ}$ | $14.3^{\circ}$ |  |
| Lateral |  |  |  |
| Anterior | $11.5^{\circ}$ | $9.3^{\circ}$ |  |
| Posterior | $25.1^{\circ}$ | $11.2^{\circ}$ |  |
|  |  |  |  |
| Table 2. Distances. |  |  |  |
|  | Average (mm) | SD (mm) |  |
| Medial to lateral border | 16.8 | 3.4 |  |
| Anterior to posterior border | 19.1 | 2.2 |  |
| FS to medial border | 6.1 | 2.5 |  |
| FS to lateral borer | 26.8 | 1.8 |  |

## Conclusion

When drilling laterally within the middle fossa, this triangle extending from the foramen spinosum can be useful for avoiding inadvertent exposure of the mandibular condyle and subsequent injury to the temporomandibular joint.

## References

Nonaka Y, Fukushima T, Watanabe K, Sakai J, Friedman AH, Zomorodi AR. Middle infratemporal fossa less invasive approach for radical resection of parapharyngeal tumors: surgical microanatomy and clinical application. Neurosurg Rev. 2016;39(1):87-97.

