

JUGULAR FORAMEN MORPHOMETRY



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INTRODUCTION

The jugular foramen (*foramen jugulare*, JF) is located on the skull base bilaterally, anteromedial to the mastoid process. A fibrous bridge connecting intrajugular processes of both sides splits the JF into two spaces: the anteromedial space conveying the glossopharyngeal (IX) nerve, and the posterolateral space carrying the vagus (X) and accessory (XI) nerves as well the internal jugular vein and posterior meningeal artery. Jugular foramen syndrome (JFS) is characterized by neurological symptoms of the passing cranial nerves IX, X, XI associated with some localized etiology at the jugular foramen.

PURPOSE

To assess the extent of JF variation to further understand its morphological relations to the JFS.

MATERIALS & METHODS

The jugular foramen was observed and measured by digital vernier caliper bilaterally in 135 dry skulls with opened cranial cavity.

PARAMETERS :

- External and internal maximum width (W) in a mediolateral dimension.
- External and internal maximum length (L) in an anteroposterior dimension.
- Depth: between the external plane of the JF and the jugular fossa (Ext-Fossa), and between the external plane and the internal plane of the JF (Ext-Int).

TYPING:

Based on the presence of intrajugular process (*processus intrajugularis*):

- intrajugular bridge
- intrajugular incomplete bridge

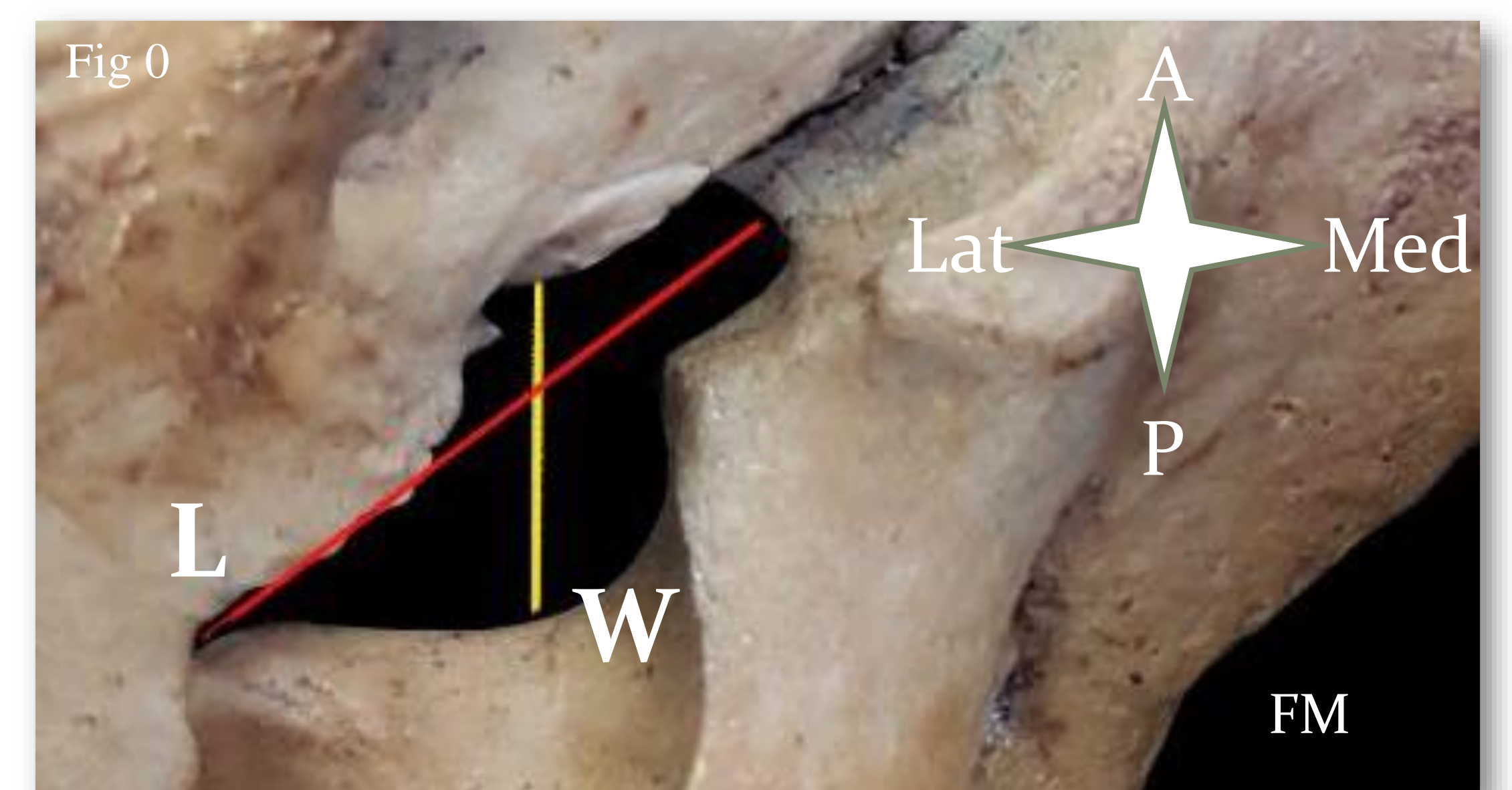


Fig.0: Endocranial perspective.
L – length, W – width, FM – foramen magnum.
Lat – lateral, Med – medial, A – anterior, P – posterior

RESULTS & DISCUSSION

		Size (mm)					Shape	Size (mm)					Shape				
		Max	Mean	± SD	Min	%		Max	Mean	± SD	Min	%					
Internal	Right	Width	20.78	12.6	4.31	6.93	0 68.4	External	23.29	13.79	4.77	8.61	0 68.1				
		Length	18.97	9.14	3.14	2.33	Δ 3.4		17.64	9.56	2.79	4.68	Δ 26.1				
							/ 28.2										
	Left	Width	18.8	11.96	3.69	5.2	0 66.3		20.33	13.55	4.88	8.94	0 61.7				
Length		12.85	8.68	2.34	2.54	Δ 31.1	13.63	8.07	2.32	3.75	Δ 32.1						
						/ 2.5						/ 32.1					
Depth	Right	Ext-Fossa	18.44	11.36	3.67	4.17	I 35.7	Bridge	Right	Bridge		32.5					
		Ext-Int	17.79	11.67	2.82	6.68	/ 15.5		Incomplete		4.1						
	Left	Ext-Fossa	19.59	11.26	3.17	4.83	I 33.0		Left	Bridge		21.2					
		Ext-Int	17.23	11.43	2.96	5.12	/ 15.9		Incomplete		2.4						

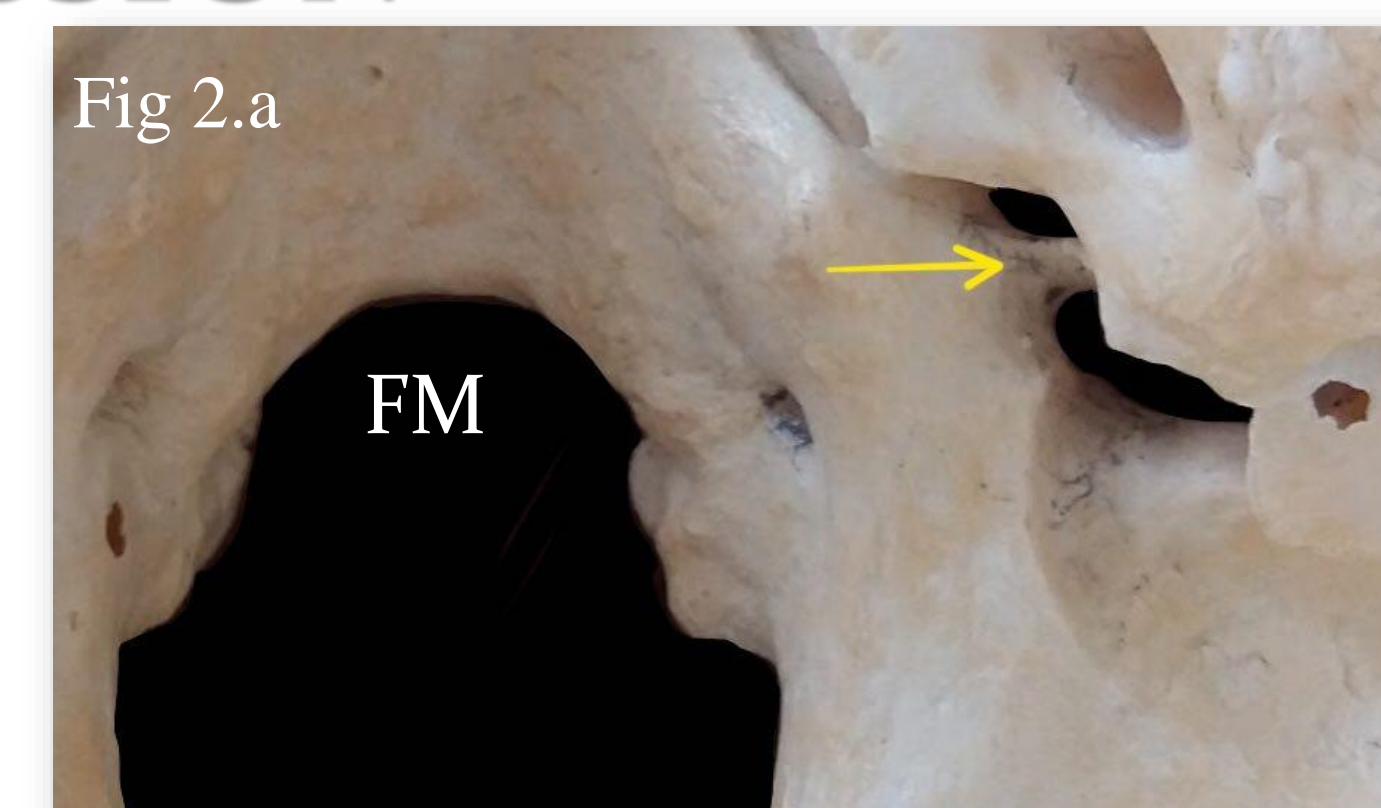


Fig. 2: Endocranial perspective, showing varying complete bridging of the JF. FM – foramen magnum

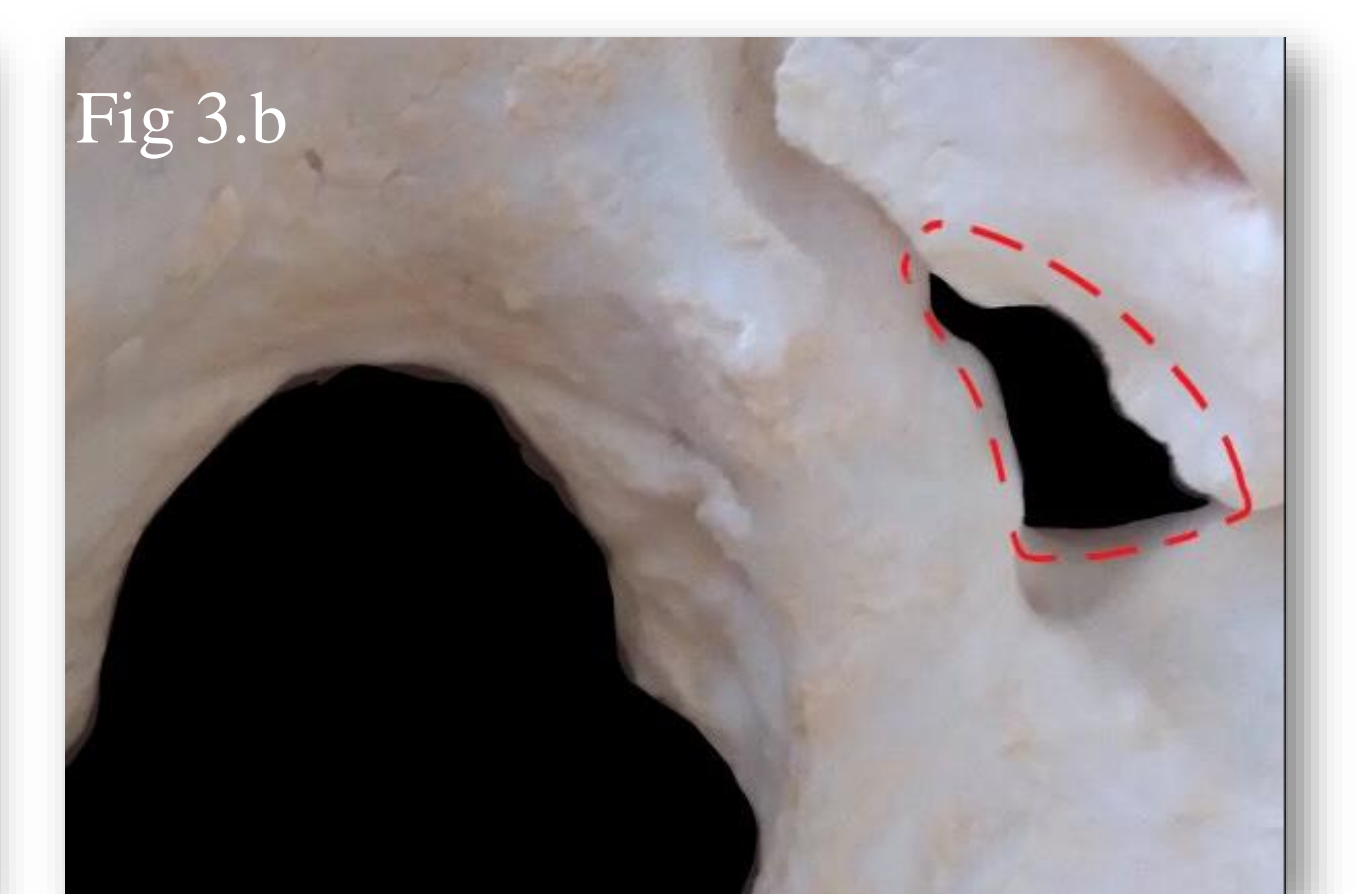
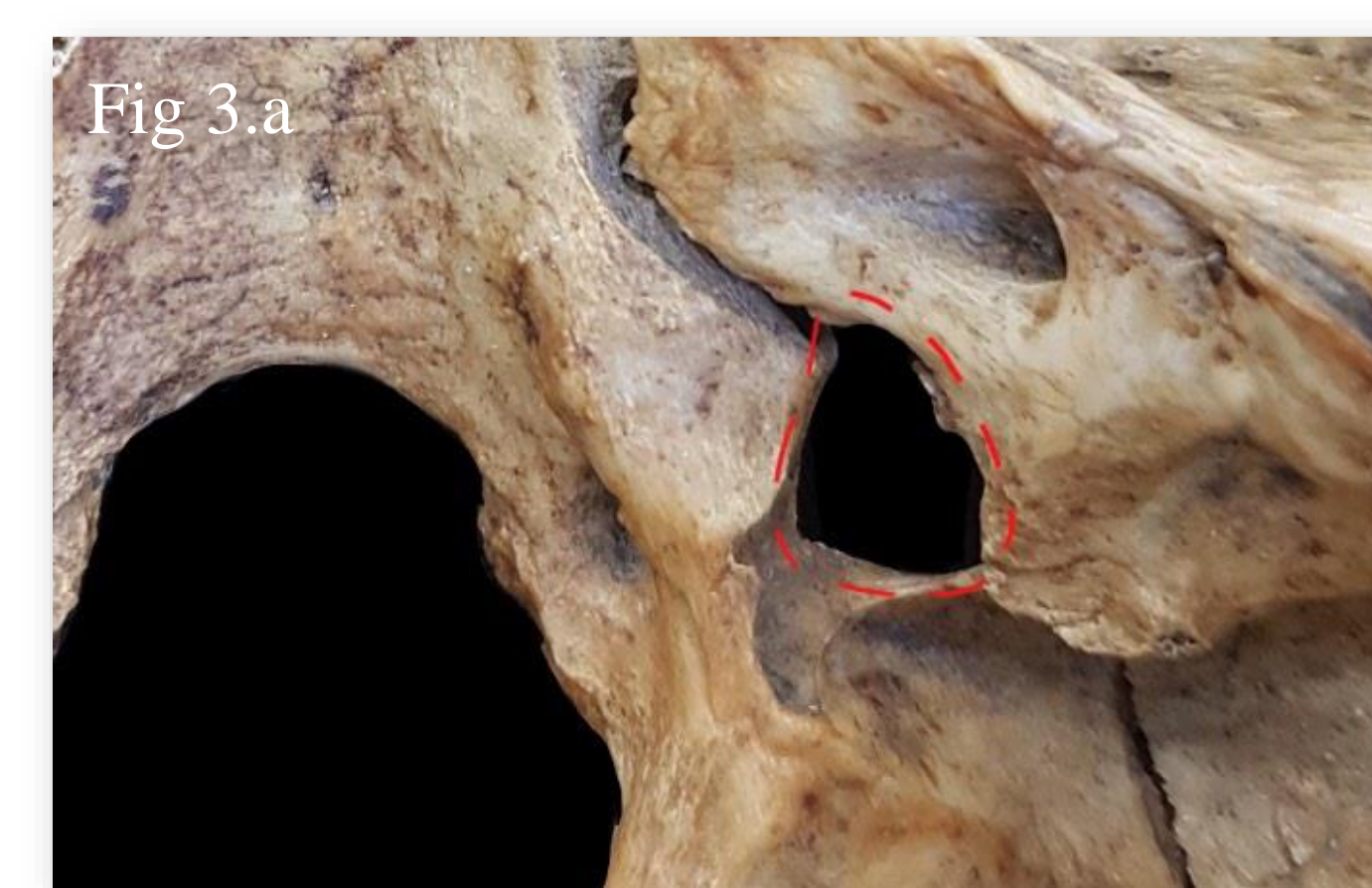


Fig. 3.a: Endocranial perspective of a round shaped jugular foramen.
Fig. 3.b: Endocranial perspective of a triangular shaped jugular foramen.



Fig 4.a: Endocranial perspective of bilateral incomplete bridging, resulting in the intrajugular processes. Fig 4.b: A larger process.



Fig 1.a: Endocranial perspective

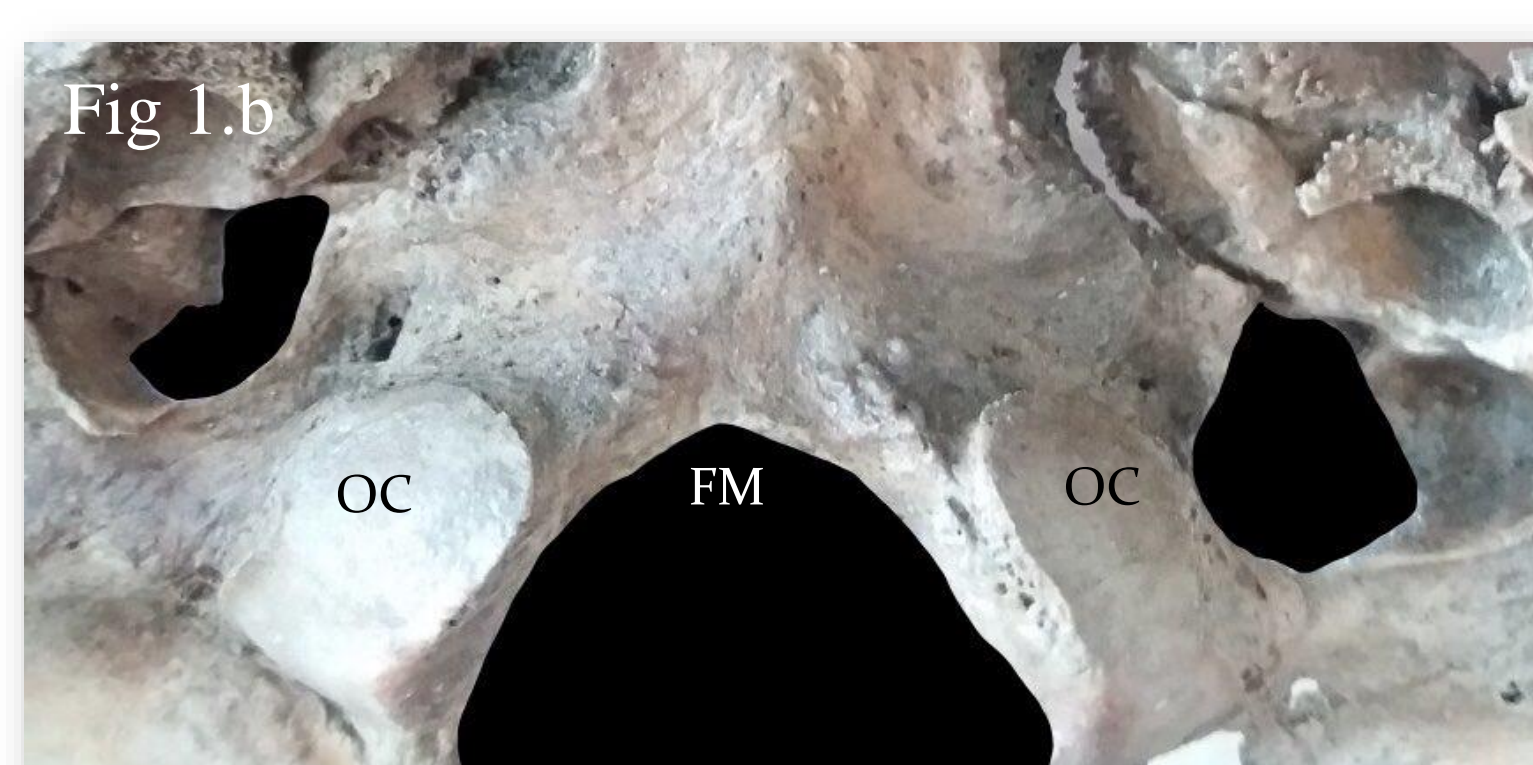


Fig 1.b: Exocranial perspective (FM – foramen magnum, OC – occipital condyle)

CONCLUSION

The JF can be thought of as a canal between the external aperture at the skull base and the internal aperture in the posterior cranial fossa and varies in alignment from a straight to a sloped line in direction. Whether or not these morphological observations play role in the JFS need to be investigated.

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