Original article

Foramen Caecum of anterior cranial fossa: variation and clinical significance

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ARTICLE INFO

Keywords:
Anterior cranial fossa
Crista galli
Foramen caecum
Emissary vein

ABSTRACT

Foramen caecum is a usually small blind foramen present just anterior to Crista galli. If it is patent it gives passage to a vein. The present study was under taken to observe variation in the number, patency, and size of the foramen caecum and bifurcation of Crista galli. Study was done on 49 dry skulls, with normal base of skull from Department of Anatomy, Government medical college, Chandigarh. Foramen caecum was found in 42 skulls. Only one skull had no foramen caecum. In 41 cases foramen ended blind but in one case it was found patent. There were numerous small foramina in one case. In two cases foramen caecum was very small as just short of complete obliteration. In remaining 38 dry skulls it showed presence of normal size foramen caecum. Bifurcation of Crista galli was not observed in any of the cases. Foramen caecum is important because in patent cases, infections of the nose and nearby areas can be transmitted to the meninges and brain through the emissary vein.

1. Introduction

The frontal crest of the frontal bone ends below in a small tract which is converted into a foramen, the foramen cecum (or foramen caecum), by articulation with the Ethmoid [1]. The foramen cecum varies in size in different subjects, and is frequently impervious. When open, it transmits the emissary vein from the nose to the superior sagittal sinus. This has clinical importance in that infections of the nose and nearby areas can be transmitted to the meninges and brain from what is known as the danger triangle of the face [2, 3].

Other studies described the location of foramen caecum in the frontal bone [2, 4]. Anteriorly this foramen is limited by the frontal bone while posteriorly by the front part of Crista galli. The lateral margins are limited by the Ethmoid ala[5]. Foramen caecum gives passage to emissary vein/veins which connects the extra cranial venous system with the intracranial venous sinuses. Different types of emissary veins are posterior condylid, mastoid, occipital and parietal emissary vein and these emissary veins have an imperative role in selective cooling of the head. It also serves as route for the transfer/carry infections into the cranium[6].

2. MATERIALS AND METHOD

For the present study on foramen caecum 43 dry skulls were taken from Department of Anatomy, Government medical college, Chandigarh. The skull with broken base and deformed shape were not included. The sex and origin of the skull could not be ascertained as skulls were part of the skeleton bought from market. The objective behind the study is to make an observation of presence/absence, patency and number of the foramen caecum in human skull of the region. Bifurcation of crita galli near the foramen cecum was also noted

3. RESULTS

Among the 43 dry skull bones foramen caecum was found in all cases but one. It was found patent in one case. There were numerous small foramina in one case. In two cases foramen caecum was very small as just short of complete obliteration. In remaining 38 dry skulls it showed presence of normal size foramen caecum (Table 1, Fig1). Bifurcation of Crista galli was not observed in any of the cases

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Fig 1-A – normal size Foramen cecum, B- Small size Foramen Cecum, C- multiple Foramen cecum , D- Patent Foramen Cecum
Table 1. Showing presence/absence, Number size and patency.

<table>
<thead>
<tr>
<th>Foramen Caecum</th>
<th>No of cases</th>
</tr>
</thead>
<tbody>
<tr>
<td>Presence</td>
<td>43</td>
</tr>
<tr>
<td>Absence</td>
<td>Nil</td>
</tr>
<tr>
<td>Normal size, single</td>
<td>38</td>
</tr>
<tr>
<td>Small, obliterated, single</td>
<td>2</td>
</tr>
<tr>
<td>Numerous</td>
<td>1</td>
</tr>
<tr>
<td>Patent, single</td>
<td>1</td>
</tr>
</tbody>
</table>

4. Discussion

The Anatomical knowledge of foramen caecum is important for understanding cause of several mid face and midline pathologic conditions of head as well as for planning surgical procedures for them.

During embryologic development, the foramen caecum contains a dural diverticulum which extends from the anterior cranial fossa to the dermal surface of the nose[7]. Normally, the dural diverticulum undergoes complete involution and the foramen cecum fills in with fibrous tissue and variably ossifies [8]. In a study by Hughes et al it was seen that ossification of the anterior cranial base at variable period in early few years. By the end of third year the anterior skull base was 100% ossified[1]. Thus, the foramen cecum is frequently found in infants, uncommonly in children, and rarely in adults where <1.5% of foramina remain open2.

In a study by Husimen TA[9] it was observed the foramen cecum persisted (giving passage to remnant of diverticulum) extending from a midline opening anterior to Crista galli. In earlier study by Barkowitch [10] a widened foramen cecum was interpreted as an intracranial extension. Along with the wide foramen cecum bifid crita galli was also found. It rarely transmits emissary venous channel (intra- or extra cranial) to the nasal cavity. This vein of foramen cecum is also described as vein connecting the nasal and paranasal mucosa to the superior sagittal sinus [9].

Vein of foramen cecum is normally found in animal like Mole [11].

5. Conclusion

A variety of midline nasal pathologies may occur along this transient embryologic communication like foramen cecum. It is always good to take help of imaging modalities like MRI in such cases to rule out any intracranial extension before doing any surgical interventions.

6. References

[5]. Foramen Cecum. Dr Danial bell, Dr Prashant Mudgal. Radiopedia 2019March 6 (cited 11 March 2019) available at Radiopedia.org