VARIATIONS OF THE POSTERIOR CONDYLAR CANALS

Jatin Goda1*, Shailesh Patel1, Laxmi Chandravadiya1, Srushti Rupareliya3, Shamin Patel4, Sanjay Chavda2

1Resident Doctor, 2Tutor, 3Associate Professor, 4Professor and Head, Department of Anatomy, Government Medical College, Bhavnagar.

ABSTRACT

BACKGROUND: To assess prevalence, normal anatomic patterns and variations of the condylar canal as the variations in course of vessels and in foramina of skull have importance for their correct identification as normal or abnormal. MATERIALS AND METHODS: 64 skulls were examined by direct observation from the Anatomy departments of the various medical colleges of Gujarat for the unilateral or bilateral presence or absence of the canal and for the presence of multiple canals or any other variations. RESULTS: The condylar canal was found bilaterally in 45 skulls (70.31%); unilaterally in 13 skulls (20.31%) and was absent in 6 skulls (9.38%). Double condylar canals were found unilaterally in 5 skulls (7.81%), 2 skulls (3.12%) showed septation in the posterior condylar canal. A higher prevalence of Intrasinus canal type was found (71.88%). Retrosinus canal type was found 8.59%. CONCLUSIONS: The posterior condylar canal in the occipital bone showed some differences, which may accompany variations in the posterior condylar veins. Knowledge of the anatomical relationships and variations of these veins is necessary not only for radiological diagnosis, but also when considering surgical or endovascular treatment of skull base diseases.

Keywords: Condylar emissary vein, Posterior condylar canal, Occipital bone

INTRODUCTION

The posterior condylar canal is the largest emissary foramen of the posterior cranial fossa. It is apparent just posteroinferior to the jugular foramen and posterior to the hypoglossal canal. The condylar canal gives way to a condylar emissary vein from sigmoid sinus to vertebral vein between the axis and atlas, in most cases or between the superior bulb of the internal jugular vein and suboccipital venous plexus. The venous system atrophies with the gradual change from fetal to neonatal circulation. This venous atrophy is accompanied by the bone canal closure; however, it persists in majority of the adult skulls.

The clinical relevance of these channels is that they provide alternative channel for venous drainage in the setting of venous obstruction, may enlarge secondary to vascular malformations and can act as a conduit for the spread of infections. Variations in posterior condylar canal may be associated with variations in posterior condylar vein which may be wrongly considered as pathological. So this study was planned to assess prevalence, normal anatomic patterns and variations of the condylar canal.

MATERIALS AND METHODS

This study was carried out on 64 dry human skulls from Anatomy Departments of the various medical colleges of Gujarat (Govt. Medical College, Bhavnagar, B.J. Medical College, Ahmedabad and NHL Medical College, Ahmedabad). The skulls were observed for presence or absence of condylar canals and for the presence of multiple canals or any other variations. The canal was classified as intrasinus type if it opens into sigmoid sulcus and retrosinus type if it opens behind the sigmoid sulcus. The data thus obtained was tabulated and separated with respect to sides. Analysis of the data was done using Microsoft excel worksheet.

RESULTS

Table-1 shows 8 types of combinations amongst canal, double Canals and septated canal including...
absence of all the features with their Incidences. Table-2 shows classification of canals with incidence of each type. Figure-1 shows variation in the form of double posterior condylar canal on right side. Figure-2 shows septation in the posterior condylar canal on left side.

Table 1: Types of combinations amongst canal, double canals and septated canal including absence of all the features with their incidences.

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Types of variations</th>
<th>Skull (Nos)</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>C C</td>
<td>38</td>
<td>59.37</td>
</tr>
<tr>
<td>2</td>
<td>C X</td>
<td>07</td>
<td>10.94</td>
</tr>
<tr>
<td>3</td>
<td>X C</td>
<td>06</td>
<td>9.38</td>
</tr>
<tr>
<td>4</td>
<td>X X</td>
<td>06</td>
<td>9.38</td>
</tr>
<tr>
<td>5</td>
<td>DC C</td>
<td>03</td>
<td>4.69</td>
</tr>
<tr>
<td>6</td>
<td>C DC</td>
<td>02</td>
<td>3.12</td>
</tr>
<tr>
<td>7</td>
<td>SC C</td>
<td>01</td>
<td>1.56</td>
</tr>
<tr>
<td>8</td>
<td>C SC</td>
<td>01</td>
<td>1.56</td>
</tr>
</tbody>
</table>

C = Canal X = Absence of all the features DC = Double canal SC = Septated canal

Table 2: Classification of canals

<table>
<thead>
<tr>
<th>Canal Type</th>
<th>n= 128</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intrasinus</td>
<td>92</td>
<td>71.88</td>
</tr>
<tr>
<td>Retrosinus</td>
<td>11</td>
<td>8.59</td>
</tr>
<tr>
<td>Absent</td>
<td>25</td>
<td>19.53</td>
</tr>
</tbody>
</table>

n= no. of observations.

DISCUSSION

The emissary veins redirect the blood outflow towards the vertebral venous system in the upright position. Some examples of such venous channels are sphenoid venous foramen (sphenoidal emissary vein), mastoid foramen (mastoid vein); parietal foramen (parietal emissary vein), condylar canal (condylar emissary vein). The condylar canal opens at the base of the skull just behind the occipital condyles. The patency of the channel depends upon the condylar emissary vein which runs along its path. Krause discovered condylar canal was present bilaterally in 21% and unilaterally in 38%. Ginsberg found this channel bilaterally in 55.9% and 17.6% unilaterally. Boyd found this channel 77% unilaterally. Galarza found intrasinusinal form 24.6% bilaterally, 17.8% on the right side and 13.5% on the left where as retrosinus form he found 1.2% bilaterally and 1.2% unilaterally on the right side. Kapakin reported doubled canal on right side. Berge & Bergman found that the posterior condylar canal was doubled in six of the 144 patent foramina (4%) and tripled in one case (<1%). In present study, condylar canal is found bilaterally in 70.31% and unilaterally in 20.31% of skulls. Double canal was found in 7.81% of skulls and 3.12% showed septation in the canal which might have been due to aberrant course of posterior condylar emissary vein or passage for the entry of an aberrant meningeal artery. However intrasinusal was the most prevalent form and it was present bilaterally in 60.94% of the skulls. There were 12.5% cases of intrasinusal type on the right side and 9.37% on the left. Retrosinusal form was found 7.81% on right side and 9.37% on the left. The condylar veins can be used as access routes to hypoglossal dural arteriovenous fistulas and transverse-sigmoid dural arteriovenous fistulas with occlusion of the jugular vein. Furthermore, dural arteriovenous fistulas can involve the condylar veins.

CONCLUSION

Posterior condylar canal shows some variations. Understanding their normal anatomy and variations is of clinical importance when considering endovascular treatments for posterior fossa dural arteriovenous fistulas, suboccipital craniotomy and they also have importance for their correct identification as normal or abnormal.

ACKNOWLEDGEMENTS

We gratefully acknowledge Dept. of Anatomy, B.J. Medical College, Ahmedabad and NHL Medical College, Ahmedabad for their support.
REFERENCES


