Anatomical Position of the Asterion and Its Underlying Structure

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Abstract

Surface anatomy is important for surgical planning. The asterion has been believed and used for locating the underlying posterior fossa dura. To prove whether this landmark is reliable or not, forty-three fixed heads of cadaver were dissected. A burr hole was made on the asterion and its underlying structure was examined. Seventy-four point four per cent (74.4%) of the asterion on the right side were adjacent to the transverse-sigmoid sinus complex when compared to 58.1 per cent on the left. Twenty-three point three per cent (23.3%) of the asterion on the right side were found over the infratentorial dura while that on the left side were 32.6 per cent. Two point three per cent (2.3%) of the asterion were located over the supratentorial dura on the right and 9.3 per cent on the left side. It is concluded, therefore, that the asterion is not an appropriate landmark to locate the underlying posterior fossa dura.

Key word : Asterion, Posterior Fossa, Skull Base Surgery, Anatomy

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Good knowledge of surface anatomy of the skull is very important for the planning of neurosurgery[1-7]. The surface anatomical landmark is used to locate the underlying structure as well as to avoid injury to the risky organ during operation. The asterion is one of the anatomical landmarks of the skull. It is the junction among the lambdoid, parietomastoid, and occipitomastoid sutures. The asterion has been believed to be related to the underlying posterior fossa dura[6,8]. Therefore, neurosurgeons make an initial burr hole on the asterion before performing a craniotomy in posterolateral cranial base surgery to approach the posterior fossa dura. Usually the burr hole is located on the trans-

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verse sigmoid sinus complex which can cause injury to the sinus.

In this study, skulls of Thai male and female cadavers were dissected to observe the asterion in relation to the underlying structures. The findings could be beneficial to surgeons in planning posterolateral cranial base surgery.

MATERIAL AND METHOD

Forty-three heads from 26 Thai male and 17 female embalmed cadavers were dissected. At the time of death, they were between 25 and 105 years of age. After the scalp was detached, the cavarium of each skull was removed to expose the posterolateral side of the skull. Both sides of the transverse sinus were measured to identify the dominant side. The asterion was then exposed and a 1 cm burr hole was made on it. The dura underlying the asterion was then further dissected. The structures underlying the burr hole were identified and classified as supratentorial dura, infratentorial dura, and transverse-sigmoid sinus complex.

RESULTS

The size of the right transverse sinus was between 4 cm and 13 cm with the mean size of 8.4 cm while that of the left transverse sinus was from 5 cm to 15 cm with the mean size of 10.5 cm. The right transverse sinuses of 32 cadavers were larger than the left while the left transverse of only 9 cadavers sinus were larger than the right. In addition, the right and left transverse sinuses of the remaining 2 cadavers were equal in size. The frequency of the asterion position in relation to the underlying structures is shown in Fig. 1.

DISCUSSION

The asterion has been believed to be a reliable landmark of the posterior fossa dura in posterolateral cranial base surgery[6,8]. Day and Tschabitscher questioned its being an indicator for posterior fossa dura[9]. They studied dried skulls and concluded that the asterion was not a strict and reliable landmark for locating the underlying posterior fossa dura. Most of the landmarks found in their study were located on the transverse-sigmoid sinus complex.

In our study, it was found on the right side that 74.4 per cent of the asterion was located over the transverse-sigmoid sinus complex while 58.1 per cent was observed on the left side. Two point three per cent (2.3%) of the asterion was located over the supratentorial dura on the right side and

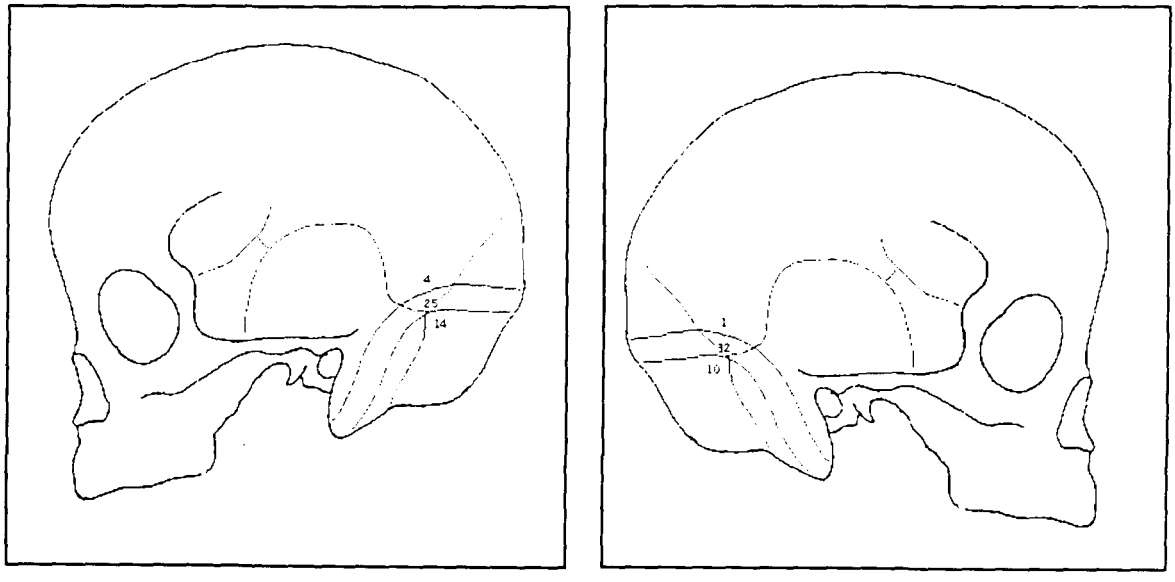

Fig. 1. Illustration of skulls showing the frequency of the asterion positions in relation to the underlying structures on the right side (right figure) and the left side (left figure).

9.3 per cent on the left side. Twenty-three point three per cent (23.3%) of the asterion was located at the posterior fossa dura on the right side and 32.6 per cent on the left side. As 77 per cent of the right transverse sinuses were larger than the left, it is more difficult to perform a craniotomy across the right sinus than across the left. In addition, the risk of injury to the right sinus was also higher than to the left. The finding, therefore, indicates that the asterion is not a reliable landmark for locating and making an initial burr hole to approach the posterior fossa dura. However, the asterion in more than half of the cadavers was found at the transverse-sigmoid sinus complex.

To avoid injury to the sinus, there are methods advocated by many neurosurgeons. Rhoton suggested that the initial burr hole should be made 2 cm below the asterion, two-thirds behind and one-third in front of the occipitomastoid suture[4]. Malis used 2 cm medial to the mastoid as the landmark to approach to the posterior fossa[10]. Sekhar described the line drawing from the inion to the base of the mastoid process and then turning obliquely along the posterior edge of the mastoid process as the transverse sinus and sigmoid sinus[7]. He made a burr hole inferior and medial to the transverse-sigmoid sinus junction. This site is usually posteroinferior to the asterion. Day et al used the superior nuchal line as a landmark to identify the distal transverse sinus and transverse-sigmoid sinus junction[9]. They made the burr hole inferior to this line and just behind the ridge of the body of the mastoid process.

SUMMARY

Forty-three fixed cadavers were dissected to study the relationship between the asterion and the underlying structures. It was found that the asterion was not a reliable landmark for approaching the posterior fossa dura even though most of these surgical landmarks were located over the mastoid process.

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ความสัมพันธ์ของแอสเตอเรียน กับอวัยวะภายในกะโหลกศีรษะ

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รอยต่อที่ผิวกะโหลกศีรษะมีความสำคัญต่อการวางแผนผ่าตัดสมองแอสเตอเรียน เป็นจุดพบกันของรอยต่อ parietomastoid, occipitomastoid และ lambdoid ซึ่งเชื่อว่าตรงกับเยื่อหุ้มสมองของส่วน posterior fossa เพื่อศึกษาถึงความแม่นยำในการใช้แอสเตอเรียน บอกตำแหน่งดังกล่าว ได้ชำแหละศีรษะจากศพจำนวน 43 ราย พบว่าแอสเตอเรียนตรงกับเยื่อหุ้มสมองส่วน posterior fossa ร้อยละ 23.3 ทางด้านขวาและร้อยละ 32.6 ทางด้านซ้ายแอสเตอเรียนตรงกับส่วน transverse-sigmoid sinus complex ร้อยละ 74.4 ทางด้านขวาและร้อยละ 58.1 ทางด้านซ้ายแอสเตอเรียนตรงกับเยื่อหุ้มสมองส่วน supratentorial ร้อยละ 2.3 ทางด้านขวาและร้อยละ 9.3 ทางด้านซ้าย จากผลที่ได้สรุปว่าแอสเตอเรียนไม่สามารถใช้เป็น ตำแหน่งที่บอกเยื่อหุ้มสมองส่วน posterior fossa และการเจาะรูกะโหลกที่แอสเตอเรียนมีโอกาสเกิดอันตรายต่อ venous sinus ได้

คำสำคัญ : กายวิภาคศาสตร์, การผ่าตัดบริเวณฐานกะโหลก, รอยต่อแอสเตอเรียน

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