Anatomical study

Is the asterion a reliable landmark for the lateral approach to posterior fossa?

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Summary An anatomical study was conducted to gain orientation regarding the posterolateral approaches. The asterion is defined as the junction of the lambdoid, parietomastoid, and occipitomastoid sutures. This anatomical point has been widely used as a landmark in lateral approaches to posterior fossa. Although there are many common practices in posterolateral approaches, studies providing accurate anatomical knowledge as to what is the correct point to start a craniotomy are limited in number. Therefore, this study was conducted in an attempt to determine the reliability of the asterion for the posterolateral approaches as surgical landmark. © 2001 Harcourt Publishers Ltd

INTRODUCTION

It is highly important for the surgeon to know where the correct localization of the initial burr hole for the lateral approach of the posterior fossa. Correct orientation for any approach begins with consideration of surface anatomical landmarks. If these landmarks are chosen properly, the correct way of gaining access to the lesion can be achieved. Hence, the first step to a successful operation will have been taken. In approaches to the posterior fossa these landmarks are highly required because of their close relation to the transverse sigmoid sinus.¹–³ The asterion is defined as the junction of the lambdoid, parietomastoid, and occipitomastoid sutures, and it has been advocated as a primary landmark in performing many kinds of posterolateral surgery. Due to its natural variability in location, its reliability can be a debatable issue. Therefore, this study was designed to determine the reliability and usefulness of the asterion as a surgical landmark for lateral approaches of the posterior fossa.

MATERIAL AND METHODS

Fifty dried adult human skulls were obtained from the Department of Anatomy for this study. A 2 mm drill bit was externally placed over the asterion, and the asterion was drilled through the bone perpendicular to the skull surface. Then, the position of the drill hole was determined on the inner surface. In order to record the position of the asterion a 3 cm grid centered over the transverse sinus and upper curve of the sigmoid sinus was used. The position was determined to fall within 1 cm² segments.

RESULTS

Asterion was located over a portion of the transvers-sigmoid sinus complex in 54% (27), above the transverse-sigmoid sinus complex in 2% (1), and over the posterior fossa dura in 44% (22). The results are also recorded for both the right and left side and summarized in Fig. 1.

DISCUSSION

It is an indisputable fact that the success in surgical strategy and planning mainly relies on the surgeon’s concrete knowledge of the superficial anatomy. Owing to the recent innovations in the microsurgical techniques and technological advances, large craniotomies have been replaced by less invasive key-hole craniotomies. Starting the craniotomy at the right point can provide advantages in the approaches where the key-hole technique in craniotomy is used. Gaining the right orientation even at the initial stages of the surgery, prevention of a large craniotomy, providing shorter surgery time, and avoiding serious complications such as sinus injuries are the advantages mentioned above.²–⁴ Even though lateral approaches to posterior fossa are widely used, a clear concept of these approaches has not yet been established and enlightening anatomical studies on the same issue remain limited. In these current approaches the planning phase are done through the surgeon’s personal experiences. Therefore, each surgeon determines a safe point to start the craniotomy for himself. This study aims at providing a knowledge of the anatomical orientation for the lateral approaches to posterior fossa which are widely used in neurosurgical practices and contribute to the relevant data pool.

Posterior fossa craniotomies can constitute a risk of injury to the sinus complex due to its location which is either in a groove in the bone or adherent to the bone, and attached by the emissary
vein. Positioning the initial burr hole away from the asterion is expected to reduce the risk of lacerating the sinus complex to a negligible level by using the method advocated by Rhoton. According to this method, the hole is positioned 2 cm below the asterion, two-thirds behind and one-third in front of the occipitomastoid suture. Similarly, in a study of Day et al., asterion was over transverse-sigmoid sinus in 61% of the skulls. Sekhar supports the use of a two-burr hole technique in which the first burr hole is placed superolaterally, and the second is placed inferomedially. In his experience, the site of the first burr hole is described as one which is usually posteroinferior to the asterion and not used as a landmark. The second burr hole is made at the most inferomedial corner of the desired bone exposure. Therefore, while the exposure of the edge of the sinus complex is achieved, no injury is given to the dura. In our study the results were somewhat similar to the study of Day et al. in that asterion was over the transverse-sigmoid sinus complex in 55% of the skulls. This indicates that the sinus complex can easily be lacerated in more than half of the cases if the asterion is selected as a landmark in the lateral approaches to posterior fossa. Thus, the results of this study show that asterion is not a safe landmark to be used in the retrosigmoid approaches, and starting the craniotomy medially and 2 cm below the asterion can reduce the risk of injury to the sinus complex to a great extent.

REFERENCES