

Relationship of the Transverse Sinus and Sigmoid Sinus to Surface Landmarks

Justin Burrell; Alexander Evins; Alejandro Santillan MD; Collin Tebo; Philip E. Stieg MD, PhD; Antonio Bernardo MD

Department of Neurological Surgery Weill Cornell Medical College



Introduction

The transverse sinuses receive blood from the temporal, parietal, and occipital lobes. Therefore, the identification of surface landmarks related to the transverse sinus and sigmoid sinus (Figure 1) is useful in planning posterolateral approaches to the cranial base in order to avoid potentially severe complications.

Figure 1. Posterior Dural Sinuses.



The transverse sinus lies deep to the superior nuchal line between the inion and the asterion. The asterion, defined by the convergence of the lambdoid, occipitomastoid, and parietomastoid sutures, typically overlies the transversesigmoid sinus junction.

Methods

10 adult cadavers (20 sides) underwent dissection of the transverse sinus and sigmoid sinus to study their relationship to surface anatomic structures. Several external landmarks were exposed such as the root of the zygoma, the mastoid tip, the mastoid groove, the inion, the asterion, the superior nuchal line, the lambdoid, parietomastoid, and occipitomastoid sutures, and the spine of Henle (Figure 2). Measurements of the distance from these external landmarks to the transverse sinus and sigmoid sinus were made. The exposed surgical targets were also evaluated with a BrainLab neuronavigation system.

Figure 2. The Right Transverse and Sigmoid Sinuses.



Results

Despite the high degree of anatomic varience seen with these structures, there were several bony landmarks, readily palpable through the skin overlying the occipital and mastoid areas, which were helpful in identifying the course of the transverse and the sigmoid sinuses. The transverse sinus was found to lie deep to the superior nuchal line between the inion and the asterion (Figures 3 and 4). The asterion, defined by the convergence of the lambdoid, occipitomastoid, and parietomastoid sutures, was found to overlie the transverse-sigmoid sinus junction. We accurately correlated anatomical measurements, surgical

dissections, and neuronavigation readings and identified a few additional external landmarks which are helpful in locating, with resonable accuracy, deeper structures and in planning the approach.

Figure 3. The Right Transverse and Sigmoid Sinuses and its Surface Landmarks.



Figure 4. Left Transverse-Sigmoid Junction.



Conclusions

The localization of the lateral transverse sinus and sigmoid sinus based on superficial anatomical landmarks is paramount in order to avoid potentially catastrophic lacerations of the posterior fossa venous sinuses. We identified reliable external landmarks related to the venous sinuses which can be helpful in planning combined posterior fossa and lateral cranial base surgical approaches.

Learning Objectives

By the conclusion of this session, participants should be able to identify surface landmarks for the transverse and sigmoid sinuses.

References

- 1. Day J. Neurosurgery. 1996;38(6):1079-1084.
- 2. Avci E. Surg Neurol. 2003;59(5):392-397.
- 3. Ziyal IM. *J Neurosurg*. 2001;94:686-687.
- 4. Tubbs RS. J Neurosurg. 2000;93(2):279-281.
- 5. Day J. *Neurosurgery*. 1998;42(1):198-199.