

Incidence of Venous Sinuses within the Tentorium Cerebelli in 100 Cases of Autopsy

L. Sankar¹, Parthiban Durai Samy²

Abstract

Introduction: The tentorium is a membrane which covers the cerebellum. It separates the cerebrum from the cerebellum. The term tentorium was first coined by Winslow. The tentorium is attached to the temporal, occipital, and sphenoid bones. All of the tentorial margins, except the free edges bordering the incisura, are rigidly attached to the cranium. The anterior border is attached to the petrous ridge. The lateral and posterior borders are attached to the inner surface of the occipital and temporal bones along the internal occipital protuberance and to the edges of the groove for the transverse sinus. **Aim of the Study:** To determine the incidence of venous sinuses within the tentorium cerebelli. Identify the location, configuration and size of the sinuses within the tentorium. **Materials and Methods:** In this study, 100 human cadaveric brains of both male and female that underwent autopsy within 12-48 hrs after death were studied in the year 2016-2018 in Department of Neurosurgery, Government Mohan Kumaramangalam Medical College, Salem. Skullcap was opened in a circular manner. The frontal lobes were lifted after opening the dura mater and the anterior falx was cut. The brain stem was cut axially just above the level of tentorial incisura. **Results:** Variations of tentorial venous sinus in cadaver cerebellar tentoria were examined in 100 autopsies. Venous sinuses were present in tentorium in 91 (91%) cadavers and absent in 9 cadavers. There were 145 tentorial venous sinuses in 91 cadavers. Of these sinuses, 81 (55.9%) occurred on the left side, 64 (44.1%) occurred on the right side. **Conclusion:** Incidence of venous sinuses in tentorium cerebelli is 91%. Middle one-third of tentorium cerebelli is the least vascular portion. These findings will be useful for procedures that require sectioning of the tentorium. These sinuses serve as important collateral channels when the straight sinus or torcular herophili is occluded by pathological processes.

Keywords: Tentorium Cerebelli; Venous Sinus; Skull Injury; Congenital Malformations of the Brain.

Introduction

The tentorium is a membrane which covers the cerebellum. It separates the cerebrum from the cerebellum. The term tentorium was first coined by Winslow. He called it as la tente. Tent means something covers rather than supports. The tentorium is attached to the temporal, occipital, and sphenoid bones [1]. All of the tentorial margins, except the free edges bordering the incisura, are rigidly attached to the cranium.

The anterior border is attached to the petrous ridge. The lateral and posterior borders are attached to the inner surface of the occipital and temporal bones along the internal occipital protuberance and to the edges of the groove for the transverse sinus. The anterior end of each free edge is attached to the petrous apex and the anterior and posterior clinoid processes [2]. The attachment to the petrous apex and the clinoid processes forms three dural folds: the anterior and posterior petroclinoid folds and the interclinoid fold. Between these folds, the oculomotor trigone is located, through which the oculomotor and trochlear nerves enter the sinus. The posterior petroclinoid fold extends from the petrous apex to the posterior clinoid process. The anterior petroclinoid fold extends from the petrous apex to the anterior clinoid process [3]. The interclinoid fold covers the ligament extending from the anterior to the posterior clinoid process. The oculomotor nerve penetrates the dura in the central part of this triangle, the oculomotor triangle,

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and the trochlear nerve enters the dura at the posterolateral edge of this triangle [4]. The tentorial sinus as described here, however, may have a protracted existence developmentally and may endure permanently [5]. The relationship between the tentorial sinus of adults and that of the human embryo is not firmly established. However, as suggested by Lasjaunias and Raybaud, the tentorial sinus described above probably represents one of the several possible modes of the persistence of the embryonic arrangement [6]. Rapid increase and a decrease in the inner diameter of the transverse sinuses frequently results in irregular inner diameters and irregular margins of the transverse sinus. Pouches of the dural sinus may be formed and may extend from the transverse sinus into the convexity dura or the tentorial dura. These pouches may receive cortical veins from the convexity or from the undersurface of the temporo-occipital lobes. Because most of the tentorial venous sinuses encountered in this study were observed to drain into the torcular hemophilia, transverse sinus, and the junction of the transverse sinus and superior petrosal sinus, it is possible that they may represent outpouching of the transverse sinus [7].

Materials and Methods

In this study, 100 human cadaveric brains of both male and female that underwent autopsy within 12-48 hrs after death were studied in the year 2016-2018 in Department of Neurosurgery, Government Mohan Kumaramangalam Medical College, Salem. Exclusion criteria: 1. Head injury 2. Intracranial pathology 3. Accidental distortion during dissection Skullcap was opened in a circular manner. The frontal lobes were lifted after opening the dura mater and the anterior falx was cut. The brain stem was cut axially just above the level of tentorial incisura. The cerebral hemispheres were removed and the tentorium was inspected macroscopically for the presence of venous sinuses. The size, configuration, location, and pattern of venous drainage were noted. Subsequently, the brain stem and cerebellum were removed through the tentorial incisura, and the tentorium was inspected again. This was performed to avoid confusing the veins on the surface of the cerebellum with venous sinuses, which was possible especially when the tentorium was thin. In addition, the tentorial sinus was opened, and a probe was passed inside to confirm its presence. An imaginary line drawn horizontally at the junction of the superior petrosal sinus and transverse sinus was used to divide the

tentorium arbitrarily into anterior and posterior portions. And again the tentorium was arbitrarily divided into medial one-third, middle one-third, lateral one-third in relation to the transverse sinus.

Results

Table 1: Incidence of Tentorial Venous Sinus

Total no.of cadavers studied	Tentorium with venous sinuses
100	91

Variations of tentorial venous sinus in cadaver cerebellar tentoria were examined in 100 autopsies. Venous sinuses were present in tentorium in 91(91%) cadavers and absent in 9 cadavers (Table 1).

Table 2: Frequencies of Bilateral Venous Sinuses

Total no.of cadavers with tentorial venous sinuses	Bilateral venous sinuses	Unilateral venous sinuses
91	33 (36.3%)	58 (63.7%)

Only one tentorial venous sinus was encountered in the anterior portion of tentorium cerebelli. The sinuses were bilateral in 33 (36.3%) cadavers and more than 2 sinuses encountered in 16 cadavers. Unilateral venous sinuses were seen in 58 cadavers (63.7%) (Table 2).

Table 3: Frequencies of Venous Sinuses in Left and Right Side of Tentorium

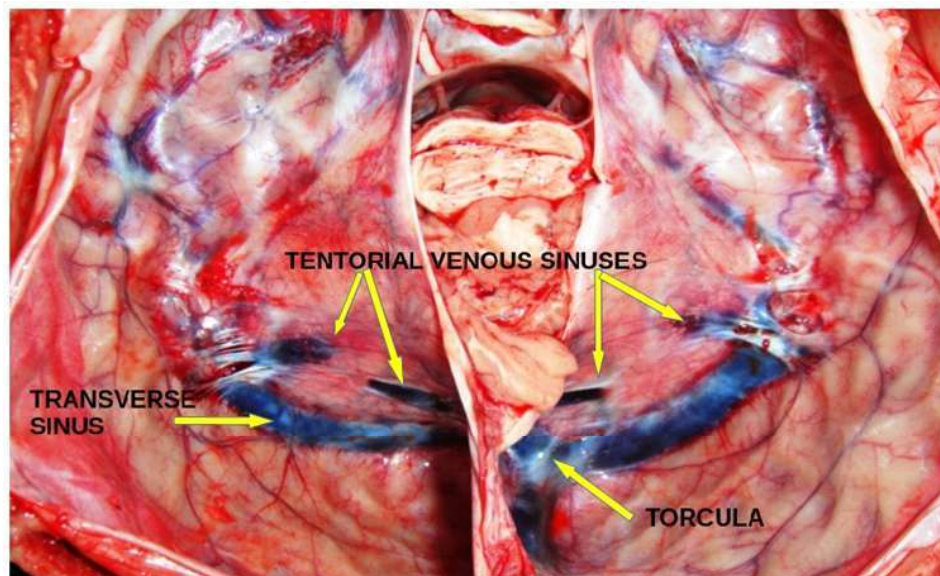
Total no. of venous sinuses	Left side	Right side
145	81(55.9%)	64(44.1%)

Among the cadavers, totally venous sinuses were 145. Left side affected venous sinuses were 81(55.9%) in right side 64 (44.1%). in our study right side venous sinuses were compared to the left side (Table 3).

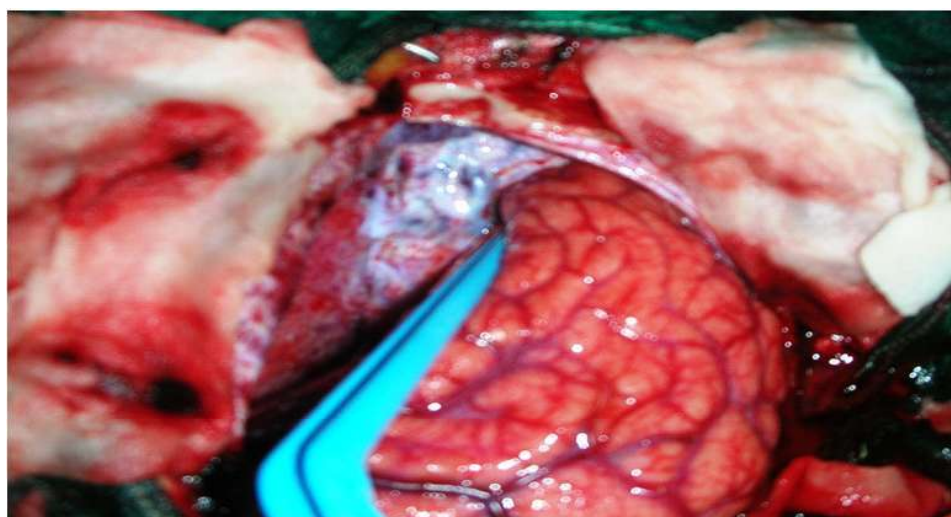
Table 4: Frequencies of Venous Sinuses by Location in Tentorium

Medial one-third of the tentorium	Middle one-third of the tentorium	Lateral one-third of the tentorium
69	10	58

An imaginary line drawn horizontally at the junction of the superior petrosal sinus and transverse sinus was used to divide the tentorium arbitrarily into anterior and posterior portions. And again the tentorium was arbitrarily divided into medial one-third, middle one-third, lateral one-third on corresponding to the transverse sinus. The frequency of location of venous sinuses are 69 in Medial one-third of tentorium, 10 was in Middle one-third of tentorium, 58 Lateral one-third of the tentorium (Table 4).



Picture 1: Cadaveric Picture of Tentorial Venous Sinus



Picture 2: Intra Operative Picture of Tentorial Venous Sinus

Discussion

Traditionally, anatomists, pathologists, and clinicians have devoted their attention to the major intracranial venous sinuses. Following in their footsteps, neurosurgeons have become knowledgeable regarding the size, course, and tributaries of the major venous sinuses. Knowledge of the variations of the dural venous sinuses is important to distinguish normal variations from pathological processes. However, until recently, venous sinuses in the tentorium cerebelli received scant attention in the textbook of neuroanatomy, neurosurgery and even in the literature. Gibbs and Gibbs, in their study on the torcular and lateral sinuses, seem to have been the first to describe

tentorial sinuses. They observed two sinuses in the tentorium which received blood from the superior cerebellar veins and emptied into the transverse sinus near the straight sinus [8]. After their report, the tentorial sinuses were noted in studies of the dural sinuses near the torcular. Miami Z et al. studied the presence of venous channels in the tentorium by injecting a Vinylite-acetone mixture and then producing corrosion casts. They observed that venous channels are extremely common in the tentorium [9]. They also noted that, in most instances, the least vascular part of the tentorium is its middle portion. They suggested that in addition to phlebographic studies, the presence and the course of these venous channels could be established intraoperatively by jugular

compression [10]. Osaka K et al. In his study of the anatomic variations of the venous sinuses in the region of the torcular herophili, the presence of venous sinuses within the tentorium cerebelli. reported that in 10% of healthy patients, the straight sinus communicates with the lateral sinus by means of tentorial veins [11]. Raybaud CA. reported that each half of the tentorium had two consistent, but frequently asymmetrical, sinuses, the medial and lateral tentorial sinuses. The medial sinuses received the superficial veins of the cerebellum and drained into the junction of the straight and transverse sinuses, and the lateral tentorial sinuses received the veins of the lateral surface of the temporal and occipital lobes and drained into the transverse sinuses [12]. Saxena Rc et al. studied the termination of Labbé's vein and observed that in 73% of the cases, Labbé's vein reaches the transverse sinus through a tentorial sinus. Information about the termination of the inferior anastomotic vein of Labbé is of crucial importance in the subtemporal neurosurgical approach and its modifications. By dissecting the vein of Labbé out of its dural bed and shifting its fixation point, microsurgical access is facilitated considerably [13]. Vidyasagar C et al. studied 23 cadavers using a retrograde venous injection of a mixture of Rhodopas and lead tetroxide and observed that the tentorial sinus was present in more than half of the cases and considered this sinus as a true sinus, principally draining the superior and inferior hemispheric veins of the cerebellum [14]. He also noted the tentorial sinus traversed the posterior portion of the tentorium cerebelli and opened into the lateral or straight sinus [15].

Conclusion

Middle one-third of tentorium cerebelli is the least vascular portion. These findings will be useful for procedures that require sectioning of the tentorium. These sinuses serve as important collateral channels when the straight sinus or torcular hemophilia is occluded by pathological processes. Rapid increase and decrease in the inner diameter of the transverse sinuses frequently results in irregular inner diameters and irregular margins of the transverse sinus.

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