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Cadaveric Study of Anatomical Variations in Tentorial Venous Sinus in South Tamil Nadu

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ABSTRACT

Aim:

To determine the frequency location, configuration and pattern of drainage of venous sinuses within the tentorium cerebelli.

Background:

Sectioning of the tentorium is done in neurosurgical procedures like transoccipital transtentorial, infratentorial supracerebellar, and subtemporal transtentorial approaches.

Knowledge of the anatomical variations of tentorial venous sinus is important to decide the direction of incision and appropriate method of hemostasis to reduce venous congestion and bleeding.

Methodology:

This study of tentorial venous sinuses and its variations is a cadaveric study. 100 cadavers from the Forensic Medicine Department, Tirunelveli Medical College were included in the study. Bicoronal scalp incision made, cerebral hemispheres removed; tentorium inspected for presence of venous sinuses. Depending on their size, configuration, location and pattern of drainage, the tentorial venous sinuses are classified into four groups.

Results:

Tentorial Venous sinuses present in 92(92%) cadavers and absent in 8 cadavers. There were 146 tentorial venous sinuses in 92 cadavers. Of these sinuses, 88(60.2%) occurred on left side, 58(39.7%) occurred on right side. More sinuses present in the left side.

The sinuses were bilateral in 29(31.5%) cadavers. The sinuses were unilateral in 63(68.4%) cadavers.

Conclusion:

In this cadaveric study the incidence of tentorial venous sinus is 89%. Middle one-third of tentorium cerebelli is the least vascular Portion. More sinuses present in leftside of tentorium. Findings are essential for procedures of sectioning of the tentorium.

Keywords: Venous Sinus, Tentoriumcerebelli

I. INTRODUCTION

Sectioning of the tentorium is done in certain neurosurgical procedures such as transoccipital transtentorial, infratentorial supracerebellar, and subtemporal transtentorial approaches. Knowledge of the anatomical variations of tentorial venous sinus is important to decide the direction of incision and appropriate method of hemostasis to reduce venous congestion and bleeding.

AIM OF STUDY

To determine the frequency location, configuration and pattern of drainage of venous sinuses within the tentorium cerebelli.

II. REVIEW OF LITERATURE

Anatomy of the Tentorium cerebelli

The tentorium is a membrane which covers the cerebellum3. It separates the cerebrum from the cerebellum. The term tentorium was first coined by Winslow. He called it as la tente4. Tent means something covers rather than supports. The tentorium is attached to temporal, occipital, and sphenoid bones. All of the tentorial margins, except the free edges bordering the incisura, are rigidly attached to the cranium5. 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.

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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; 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, and the trochlear nerve enters the dura at the posterolateral edge of this triangle. The petro sphenoid ligament passes between the leaves of the posterior petroclinoid fold from the petrous apex to the lateral border of the dorsum sellae, just below the posterior clinoid process6. The abducens nerve passes below the petro sphenoid ligament to enter the cavernous sinus.

From the anterior part of the free edge, the dura mater slopes steeply downward to form the lateral wall of the cavernous sinus and to cover the middle cranial fossa. The attachment of the anterior end of the free edge to the petrous apex may be situated as much as 10 mm lateral and 8 mm below the level of the clinoid processes. The low position of the free edge may facilitate descending tentorial herniations. The falx cerebri fuses into the dorsal surface of the tentorium in the midline behind the apex. The straight sinus is enclosed in the falcotentorial junction. It begins at the tentorial apex, where it receives the vein of Galen and of the inferior sagittal sinus, and terminates in the torcular sinus.

III. MATERIALS AND METHODS:

This study of tentorial venous sinuses and its variations is a cadaveric study. 100 cadavers from the Forensic Medicine Department, Tirunelveli Medical College were included in the study. As routine method of forensic cadaveric examination, the bicoronal scalp incision made. Skull vault was opened in circular manner. The frontal lobes were lifted after opening the duramater and the anterior falx was cut. The brain stem cut axially just above the level of tentorial incisura. The cerebral hemispheres removed and the tentorium was inspected macroscopically for the presence of venous sinuses. The location, configuration and pattern of venous drainage were noted. An imaginary line drawn horizontally at the junction of transverse sinus and the superior petrosal sinus was used to divide the tentorium arbitrarily into anterior and posterior portions. Depending on their size, configuration, location and pattern of drainage, the tentorial venous sinuses are classified into four groups.

Group One(I): Venous sinuses draining in medial-third of tentorium cerebelli
Type a: Sinuses draining into straight sinus
Type b: Sinuses draining into torcular sinus
Type c: Sinuses draining into medial-third of transverse sinus
Group Two(II): Venous sinuses in middle-third of tentorium cerebelli
Group Three(III): Venous sinuses in lateral one-third of tentorium cerebelli
Group Four(IV): Venous ring pattern

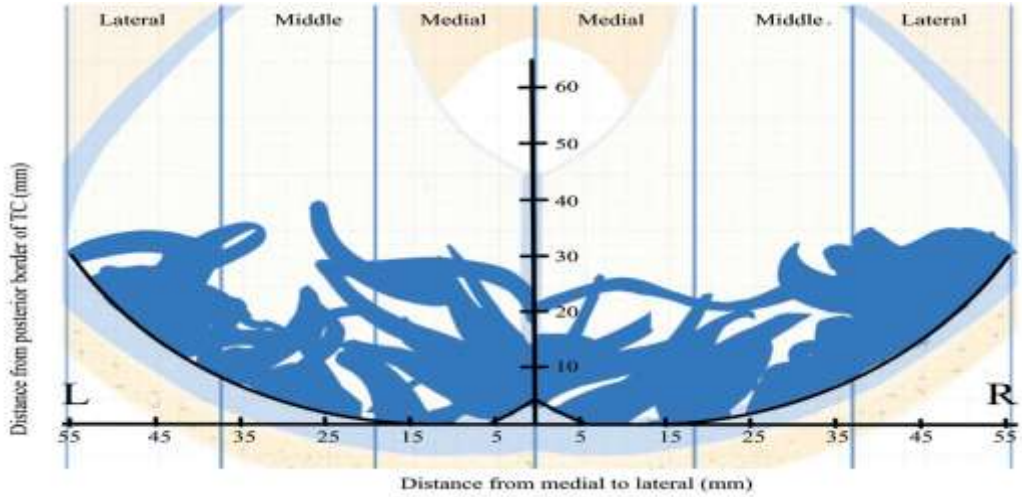

Figure 1: Graphic illustration is showingthe location density of all tentorial sinuseson 48 sides. Tentorial sinuses are denserin the medial and lateral regions andrelatively less dense in the middle region.

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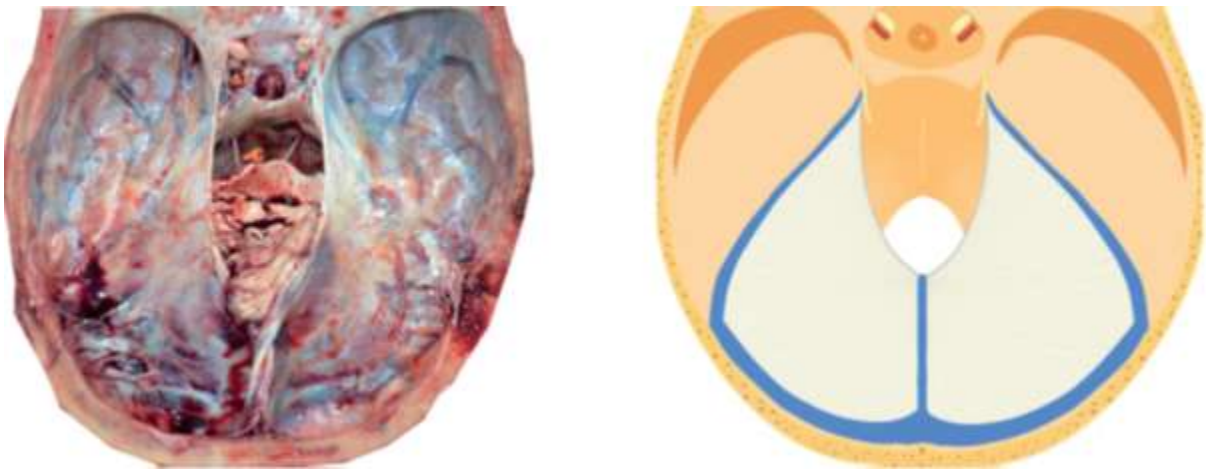

Figure 2: Dissection photo of cadaver 4 **(A)**, and its illustration **(B)** showing no tentorial sinuses.

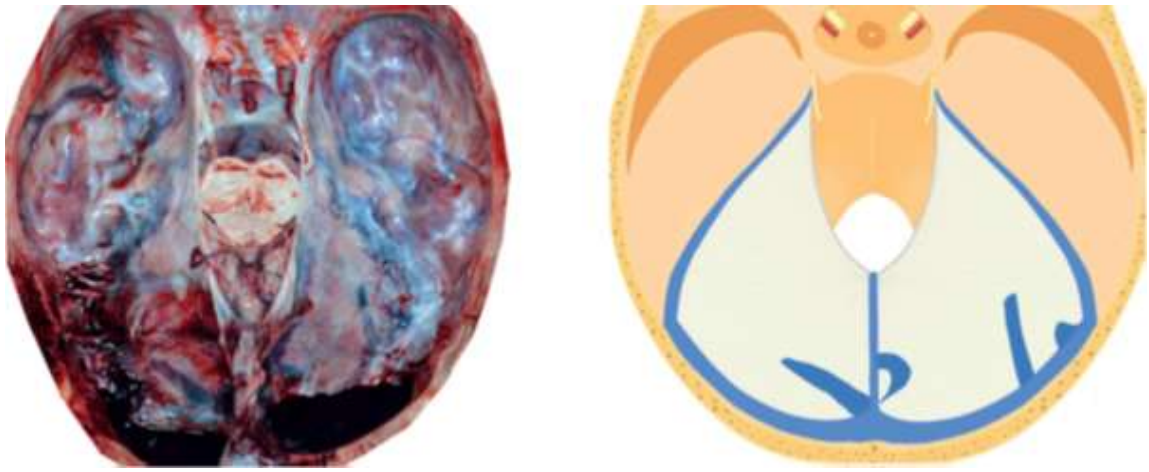

Figure 3: Dissection photo of cadaver 3 **(A)**, and its illustration **(B)** showing a medial tentorial sinus on the left side and both medial and lateral tentorial sinuses on the right side.

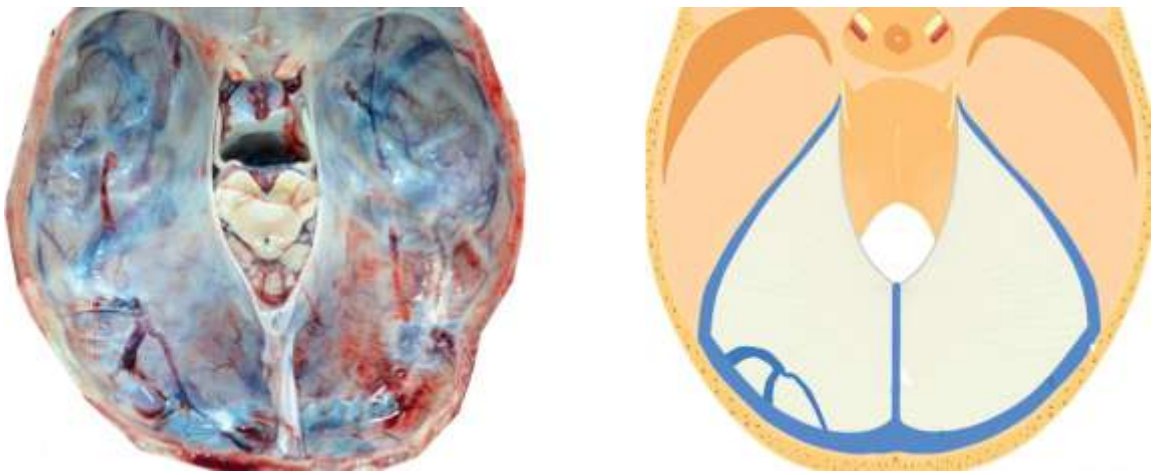

Figure 4: Dissection photo of cadaver 24 **(A)**, and its illustration **(B)** showing a middle-lateral tentorial sinus on the left side.

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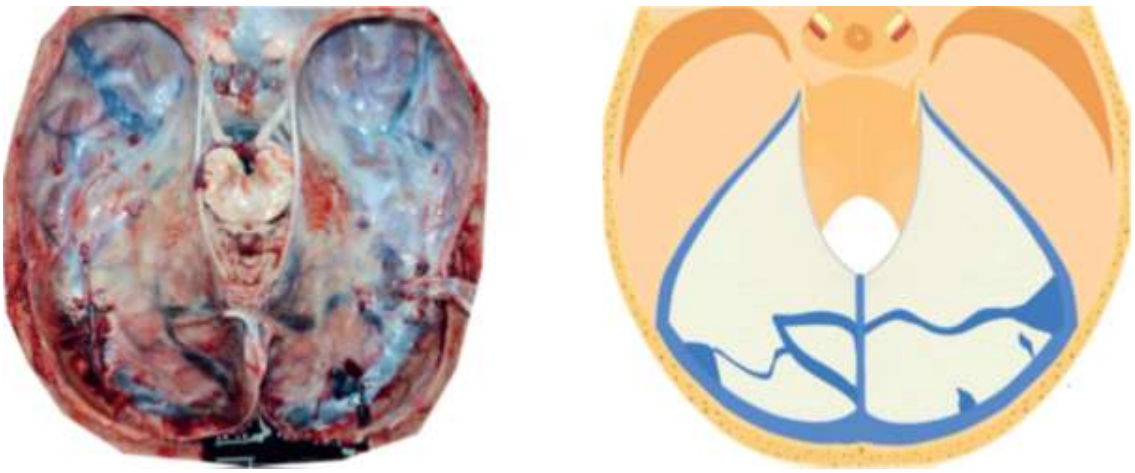

Figure 5 Dissection photo of cadaver 14 **(A)**, and its illustration **(B)** showing a ring-shaped tentorial sinus in all tentorial areas.

RESULTS OF THE STUDY:

Anatomical variations of tentorial venous sinuses in cadaver were examined in 100 autopsy in Tirunelveli medical college. Tentorial venous sinuses were present 92(92%) cadavers absent in 8(8%) cadavers.

There are 146 tentorial venous sinuses in 92 cadavers.

Of these sinuses, 88 (60.2 %) occurred in left side, 58(39.7%) occurred on right side.

More sinuses present on left side.

Among 92 cadavers, sinuses were bilaterally present in 29(31.5%) patients and unilaterally present in 63(68.4%) cadavers. More sinuses present unilaterally.

The tentorial venous sinuses in tentorium cerebelli were classified into 4 groups depending on their location, configuration, and pattern of venous sinus drainage.

Group1: venous sinuses in medial one-third of tentorium cerebelli
Type a: sinuses draining into straight sinus
Type b: sinuses draining into torcular sinus
Type c: sinuses draining into medial one-third of transverse sinus
Group2: venous sinuses in middle one-third of tentorium cerebelli
Group3: venous sinuses in lateral one-third of tentorium cerebelli
Group 4: venous ring pattern

Group1: venous sinuses in medial one-third of tentorium cerebelli

Group		No.of Sinuses	Percentage
A		74	50.6%
	a	22	29.72%
	b	45	60.8%
	c	7	9.4%
B		9	6.1%
C		55	37.6%
D		8	5.4%

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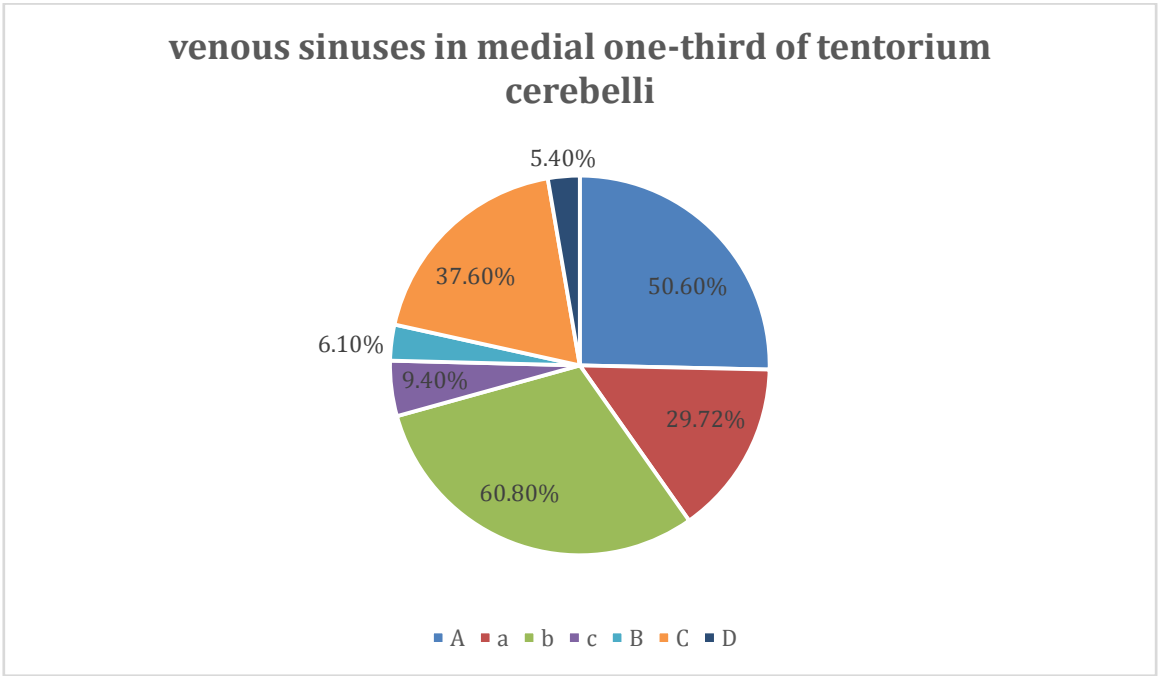
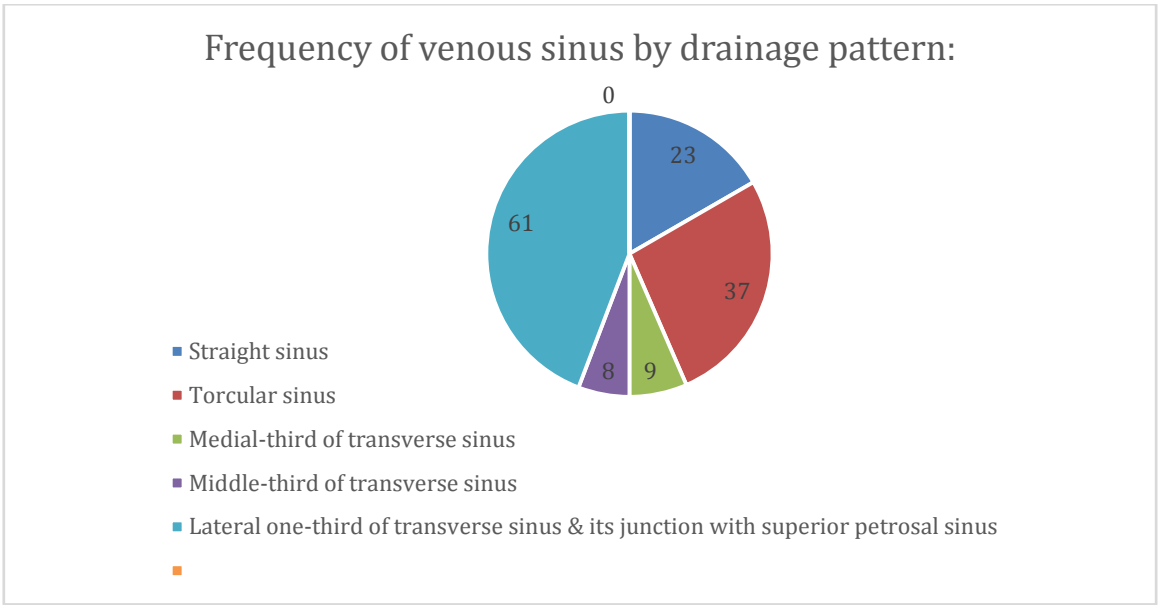


Frequency of venous sinus by drainage pattern:

Straight sinus	**23**
Torcular sinus	**37**
Medial-third of transverse sinus	**9**
Middle-third of transverse sinus	**8**
Lateral one-third of transverse sinus & its junction with superior petrosal sinus (Venous ring pattern excluded)	**61**
P value	**<0.001**



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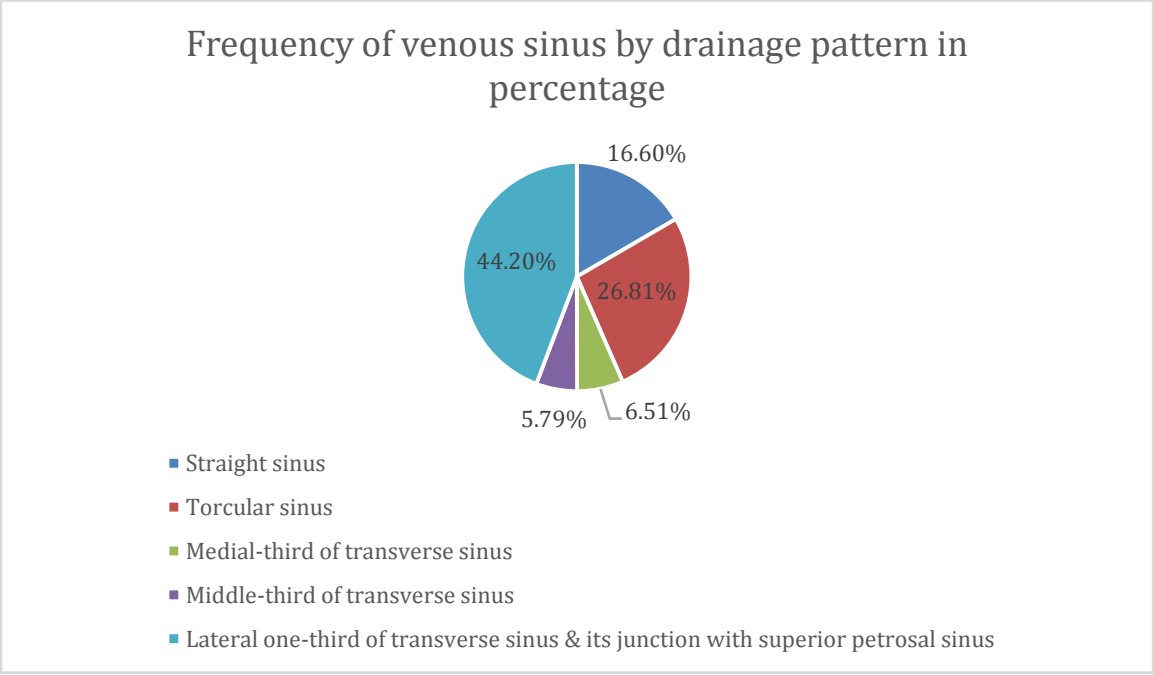
Frequency of venous sinus by drainage pattern in percentage

Straight sinus	16.6%
Torcular sinus	26.81%
Medial-third of transverse sinus	6.51%
Middle-third of transverse sinus	5.79%
Lateral one-third of transverse sinus & its junction with superior petrosal sinus (Venous ring pattern excluded)	44.2%
P value	**<0.001**

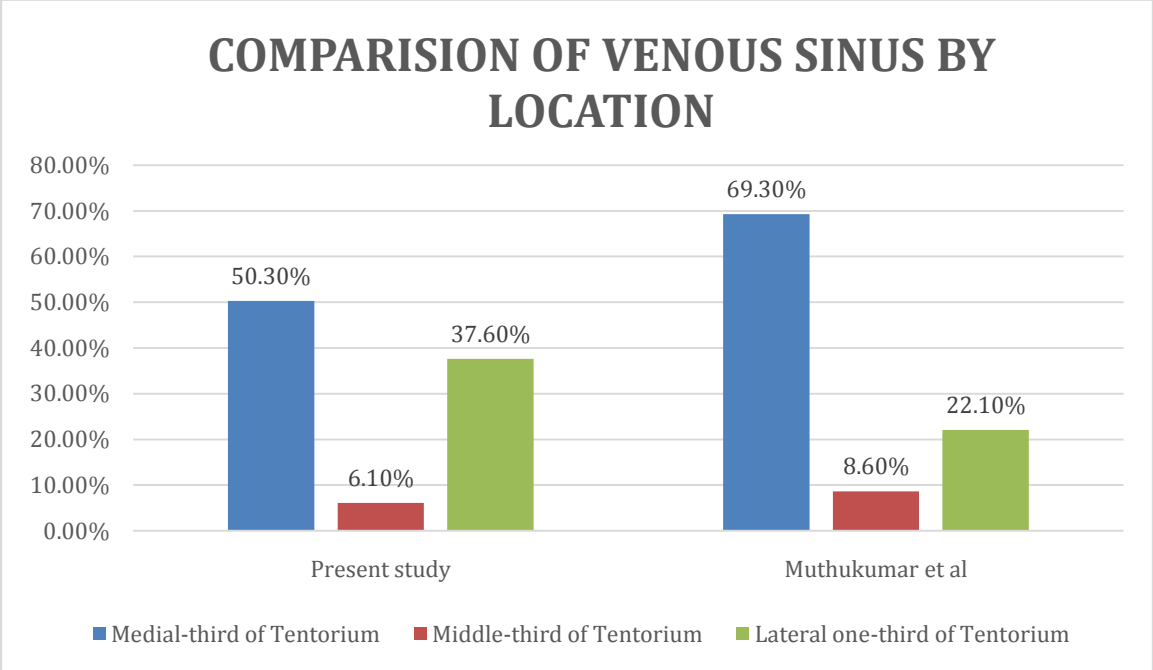


IV. DISCUSSION

Knoledge of the variations of dural venous sinuses are important to distinguish normal variations from pathological processes.

COMPARISION OF VENOUS SINUS BY LOCATION

Studies	Medial-third of Tentorium	Middle-third of Tentorium	Lateral one-third of Tentorium
Present study	50.3%	6.1%	37.6%
Muthukumar et al	69.3%	8.6%	22.1%



V. CONCLUSION

1. In this cadaveric study the incidence of tentorial venous sinus is 92%
2. The tentorial venous sinuses in tentorium cerebelli were classified into 4 groups depending on their location, configuration, and pattern of venous sinus drainage.

Group1: venous sinuses in medial one-third of tentorium cerebelli
Type a: sinuses draining into straight sinus
Type b: sinuses draining into torcular sinus
Type c: sinuses draining into medial one-third of transverse sinus
Group2: venous sinuses in middle one-third of tentorium cerebelli
Group3: venous sinuses in lateral one-third of tentorium cerebelli
Group 4: venous ring pattern 3.50.6% of tentorial venous sinuses are located in medial-third of tentorium cerebelli, 6.1% in middle third of tentorium cerebelli,37.6% in lateral third of tentorium cerebelli.(venous ring pattern is excluded).
4.Middle one-third of tentorium cerebelli is the least vascular portion.
5.More sinuses present in left side of tentorium than the right.
6.These findings will be useful for procedures that require sectioning of tentorium.
7.These sinuses serve as important collateral channel when the straight sinus or torcularherophili is occluded by pathological process.
8.They also play an important role in several vascular & conginental malformations of the brain.

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