

# “From Above And Below”: The Surgical Anatomy Of Interhemispheric Transtentorial And Supracerebellar Infratentorial Approaches To Access The Pineal Region - A Cadaveric Dissection

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## Background

The surgical approaches to lesions located in the pineal region, arising in the quadrigeminal cistern or cerebellomesencephalic fissure, are challenging due to rich neurovascular content of this region. The quadrigeminal cistern is situated posterior to the quadrigeminal plate and communicates inferiorly into the cerebellomesencephalic fissure, which is related to the roof of the fourth ventricle. The supracerebellar infratentorial (SCIT) and interhemispheric transtentorial (IHTT) approaches are classic techniques used to access this region. The objective of this study is to review the surgical anatomy of such approaches and evaluate the differences in terms of exposure between them.

## Methods

Surgical and microsurgical dissections were performed utilizing 4 formalin-fixed and latex-injected adult cadaveric heads. Both approaches were completed to expose the relevant anatomic structures and then demonstrate the advantages and limitations of each technique. An “above” (IHTT) and “below” (SCIT) anatomical comparison is done for the understanding of those different corridors to the pineal region.

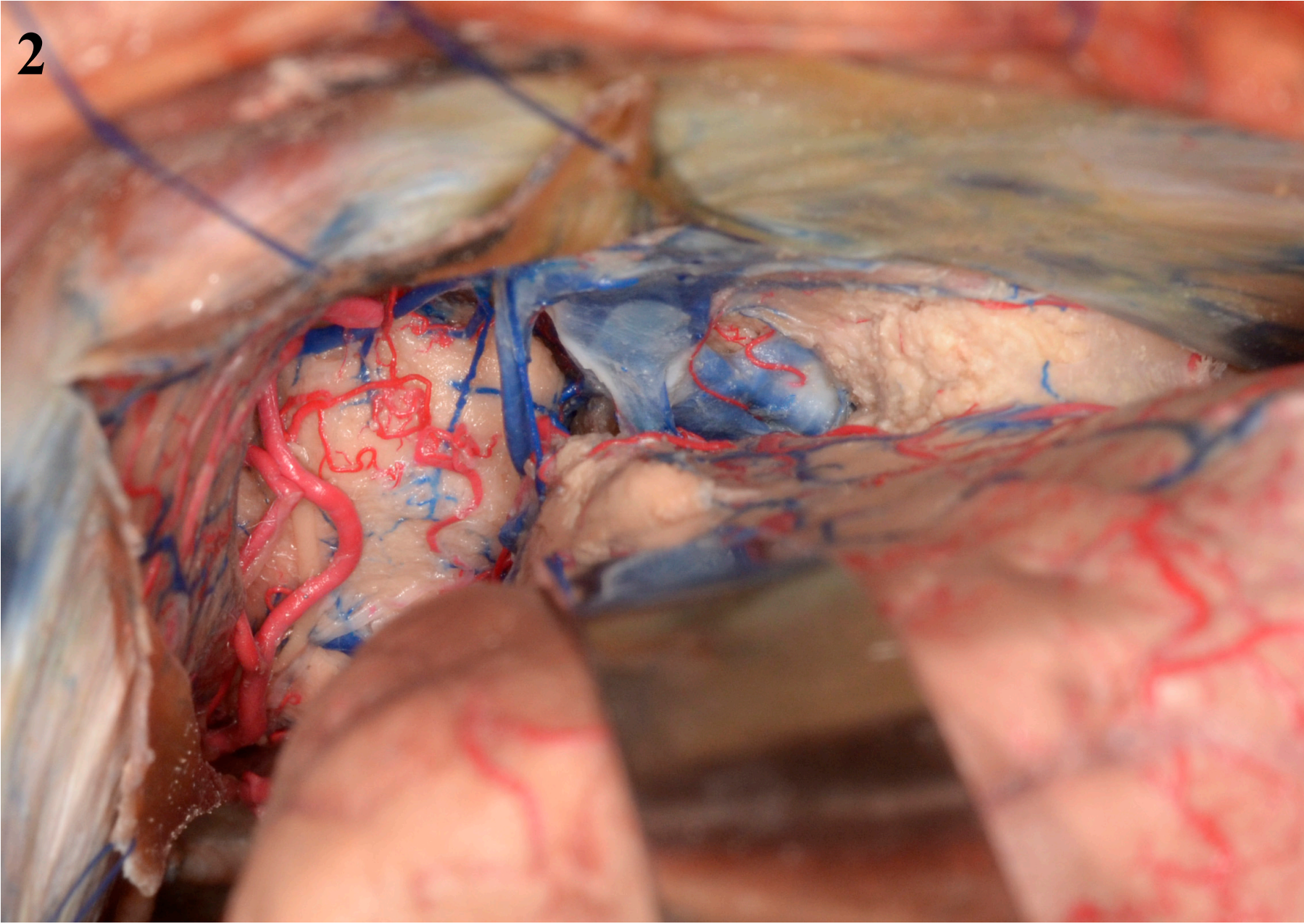
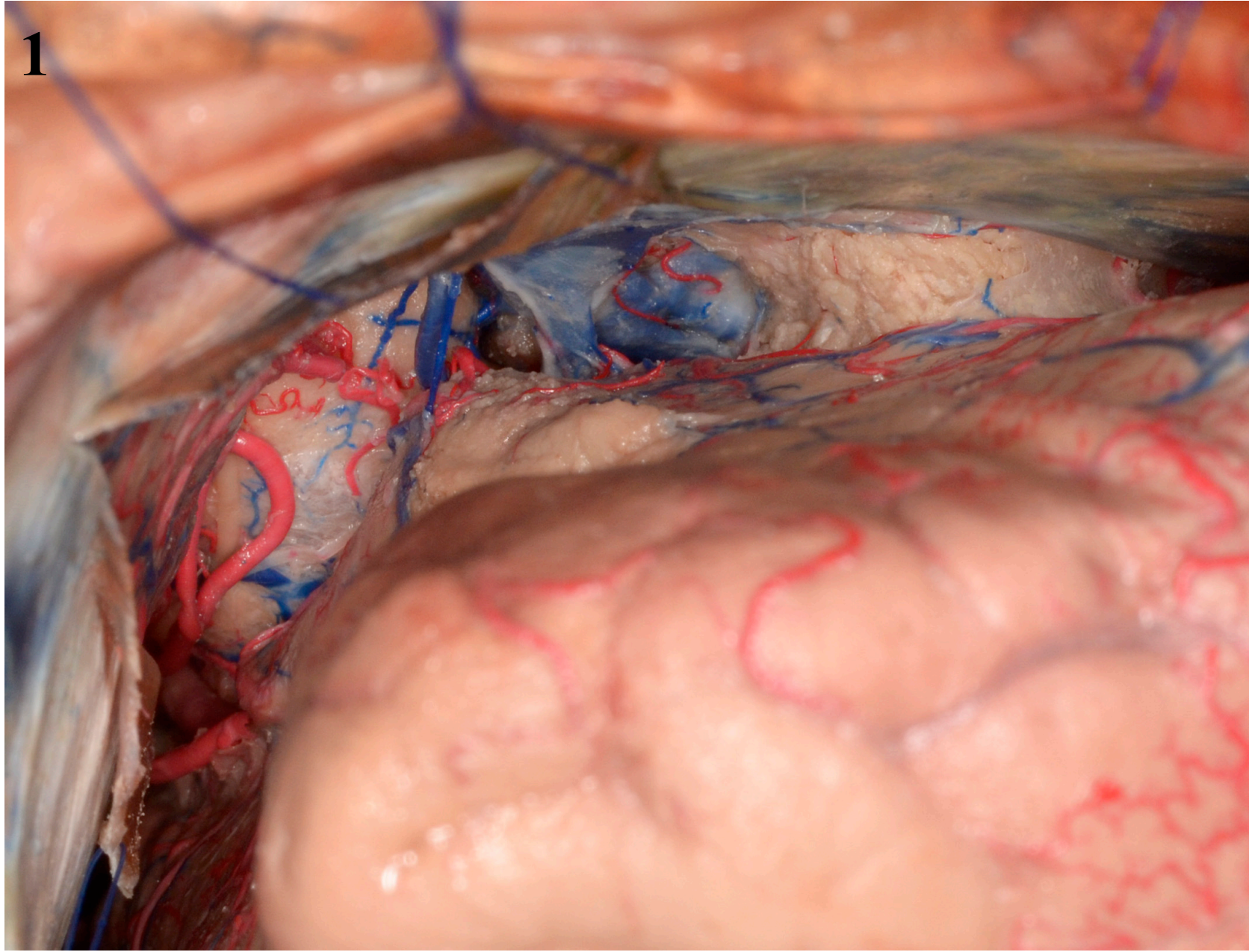
## Results

Both approaches are suitable to reach the structures in the quadrigeminal cistern and cerebellomesencephalic fissure, which are: the posterior cerebral artery; the superior cerebellar artery, along with the trochlear nerve, just below the inferior coliculus; the medial posterior choroidal arteries; and the venous complex, composed mainly by the internal cerebral vein, that exits the velum interpositum; the basal vein of Rosenthal, that exits the ambiens cistern; the vein of Galen, which comes into the straight sinus; the lateral mesencephalic vein; the internal occipital vein; and the precentral cerebellar vein. In both approaches, we can reach the quadrigeminal plate, the pineal body, the posterior part of the third ventricle, and the walls of the cerebellomesencephalic fissure. The inner wall is composed by the lingula, the superior and middle cerebellar peduncles, and the outer wall, by the culmen, the central lobule and its wings.

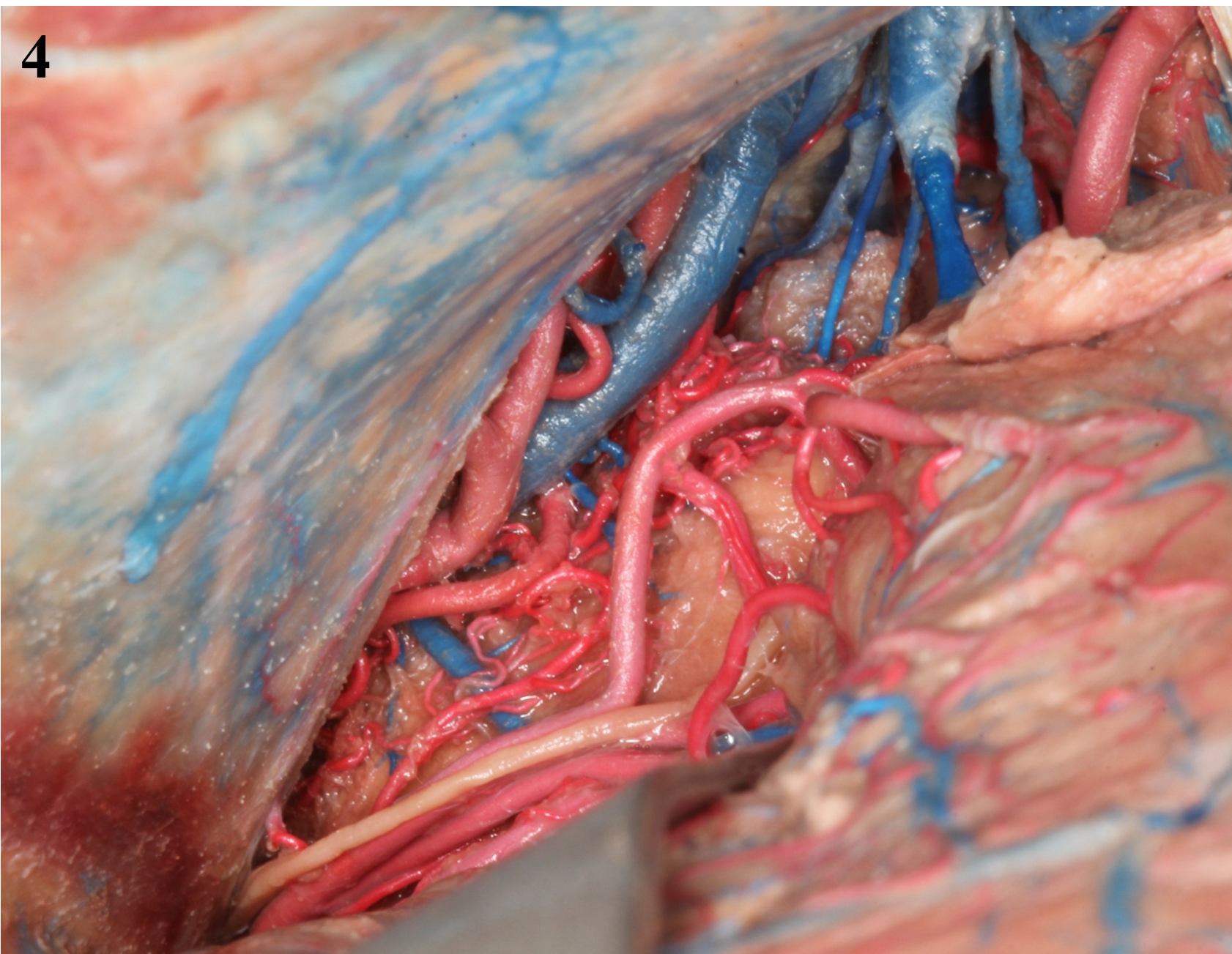
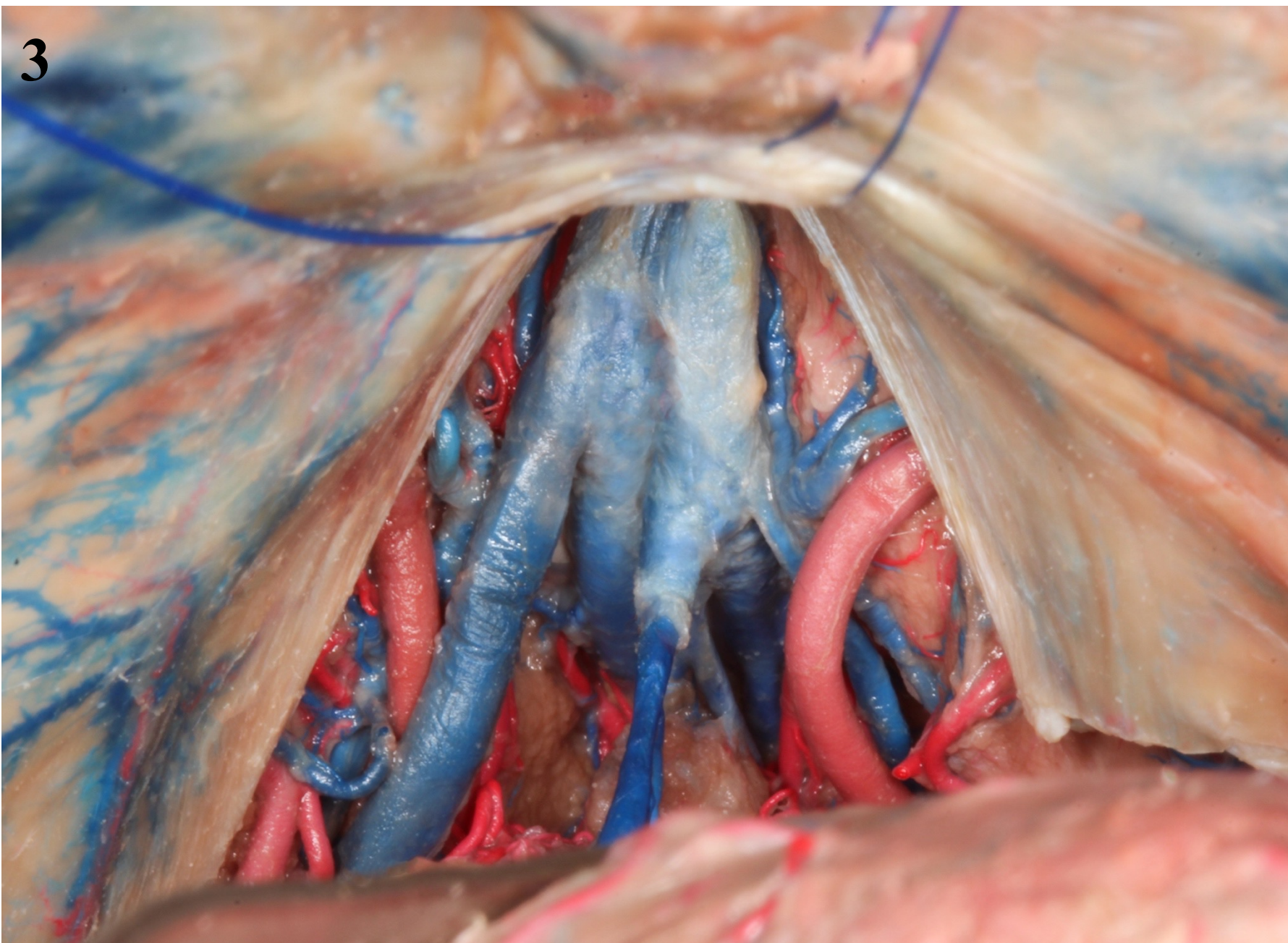
The Figures 1 and 2 show this anatomy through the IHTT approach, which provide a superior to inferior trajectory and is very useful to reach lesions in the most inferior portion of the ipsilateral cerebellomesencephalic fissure, in the posterior aspect of the ambient cistern, and lesions above the vein of Galen and its tributaries, displacing downward these deep venous structures. Its limitations are associated with an inadequate visualization of the contralateral quadrigeminal region and the ipsilateral cisternal pulvinar surface. The Figures 3 and 4 show the same anatomy, but in a posterior to anterior trajectory, provided by the SCIT approach, which is better to reach lesions in the pineal region below the vein of Galen, and that displace the venous contents superiorly or anteriorly. The paramedian variant can also provide access to the ipsilateral cerebellomesencephalic fissure. On the other hand, the exposure of the pineal region below the level of the superior colliculus is often limited when a pure midline SCIT approach is selected.

## Conclusion

Good exposure of structures in the pineal region is provided by both approaches described, but understanding of how lesions in this space could modify the anatomy is paramount for selection of the most well-suited approach for each individual case.



Figures 1 and 2. Anatomy of the pineal region, showing the structures in the quadrigeminal cistern and cerebellomesencephalic fissure, provided by the interhemispheric transtentorial approach, in a superior to inferior view.



Figures 3 and 4. The same anatomy of the pineal region provided by the supracerebellar infratentorial approach, in a posterior to anterior view, using both a median and paramedian trajectory, respectively.

## References

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