

## TELOVELAR APPROACH TO THE FOURTH VENTRICLE

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In the past, operative access to the fourth ventricle was obtained by splitting the cerebellar vermis or removing part of a cerebellar hemisphere (1). In examining the clefts and walls of the cerebellomedullary fissure, we found that the inferior half of the roof of the fourth ventricle was formed by tela choroidea in which the choroid plexus arises, and the inferior medullary velum, another paper-thin layer, which attaches to the upper edge of the tela and extends from the nodule of the vermis to the flocculus. We also found that opening the tela alone will provide adequate ventricular exposure, in most cases, without splitting the vermis. The inferior medullary velum can also be opened if opening the tela does not provide adequate exposure. Opening the tela alone provides access to the full length of the floor and the entire ventricular cavity except, possibly, the fastigium, superolateral recess, and the superior half of the roof. Opening the inferior medullary velum accesses the latter areas, including the superior half of the roof. Extending the opening in the tela laterally toward the foramen of Luschka opens the lateral recess and exposes the surfaces of the cerebellar peduncles bordering the recess. Tumors in the fourth ventricle may stretch and thin these two semitranslucent membranes to a degree that one may not be aware that they are being opened in exposing a fourth ventricular tumor.

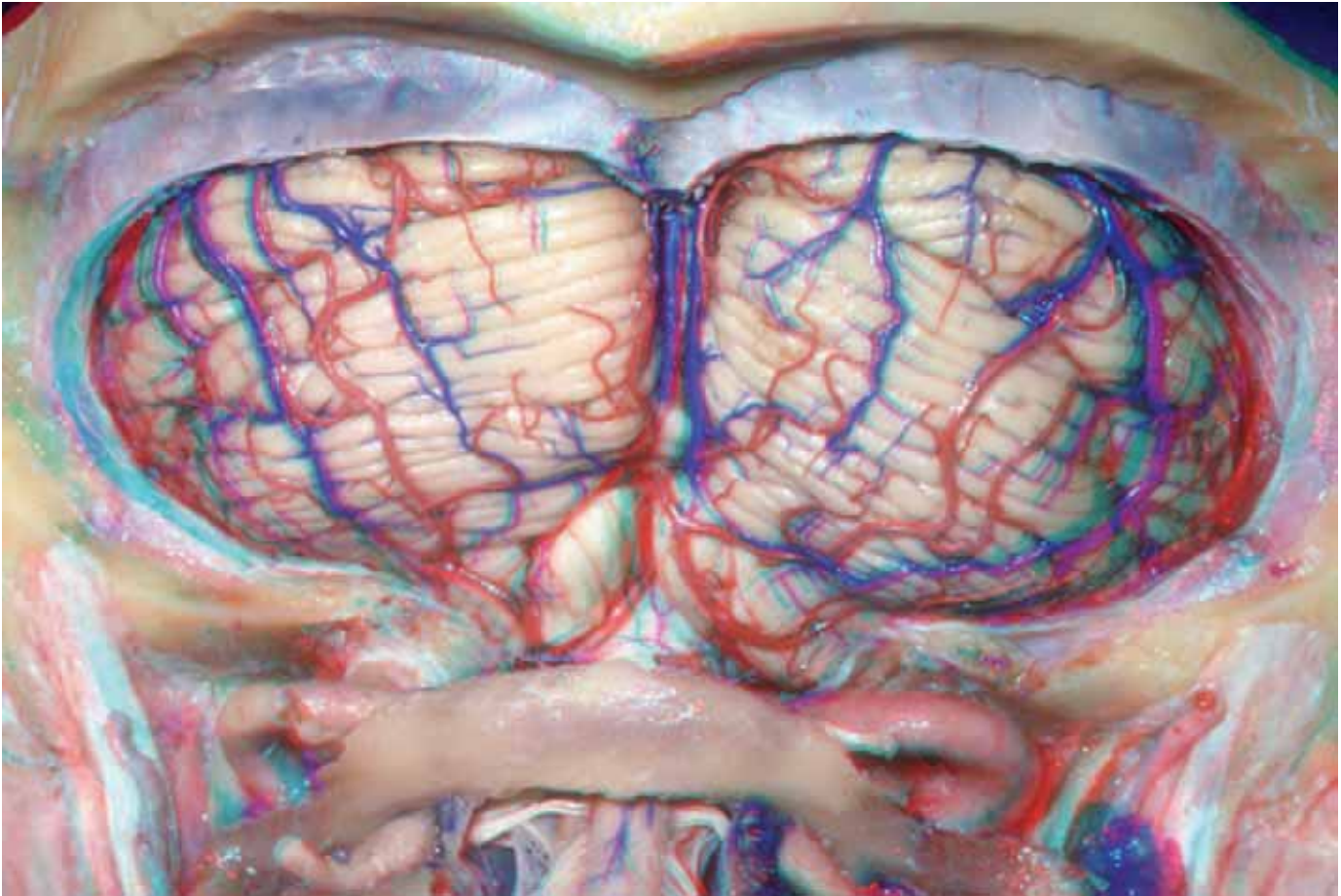
There are no reports of deficits after isolate opening of the tela and velum. However, other structures exposed in the ventricle walls at risk for producing deficits include the dentate nuclei, cerebellar peduncles, the floor of the fourth ventricle, and the posterior inferior cerebellar artery (PICA). During an operation on the caudal part of the roof, one should remember

that the dentate nuclei are located just rostral to the superior pole of the tonsils underlying the dentate tubercles in the posterolateral part of the roof, where they are wrapped around the superolateral recesses near the lateral edges of the inferior medullary velum. All of the cerebellar peduncles converge on the lateral wall and roof, where they may be damaged. The superior cerebellar peduncle is more likely to be injured during operations on lesions involving the superior part of the roof above the level of the dentate tubercles; the inferior peduncle is most susceptible to damage in exposing lesions within the lateral recess; and the middle cerebellar peduncle is susceptible to injury during procedures in the cerebellopontine angle, because the middle peduncle forms a major part of the cisternal surface facing the cerebellopontine angle.

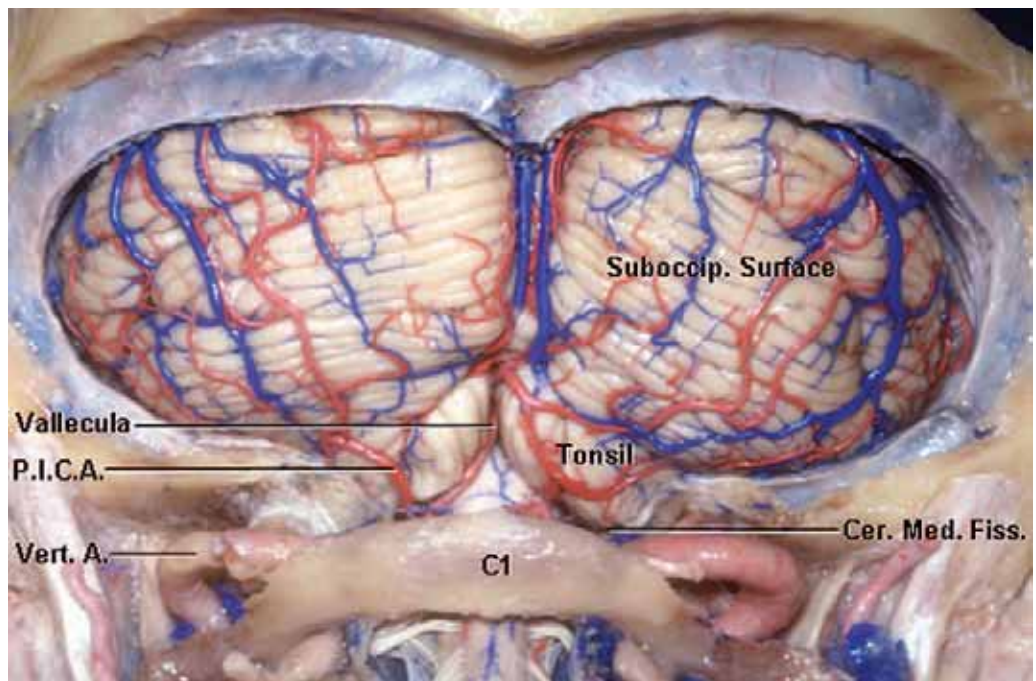
The PICA is frequently exposed in approaches directed through the tela choroidea or inferior medullary velum. Occlusion of the branches of the PICA distal to the medullary branches at the level of roof of the fourth ventricle avoids the syndrome of medullary infarction but produces a syndrome resembling labyrinthitis, which includes rotatory dizziness, nausea, vomiting, inability to stand or walk unaided, and nystagmus without appendicular dysmetria (1). The main trunk of the anterior inferior cerebellar artery is infrequently exposed in opening the cerebellomedullary fissure, but it may also send choroidal branches to the tela and choroid plexus in the lateral recess.

## REFERENCES

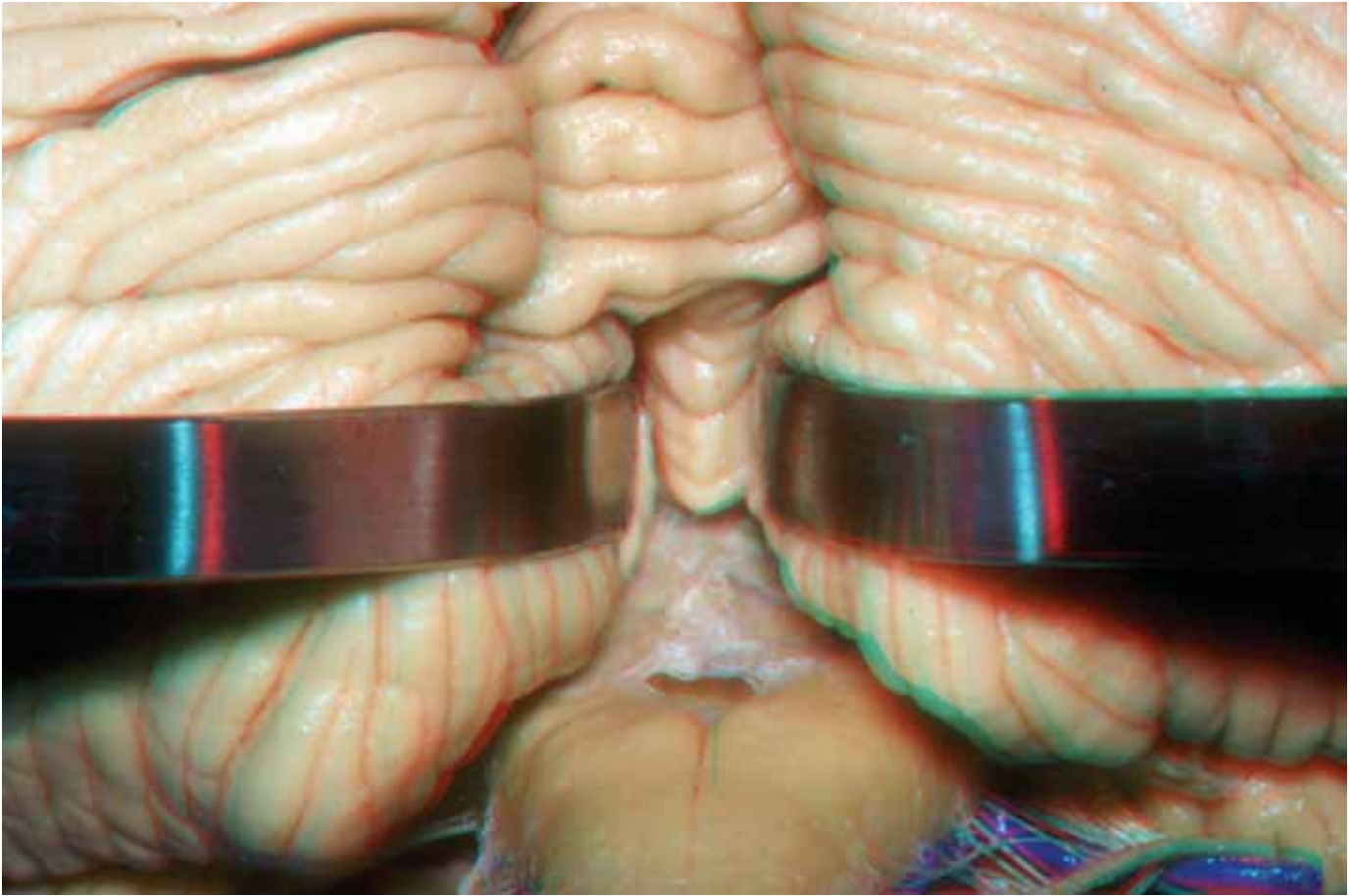
1. Rhoton AL Jr: Cerebellum and fourth ventricle. *Neurosurgery* 47 [Suppl 3]:S7-S27, 2000.



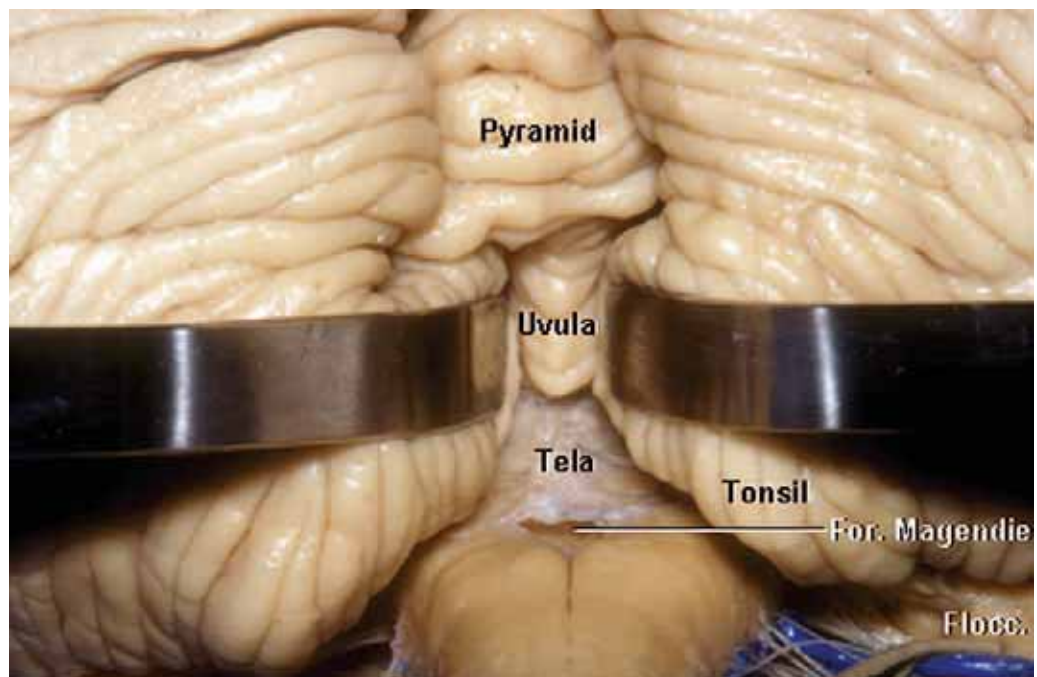
**FIGURE 10-1.** *Telovelar approach to the fourth ventricle and lateral recess. The suboccipital cerebellar surface is located below and between the sigmoid and lateral sinuses and is the surface that is exposed in a suboccipital craniectomy. The vermis sits in a depression, the posterior cerebellar incisura, between the hemispheres. The cerebellomedullary fissure extends superiorly between the cerebellum and medulla along the inferior half of the ventricular roof and lateral recess. The vallecule extends upward between the tonsils and communicates through the foramen of Magendie with the fourth ventricle. The PICAs loop above the tonsil and exit the fissure to supply the suboccipital surface.*

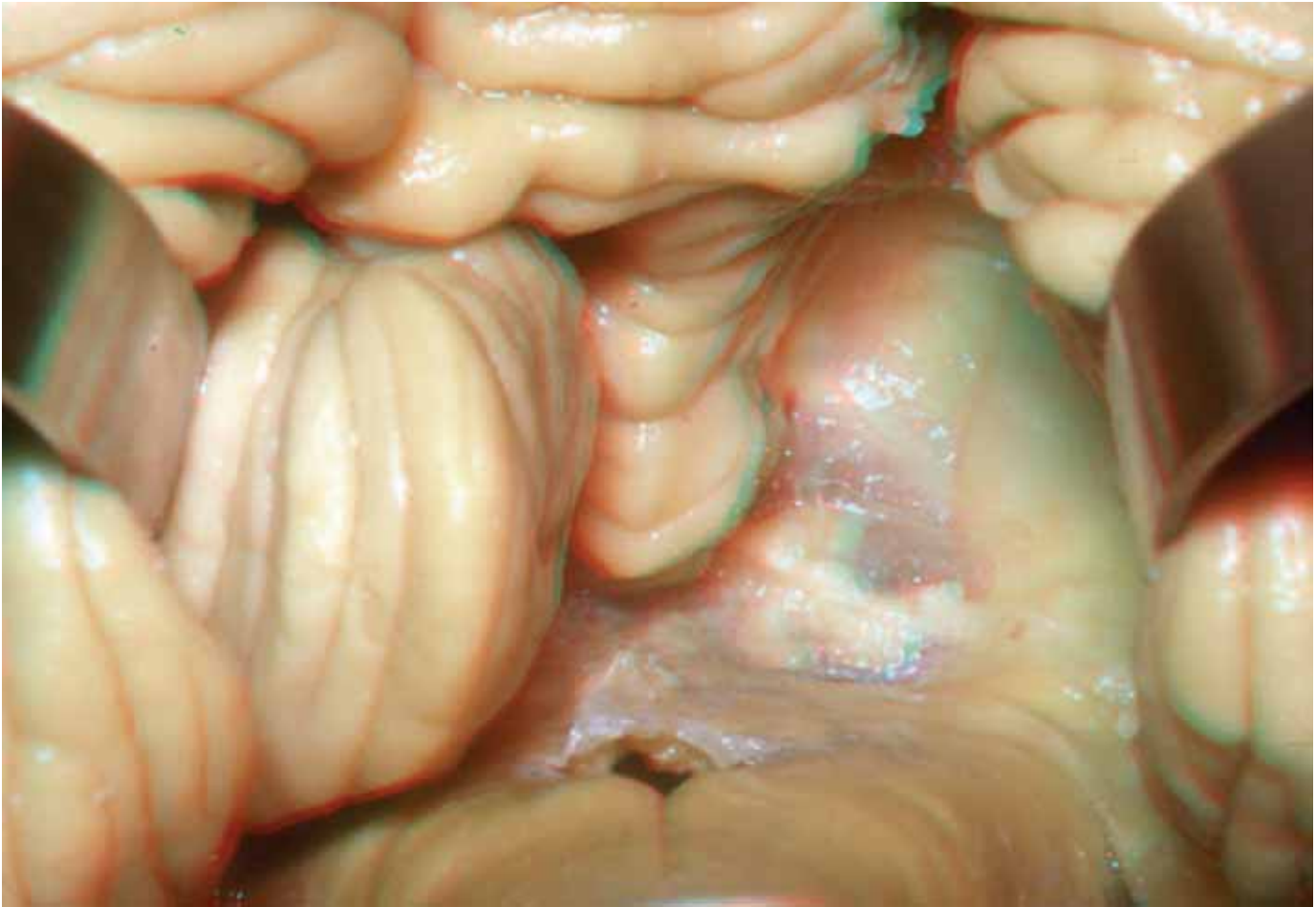




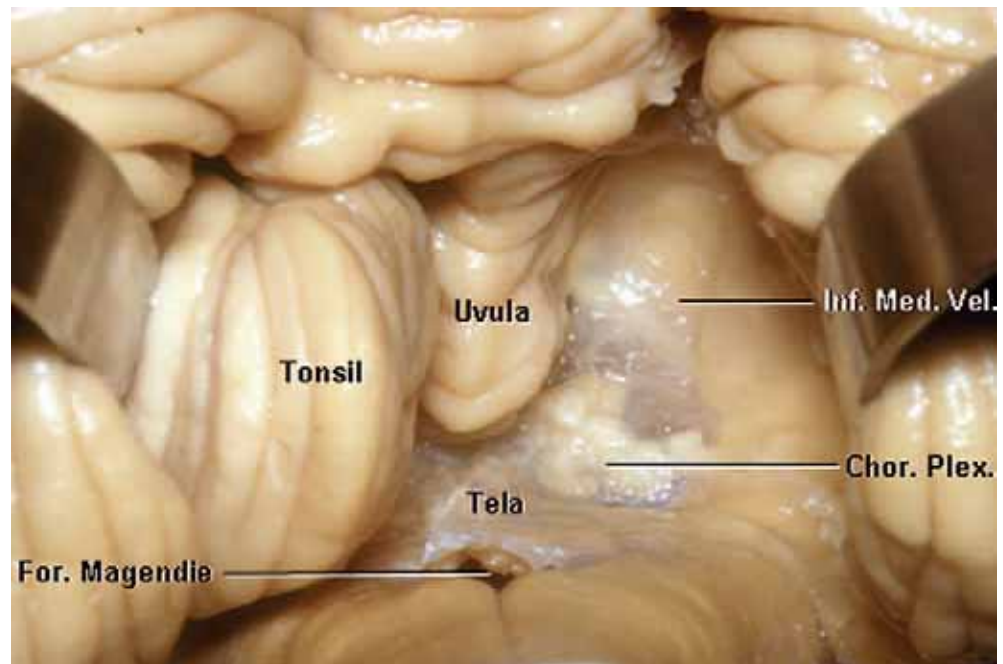


**FIGURE 10-2.** Enlarged view of the cerebellomedullary fissure and inferior half of the fourth ventricular roof. The lower parts of the vermis behind the ventricle are the pyramid and uvula. The uvula hangs downward between the tonsils, thus, mimicking the situation in the oropharynx. The tela choroidea, a paper-thin ependymal membrane exposed below the uvula, forms the lower part of the fourth ventricular roof. The choroid plexus arises on the inner surface of the tela and extends downward in the midline through the foramen of Magendie and laterally through the foramen of Luschka behind the glossopharyngeal and vagus nerves.

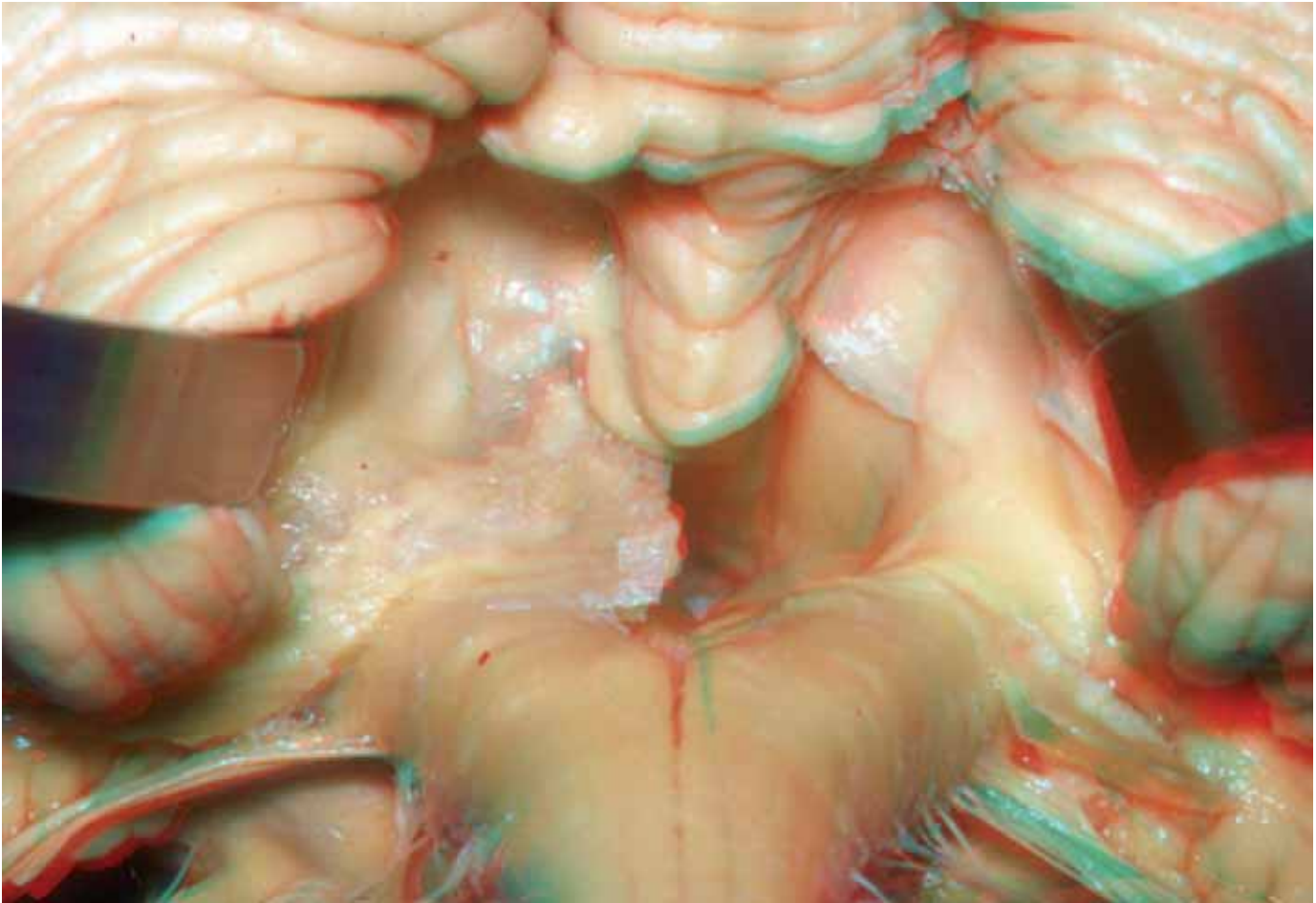




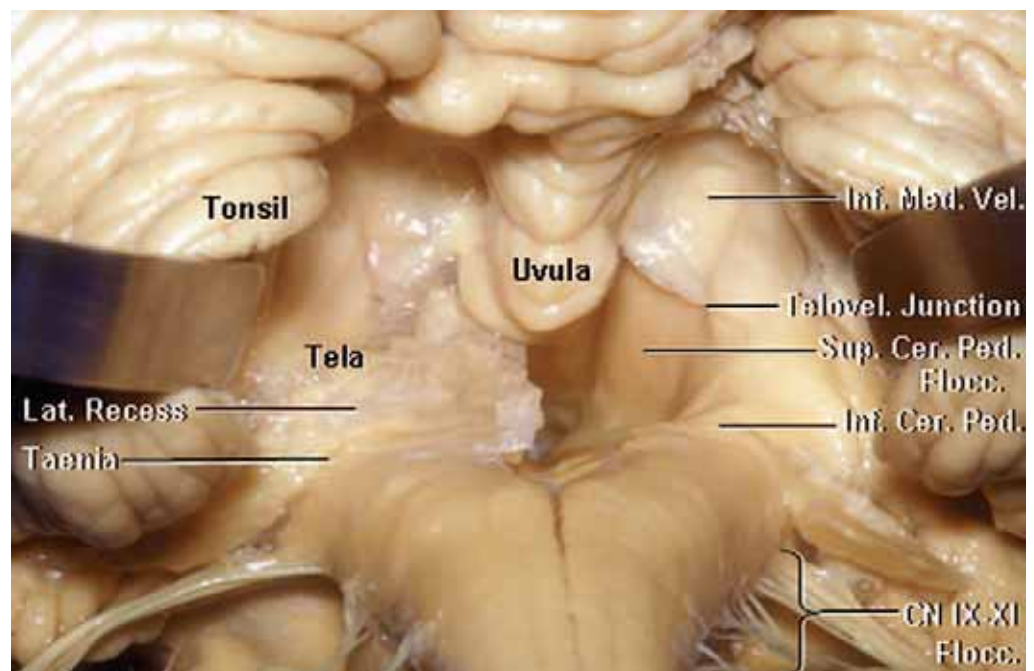
**FIGURE 10-3.** The right tonsil has been retracted to expose the lower half of the roof, which is formed by the inferior medullary velum and tela choroidea. The cerebellomedullary fissure extends upward between the rostral pole of the tonsil on one side and the tela choroidea and inferior medullary velum on the opposite side. The segment of the PICA passing through this fissure is called the telovelotonsillar segment. The choroid plexus arises on the inner surface of the tela and extends downward in the midline through the foramen of Magendie and laterally through the foramen of Luschka. The inferior medullary velum arises on the surface of the nodule, drapes across the superior pole of the tonsil, and blends into the flocculus laterally.

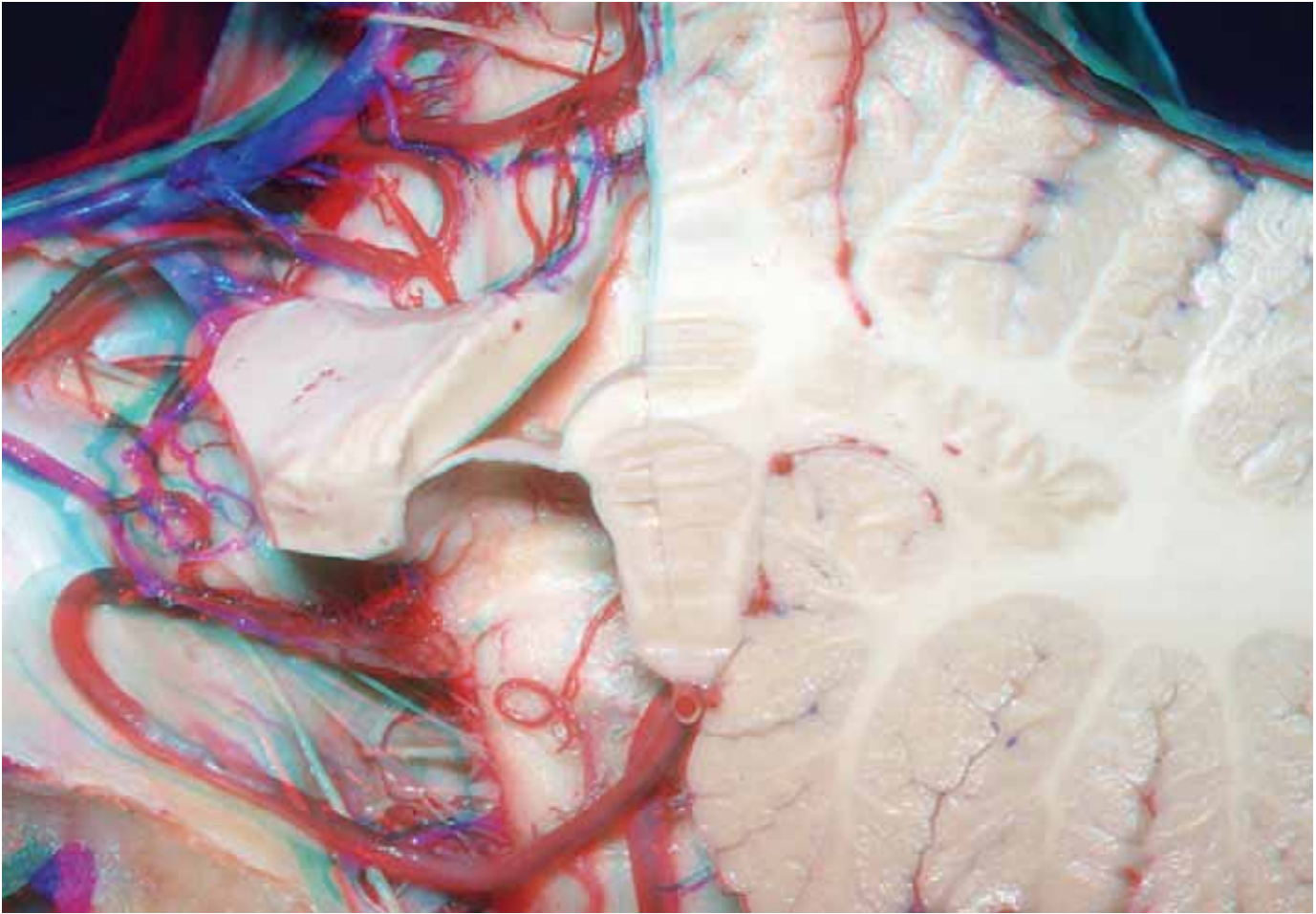




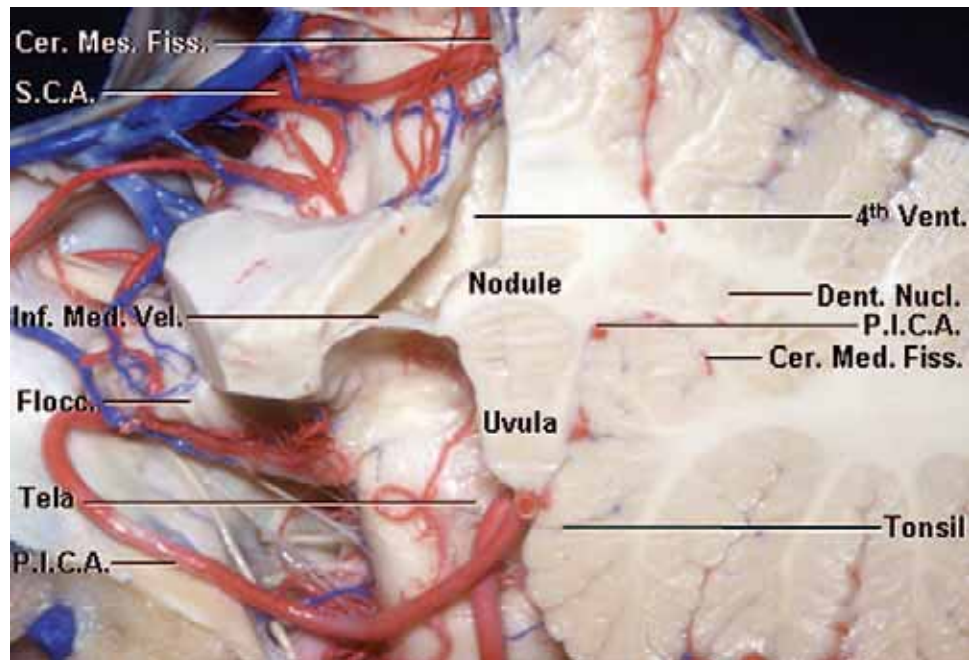


**FIGURE 10-4.** Both tonsils have been removed to expose the inferior medullary velum and tela choroidea bilaterally. The telovelar junction is the junction between the velum and tela. The rhomboid lip is a sheet-like layer of neural tissue attached to the lateral margin of the ventricular floor, which extends posterior to the glossopharyngeal and vagus nerves and joins the tela choroidea to form a pouch at the outer extremity of the lateral recess. The right half of the tela has been removed to expose the ventricle and the lateral recess. The inferior medullary velum extends laterally to form a peduncle, the peduncle of the flocculus, which blends into the flocculus at the outer margin of the lateral recess.

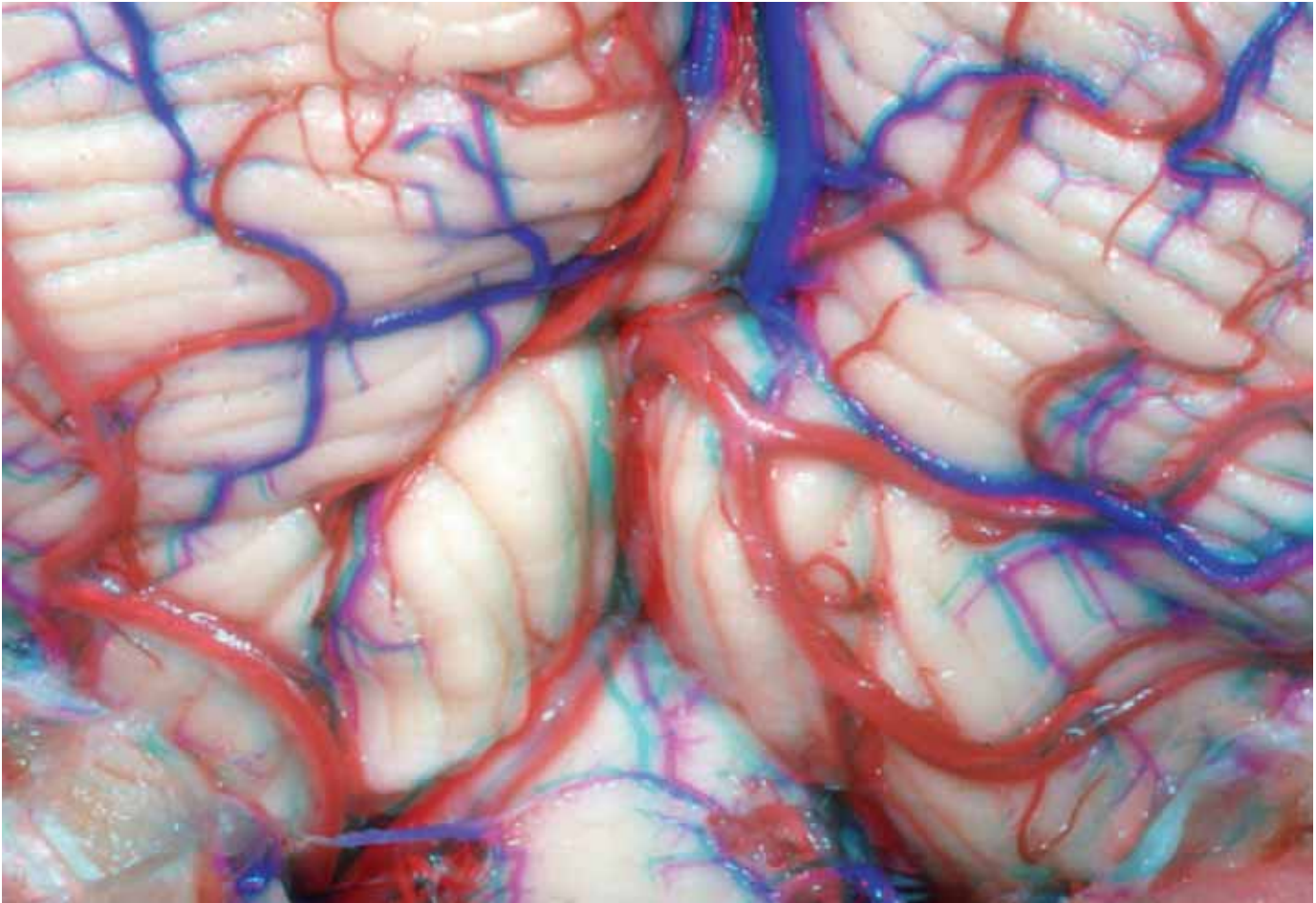




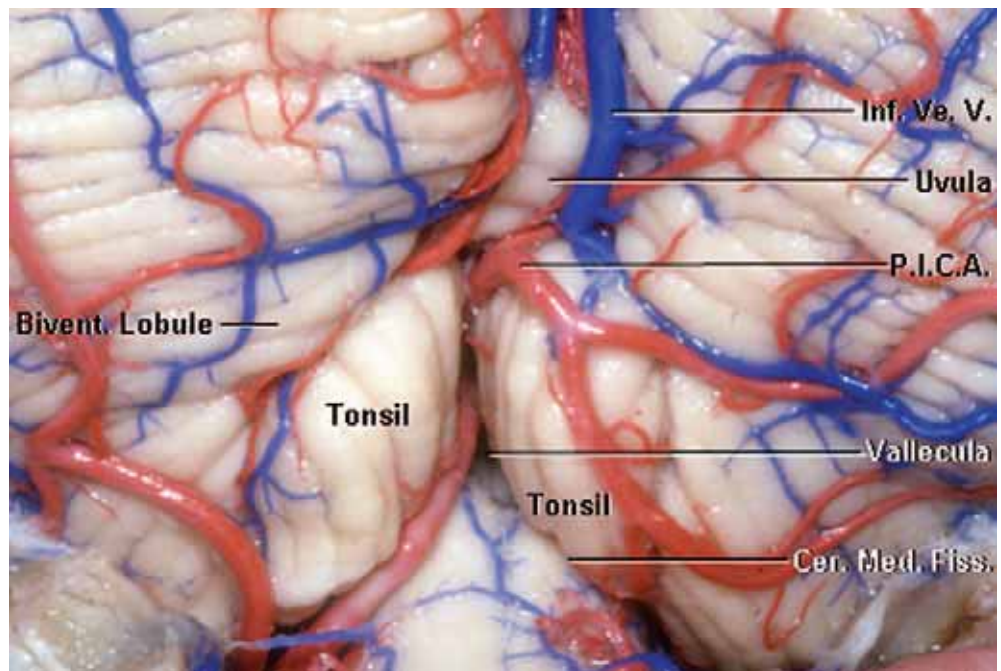
**FIGURE 10-5.** The cerebellum has been sectioned in an oblique coronal plane to show the relationship of the rostral pole of the tonsil to the inferior medullary velum and dentate nucleus. The dentate nucleus is located in the ventricular roof, near the fastigium, where it wraps around, and is separated from the rostral pole of the tonsil by the inferior medullary velum. The left tonsil has been removed while preserving the left half of the inferior medullary velum. The PICA passes between the walls of the cerebellomedullary fissure formed above by the inferior medullary velum and below by the upper pole of the tonsil.



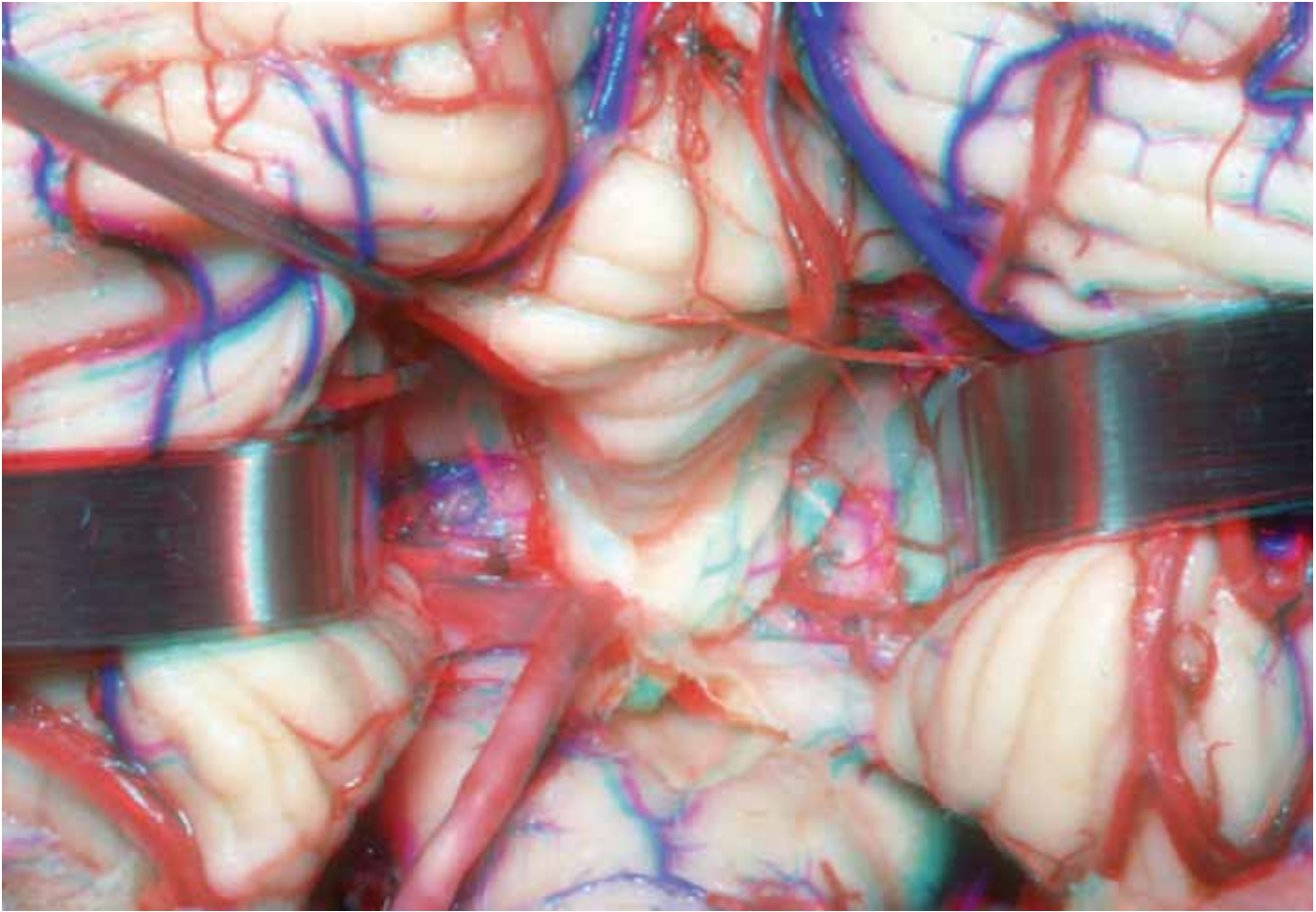




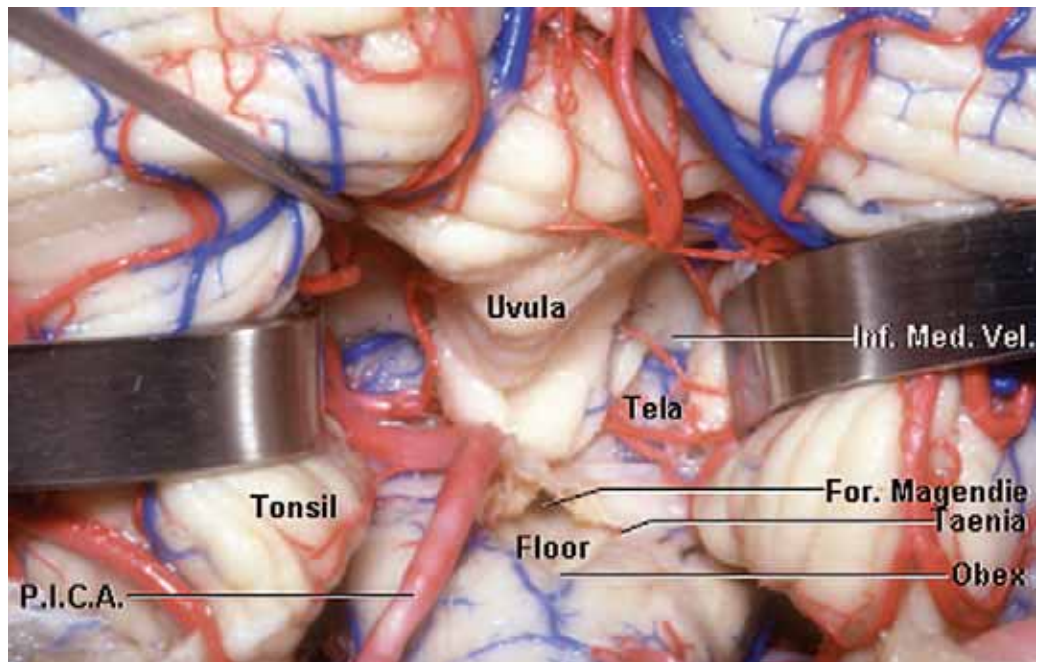
**FIGURE 10-6-10-13.** *Telovelar approach to the fourth ventricle. The lower part of the cerebellomedullary fissure extends upward between the tonsils posteriorly and the medulla anteriorly. The upper part of the fissure extends between the tonsil and the tela and velum. The vallecula opens between the tonsils into the fourth ventricle. The inferior vermian vein ascends to enter the sinuses in the tentorium.*



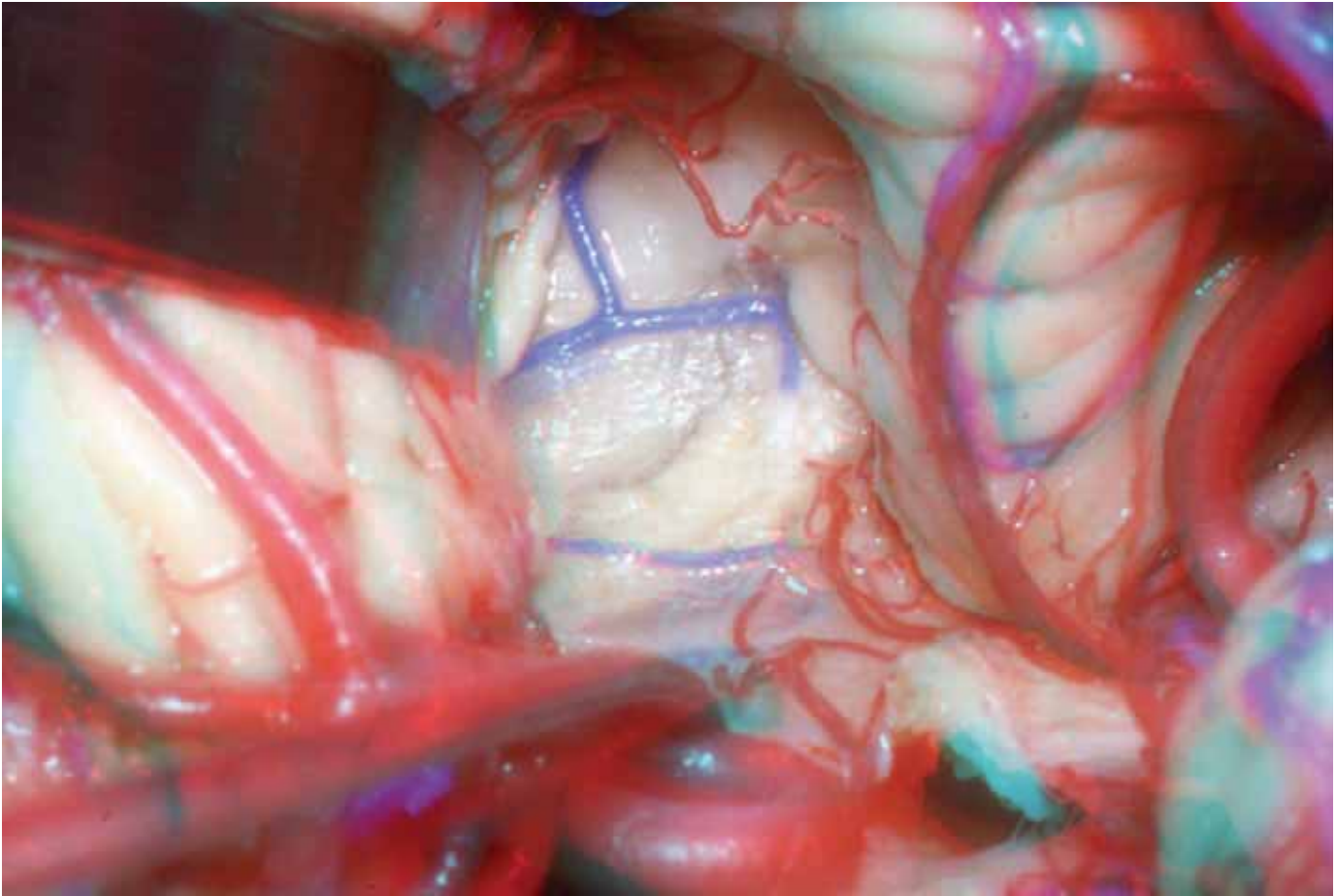




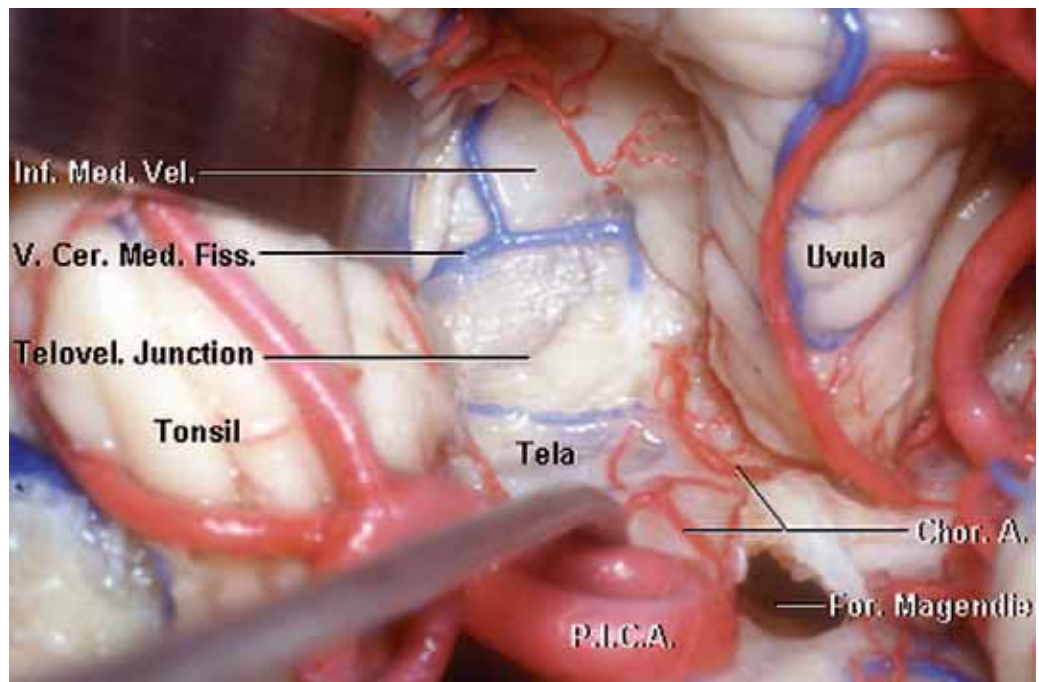
**FIGURE 10-7.** Both tonsils have been retracted laterally to expose the inferior medullary velum and tela choroidea that form the lower half of the ventricular roof. The nodule of the vermis, on which the inferior medullary arises, is hidden deep to the uvula.





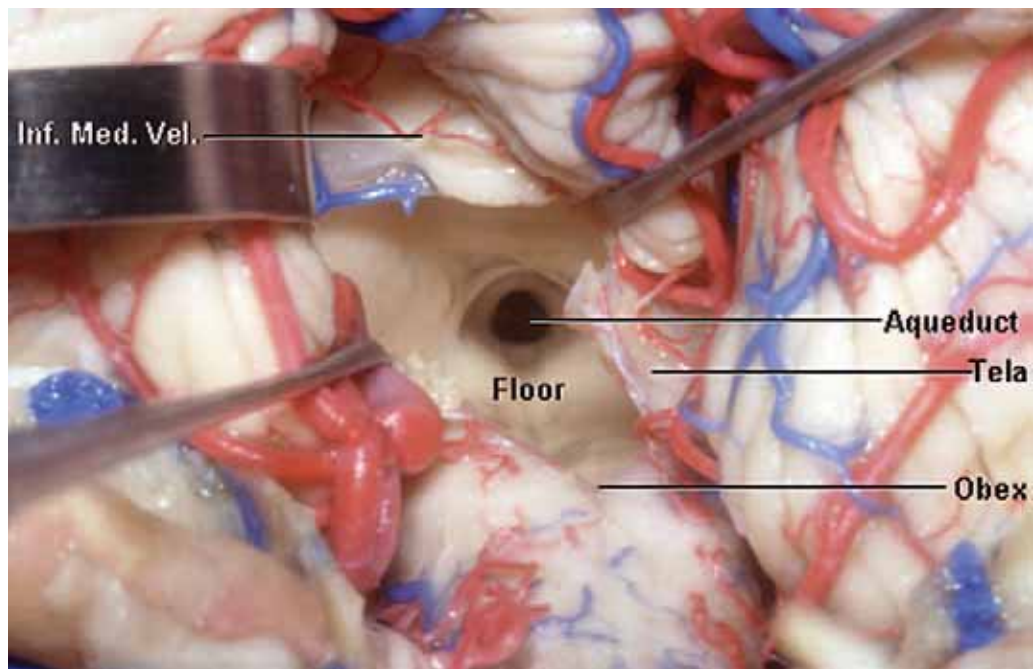


**FIGURE 10-8.** The uvula has been retracted to the right and the tonsil to the left to expose the inferior medullary velum and the tela choroidea forming the lower half of the roof of the ventricle.

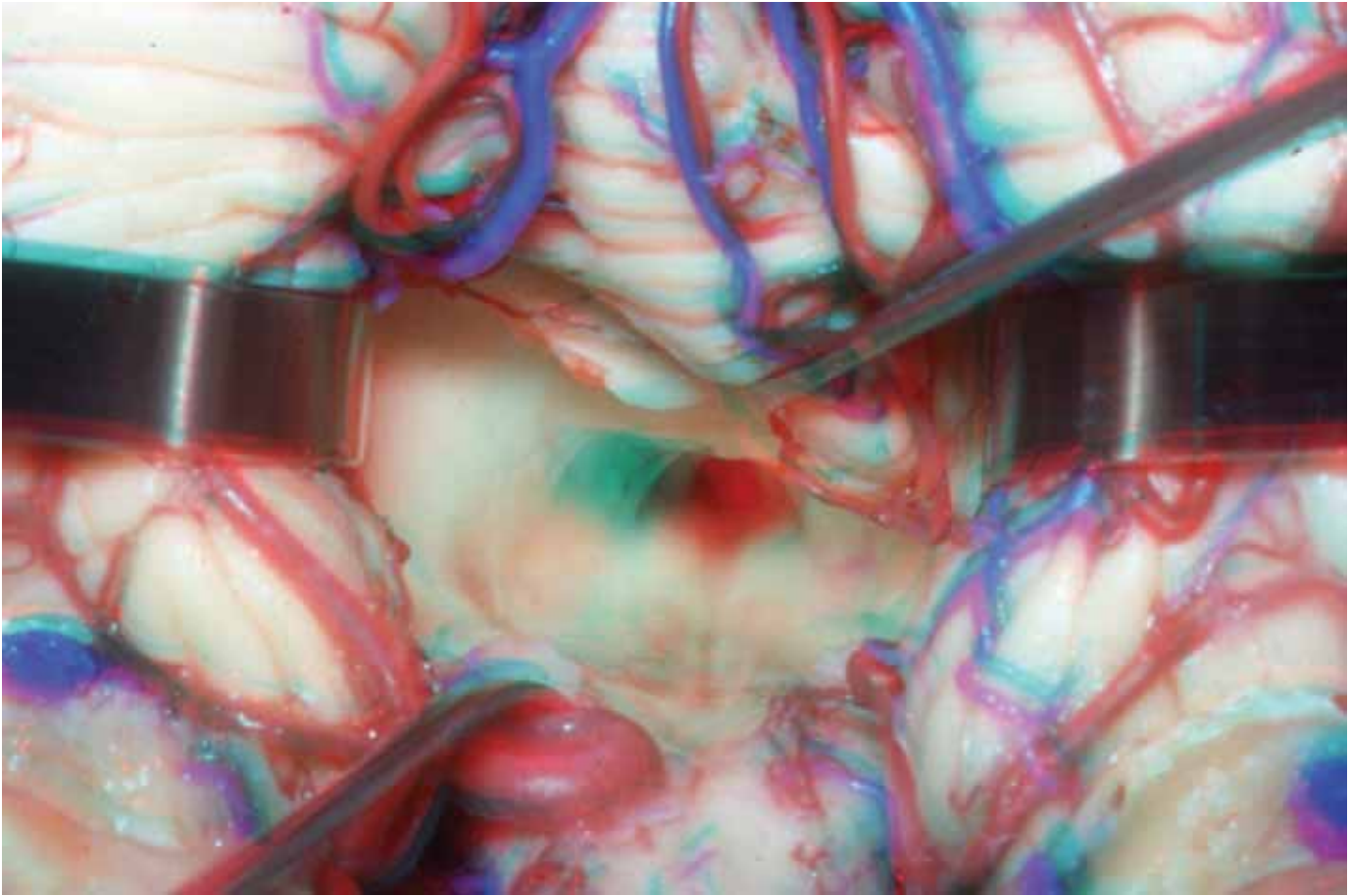




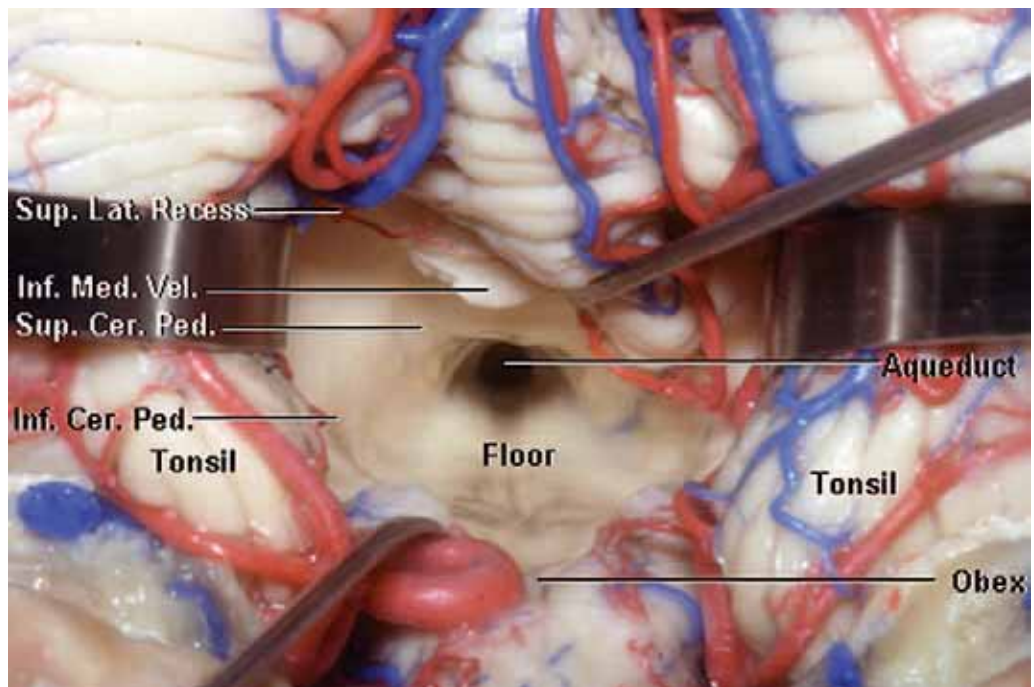
**FIGURE 10-9.** *The tela choroidea has been opened, extending from the foramen of Magendie to the junction with the inferior medullary velum. The uvula has been displaced to the right side to provide this view extending from the obex up to the aqueduct.*

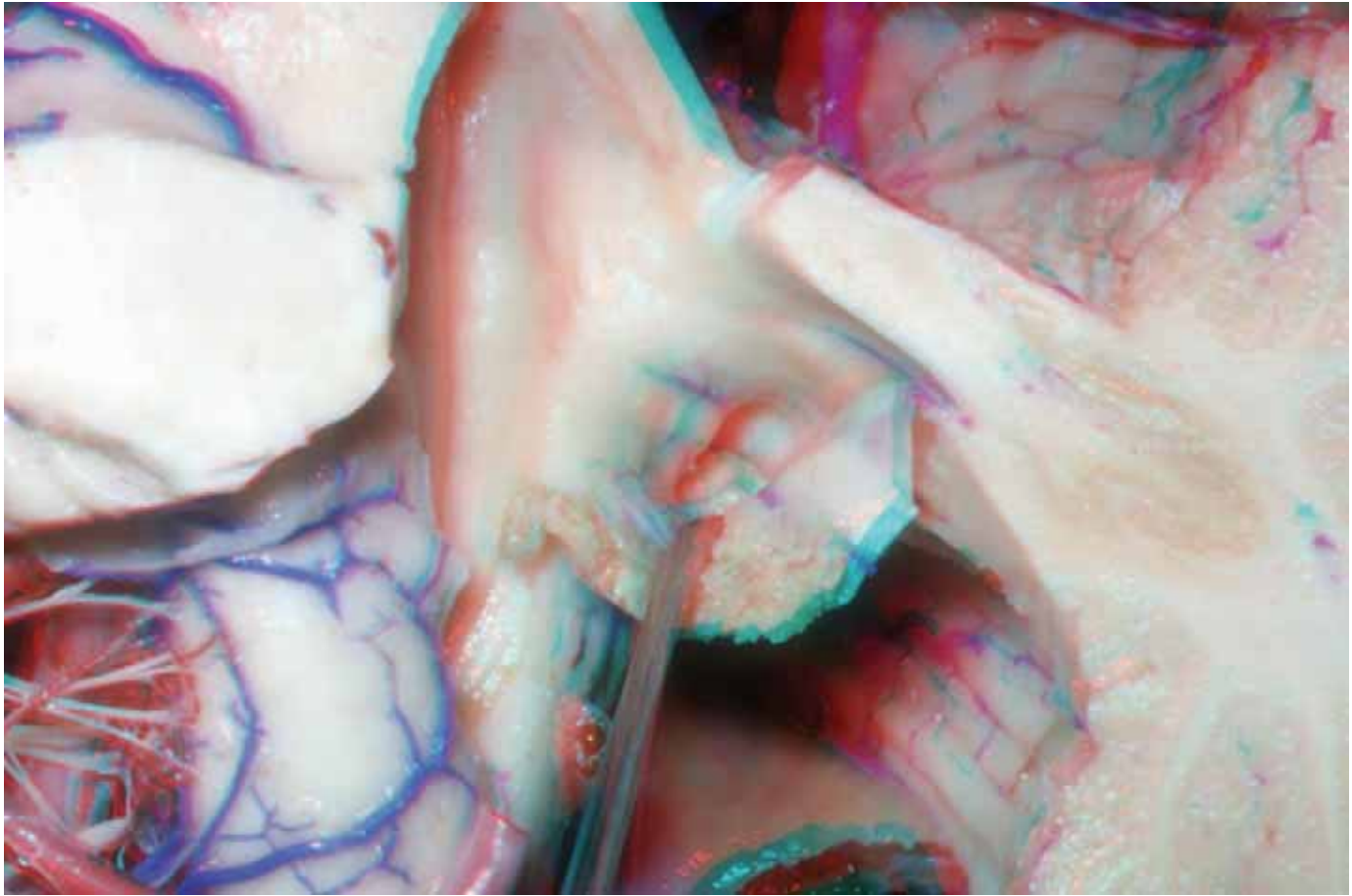




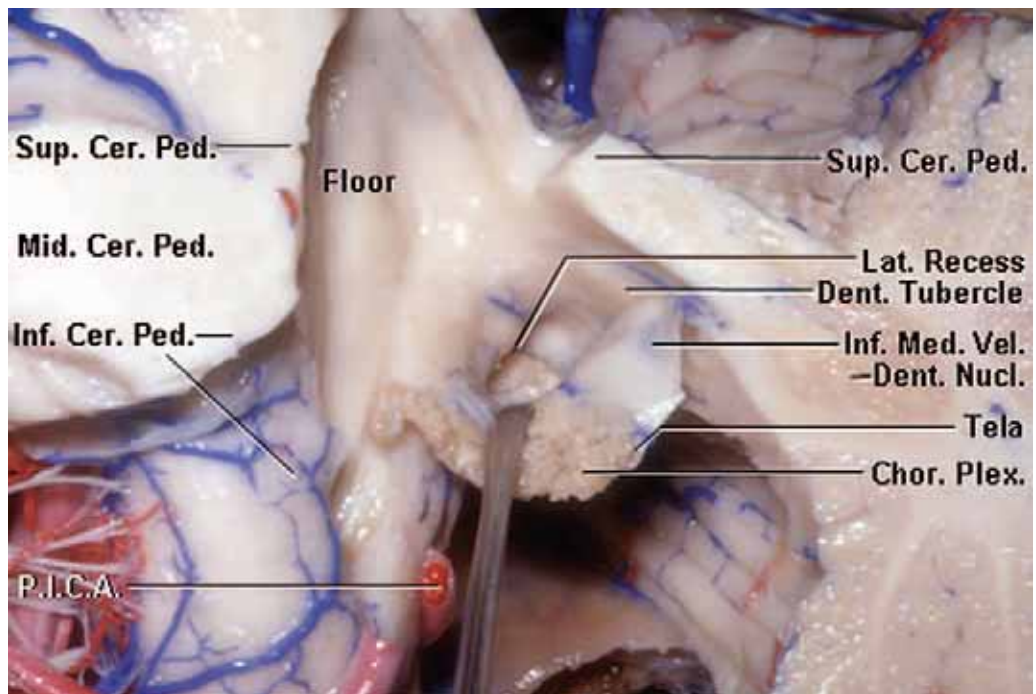


**FIGURE 10-10.** The left half of the inferior medullary velum has been divided to expose the superolateral recess and the ventricular surface formed by the superior and inferior peduncles.

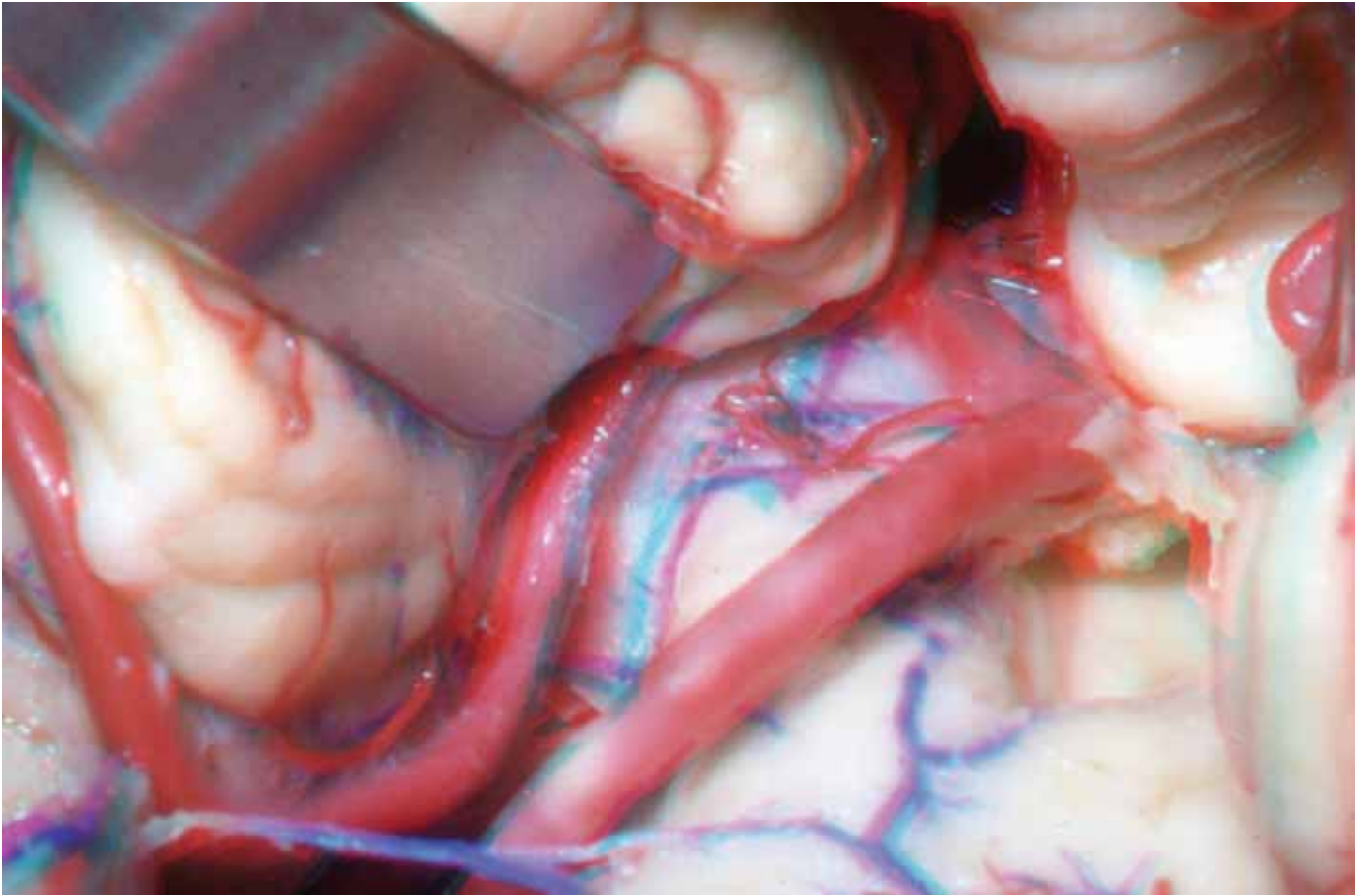




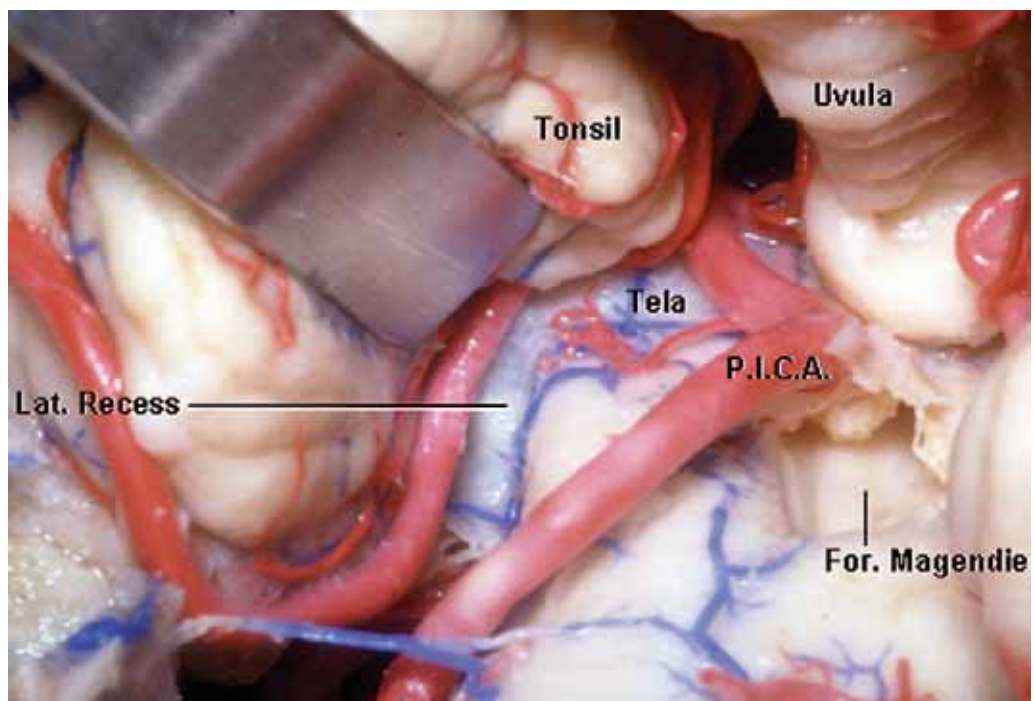
**FIGURE 10-11.** The entire right half and the medial part of the left half of the cerebellum have been removed to expose the lateral recess. The right tonsil has been removed and the tela and the inferior medullary velum, which form the lower part of the roof of the lateral recess, have been retracted downward to expose the opening into the lateral recess. The dentate nucleus is positioned near the superolateral recess of the roof of the fourth ventricle near the site of attachment of the inferior medullary velum.

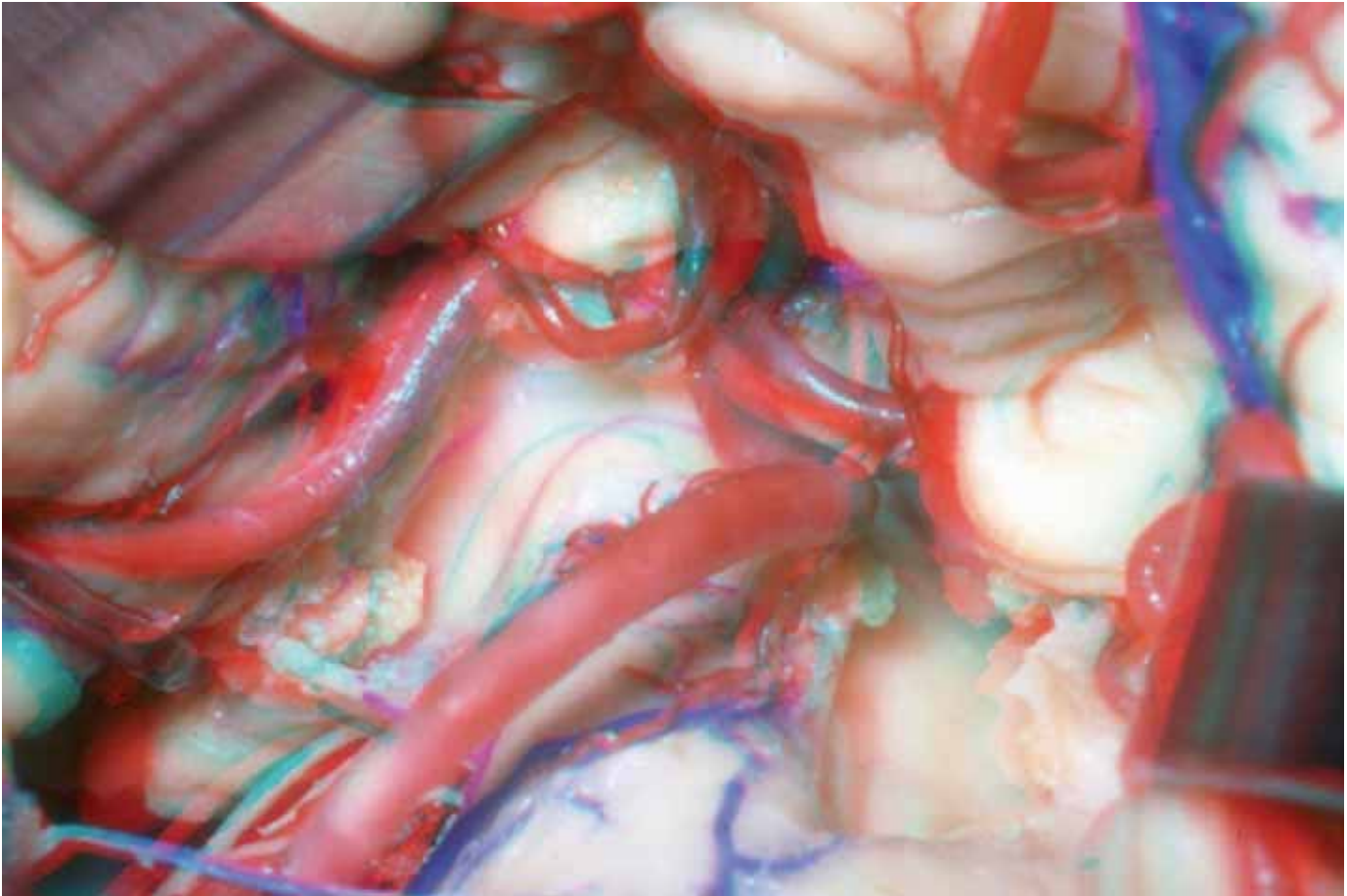




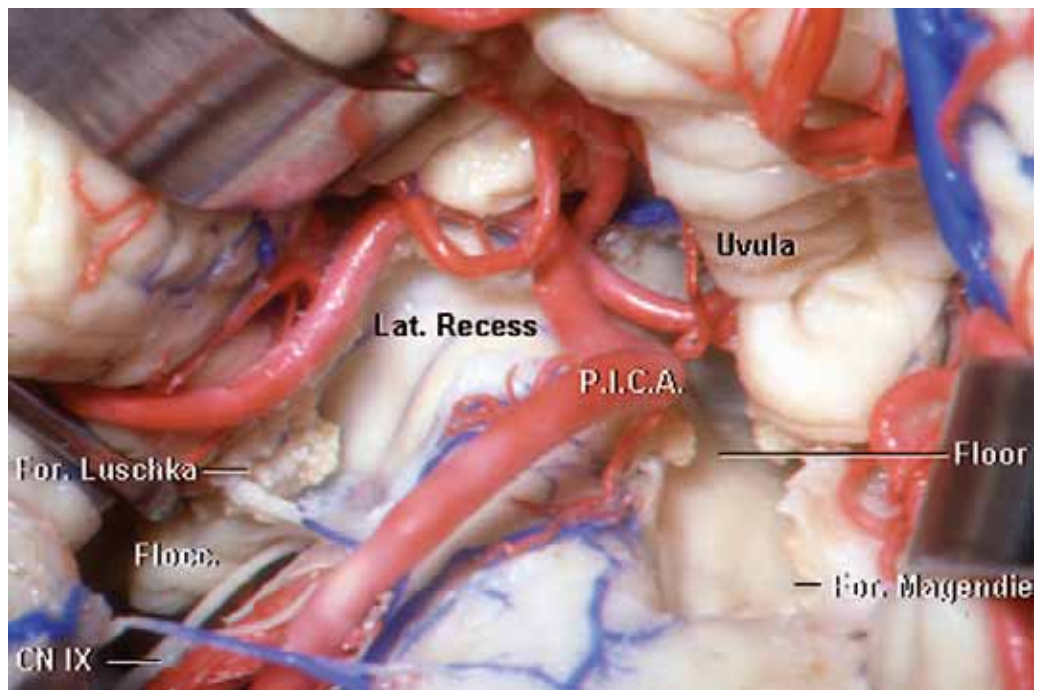


**FIGURE 10-12.** The cerebellar tonsil has been elevated to expose the tela forming the lower part of the roof of the lateral recess.

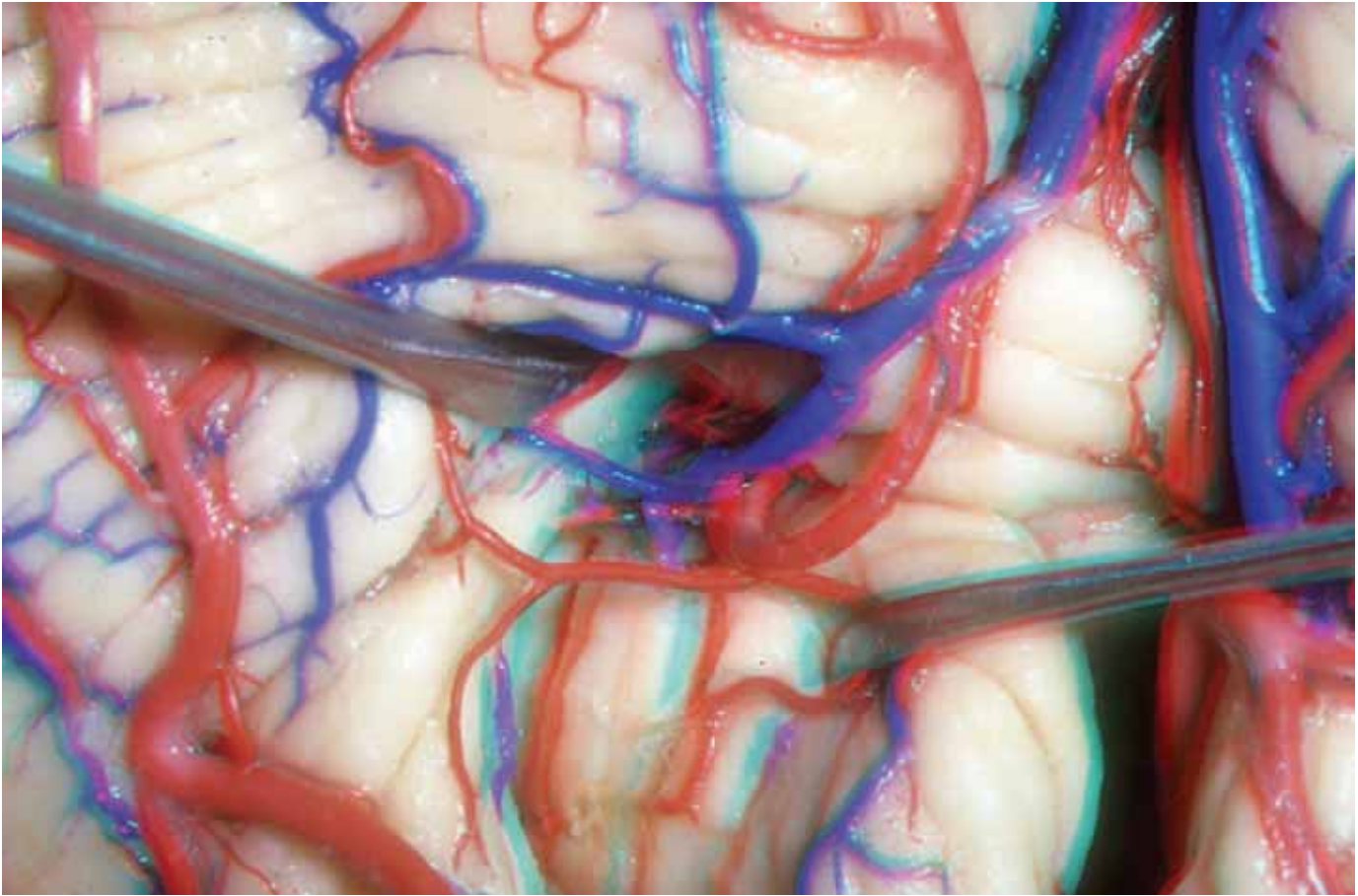




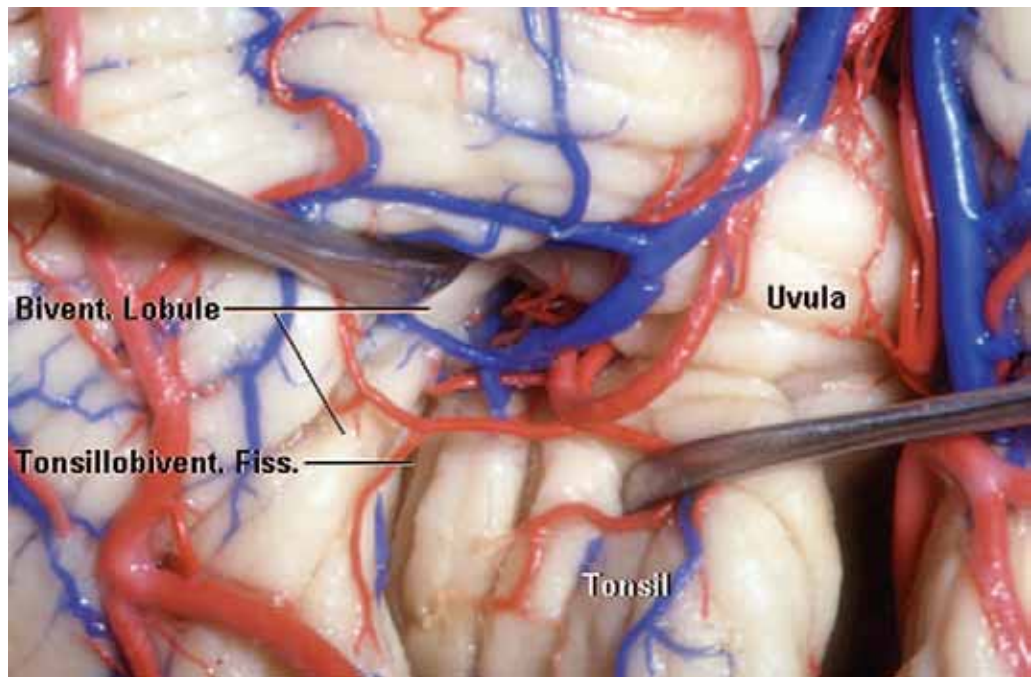
**FIGURE 10-13.** *The tela has been opened to expose the lateral recess. The opening extends laterally to the foramen of Luschka. The choroid plexus and flocculus are exposed in the cerebellopontine angle behind the glossopharyngeal nerve.*

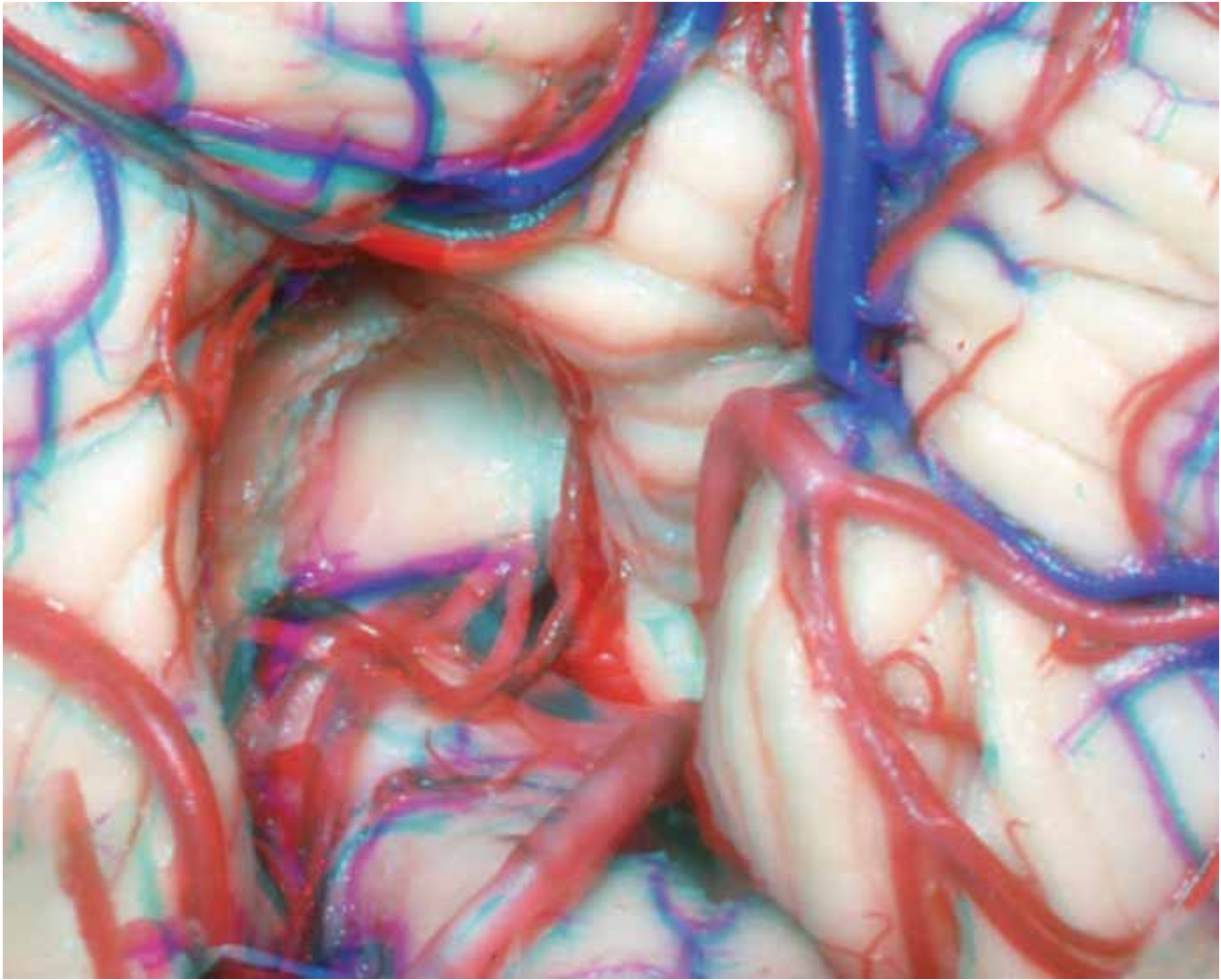




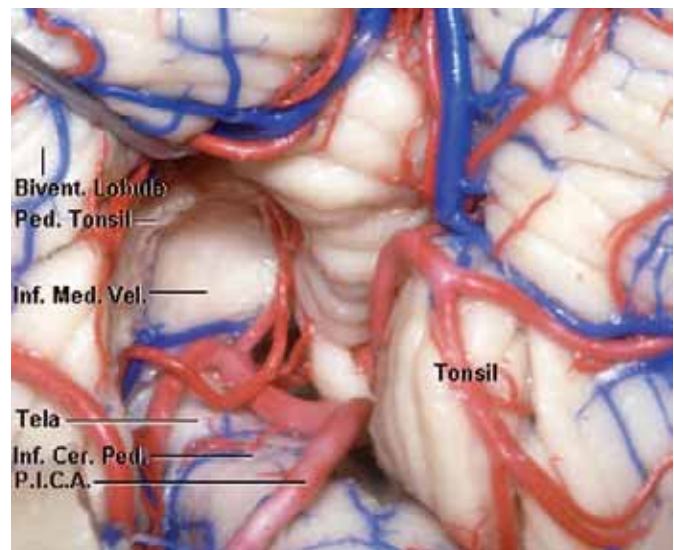


**FIGURES 10-14 and 10-15.** Relationships of the lateral margin of the cerebellar tonsil to the biventral lobule. Figure 10-14. The peduncle of the tonsil is the bundle of white matter, located at the superolateral margin of the tonsil, that attaches the tonsil to the remainder of the cerebellum. All of the margins of the tonsil, other than the site of the tonsilar peduncle, are free margins. The left tonsil has been retracted medially to open the deep cleft between the tonsil and the biventral lobule. The peduncle of the tonsil is at the superolateral margin of the tonsillobiventral fissure.

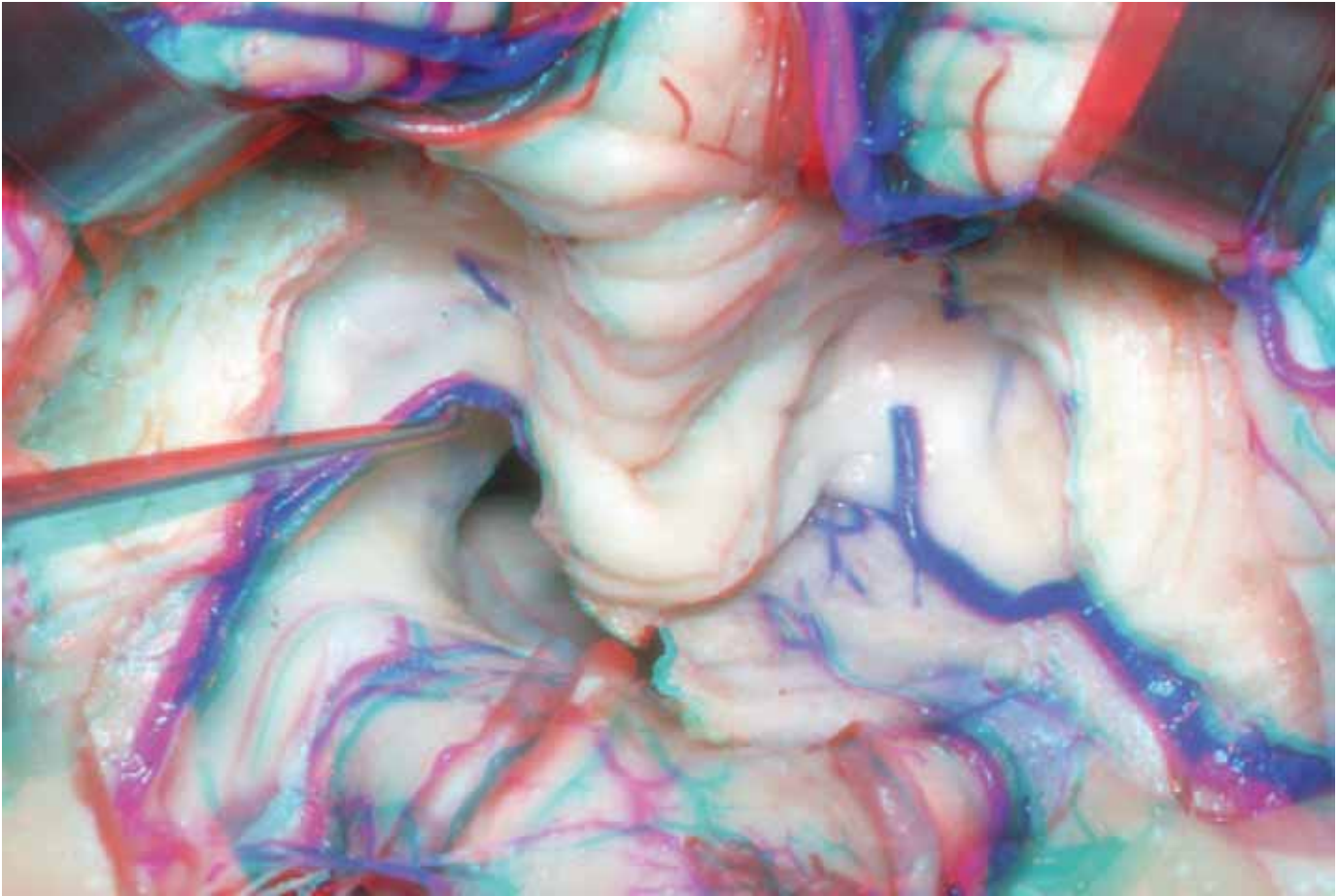




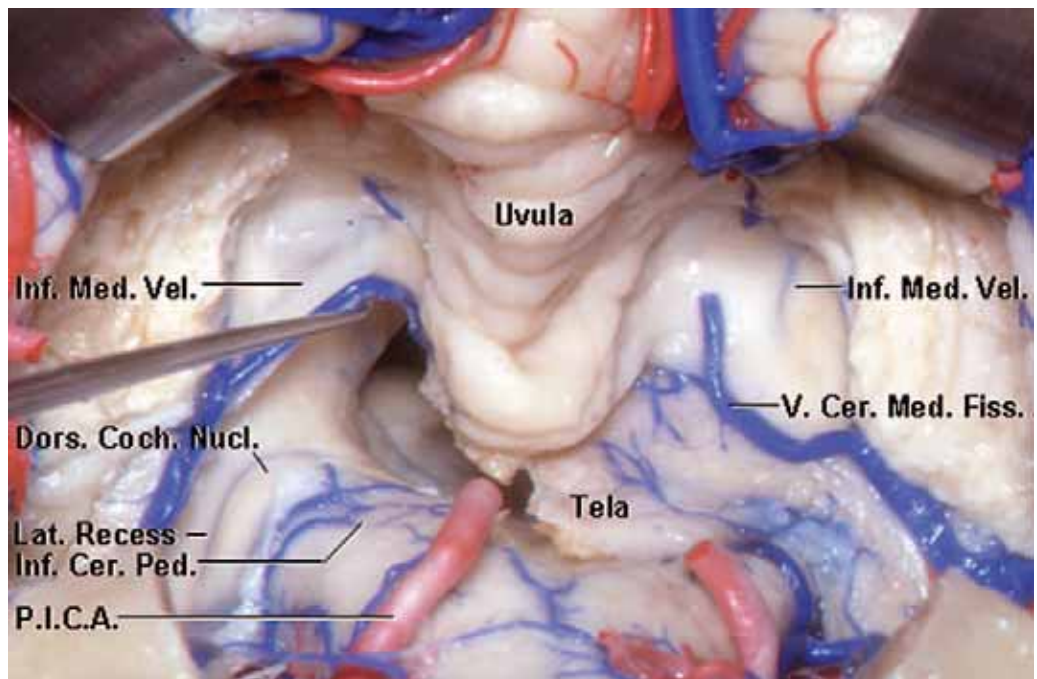
**FIGURE 10-15.** *The peduncle of the tonsil has been divided and the tonsil has been lifted out of the cerebellomedullary fissure to expose the caudal surface of the inferior medullary velum and the tela choroidea that form the lower half of the ventricular roof.*

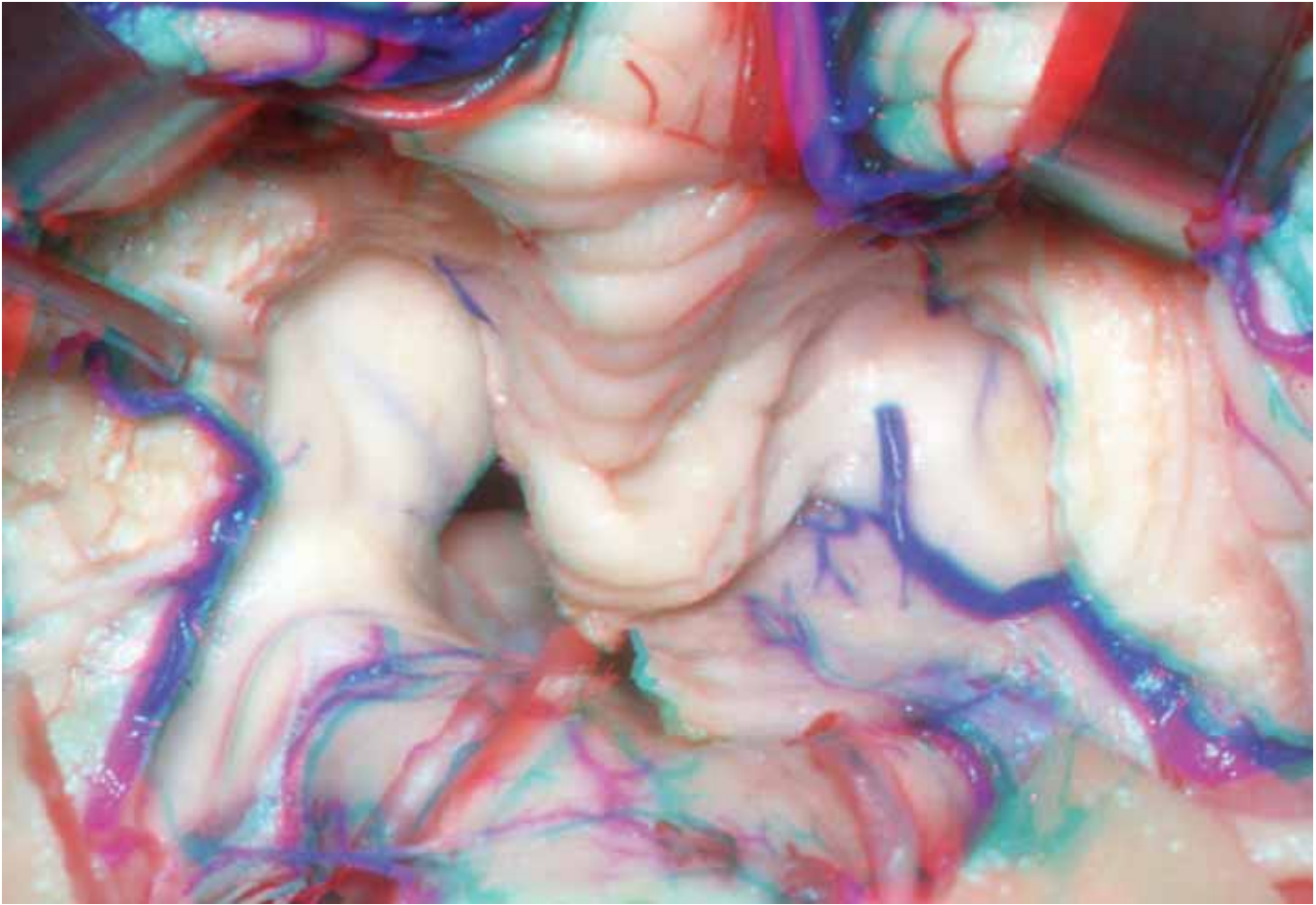






**FIGURES 10-16 and 10-17.** Another specimen. Figure 10-16. Both tonsils have been removed to expose the inferior medullary velum and tela choroidea. The inferior medullary velum extends from the nodule along the inferior half of the roof of the fourth and blends laterally into the flocculus. The tela, in which the choroid plexus arises, has been removed on the left side. A dissector has been placed inside the superolateral recess to show the paper-thin inferior medullary velum. Opening the velum will expose the superolateral recess. The dorsal cochlear nucleus sits in the floor of the lateral recess.





**FIGURE 10-17.** The velum has been removed on the left side. Opening the velum or removing it gives excellent access to the cerebellar peduncles and to the superior lateral recess of the fourth ventricle. The auditory tubercle is a prominence in the lateral recess that overlies the dorsal cochlear nucleus. A., artery; Bivent., biventral; Cer., cerebellar; Cer. Med., cerebellomedullary; Cer. Mes., cerebellomesencephalic; Coch., cochlear; Chor., choroid; CN, cranial nerve; Dent., dentate; Dors., dorsal; Fiss., fissure; Flocc., flocculus; For., foramen; Inf., inferior; Lat., lateral; Med., medullary; Mid., middle; Nucl., nucleus; Ped., peduncle; Plex., plexus; S.C.A., superior cerebellar artery; Suboccip., suboccipital; Sup., superior; Telovel., telovelar; Tonsillobivent., tonsillobiventral; V., vein; Ve., vermician; Vel., velum; Vent., ventricle; Vert., vertebral.

