Aberrant Roots of the Abducent Nerve*

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In Gray's3 textbook of anatomy the abducent nerve is described as a single trunk emerging from the ventral surface of pons on each side of the basilar artery and proceeding as such to its termination into the lateral rectus muscle. During removal of the brains at autopsy, the author noticed that frequently the abducent nerve emerged as 2 roots from the pons on one or both sides. This prompted a review of literature and further study of this aberration.

Material and Methods

Variations in the abducent nerve were recorded personally by the author during the removal of the brain at autopsy in 300 consecutive cases. Dissections then were carried out at the base of the skull to follow the course of each nerve. The following features were studied:

1. Number of fascicles in each nerve as seen under magnifying lens.
2. The point of exit of each nerve from the ventral surface of the pons.
3. Whether the nerve emerged as 1 or more roots.
4. Whether the nerve roots pierced the dura mater separately or as 1 trunk.
5. Point of union of roots in case of more than 1 root.
6. Communication between the abducent nerve and other structures in the cavernous sinus, i.e., sympathetic plexus on the internal carotid artery, 5th cranial nerve, etc.
7. Dissection of lateral recti.

Photographs were taken at various stages of dissection. The pons was sectioned and stained and variations in the cranial-nerve nuclei were looked for.

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Summary of Findings

Each abducent nerve was found to be composed of 15–20 fascicles which ran as a single trunk in most of the cases. In 18 cases (6 per cent) the nerve emerged as 2 trunks from the ventral surface of the pons on one or both sides. Both roots entered the dura mater through separate openings. The larger root was labelled as the main trunk and the smaller root as accessory or aberrant root. In 13 cases the aberrant root was unilateral, on the left side in 10 cases and on the right side in 3 cases. In the remaining 5 cases the aberrant root was present bilaterally. In no case was more than 1 aberrant root noted on each side. In each case the aberrant root was situated lateral to the main trunk and smaller in size (diameter, 0.5 mm.) than the main trunk (diameter, 1 mm.). The distance between the 2 roots where they pierced the dura mater varied from 2 mm. to 4 mm.

In 17 cases the aberrant root joined the main trunk in the cavernous sinus. In 1 case on the left side the aberrant root did not join the main trunk but entered the lateral rectus muscle separately (Fig. 1). In this case the left internal auditory artery passed between...
the 2 roots which emerged separately from the pons. The roots pierced the dura mater of the posterior fossa through 2 separate openings 3 mm. apart. The main trunk lay above the petrosphenoid ligament and the aberrant root below it. Both roots crossed the inferior petrosal sinus from lateral to medial side. They coursed horizontally in the cavernous sinus lateral to the internal carotid artery—the aberrant root below the main trunk. Both roots entered the orbit through the medial part of the superior orbital fissure and pierced the lateral rectus muscle 4 mm. apart—the main root on the superior surface and the aberrant root on the lateral surface. Further dissection of the orbit did not reveal any other abnormality.

In every case communications were noted between the abducent nerve and the sympathetic plexus on the internal carotid artery. No communications were found between the abducent nerve and the other cranial nerves in the cavernous sinus.

In 4 cases the left anterior inferior cerebellar artery arising from the basilar was found between the 2 roots on the left side. One of these is the case described above and shown in Fig. 1. There were no vessels between the 2 roots in the rest of the cases.

Sections of the pons in 2 cases did not reveal any abnormality in the cranial-nerve nuclei.

Discussion

The occurrence of aberrant roots of the abducent nerve in 6 per cent of the routine autopsies is significant enough to be documented in view of the fact that a standard textbook of anatomy does not even mention it.

Review of the literature revealed that this variation is listed in Wolff's anatomy of the eye and orbit. According to this text, the abducent nerve may arise in 2 parts which remain separate until the superior orbital fissure. The frequency of this aberration was not given. Sunderland and Hughes mentioned that the abducent nerve, after entering the cavernous sinus, was split into irregular anastomosing bundles by thick septa from fibrous dural prolongations which accompany the nerve. These bundles fused anteriorly and the nerve continued as a single trunk until its final division inside the

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**Fig. 2.** View through the tentorial hiatus showing the anterior inferior cerebellar artery (arrow), branch of the basilar artery (B), passing between the main trunk of the left abducent nerve and its aberrant root.