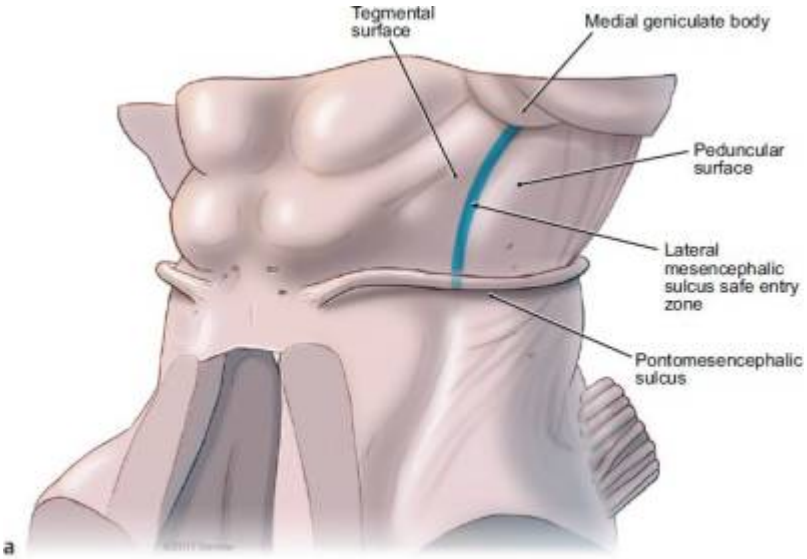
Lateral mesencephalic sulcus



Lesions located at the lateral midbrain surface are better approached through the lateral mesencephalic sulcus (LMS). The goal of a study was to compare the surgical exposure to the LMS provided by the subtemporal approach and the paramedian and extreme-lateral variants of the supracerebellar infratentorial approach.

These 3 approaches were used in 10 cadaveric heads.

Cavalcanti et al., performed measurements of predetermined points by using a neuronavigation system. Areas of microsurgical exposure and angles of the approaches were determined. Statistical analysis was performed to identify significant differences in the respective exposures.

The surgical exposure was similar for the different approaches-369.8 ± 70.1 mm2 for the ST; 341.2 ± 71.2 mm2 for the SCIT paramedian variant; and 312.0 ± 79.3 mm2 for the SCIT extreme-lateral variant ($p = 0.13$). However, the vertical angular exposure was 16.3° ± 3.6° for the ST, 19.4° ± 3.4° for the SCIT paramedian variant, and 25.1° ± 3.3° for the SCIT extreme-lateral variant craniotomy ($p < 0.001$). The horizontal angular exposure was 45.2° ± 6.3° for the ST, 35.6° ± 2.9° for the SCIT paramedian variant, and 45.5° ± 6.6° for the SCIT extreme-lateral variant opening, presenting no difference between the ST and extreme-lateral variant ($p = 0.92$), but both were superior to the paramedian variant ($p < 0.001$). Data are expressed as the mean ± SD.

The extreme-lateral SCIT approach had the smaller area of surgical exposure; however, these differences were not statistically significant. The extreme-lateral SCIT approach presented a wider vertical and horizontal angle to the LMS compared to the other craniotomies. Also, it provides a 90° trajectory to the sulcus that facilitates the intraoperative microsurgical technique [1].

Ten formalin-fixed and frozen brainstem specimens (20 sides) were analyzed. The white fiber dissection technique was used to study the intrinsic microsurgical anatomy as related to safe entry zones on the brainstem surface. Three anatomic landmarks on the anterolateral brainstem surface were selected: lateral mesencephalic sulcus, peritrigeminal area, and olivary body. Ten other specimens were used to study the axial sections of the inferior olivary nucleus. The clinical application of these anatomic nuances is presented.

The lateral mesencephalic sulcus has a length of 7.4 to 13.3 mm (mean, 9.6 mm) and can be dissected safely in depths up to 4.9 to 11.7 mm (mean, 8.02 mm). In the peritrigeminal area, the distance of the fifth cranial nerve to the pyramidal tract is 3.1 to 5.7 mm (mean, 4.64 mm). The dissection may be performed 9.5 to 13.1 mm (mean, 11.2 mm) deeper, to the nucleus of the fifth cranial nerve. The inferior olivary nucleus provides safe access to lesions located up to 4.7 to 6.9 mm (mean, 5.52 mm) in the anterolateral aspect of the medulla. Clinical results confirm that these entry zones constitute surgical routes through which the brainstem may be safely approached.

The white fiber dissection technique is a valuable tool for understanding the three-dimensional disposition of the anatomic structures. The lateral mesencephalic sulcus, the peritrigeminal area, and the inferior olivary nucleus provide surgical spaces and delineate the relatively safe alleys where the brainstem can be approached without injuring important neural structures [2)].

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Cavalcanti DD, Morais BA, Figueiredo EG, Spetzler RF, Preul MC. Surgical approaches for the lateral mesencephalic sulcus. J Neurosurg. 2019 Apr 12:1-6. doi: 10.3171/2019.1.JNS182036. [Epub ahead of print] PubMed PMID: 30978690.

2)
Recalde RJ, Figueiredo EG, de Oliveira E. Microsurgical anatomy of the safe entry zones on the anterolateral brainstem related to surgical approaches to cavernous malformations. Neurosurgery. 2008 Mar;62(3 Suppl 1):9-15; discussion 15-7. doi: 10.1227/01.neu.0000317368.69523.40. PubMed PMID: 18424962.