

Technical Note

The orbitozygomatic stich: A technical modification of the lateral supraorbital approach

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Abstract

Background: The lateral supraorbital approach (LSO) provides access to a variety of pathologies including anterior and some posterior circulation aneurysms, sellar and suprasellar lesions, and anterior fossa tumors. Technical modifications of LSO improve the surgical exposure of the skull base.

Methods: We retrospectively analyzed 73 consecutive patients treated by the senior author (Juha A. Hernesniemi), at the Department of Neurosurgery, Helsinki University Hospital in Helsinki, Finland from May 2013 to October 2013. This study cohort underwent a modified LSO to access anterior circulation aneurysms, sellar and suprasellar tumors, and anterior fossa tumors. The studied population comprised 30 men and 43 women, with a mean age at treatment of 54 years (9–83 years).

Results: LSO was successfully used to access anterior circulation aneurysms in 59 (81%) patients, 10 (14%) patients with anterior cranial fossa tumors, and 4 (5%) patients with suprasellar tumors. The skull base drilling provided a mean of 6.8 mm (1.7–22 mm) in increased exposure.

Conclusion: LSO provides adequate access to vascular and neoplastic lesions of the anterior cranial fossa, by drilling approximately 6.8 mm (1.7–22 mm) of the lateral orbital wall and sphenoid wing. This enhances surgical exposure and trajectory. An additional trick while performing an LSO is to place a single or multiple stiches (orbitozygomatic stich) at the base of the dura once opened, eliminating the dead space between the dura and anterior skull base.

Key Words: Aneurysm, lateral supraorbital approach, orbitozygomatic stich

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INTRODUCTION

The lateral supraorbital approach (LSO) is a simple, more efficient modification of the pterional approach.^[15,16] The senior author (Juha A. Hernesniemi) has used LSO in more than 6000 neurovascular and tumor cases over the last 30 years.^[6,8-11,13] LSO provide access to a variety of pathologies including most anterior and some posterior circulation aneurysms, sellar and suprasellar lesions, and anterior fossa tumors.^[6,8-11,13]

The pterional and orbitozygomatic (OZ) approaches require multiple steps making their execution time consuming.^[14] One advantage of LSO is avoidance of dissection of multiple layers and extensive skull base drilling. It is more straightforward to perform and requires only approximately 10 min to complete the bone work.^[6]

In this report, we analyzed 73 consecutive patients treated through a modified LSO. Our aim is to delineate the technical aspects of the modified LSO including the extent of skull base drilling and maximal dural retraction with an additional OZ stitch as a safe and effective alternative to increase the exposure of the surgical field and trajectory.

METHODS

Study cohort

We retrospectively analyzed 73 consecutive patients treated by the senior author (Juha A. Hernesniemi), at the Department of Neurosurgery, Helsinki University Hospital in Helsinki, Finland, from May 2013 to October 2013. This study cohort underwent a modified LSO to access anterior circulation aneurysms, sellar and suprasellar tumors, and anterior fossa tumors. The studied population comprised 30 men and 43 women, with a mean treatment age of 54 years (9–83 years) [Table 1].

Radiological measurements

For each patient, we analyzed two-dimensional, pre- and post-operative computed tomographic images. The amount of orbital roof and sphenoid ridge bone removed during drilling was assessed by measuring the distance from the orbit's medial wall to the lateral sphenoid wing at the pterion in the coronal images using the "Centricity Radiology RA 600 v 6.1." – standard program (General Electrics Manufacturer) [Figure 1].

Surgical technique

The basics of LSO have been widely described previously.^[6,7] In this report, we focus on the latest adjuncts to the original technique, specifically the additional skull base drilling and dural flap retraction with an extra OZ stitch.

Craniotomy and skull base drilling

Following a standard 3–4 cm diameter LSO,^[6,7] the lateral part of the anterior cranial fossa (the roof of the orbit)

Table 1: Characteristics of patients treated through a modified lateral supraorbital approach

	n (%)
Total number of patients	73 (100)
Women	30 (41)
Men	43 (59)
Age at treatment (years)	
Mean	54
Range	09-84
Number of patients with intracranial aneurysms	59
Women	36 (61)
Men	23 (39)
Number of patients with anterior cranial fossa tumors	10
Women	6 (60)
Men	4 (40)
Number of patients with suprasellar tumors	
Woman	1 (25)
Men	3 (75)
Drilling of orbital lateral wall and sphenoid wing (mm)	
Mean	6.83
Range	1.7-22

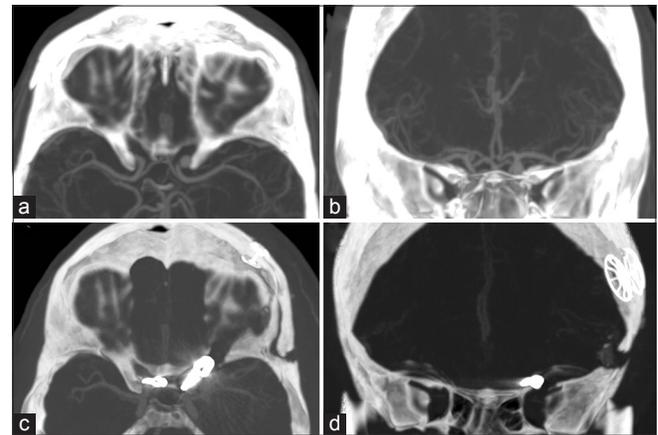


Figure 1: Computed tomographic images (a - axial; b - coronal; c - postoperative axial; d - postoperative coronal). Showing a left posterior communicating artery aneurysm and right ophthalmic treated through a left lateral supraorbital approach. Demonstrating the amount of skull base drilling

and the sphenoid ridge are drilled using a 5 mm ball tip with saline irrigation. We started at the lateral aspect of the orbit before proceeding to the lesser sphenoid wing. Then, a 5 mm diamond tip without saline irrigation ("hot drilling") is used to stop bone bleeding and smooth the bony surface. The bone should be drilled until the axis of the optical view is in a parallel line with the anterior skull base [Figure 2].

Dural opening and orbitozygomatic stitch technique

The dura is opened in a curvilinear fashion based on the sphenoid bone and retracted anterolaterally. Dural

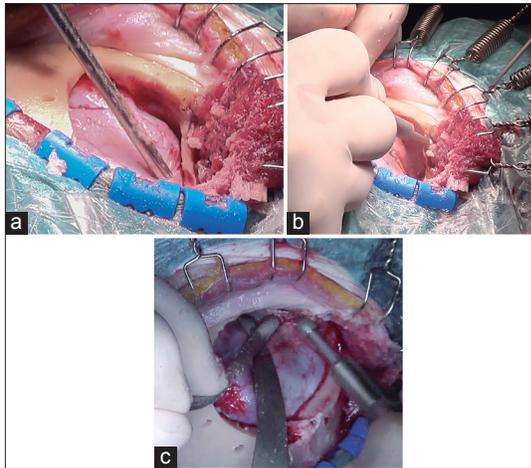


Figure 2: Intraoperative pictures. Performing a right lateral supraorbital approach (a) beginning of the anterior fossa drilling. (b) Drilling of the lateral orbital wall with a diamond tip (lateral view). (c) Drilling of the lateral orbital wall with a diamond tip (superior view)

stitches are applied circumferentially and retracted with artery clips. Then, OZ dural stitch is applied, at the base of the lateral sphenoid bone and dural pedicle base. An interrupted dural stitch is applied in an outward-inward fashion through the whole thickness of the dura at the lower 2/3 of the dural flap and retracted superiorly with artery clips. The width of the base of OZ stitch is up to 10 mm. This allows for further widening of the microsurgical exposure with maximal stretching of the dural flap and obliteration of the dead retro-orbital space resulting from the skull base drilling [Figure 3].

RESULTS

Pathologies

LSO was successfully used to access anterior circulation aneurysms in 59 (81%) patients, 10 (14%) patients with anterior cranial fossa tumors, and 4 (5%) patients with suprasellar tumors [Table 1].

Skull base drilling

The skull base drilling provided a mean of 6.83 mm (1.7–22 mm) in increased exposure [Table 1].

DISCUSSION

The techniques for accessing different pathologies of the anterior cranial fossa have evolved since the first frontotemporal approach described by Dandy in 1918.^[1,17] In this report, we present a technical modification of LSO originally described by the senior author (Juha A. Hernesniemi) based on experience of the surgical technique, to provide better access with less skull base drilling compared to the pterional and OZ approach while providing a wide, safe surgical exposure.

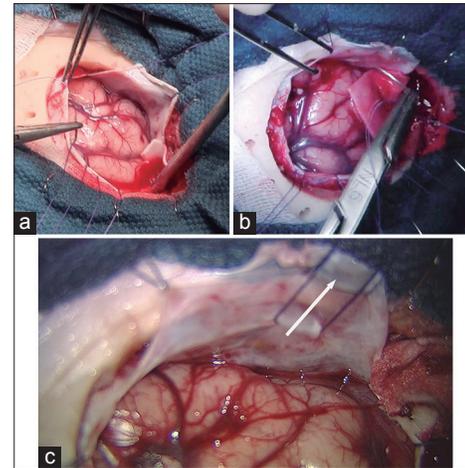


Figure 3: Intraoperative pictures. Dural retraction (a) multiple stitches are used to elevate the dural edges over the craniotomy. (b and c) The orbitozygomatic stitch is placed on the most inferior aspect of the dural pedicle to eliminate the dead space product of the bone drilling or to contain the periorbital fat away the surgical field (white arrow demonstrating retraction direction of the orbitozygomatic stitch)

Surgical cases

In our series, the modified LSO provided adequate access to pathologies involving the anterior cranial fossa and anterior circulation aneurysms. This is in concordance with previous reports using the same surgical approach and similar approaches.^[3,6,8-13]

Skull base drilling

LSO represents a smaller, tailored craniotomy that can be placed more anteriorly or posteriorly depending on the pathology to be approached.^[6,7] The lateral wall of the orbit and lesser sphenoid wing were drilled a mean of 6.83 mm. An advantage of the modified LSO includes sparing additional steps of traditional approaches such as OZ or pterional craniotomies while still offering adequate access to the pathologies previously mentioned.^[2,4,5,14]

One important consideration during drilling of the orbital roof and wall is the inadvertent opening of the periorbital fascia, causing herniation of the periorbital fat into the surgical corridor. This is addressed with a single stitch placed on the most inferior aspect of the dural pedicle to eliminate the dead space product of the bone drilling or to contain the periorbital fat away the surgical field. The key to the modified LSO is the extra bone removal. This allows for increased access to the skull base. The surgeon's vision and trajectory are maximized, however, with OZ stitch which tacks the dura against the bone and eliminates any dead space. The additional bone removed in the modified LSO is typically not necessary for access to most of pathologies that the standard LSO is used for. When this standard approach is not sufficient, the modified version with the OZ stitch may provide the needed access.

CONCLUSION

LSO provides adequate access of vascular and neoplastic lesions of the anterior cranial fossa, by drilling approximately 6, 8 mm (1.7–22 mm) of the lateral orbital wall and sphenoid wing, the surgical field increased considerably improving the surgical exposure and trajectory. An additional trick while performing an LSO is to place a single or multiple stiches (OZ stich) at the base of the dura once opened, eliminating the dead space between the dura and the anterior skull base.

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Conflicts of interest

There are no conflicts of interest.

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