Three-Piece Orbitozygomatic Approach

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OBJECTIVE: To describe the technical details of a 3-piece orbitozygomatic approach.

INTRODUCTION: In a 3-piece orbitozygomatic approach, soft tissue exposure is mostly comparable to the classic frontopterional approach. Osseous resection is a 3-piece operation that consists of first performing anterior and posterior cuts along the zygomatic arch, reflecting it down, attached to the masseter. This is followed by a classic frontotemporosphenoidal craniotomy, and finally, an osteotomy of the orbital rim, roof, and lateral wall of the orbit.

RESULTS: When compared with its 1- and 2-piece counterparts, 3-piece orbitozygomatic craniotomy, as described here, is a relatively simple operation and is thus advisable when considering an anterior or middle fossa approach. Brain exposure is wide, whereas cerebral retraction is minimal. We recommend avoiding orbit sectioning as deep as the superior orbital fissure.

CONCLUSION: The modifications described herein show the technical features of the 3-piece orbitozygomatic approach, which provides excellent brain exposure with less retraction and a good cosmetic result.

KEY WORDS: Anatomy, Cranial base, Orbitozygomatic approach, Skull base, Zygoma

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The pterional approach (frontotemporosphenoidal approach)[1-4] is one of the most common approaches in neurosurgery. Over the past 3 decades, significant improvements in cranial base surgery for lesion excision have been achieved as a consequence of greater osseous removal, which minimizes brain retraction.[5] Orbitozygomatic craniotomy[5-22] emerges as a result of this approach. Many variants of the orbitozygomatic approach have been developed since the initial description provided by Jane et al,[16] Pellerin et al,[18] Hakuba et al,[13] and Al-Mefty.[7] Some authors prefer the 1-piece variant,[6-8,11,14,15,20] whereas others recommend the 2-piece approach.[5,18,19,21] Herein, we present a simple way of performing the orbitozygomatic approach in 3 osseous pieces.

PATIENTS AND METHODS

Four dry skulls and 4 formalin-fixed heads were used to demonstrate the technical features of this approach. We then performed the 3-piece orbitozygomatic approach on 31 patients (12 pituitary tumors, 5 sphenoid wing meningiomas, 4 craniopharyngiomas, 1 optic nerve glioma, 7 anterior circulation aneurysms, 1 posterior circulation aneurysm, and 1 temporal uncal cavernoma) between March 2005 and December 2007 (Table 1).

Surgical Technique

Patient Positioning

The patient is positioned supine, with the head rotated 10 to 40 degrees contralateral to the lesion. The patient's head should be inclined away from the ipsilateral shoulder.

Incision

The incision begins at the level of the zygomatic arch root, just anterior to the tragus, and extends behind the hairline toward the contralateral pupillary line (Fig. 1A).[5] In patients with thick subcutaneous tissue, the preauricular incision can be safely lowered to 20 mm below the upper edge of the zygomatic arch.[23]

Flap Dissection

A subgaleal dissection is performed so that the fat pad is exposed above the temporal fascia (Fig. 1B). This corresponds to approximately one-fourth of the anterior temporal muscle and is located just anterior to the frontal branch of the superficial temporal artery. The incision penetrates the external layer of the temporal fascia and the interfascial fat, and proceeds further in this plane to protect the frontal branch of the facial nerve. The interfascial gap holds a vein, which runs perpendicularly to the incision and should be coagulated and cut. Exposure of the orbital rim superiorly and the zygomatic arch inferiorly is then followed by a subperiosteal exposure of the whole orbital rim, zygomatic arch, and posterior zygoma.

TABLE 1. Diagnosis, Age, Sex, and Scale of Outcome of the Patients Operated in our Series Using the 3-Piece Orbitozygomatic Approach[a]

Diagnosis	No. of Patients	Average Age (range), y	Sex	GOS
Pituitary adenomas	12 (39%)	53 (31-79)	8 F (26%)	10 grade 5
			4 M (13%)	1 grade 2
				1 grade 1
Anterior circulation aneurysms	7 (23%)	40 (29-61)	3 F (10%)	4 grade 5
			4 M (13%)	2 grade 4
				1 grade 3
Sphenoid wing meningiomas	5 (16%)	66 (52-83)	4 F (13%)	4 grade 5
			1 M (3%)	1 grade 4
Craniopharyngiomas	4 (13%)	59 (48-73)	1 F (3%)	3 grade 5
			3 M (10%)	1 grade 3
Optic nerve glioma	1 (3%)	28	1 F (3%)	Grade 5
Posterior circulation aneurysm	1 (3%)	48	1 F (3%)	Grade 5
Cavernoma of the uncus	1 (3%)	33	1 M (3%)	Grade 5
TOTAL	31 (100%)	47 (28-83)	18 F (58%)	24 grade 5 (78%)
			13 M (42%)	3 grade 4 (10%)
				2 grade 3 (6%)
				1 grade 2 (3%)
				1 grade 1 (3%)

[a] GOS, Glasgow Outcome Scale score.

Section of the Zygomatic Arch

The zygomatic arch is vertically sectioned twice: by means of 1 cut that runs posterior and immediately anterior to the temporomandibular joint, and through another cut that is anterior and exactly posterior to the union of the zygomatic arch and the zygoma (first and second cuts) (Fig. 1C). In this way, the zygomatic arch is mobilized inferiorly along with the masseter muscle.

Reflection of the Temporal Muscle

The temporal muscle is separated from the cranium by retrograde dissection to prevent significant postoperative muscle atrophy (Fig. 1D). This procedure, described by Oikawa et al,[24] consists of a dissection of the temporal muscle with a periosteal elevator going from inferior to superior, avoiding the use of monopolar cautery. At the level of the superior temporal line, a small muscle and fascial cuff is kept in place for muscle reattachment at the end of the procedure. The temporal muscle is thus reflected downward through the space left by the sectioned zygomatic arch. This exposes the floor of the middle fossa in its entirety.

Craniotomy

A pterional (frontotemporosphenoidal) craniotomy is performed in the usual manner (third cut) (Fig. 2A). The amount of frontal and temporal bone to be removed will vary according to the type and localization of the lesion. Usually, 4 burr holes are placed. The first burr hole (key hole) is placed in the frontal bone, just above and posterior to the frontozygomatic suture. The second burr hole is located in the frontal bone, behind the orbital rim, close to the supraorbital notch. The third burr hole is made below the superior temporal line, at the level of the coronal suture. Finally, the fourth burr hole is positioned in the squamous temporal bone, just above the zygomatic arch. The greater sphenoid wing, as well as the squamous part of the temporal bone, is drilled until the tip and the lateral inferior dural border of the temporal lobe are completely exposed. Then, the orbital roof and lateral wall are extensively drilled so that a fine bone layer is created. This will allow easier sectioning for orbital osteotomy later.

Orbital Removal

Three sections are required to remove the orbital rim, the orbital roof, and the lateral wall (Fig. 2B). Before that, the anterior two-thirds of the periorbita must be freed on the superior and lateral orbital walls to allow depression of the orbital contents. Thus, the orbital rim is cut 1 cm lateral to the frontal medial edge of the craniotomy, so that a bone step is left to support the replacement of the bone flap at closure. This cut extends backward over the orbital roof for approximately 3 cm (fourth cut), and changes direction toward the inferior orbital fissure through the lateral orbital wall (fifth cut). Osteotomy is completed by cutting the orbital rim from just above the union of the zygomatic arch and the zygoma up to the inferior orbital fissure (sixth cut). At this point, extreme care must be taken when separating the periorbita and orbital rim from the orbital walls, so as to prevent exposure and release of periorbital fat. The periorbita is usually most firmly attached to the bone at the level of the frontozygomatic suture. Likewise, special attention must be given to the supraorbital nerve. Before proceeding with the dissection, the bone gap through which it becomes superficial should be unroofed, particularly when there is a foramen rather than a notch.

Closure

Surgical closure is performed following a sequence that is reverse in order to the approach applied. This means that the orbital bone is to be

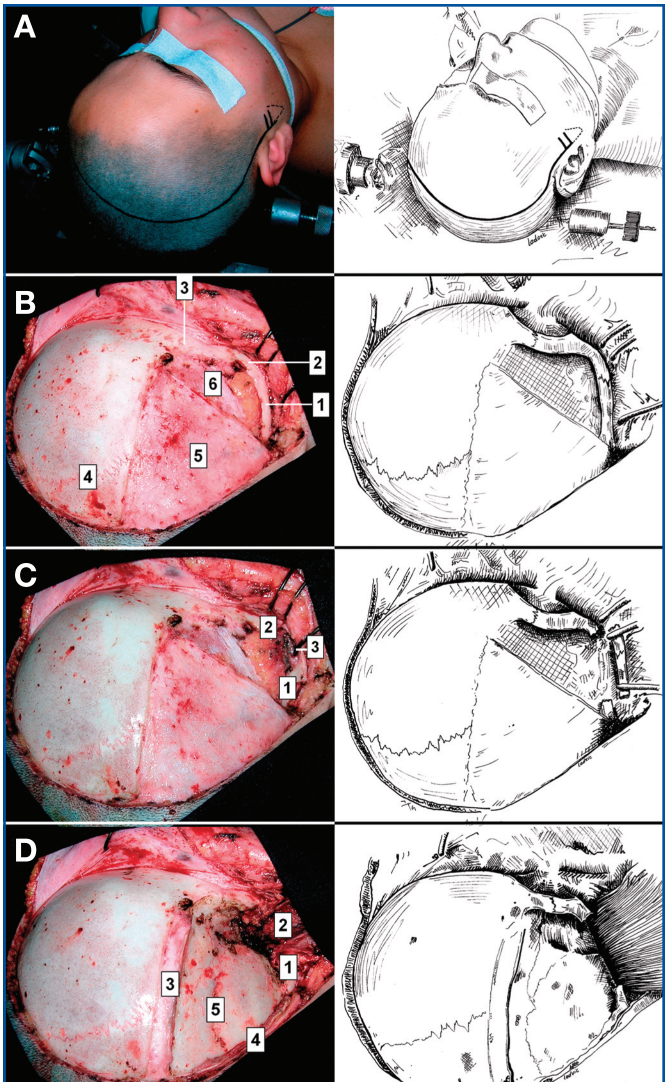

FIGURE 1. **A**, *position of the head and skin incision for the 3-piece orbitozygomatic approach. Note that the incision is a few millimeters below the lower margin of the zygomatic arch, and finishes at the contralateral pupillary line. A "safety zone," described to avoid lesions of the facial nerve, is placed below the zygomatic arch just anterior to the tragus.* **B**, *subgaleal and interfascial dissection to expose the zygomatic arch and orbital rim. 1, zygomatic arch; 2, zygoma; 3, orbital rim; 4, coronal suture; 5, superficial layer of temporal fascia (subgaleal dissection); 6, deep layer of temporal fascia (interfascial dissection).* **C**, *two cuts (posterior and anterior) are performed to the zygomatic arch, allowing the arch and the attached masseter muscle inferiorly (first bony piece) to recline. 1, posterior cut; 2, anterior cut; 3, zygomatic arch inferiorly reclined.* **D**, *the temporal muscle has been detached and mobilized inferiorly through the space previously occupied by the zygomatic arch. A "cuff" of muscle has been left, at the superior temporal line, for late suture. 1, posterior cut of zygomatic arch; 2, temporal muscle inferiorly reflected; 3, "cuff" of temporal muscle at the superior temporal line; 4, posterior section of temporal muscle; 5, squamous suture.*

first replaced and secured to the cranium, followed by the frontotemporosphenoidal plate. Next, the temporal muscle is sutured to the cuff left

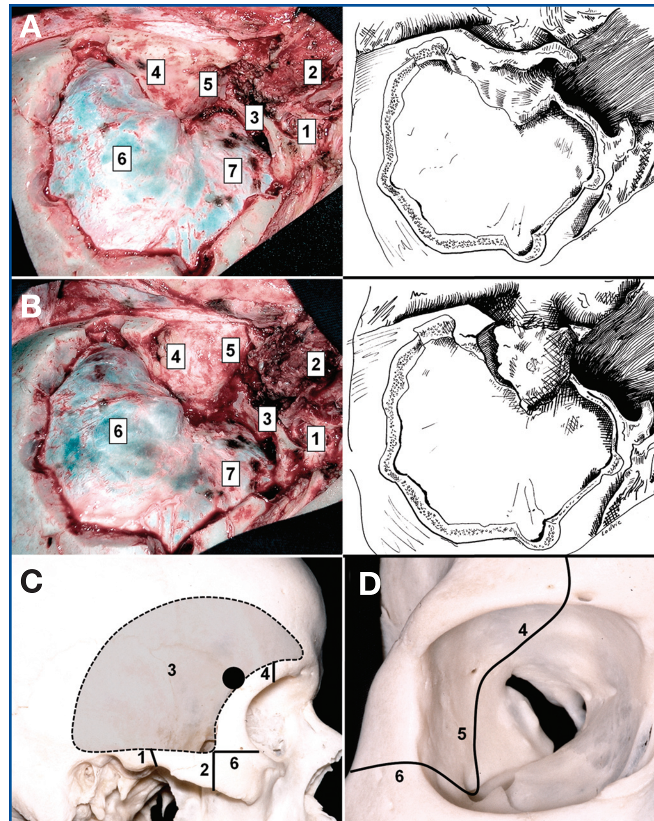

FIGURE 2. **A**, *frontotemporosphenoidal craniotomy (second bony piece). 1, posterior cut at the zygomatic arch; 2, temporal muscle reflected inferiorly; 3, lower craniotomy margin, at the level of the floor of the media fossa; 4, orbital roof; 5, lateral orbital wall; 6, frontal dura; 7, temporal dura.* **B**, *completed approach. The orbital osteotomy has already been done (third osseous piece). 1, posterior cut of zygomatic arch; 2, temporal muscle inferiorly reflected; 3, inferior margin of craniotomy; 4, periorbita at orbital roof; 5, periorbita at lateral orbital wall; 6, frontal dura; 7, temporal dura.* **C** *and* **D**, *osseous sections, in sequential order, necessary to perform a 3-piece orbitozygomatic approach. 1, posterior cut of zygomatic arch, just anterior to temporomandibular joint; 2, anterior cut of zygomatic arch, just posterior to its union with the zygoma; 3, frontotemporosphenoidal craniotomy. The "keyhole" zone is represented by a black circle; 4, section at the level of the orbital roof and superior orbital rim; 5, cut at the lateral wall of the orbit; 6, section at the level of the zygoma.*

for that purpose, and, lastly, the zygomatic arch is replaced and secured to the cranium. There are many bone-fixing materials available that can assist in preventing subsequent twisting. However, we have obtained excellent cosmetic results with nonabsorbable sutures (e.g., silk).

DISCUSSION

The orbitozygomatic approach presents 2 main variants, namely, the 1- and the 2-piece procedures. In the 1-piece orbitozygomatic approach, the frontotemporosphenoidal craniotomy is elevated along with the orbitozygomatic osteotomy, whereas in the 2-piece variant, the frontotemporosphenoidal bone flap is elevated first and the orbitozygomatic part is separated afterward. After the important pioneering reports,[7,8,13,16,18] many authors contributed to refine the surgical technique of the orbitozygomatic approach.[5,9-11,14,15,17,19-22] In 1998, Zabramski et al[5] described the 2-piece orbitozygomatic approach. In 2002, after the original description by Jane et al[16] and Al-Mefty,[7] Abdel Aziz et al[6] redefined the 1-piece orbitozygomatic approach. This approach is based on the MacCarty keyhole burr hole,[25] and many modifications were presented in subsequent years.[8,11,14,15,20] In 2006, Tanriover et al[26] analyzed the advantages and disadvantages of the 1- and 2-piece methods to eventually demonstrate that the main advantage of the 2-piece approach is greater orbital removal with orbital bone preservation.

The 3-piece technique was described or suggested before the present work.[5,10,13] The original 3-piece approach described herein constitutes a modification of the 2-piece approach described by Zabramski et al.[5] By sectioning the zygomatic arch, a 3-cm-long free segment is obtained. This operation, as recommended by Delashaw et al,[10] keeps the attachment of the masseter muscle in place at the zygomatic arch. In this manner, after being reflected from the cranium, the temporal muscle is mobilized inferiorly, and the already sectioned zygomatic arch is pushed down. This provides good basal exposure of the middle fossa floor, and secures exposure of the orbital lateral wall up to the level of the inferior orbital fissure, which is necessary for the orbitozygomatic osteotomy (Fig. 2C). No extra time was needed to perform the 3-piece approach, given the fact that the number of surgical cuts and the extension of the dissection were both similar to the aforementioned variants. Moreover, we do not consider that the 3-piece craniotomy produces worse cosmetic results compared with its 1- and 2-piece counterparts (Fig. 3). Several complications depicted in 3-piece orbitozygomatic craniotomy (frontotemporal branch of facial nerve lesion, supraorbital nerve lesion, postoperative soft tissue edema in the frontoorbital region) are similar to those described for 1- or 2-piece orbitozygomatic craniotomy. Regarding our results, only 1 patient presented a transitory palsy of eyebrow elevation that resolved postoperatively in 1 week. No damage to the supraorbital nerve was observed during dissection, and soft tissue edema always disappeared by approximately the fifth day after surgery.

Orbitozygomatic craniotomy offers a greater angle of view and enough space for the operation both horizontally and vertically.[27] Removal of the orbital part improves the angle of horizontal attack, which is particularly useful when using a subfrontal or transsylvian route. Additionally, removal of the zygomatic arch, lowering the temporal muscle below the level of the middle fossa floor, improves the angle of vertical attack, which proves particularly useful when using a pretemporal route. Gonzalez et al,[28] comparing the extended and the conventional orbitozygomatic craniotomy, suggested that when the approach is extended anteriorly (maxillary extension), the increase of the working area is so small that it is worthless. Moreover, as demonstrated by Schwartz et al,[29] the greatest advantage of the orbitozygomatic approach in terms of increased exposure is achieved through orbital osteotomy. Thus, the authors think that increasing the extent of bone removal anteriorly to the zygomatic arch provides no greater basal exposure and is scarcely useful (Fig. 2C). Nevertheless, the approach described in this article differs basically in the extent of bone removal compared with the "conventional" orbitozygomatic craniotomy, and this fact may determine some variations in surgical exposure.

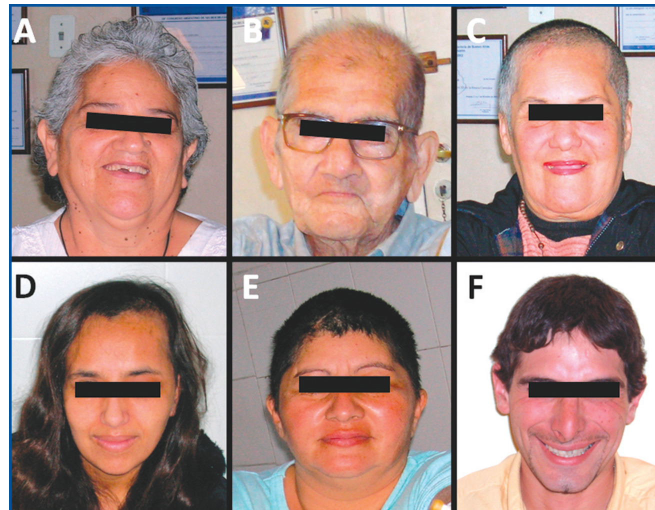

FIGURE 3. *Cosmetic results after surgery using the 3-piece orbitozygomatic approach.* **A**, *pituitary macroadenoma (approached on the right).* **B**, *left sphenoid wing meningioma.* **C**, *another left sphenoid wing meningioma.* **D**, *left optic nerve glioma.* **E**, *left superior cerebellar artery aneurysm.* **F**, *left uncal cavernoma.*

Zabramski et al[5] suggest that the section of the orbital roof should reach the superior orbital fissure. In our opinion, this requires significant frontal lobe retraction, incurs risking the neural and vascular structures coursing through the lateral part of the superior orbital fissure, and the last millimeters of the resected orbital roof offer no real increased exposure. Therefore, we suggest halting the orbital roof cut (fourth cut) 1 cm before the superior orbital fissure to change the course of the cut from that point toward the inferior orbital fissure (fifth cut) (Fig. 2D).

CONCLUSION

The modifications to the orbitozygomatic approach described herein offer safe and easy access with excellent exposure and very good cosmetic results.

Disclosure

The authors have no personal financial or institutional interest in any of the drugs, materials, or devices described in this article.

REFERENCES

1. Oliveira E, Siqueira M, Tedeschi H, Peace DA. Technical aspects of the fronto-temporo-sphenoidal craniotomy. In: T. Matsushima, org. *Surgical Anatomy for Microneurosurgery VI: Cerebral Aneurysm and Skull Base Lesions*. Fukuoka: Sci Med Publication; 1993:3-8.

2. Samson DS, Hodosh RM, Clark WK. Microsurgical evaluation of the pterional approach to aneurysms of the distal basilar bifurcation. *Neurosurgery*. 1978;3(2):135-140.
3. Yaşargil MG, Fox JL. The microsurgical approach to intracranial aneurysms. *Surg Neurol*. 1975;3(1):7-14.
4. Yaşargil MG, Antic J, Laciga R, Jain KK, Hodosh RM, Smith RD. Microsurgical pterional approach to aneurysms of the basilar bifurcation. *Surg Neurol*. 1976;6(2):83-91.
5. Zabramski JM, Kiris T, Sankhla SK, Cabiol J, Spetzler RF. Orbitozygomatic craniotomy. Technical note. *J Neurosurg*. 1998;89(2):336-341.
6. Abdel Aziz KM, Froelich SC, Cohen PL, Sanan A, Keller JT, van Loveren HR. The one-piece orbitozygomatic approach: the MacCarty burr hole and the inferior orbital fissure as keys to technique and application. *Acta Neurochir (Wien)*. 2002;144(1):15-24.
7. Al-Mefty O. Supraorbital-pterional approach to skull base lesions. *Neurosurgery*. 1987;21(4):474-477.
8. Al-Mefty O. Clinoidal meningiomas. *J Neurosurg*. 1990;73(6):840-849.
9. Balasingam V, Noguchi A, McMenomey SO, Delashaw JB Jr:.Modified osteoplastic orbitozygomatic craniotomy. Technical note. *J Neurosurg*. 2005;102(5):940-944.
10. Delashaw JB Jr, Tedeschi H, Rhoton AL Jr. Modified supraorbital craniotomy: Technical note. *Neurosurgery*. 1992;30(6):954-956.
11. Froelich S, Aziz KA, Levine NB, Tew JM Jr, Keller JT, Theodosopoulos PV. Extension of the one-piece orbitozygomatic frontotemporal approach to the glenoid fossa: Cadaveric study. *Neurosurgery*. 2008;62(5 Suppl 2):ONS312–ONS317.
12. Fujitsu K, Kuwabara T. Orbitocraniobasal approach for anterior communicating artery aneurysms. *Neurosurgery*. 1986;18(3):367-369.
13. Hakuba A, Liu S, Nishimura S. The orbitozygomatic infratemporal approach: A new surgical technique. *Surg Neurol*. 1986;26(3):271-276.
14. Hayashi N, Hirashima Y, Kurimoto M, Asahi T, Tomita T, Endo S. One-piece pediculated frontotemporal orbitozygomatic craniotomy by creation of a subperiosteal tunnel beneath the temporal muscle: Technical note. *Neurosurgery*. 2002;51(6):1520-1524.
15. Ikeda K, Yamashita J, Hashimoto M, Futami K. Orbitozygomatic temporopolar approach for a high basilar tip aneurysm associated with a short intracranial internal carotid artery: A new surgical approach. *Neurosurgery.* 1991;28(1):105-110.
16. Jane JA, Park TS, Pobereskin LH, Winn HR, Butler AB. The supraorbital approach: Technical note. *Neurosurgery*. 1982;11(4):537-542.
17. McDermott MW, Durity FA, Rootman J, Woorhurst WB. Combined frontotemporal-orbitozygomatic approach for tumors of the sphenoid wing and orbit. *Neurosurgery*. 1990;26(1):107-116.
18. Pellerin P, Lesoin F, Dhellemes P, Donazzam M, Jomin M. Usefulness of the orbitofrontomalar approach associated with bone reconstruction for frontotemporosphenoid meningiomas. *Neurosurgery*. 1984;15(5):715-718.
19. Pontius AT, Ducic Y. Extended orbitozygomatic approach to the skull base to improve access to the cavernous sinus and optic chiasm. *Otolaryngol Head Neck Surg*. 2004;130(5):519-525.
20. Shigeno T, Tanaka J, Atsuchi M. Orbitozygomatic approach by transposition of temporalis muscle and one-piece osteotomy. *Surg Neurol*. 1999;52(1):81-83.
21. Sindou M, Alaywan M. Orbital and/or zygomatic removal in an approach to lesions near the cranial base. Surgical technic, anatomic study and analysis of a series of 24 cases [in French]. *Neurochirurgie*. 1990;36(4):225-233.
22. Socolovsky M, Campero A, Chiaradio P, et al. Modified orbitozygomatic approach. *Rev Argent de Neuroc*. 2001;15:13-18.
23. Campero A, Socolovsky M, Martins C, Yasuda A, Torino R, Rhoton AL. Facial-zygomatic triangle: A relationship between the extracranial portion of facial nerve and the zygomatic arch. *Acta Neurochir (Wien)*. 2008;150(3):273-278.
24. Oikawa S, Mizuno M, Muraoka S, Kobayashi S. Retrograde dissection of the temporalis muscle preventing muscle atrophy for pterional craniotomy. Technical note. *J Neurosurg*. 1996;84(2):297-299.
25. MacCarty CS. *The Surgical Treatment of Intracranial Meningiomas.* Springfield: Charles C Thomas; 1961:57-60.
26. Tanriover N, Ulm AJ, Rhoton AL Jr, Kawashima M, Yoshioka N, Lewis SB. One-piece versus two-piece craniotomy: Quantitative and qualitative considerations. *Neurosurgery*. 2006;58(4 Suppl 2):ONS229-ONS237.
27. Figueiredo EG, Deshmukh P, Zabramski JM, et al. Quantitative anatomic study of three surgical approaches to the anterior communicating artery complex. *Neurosurgery*. 2005;56(2 Suppl):397-405.
28. Gonzalez LF, Crawford NR, Horgan MA, Deshmukh P, Zabramski JM, Spetzler RF. Working area and angle of attack in three cranial base approaches: Pterional, orbitozygomatic, and maxillary extension of the orbitozygomatic approach. *Neurosurgery*. 2002;50(3):550-557.
29. Schwartz MS, Anderson GJ, Horgan MA, Kellog JX, McMenomey SO, Delashaw JB Jr. Quantification of increased exposure resulting from orbital rim and orbitozygomatic osteotomy via the frontotemporal transsylvian approach. *J Neurosurg*. 1999;91(6):1020-1026.

COMMENTS

The authors present a concise description of the 3-piece orbitozygomatic craniotomy. They show that this approach can be used with safety and good cosmetic results. When selected for the appropriate lesion, the orbitozygomatic approach offers superior exposure and working angles. Our experience has been similar to that of this report in that the surgical advantages offered by this approach outweigh the minimal morbidity that it adds.

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This technical note describes and advocates a simple modification of the standard 2- piece front-temporal orbitozygomatic approach: separate division of the zygomatic arch. This converts a 2- piece bone removal (fronto-temporal plate and orbitozygomatic segment) into 1 of 3 pieces (cranial plate, orbital roof and superior-lateral rim, and zygomatic arch. It has 2 advantages: (1) The aggressive anterior retraction of soft tissue overlying the zygoma (to make the chevron shaped cut (posterior-inferior to antero-superior through the number 6 in Figure 2C) that frees the posterior piece of zygoma attached to the lateral orbital rim and the zygomatic arch) is not needed; and (2) access to the inferior lateral orbital wall and anterior-lateral end of the inferior orbital fissure is enhanced by downward deflection of the temporalis muscle permitted by prior division of the zygomatic arch; this facilitates identification of the inferior orbital fissure, placement of the osteotomy through the lateral orbital wall, and drilling that thins the midportion of the greater sphenoid wing. This thick wedge of the midportion of the greater sphenoid wing, bordered by the midportion of the lateral orbital wall, the anterior middle cranial fossa, and the anterior-inferior portion of the fossa of the temporalis muscle, is often an impediment to freeing of the orbitozygomatic segment in the 2-piece approach (and, especially, the fronto-temporal-orbitozygomatic bone plate of the one piece orbitozygomatic approach).

One relative disadvantage is potential obstruction of access to drilling of this wedge of bone, and to resection of tumor at this junction of lateral orbit, middle cranial fossa and infratemporal fossa, by the posterior portion of the zygoma removed in the two piece approach but left intact in the 3-piece approach.

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