TECHNICAL NOTE

Fronto-Orbito Zygomatic Approach: A Technical Modification

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Abstract—The fronto-orbito zygomatic approach is part of the surgical armamentarium of modern skull base surgery. As described in the literature, it requires costly technological tools such as powerful drills and saws, to be performed. In the present communication we describe a technical modification that allows the zygoma to be elevated "en bloc" together with the fronto-orbital bone flap by means of appropriate use of the Gigli's saw. Using this technique, adequate replacement of the craniotomy flap requires only two silk sutures. This technical modification, which was already successfully used in over 20 cases, would also allow this useful approach to be performed in those neurosurgical environments where modern costly technology for cranial base surgery is not available. (*Skull Base Surgery, 6(2):125–128, 1996*)

The introduction of the techniques of cranial base surgery has offered an unquestionable contribution to the neurosurgical treatment of certain difficult deep-seated lesions. The practice of skull base surgery demands a particular skill, which mainly results from long training with the modern techniques of bone microdissection. It also requires the availability of modern technology such as high-powered drills and oscillating-vibrating saws.

The fronto-orbito zygomatic approach is part of the technical armamentarium a cranial base surgeon can use for dealing with lesions located in the area of superior orbital fissure, cavernous sinus, the petrous apex, and the interpeduncular fossa. As described in the literature,[1,2] this approach requires a complex instrumentarium to be performed, as does any cranial base surgery. We describe here a technical modification which enables this useful cranial bone flap to be raised and replaced without costly modern technology.

MATERIALS AND METHODS

A curvilinear skin incision is performed starting 3 cm below the zygomatic process in front of the external auditory meatus just behind the superficial temporal artery, and terminates 4 cm past the midline behind the hairline. After the skin flap is reflected anteriorly with fish hooks, the frontal pericranium is elevated in a posterior-to-anterior direction until the supraorbital nerve is exposed and can be mobilized away from the orbit. The periorbita is then visualized and carefully dissected away from the orbital wall. Then the zygoma is fully exposed, using a technique described in a previous paper[3] for preventing injury of the frontal branches of the facial nerve. Briefly, soft tissue dissection is conducted between the deep layer of the superficial temporal fascia and the deep temporal fascia, and the zygoma is exposed subperioste-

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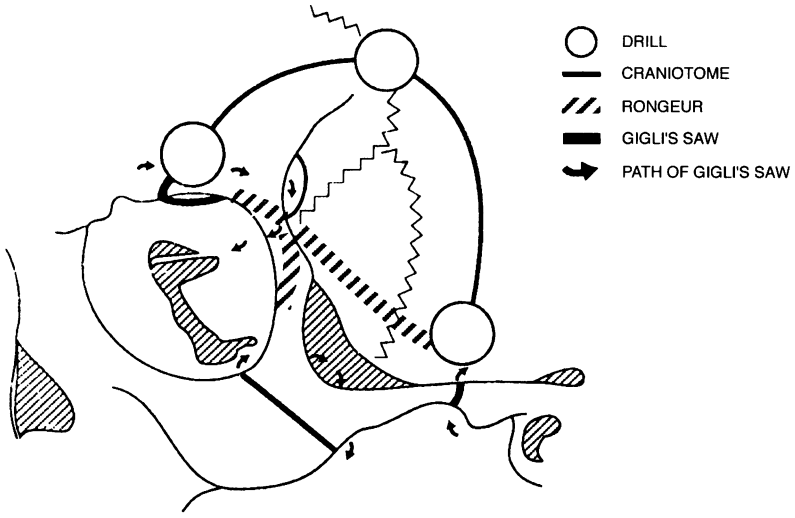

Figure 1. Graphic representation of fronto-orbito zygomatic approach. Path of Gigli's saw is indicated (arrows).

ally until a full view of the fronto-orbito zygomatic region is obtained. The temporalis muscle is detached from the temporal fossa to expose the lateral orbital wall. At this time, a key burr hole is made below the temporal line which exposes the orbital content and the basal frontal dura, which are to be connected with a supraorbital frontal burr hole as described by Al-Mefty (Fig. 1).[4] Two additional key burr holes, one in the fronto-temporal and another in the temporal region, can now be made to complete the craniotomy, if a craniotome is not available. Then the lateral orbital wall is removed with either a drill or with conventional rongeurs, and the zygomatic process is transected close to the mandibular joint using the Gigli's saw. Two small holes are drilled just before completing the zygomatic resection, to be used for reapproximation at the end of the procedure. The Gigli's saw is then passed from the inferior angle of the proximal portion of the zygomatic process in front and below the zygomatic arch above the temporalis muscle, in the direction of the exposed lateral orbital wall. A curved instrument such as a long curved mosquito forceps can be a useful tool for properly driving the Gigli's saw into this limited space (Fig. 2). With an assistant retracting downwards the skin flap together with the reflected soft tissues, an oblique cut is made in the zygomatic arch, taking care to direct the Gigli's saw not too forcefully to avoid the loosening and subsequent fracturing of the arch. The oblique direction the surgeon is obliged to maintain for moving the Gigli's saw in this narrow space would prevent inadvertent opening of the maxillary sinus. The bone flap can be lifted up after the temporal burr hole and the "key hole" are connected with rongeurs. Exposure of the temporal dura can be amplified as required by means of a basal temporal craniectomy following elevation of the bone flap and downward deflection of the temporalis muscle (Fig. 3). In addition to those holes made in the zygomatic process, one pair of small holes is drilled in the frontal region, sufficient for reapproximating the bone

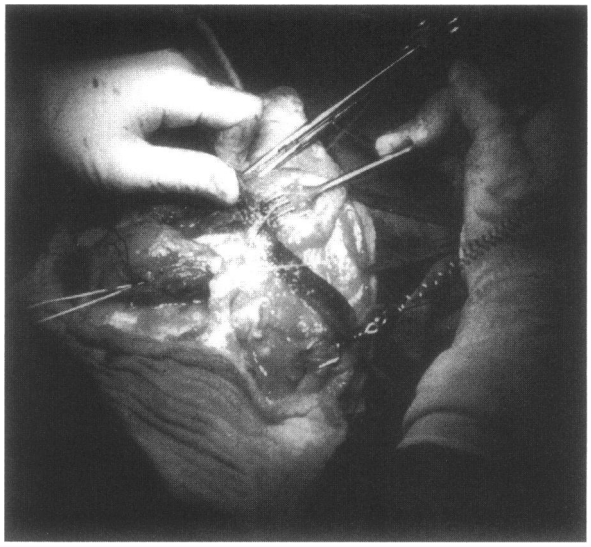

Figure 2. Transection of the zygomatic arch is shown. Note the oblique direction of the Gigli's saw.

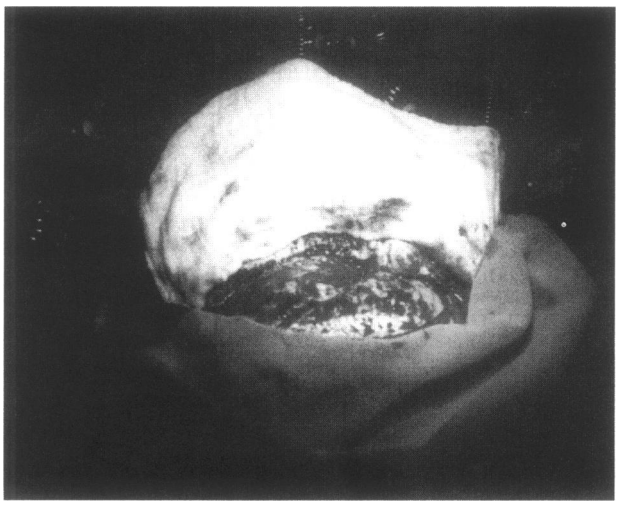

Figure 3. Fronto-temporal dura exposure after fronto-orbito zygomatic bone flap elevation.

Table 1. Series of Patients Operated on with Fronto-Orbito-Zygomatic Approach*

No.	*Age*	*Sex*	*Histology*	*Localization*	*Complications (related to approach)*
1	55	F	Sarcoma	Basal MCF	No
2	42	M	Carcinoma	Cranio-orbital	No
3	57	F	Meningioma	Cavernous sinus	No
4	54	F	Meningioma	Cavernous sinus	Temporary upper facial paralysis
5	24	M	Neurinoma	First trigeminal branch	No
6	55	F	Meningioma	Petroclival	No
7	8	M	Hamartoma	Hypothalamus	No
8	4	F	Hamartoma	Hypothalamus	No
9	9	F	Meningioma	Clinoidal	No
10	37	F	Neurinoma	V c.n. (hourglass petroclival)	Permanent upper facial paralysis
11	45	M	Meningioma	Cavernous sinus	No
12	15	M	Craniopharyngioma	Sellar-suprasellar	No
13	58	M	Meningioma	Petroclival	No
14	65	F	Meningioma	MCF	No
15	49	F	Meningioma	Petroclival	Temporary upper facial paralysis
16	24	M	Chordoma	Petroclival	No
17	45	F	Cavernous angioma	Temporopolar	Temporary upper facial paralysis
18	40	F	Meningioma	Clinoidal	No
19	67	M	Meningioma	Petroclival	No
20	23	F	Craniopharyngioma	Retrosellar	No
21	38	M	Adenoma	Sellar-suprasellar (giant)	No
22	56	M	Aneurysm	Basilar artery	No
23	52	F	Aneurysm	ACoA Large size + MCA	No

*Cases 1 to 16 in Moscow; cases 17 to 23 in Rome.

flap using two silk sutures. In our experience, bone flap healed uneventfully in more than 20 cases—in the vast majority, cranial base pathological processes—in which it was utilized (Table 1).

Illustrative Case

A 40-year-old woman presented with a 6-month history of visual loss in right eye, headache, epileptic seizures, and behavioral disturbances. CT scan (Fig. 4) and MRI (Fig. 5) showed a right clinoidal meningioma. The lesion was removed following convenient exposure using a right fronto-orbito zygomatic approach (Fig. 6). The post operative course was uneventful.

DISCUSSION

The interest of the present communication rests on the fact that a complex bone flap such as the one described

Figure 4. CT of a 40-year-old woman with a 6-month history of visual loss in the right eye, headache, epileptic seizures, and behavioral disturbances. Right clinoidal meningioma.

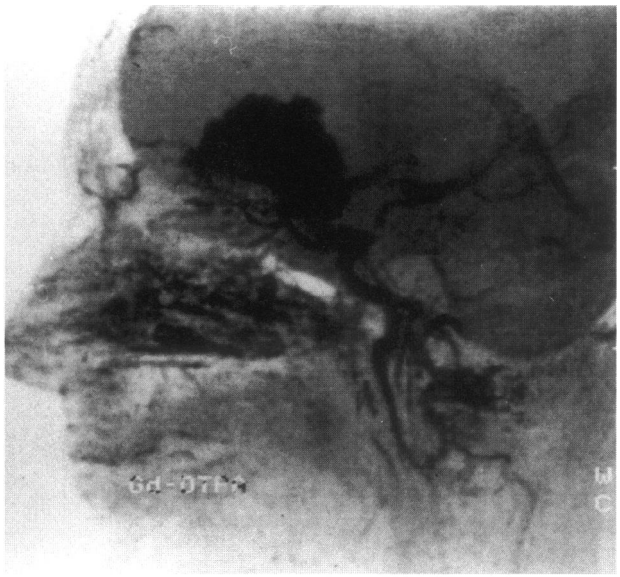

Figure 5. Angio-MRI of the same patient gives further details of the meningioma.

Figure 6. Postoperative control CT demonstrates total removal of the lesion.

here can be elevated and effectively replaced without complex technology.

Gigli's saw is a time honored neurosurgical instrument[5]; however, its use has steadily decreased in the last few years due to the introduction of high-powered instruments. As a result, young neurosurgeons completing their training in developed counties may not be familiar with the techniques necessary to master its correct use. Still, the Gigli's saw is in a useful instrument that may allow neurosurgeons to perform complex cranial bone resections in an environment where costly, high-powered, and complex instruments are not available. Thus, the advantages of this "low-tech" approach are made available to neurosurgical centers around the world where financial restraints prevent the acquisition of costly, complex technology. This would allow better treatment of cases of basally located lesions such as the one described here, which do not necessarily require resection of the cranial base, but may benefit from a more basally targeted surgical approach.

Moreover, the use of the Gigli's saw may also decrease the risk of inadvertent opening of the maxillary sinus, which is more than a purely theoretical risk when an oscillating saw is used for cutting the zygomatic root, particularly if the cutting angle is not properly oriented.

We have used this bone flap technique in over 20 cases, always with an adequate view of the targeted region and without complications related to either elevation or replacement of the bone flap.

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