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# Management of Spheno-Orbitary Meningiomas about 27 Cases

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***Abstract:***
*Spheno-orbital meningiomas represent 20% of adult orbital lesions in neurosurgical settings. They are defined as intraosseous meningiomas at the base of the anterior and middle cranial fossa, involving the sphenoid wings and the orbit associated with a soft tissue plaque component. Complete resection remains a goal despite difficulties and recurrences. We report our experience in the surgical management of spheno-orbital meningiomas.*
*Patients and methods*
*This is a series of 27 patients managed between June 2015 and April 2021, The Sex ratio was 26 female/1 male. The average age was 50 years, with a duration of evolution between 2 and 6 years. Exophthalmos was present in 85.2% of cases, of which seven had unilateral blindness and optic atrophy at the fundus, and 14 cases had a decrease in visual acuity varying between 1/10 and 8/10. Imaging took 04 forms.*
*Results:*
*All our patients underwent surgical resection performing a superior-external orbitotomy. The surgical procedure was followed by opening and decompression of several orbital orifices in isolation or in association with each other. The opening of the optic canal was performed in 19 cases, the sphenoidal cleft in 25 cases, the removal of the intradural meningioma was possible in 6 cases, and the intraorbital portion in 4 cases, the rotendum was freed in 7 cases, a clinoidectomy was performed in 2 cases, and finally the exenteration in 2 cases.*
*The postoperative aesthetic result concerning the exophthalmos was good in 82.5%. Recurrences represented 25.9% (7 cases).*
*Conclusion:*
*Spheno-orbital meningiomas are difficult tumors to manage. Their treatment is surgical by performing a superolateral orbitotomy, which often can reduce the degree of exophthalmos and also ensure stability of visual function. These lesions can be grafted with recurrences if the lesion is aggressive.*
***Keywords:*** *Spheno-orbital meningiomas • Orbital tumors • superoexternal orbitotomy • Recurrence*

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## I. Introduction:

Spheno-orbital meningiomas (SOM) are benign tumors representing 18% of intracranial meningiomas [1,2], dominated by plaque meningiomas [2,4,5,6,7], developing between the anterior and middle levels of the skull base, They cause intraosseous invasion of the small and large wings of the sphenoid, resulting in hyperostosis of the roof of the orbit, the lateral wall of the orbit and the middle cerebral fossa[1,3].

This condition is also characterized by meningiomatous thickening in the perisylvian dura. Spheno-orbital meningioma affects mostly women (3 women for 1 man) and is characterized by its hormonal dependence [3,7].

Clinically, exophthalmos is by far the most frequent sign (90% of cases) [1,3,2,8,9]. Diagnosis is easy by imaging, in fact, cerebral CT scan (bone extensions), MRI sequences appreciate on the one hand the dural invasion which is variable whether it is a mass or a plaque, and on the other hand the existence of an intra-periorbital involvement.

Treatment is initially surgical and is performed by means of a superior-external orbitotomy, which allows a very extensive or even complete removal of the lesions.

## II. Material And Methods :

In our series we operated 27 spheno-orbital meningiomas (34.61% of orbital lesions). The age ranged from 29 to 67 years, with an average of 48 years, all our cases were female except one was male, managed between 2015 and 2021.

The onset of symptomatology ranged from 2 years to 6 years. Unilateral exophthalmos was found in all cases, grade III in 26.9% of cases (Fig 1), non-axial, painful, progressive evolution. Bone swelling of the pterional region was always present except in six cases. Seven cases arrived with unilateral blindness and optic atrophy at the fundus, 14 cases had a decrease in visual acuity varying between 1/10 and 8/10. Ptosis was found in two cases. And a trigeminal neuralgia (V1) in two cases.

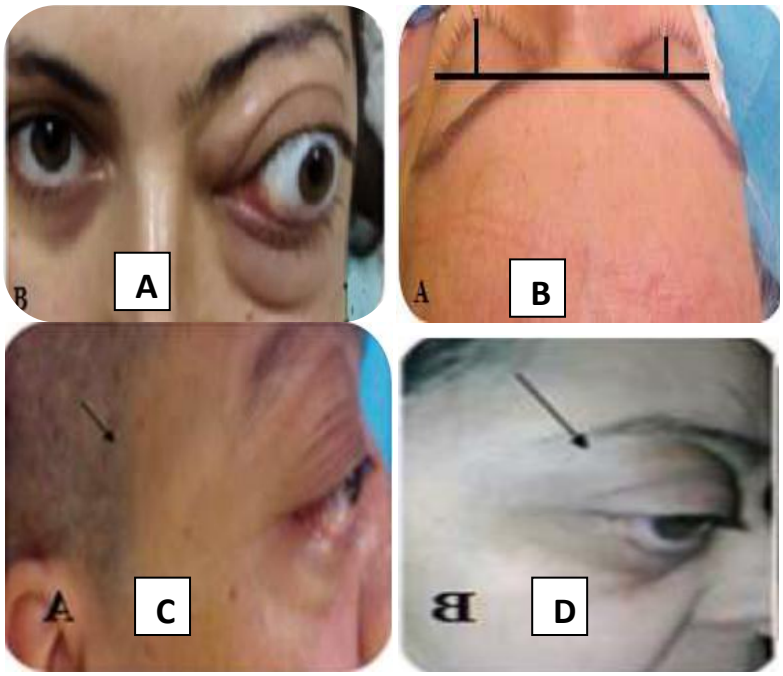
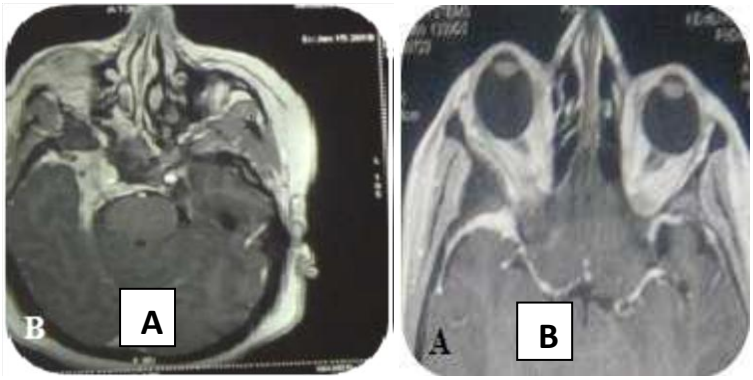



**Fig 1:** Inspection during the sphenoorbital meningioma examination, A: grade III exophthalmos, B: top "bedside test" view, C, D: side view showing the temporal bump.

Exploration by CT and MRI brain imaging allows the lesions to be classified into 4 forms:
- Superior-lateral 23% of spheno-orbital meningiomas.
- Inferior-medial 34% of spheno-orbital meningiomas.
- Orbital apices 19.23% of spheno-orbital meningiomas.
- Diffuse form 19.23% of spheno-orbital meningiomas.




4). Recurrences represented 8.97% (7 cases).

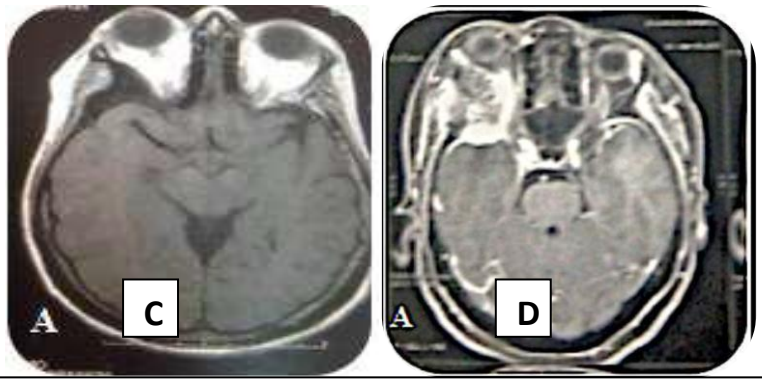



**Fig 2:** Different aspects of spheno-orbital meningiomas on imaging. (AT). Cerebral MRI in axial cerebral section, axial section shows an apical type. (B). Injected brain MRI, axial view shows a lateral type. (C) MRI imaging of medial type MSO, D: Brain MRI with injection of contrast medium shows a diffuse type.

-The treatment was surgical for all our patients, The approach was chosen according to the location of the tumor in the orbit and the cranial cavity and its relationship with the optic canal. The skin flap was unilateral for all our fronto-temporal patients, then the osseous approach was pterional for 92.56 % of the patients, one case developed through the roof of the orbit, for two cases an exenteration was made following an important recurrence, The surgical gesture was pursued by the opening and the decompression of several orbital orifices in an isolated way or in association with each other

**Technique**: The incision, pretragal, goes up along the hairline, towards the medial frontal region, then the temporal muscle is roughened and maintained by traction, and the external pillar of the orbit is completely freed, which allows to highlight an exostosis of the perionic region and of the large wing of the sphenoid. Thanks to a burr, the exostosis is circumscribed. The fronto-temporal dura mater is first discovered, and the orbital milling is performed, resecting the lateral wall of the orbit and its roof, from front to back, taking care not to open the periorbit. The orbitotomy is performed extradurally, from front to back, until the greater wing of the sphenoid and its lesser wing are completely removed, resulting in the opening of the superior orbital fissure posteriorly and laterally, the roof of the optic canal can be resected, with a burr or fine rodents. The clinoidectomy can be performed if it is invaded. The basitemporal bone is fractured downwards at the level of the inferior orbital fissure and the foramen rotundum. The latter can be opened as well as the foramen ovale. The invaded dura mater can be removed if the meningiomatous portion is important; some authors coagulate the dura mater (Simpson 2) if there is only a meningeal thickening (the invasion of the superior orbital fissure and the cavernous sinus is left in place under pain of important sequelae). Extensive closure of the dura mater with a periosteal plasty. Then, in order to avoid invagination of the temporal muscle in the bone defect thus created, a cranioplasty will be performed with acrylic cement.

## III. Results:

All our patients underwent surgical resection performing a superolateral orbitotomy (Fig. 3). The surgical procedure was followed by opening and decompression of several orbital orifices. The opening of the optic canal was performed in 19 cases, the sphenoidal cleft in 25 cases, the removal of the intradural meningioma was possible in 6 cases, and the intraorbital portion in 4 cases, the rotendum was freed in 7 cases, a clinoidectomy was performed in 2 cases, and finally the exenteration in 2 cases (Table 1)

A cranioplasty with acrylic cement was performed in 19 cases.

The postoperative aesthetic result concerning the exophthalmos was good in 82.5% of cases (Fig.

| **Actions taken** | **Number of cases** |
|---|---|
| **Optical Channel Opening** | 19 |
| **Opening of the sphenoidal cleft** | 25 |
| **Opening of the rotundum** | 7 |
| **Excision of the Intradural Portion** | 6 |
| **Exeresis of the Intraorbital Portion** | 4 |
| **clinoïdectomy** | 2 |
| **exentération** | 2 |

Table 1: illustration of the different approaches in a surgical cure of SOM

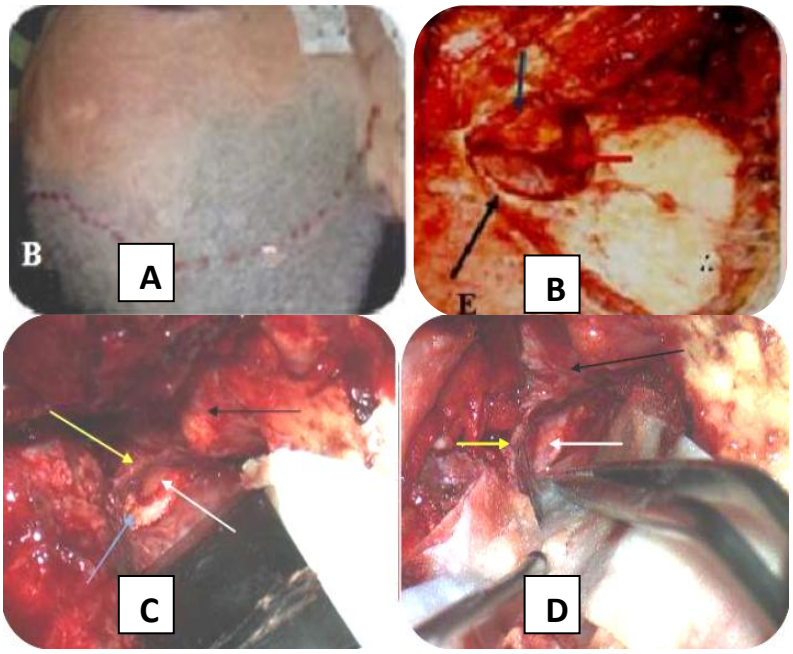
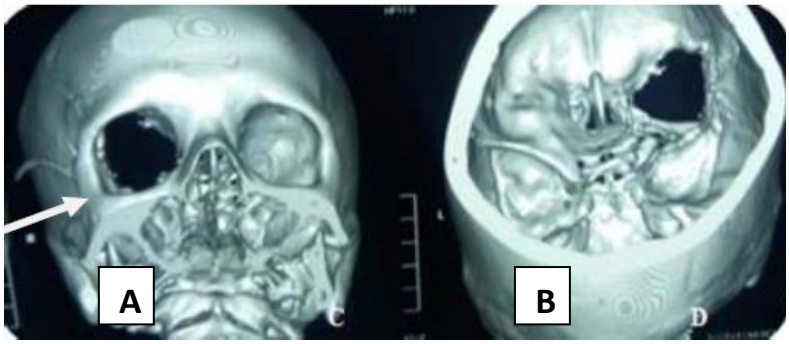



**Figure 3:** peroperative photo, A: frontotemporal incision centered on the pterion B: realization of a supero-external orbitotomy, C: peroperative image showing the opening of the left optic canal, the frontal lobe being pushed back by a spatula . The white arrow shows the optic nerve partially uncovered, in blue the optic canal in the process of opening, the black arrow is the periorbital, and the young arrow is the open sphenoidal cleft.

- Postoperative complications were observed in 15 patients (55.55%) and included :

- CSF fistula requiring acetazolamide which dried up after a few days in three patients (11.1%).
- Postoperative ophthalmoplegia in two patients. The evolution was marked by a total recovery in one patient and partial recovery in the second patient (7.4%).
- Skin necrosis of the fronto-temporal skin flap in one patient requiring revision surgery (3.7%)
- An empyema secondary to an infection of a bone plasty (acrylic cement) (3.7%).
- A misalignment of the orbit following decompression of a large spheno-orbital meningioma (3.7%).
- Two cases of enophthalmos following spheno-orbital decompression (7.4%).



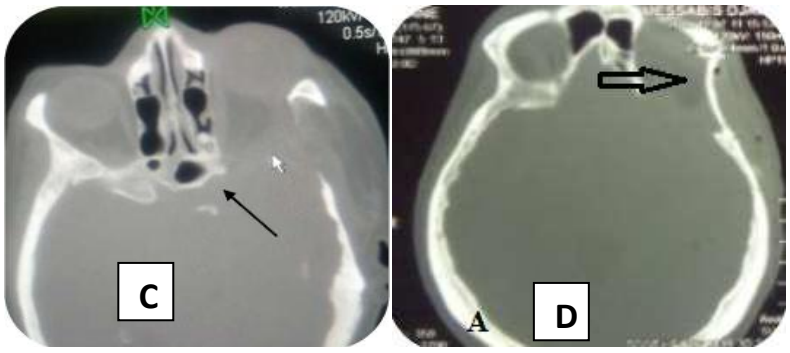



**Figure 4:** postoperative imaging, A, B: cerebral CT in 3D reconstruction which the supero-external craniectomy shows a reduction in the exophthalmos,, C, D: CT in bone windows in which the total excision of the exostosis was shown with clinoidectomy, and placement of the acrylic cement plasty.

-Seven cases of recurrence of spheno-orbital meningiomas 25.9% of the cases (one man and six women) two required revision surgery, with two cases of exenteration (one with placement of an orthosis)

## IV. Discussion:

Meningiomas involving the sphenoid wing are most often histopathologically benign, representing about 9 to 18% of all intracranial meningiomas (MacCarty, 1972; Basso et al., leroy, fleur 2020). This is the dominant pathology among orbital tumors in our department, 34.61%, this figure is high when compared with other series such as [B.Yakoubi] is 7.04% [13], and [Civit] 20%, this is probably due to the fact of the large recruitment.

We noticed a clear female predominance at 92.8% of our patients, in other series this ratio is variable between 1/3 to 1/15, for Rootman are 80% [10] this rate varies in general in the literature between 58 to 100%. [2,11].

Exophthalmos, which is present in our series in 91% of cases, which is in line with all studies whose rate is between 85% and 95% [4].

PET-CT studies have reported the presence of pathological hyperostotic cells in areas not identified by the surgeons, indicating the need for maximal resection [2].

Resection of spheno-orbital meningioma is currently a safe and effective therapy, as it provides good aesthetic and visual results with little morbidity [2,7]. However, partial resection of the hyperostosis increases the risk of recurrence and the possible need for a second operation or radiotherapy with its potential risks [2].

We had good postoperative aesthetic results concerning the exophthalmos in 82.5% of the cases, this rate is superposable to other series of 77 to 100% [2,4].

The reconstruction of the orbital walls is an important step in this surgery, the main objective of which is to prevent enophthalmos, in particular pulsatile enophthalmos which can be present in 2.3% to 30% of patients [2,6,11]. This reconstruction can be done by a sheet of collagen maintained by fibrin glue can completely cover the bone defect post surgery [8], other authors are satisfied by an external cranioplasty to limit the invagination of the temporal muscle, thus facilitating an eventual surgical revision [4].

Over the years, there is no clear trend in the change of surgical approach and reconstruction technique, except the opening of the periorbit instead of periorbital resection and the use of endoscopy first described in 1981 (reserved at that time only for orbital biopsies), nowadays it seems to be a good alternative for the medial and infero-medial forms [12].

Recurrences represent 25.9% (7 cases), two of which were surgically re-done. In the literature, it ranges from 10 to 20 % to 29 % [5] of cases. This rate varies respectively according to the years of evolution 5, 10 and 15 years, were 88 %, 81.8 % and 77.9 % (these rates were in close relation with the classification of simpson [8].

For the complementary treatment by radiotherapy we follow this algorithm: (like several authors [8] it is recommended after surgery if the meningioma is of grade II, and in front of a recurrence, or a voluminous meningioma with neurological damage (even of grade I). Other authors propose radiosurgery in case of a tumor remnant far from the optic nerve.

The anatomopathology includes in our series two cases of atypical meningiomas, and one case of mixed meningioma, and the rest of the patients are of meningothelial type of grade I. Two cases were referred for radiotherapy.

## V. Conclusion:

Sphenoorbital meningiomas are difficult tumors to manage. Their treatment is surgical by performing a super-external orbitotomy, which often can reduce the degree of exophthalmos and also ensure stable visual function. These lesions can be grafted with recurrences if the lesion is aggressive, but which can remain stable for several years.

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