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# Sellar floor reconstruction after transsphenoidal surgery using fibrin glue without grafting or implants: technical note

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**Abstract**

**Background:** Different techniques have already been described for reconstructing the sellar floor after transsphenoidal (TS) procedures. This paper reports on the use of fibrin glue alone without grafting or the use of implants in the reconstruction of the sellar floor after TS.

**Methods:** Five hundred sixty-seven patients who submitted to TS for pituitary and sellar region tumors were studied. No intraoperative cerebrospinal fluid (CSF) leak occurred in 503 patients (group 1); in the remaining 64 patients (group 2), intraoperative CSF leak was noted. In group 1 patients, closure of the sellar floor consisted of packing the surgical bed with hemostatic material only. When CSF leak was noted, the surgical bed was covered with a layer of hemostatic material and the intrasellar space was filled up with fibrin glue. An additional layer of hemostatic material was added at the topography of the preexisting sellar floor, and a second amount of fibrin glue was applied over it. At the end of surgery, a continuous lumbar CSF drainage system was installed in group 2 patients and kept for 5 days. Prophylactic antibiotics were administered during this period.

**Results:** We did not observe delayed CSF leak, meningitis, or visual loss in group 1 patients. In group 2, 2 patients presented with complications: 1 patient got meningitis but no overt CSF leak, and the other disclosed a delayed postoperative leak treated by reoperation.

**Discussion:** Our results showed that closure of the sellar floor with hemostatic material and fibrin glue without grafting or the use of implants is a safe and efficient method to prevent postoperative complications after TS. Generally speaking, there is no need for grafting or the use of implants at the end of TS.



*Keywords:* Complications; Fibrin glue; Pituitary tumor; Techniques; Transsphenoidal surgery

## 1. Introduction

The sublabial transseptosphenoidal approach for sellar tumors was first introduced by Cushing in 1909 [7], after the concepts of Hirsch [16] and Halstead [12]. By that time, the main operative difficulties included poor visualization and illumination of the narrow surgical route. Hardy [13] and Hardy and Wigser [14] added the surgical microscope and intraoperative fluoroscopy to the technique in the 1960s. Since then, the original technique has taken advantage of evolving surgical tools such as intraoperative neuronavigation, intraoperative imaging, and neuroendoscopy [17,18], but remained basically the same.

The opening of the sellar floor performed, whereas approaching sellar tumors has been related to postoperative complications [2,6,24,25]. CSF leak, which is one of the most frequent of them, is caused by rupture of diaphragm sellae and opening of the subarachnoid space while removing the tumor.

Many techniques have been used to prevent and treat CSF leak and other local complications [4,9,11,15,20-23,28]. Most of them recommended the closure of the sellar floor by means of autologous or heterologous grafting (bone,

*Abbreviations:* CSF, cerebrospinal fluid; GH, growth hormone; TS, transsphenoidal.

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Table 1
Groups 1 and 2 demographics according to the type of tumor

| | Nonsecreting | GH-secreting tumors | Corticotropin-secreting tumors | Other | Total |
|---|---|---|---|---|---|
| Group 1 (without intraoperative CSF leak) | 287 | 102 | 51 | 63 | 503 |
| Group 2 (with intraoperative CSF leak) | 28 | 22 | 07 | 07 | 64 |

cartilage, bioprosthesis, and biocompatible materials), with or without postoperative continuous CSF lumbar drainage [26,27].

In this paper, we present our technique for sealing the sellar floor after TS for pituitary and sellar region tumors. This technique has been extensively used over the last decade in our center and consisted of the use of fibrin glue alone without any type of grafting or implant.

## 2. Methods

Five hundred sixty-seven patients who submitted to transsphenoidal surgery for pituitary and sellar region tumors from 1998 to 2002 at the Hospital Brigadeiro and the Clinica Neuroendocrina de Sao Paulo, Brazil, were studied. No intraoperative CSF leak occurred in 503 patients (group 1); in the remaining 64 patients (group 2), intraoperative CSF leak was noted (Table 1). In group 1, there were 287 patients with nonsecreting tumors, 102 with GH–secreting tumors, 51 with corticotropin-secreting tumors, and 63 with other lesions. In group 2, there were 28 patients with nonsecreting tumors, 22 with GH-secreting tumors, 7 with corticotropin-secreting tumors, and 7 patients with other lesions. All patients have been followed by a multiprofessional team in the postoperative period. The mean follow-up time was 4.1 years (1.1-6.8 years).

Microsurgical resection of pituitary or sellar tumor was performed through a transsphenoidal approach in all patients. No CSF lumbar drainage was installed at the beginning of the operation in any patient.

After tumor resection, the surgical bed was inspected with special attention to the occurrence of CSF leak (including the performance of Valsalva maneuver). In patients without CSF leak, closure of the sellar floor consisted of packing the surgical bed with hemostatic material (Surgicel, Johnson & Johnson company, Somerville, NJ) only, covering the lower portion of the sella. When CSF leak was noted, the surgical bed was covered with a layer of hemostatic material and the intrasellar space was filled up with fibrin glue (Beriplast, Aventis Behringer Gmbh, Marburg, Germany). An additional layer of hemostatic material was added at the topography of the preexisting sellar floor, and a second amount of fibrin glue was applied over it. The mean volume of fibrin glue used in the procedure was 3 mL. After 3 minutes, the transnasal retractor was then removed.

The nasal septum was brought back to the midline and the nasal cavity was packed with Doyle-type cannulas, which were removed 12 hours later. The sublabial incision was closed with absorbable suture.

At the end of surgery, a continuous lumbar CSF drainage system was installed only in those patients in whom intraoperative CSF leak was noted and kept for 5 days. Prophylactic antibiotics were administered during this period.

## 3. Results

We did not observe delayed CSF leak, meningitis, or visual loss in those patients who did not show intraoperative CSF leak and were treated only by packing of the surgical cavity with hemostatic material (group 1). In group 2, 2 patients presented with complications: 1 patient got meningitis but no overt CSF leak, easily treated by antibiotics, and the other disclosed a delayed postoperative leak treated by reoperation. (A small nasal mucosa graft and fibrin glue were used in this reoperation.) This patient had Cushing's disease, and she had been previously operated 4 times in other centers. There was no additional visual loss in group 2 patients (Table 2).

## 4. Discussion

This is the larger series of patients in whom this technique for sellar floor reconstruction has been performed published in the literature.

The transsphenoidal route is considered to be the best approach for resection of intrasellar tumors. This reputation is mostly due to the ease, speed, and safety of the procedure. The mortality rate of this procedure, when performed by an experienced surgeon, varies from 0% to 1% [2,5,8]. However, the occurrence of complications, even in experienced teams, is not rare [2,6,23-25]. Complications are usually derived from poor surgical indication, preoperative clinical morbidity, anesthetic issues, anatomical variations, hormonal dysfunction, and surgical technique [5].

The opening of the ventral and dorsal walls of the sphenoid sinus, followed by manipulation of sellar content, represents the main part of the procedure. Ciric et al [5] have shown that epistaxis, sinusitis, lesions of the internal carotid

Table 2
Postoperative incidence of CSF leak and meningitis in groups 1 and 2 patients

| | Group 1 (n = 503) | Group 2 (n = 64) |
|---|---|---|
| Early postoperative CSF leak | 0 | 0 |
| Delayed postoperative CSF leak | 0 | 1 |
| Meningitis | 0 | 1 |
| Total | 0 | 2 |