



Identification and Repair of Intraoperative Cerebrospinal Fluid Leaks in Endonasal Transphenoidal Pituitary Surgery: Surgical Experience in a Series of 1002 Patients

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Introduction

Cerebrospinal fluid (CSF) rhinorrhea is a common complication following transsphenoidal surgery. We reviewed our institutional experience with CSF leaks associated with direct transsphenoidal operations.

Methods

A retrospective review of 1,002 patients treated for pituitary adenomas and other sellar lesions was performed. Inclusion criteria included all pathology of the sellar region approached via a direct endonasal transsphenoidal approach. A literature review of the incidence of CSF leaks associated with the direct endonasal transsphenoidal approach to pituitary lesions was conducted.

Learning Objectives

- Analyze risk factors associated with postoperative CSF leaks, even in the absence of intraoperative CSF leak
- Compare methods and sellar repair in addressing post-operative CSF leaks

Table 1

<u>Pathology</u>	<u>Number of patients</u>
Nonfunctional adenomas	551 (55%)
GH-secreting adenomas	123 (12.3%)
ACTH-secreting adenomas	97 (9.7%)
Prolactinomas	84 (8.4%)
Rathke's cleft cysts	94 (9.4%)
Other	53 (5.2%)

Pathology of the 1002 patients with pituitary lesions that underwent transsphenoidal surgery for resection.

Table 2

	Intraoperative CSF leak; intraoperative graft placed	No intraoperative leak; intraoperative graft placed	No intraoperative leak; no graft	Total
Postoperative CSF leak	13	0	13	26
No postoperative CSF leak	362	92	522	976
Total	375	92	535	1002

Comparison of intraoperative findings and postoperative outcomes in this series of 1002 patients.

Table 3

Study	Cases	Pathology	Macro/Micro	CSF Leak	Repeat Method
Cappabianca et al., 2002, ²	146	NFA: 80 Functional: 66	Macro: 125 Micro: 21	3.70%	None described
Frank et al., 2002, ³	380	NFA: 173 Functional: 107	Macro: 294 Micro: 86	1.20%	Nasal packing in 22% (n=84)
Dehdashti et al., 2008, ⁷	200	NFA: 111 Functional: 89	Macro: 158 Micro: 42	3.50%	Autologous fat and fascia graft
Charalampakis et al., 2009, ⁹	134	NFA: 59 Functional: 75	Macro: 60 Micro: 74	3.30%	None described
Gondim et al., 2013, ¹	301	NFA: 135 Functional: 166	Macro: 248 Micro: 53	2.60%	Autologous fat and fascia graft, mucoperiosteum with possible nasal septal flap
Messerer et al., 2013, ¹⁰	82	NFA: 24 Functional: 58	Macro: 43 Micro: 39	12.10%	Autologous fat or fascia graft with synthetic dural graft
Berkner et al., 2012, ¹¹	570	NFA: 153 Functional: 417	Macro: 437 Micro: 133	1.30%	Autologous fat and fascia graft
Dallaipiazza et al., 2015, ⁸	40	NFA: 75 Functional: 0	Macro: 27 Micro: 55	2.50%	None described
Wang et al., 2015, ¹²	1166	NFA: 577 Functional: 589	Macro: 921 Micro: 245	0.60%	Duragen, Duraform, Biogide
Zhan et al., 2015, ¹³	158	NFA: 77 Functional: 81	Macro: 133 Micro: 25	3.90%	Autologous fat or fascia graft with synthetic dural graft and muscle
Magro et al., 2016, ¹⁴	300	NFA: 300 Functional: 0	Macro: 299 Micro: 1	2.70%	Autologous fat with dural substitute – OR titanium MESH with dural substitute
Current	1002	NFA: 683 Functional: 319	Macro: 491 Micro: 462	2.59%	Autologous fat and fascia graft

Previously reported case series of direct endonasal endoscopic transphenoidal surgeries.

Results

1002 patients met inclusion criteria. Preoperative diagnoses included 855 pituitary adenomas (85.4%), 94 Rathke's cleft cysts (9.4%), and 53 other sellar lesions (5.2%). Lesions with diameter = 1 cm comprised 49% of the series. Intraoperative repair of an identified CSF leak was performed in 375 patients (37.4%) using autologous fat, fascia, or both. An additional 92 patients (9.2%) underwent empiric sellar reconstruction without evidence of an intraoperative CSF leak. Postoperative CSF leaks developed in 26 patients (2.6%), of which 13 (1.3%) had no intraoperative leak identified. The remaining 13 patients (1.3%) had failure of an intraoperative repair. Eight patients underwent additional surgery (0.8% reoperation rate) for CSF leak repair, and 18 were successfully treated with lumbar drainage or lumbar puncture alone. The incidence of postoperative CSF rhinorrhea in our series was compared to eleven other reported series that met inclusion criteria, with incidence rates ranging between 0.6-12.1%.

Conclusions

Half of patients who developed postoperative CSF rhinorrhea had no evidence of intraoperative CSF leakage. Unidentified intraoperative CSF leaks and/or delayed development of CSF fistulae are equally important sources of postoperative CSF rhinorrhea as employing effective CSF leak repair methods. Empiric sellar reconstruction in the absence of an intraoperative CSF leak is recommended in patients following resection of large tumors, especially if the arachnoid is thinned out and herniates into the sella.

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