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A Special Focus on the Role of Continuous Lumbar Drain in Managing Post-Operative CSF Leakage Following Endoscopic Endonasal Surgeries: Retrospective Study

WALID E. ELHALABY, M.D.[1]; AHMED FARAHAT, M.D.[2]; HISHAM N. LASHEEN, M.D.[3]; MOHAMED ADEL GHONEIM, M.D.[4] and OMAR ABDELALEEM RAGAB, M.D.[5]

The Department of Neurosurgery[1,4], Faculty of Medicine, Cairo University, Department of Ear, Nose & Throat[2,3], Faculty of Medicine, Cairo University and Department of Neurosurgery[5], Faculty of Medicine, Beni Suef University

Abstract

Background: With the wide use of Endoscopy; endonasal approach for pituitary surgery it is now considered as the gold standard approach to sellar lesions. Been considered as a safe and effective approach for pituitary tumor resection in many series; however, there's no surgery without risks or potential complications CSF leak is One of the most common and is one of the main causes of morbidity like meningitis and pneumocephalus.

Aim of Study: To study the effect of continous lumber drain in treating post-operative CSF leak.

Patients and Methods: 133 patients all presenting with a pituitary adenoma who underwent endoscopic endonasal trans-spheroidal approach, 21 of them suffered from post operative CSF leakage for more than 24 hours for whom a 18-gauge catheter was introduced into the subarachnoid space between L3 and L4 under local anesthesia.

Results: 21 patients experienced arachnoid tear and CSF leak for more than 24 hours post operatively, while all other patients were excluded; leak was incident in 15.7% of the cases (21 of 133). 15 patients improved on conservative measures. With no recurrence after removal of the drainage. 6 patients (28.5%) continued to have CSF leak on day 5 postoperatively who required endoscopic endo nasal repair.

Conclusion: Lumbar drains are commonly used foremost operative CSF diversion as a prophylactic measure and/or as first-line treatment for CSF rhinorrhea following trans-spheroidal approach of hypophysectomy. The risk of complication is low with the use of lumbar drain; however, it increases the length of hospitalization.

Key Words: Pituitary – Trans-sphenoidal – endoscopic – lumber-drain – CSF leak.

Correspondence to: Dr. Walid E. Elhalaby, The Department of Neurosurgery, Faculty of Medicine, Cairo University

Introduction

WITH the wide use of Endoscopy; endonasal approach for pituitary surgery it is now considered as the gold standard approach to sellar lesions **[1].** Been considered as a safe and effective approach for pituitary tumor resection in many series; however, there's no surgery without risks or potential complications **[2,3].**

CSF leak is One of the most common and bothering complication, that may not be avoided intra-operatively but its persistence postoperatively is what must be avoided as it is one of the main causes of morbidity like meningitis and pneumocephalus **[4].**

Series reported that the incidence of postoperative CSF leak as a complication after trans-sphenoidal surgery to be 0.5-15% **[5,6,7].** However the incidence significantly dropped after the introduction of the nasoseptal flap **[8].**

Nasoseptal flap has decreased the incidence of post-operative CSF leak but it has not completely eliminated this complication. That's why in numerous centers; continuous lumbar drainage is now often used in endoscopic endonasal trans-sphenoidal approach intra-operatively for prevention **[9]** and postoperatively for management of CSF leaks **[10].**

Although the results of continuous lumbar drainage placement are still under question in many cases of low-flow CSF leakage which accounts for large percentage of CSF rhinorrhea after endoscopic sellar surgery **[11],** During this study, we evaluated the benefits of inserting a lumbar drain post operatively in cases of persistent CSF leakage and to review the current literature addressing its uses, methodology, CSF diversion indications, suggested algorithms and reported complication.

Patients and Methods

This is a retrospective study conducted on 133 patients all presenting with a pituitary adenoma who underwent endoscopic endonasal trans-sphenoidal excision in the period from May 2018 to April 2024, only 21 patients had intra-operative arachnoid tear and as well as post operative CSF leakage lasting for more than 24 hours to meet the inclusion criteria, while other patients were excluded.

All of the patients were positioned on their sides. An 18-gauge subarachnoid catheter was introduced into the subarachnoid space between L3 and L4 under local anesthesia connected to the CSF drain. Sterile dressings were applied, a loop of the catheter was made to relieve tension, and taped over onto the patient's flank. The lumbar drain tube place at the patients' shoulder level with complete bed rest afterwards, as well as IV antibiotics.

Over drainage is a common complication, so close monitoring of the patient is very important as well as complete bed rest. The Lumbar Drain was placed at shoulder level to drain approximately 200 to 300cc per day. Drainage to be continued for 2 days postoperatively, after that the lumbar drain was closed for the next 24 hours and, if there no witnessed CSF leak Lumbar drain to be removed on the fourth day postoperatively if no obvious leak occurred.

Patients were instructed to rest with their head elevated about 15 degrees and to avoid any activity that might raise intracranial pressure, such as straining or blowing off their noses. In cases where there are obvious CSF leakage on day 4 of the surgery the lumbar drainage to remain placed for total 5 days, if leakage continued the lumbar drain to be removed and a surgical endoscopic repair to be done.

Nasal packing was removed under vision endoscopically day 1 to day 3 after surgery. A third-generation cephalosporin was continued till day 7 postoperatively.

Leakage from nostrils was monitored after pack removal and patient was discharged unless CSF leak occurred. Endoscopic repair of skull base was performed in patient whose CSF leakage persisted more than 5 days despite the presence of a continuous lumbar drain.

Results

Out of our study population 133 patients in this study, only 21 patients experienced arachnoid tear and CSF leak intra-operatively as well as post operative CSF leakage more than 24 hours, while all other patients who didn't have leak or had leak for less than 24 hours were excluded; leak was incident in 15.7% of the cases (21 of 133).

Out of the 21 patients included in this study, 14 were females (66.6%), 21 had macro-adenomas (100%), total excision was achieved in 95% of the cases & 8 of them (38%) were recurrent adenomas.

15 patients improved on conservative measures. With no recurrence after removal of the drainage.

6 patients (28.5%) continued to have CSF leak on day 5 postoperatively who required endoscopic endo nasal repair to be done.

Only one patient suffered from symptoms of intracranial hypotension and CT scan showed pneumocephalus, which was not under tension who fully recovered using conservative management.

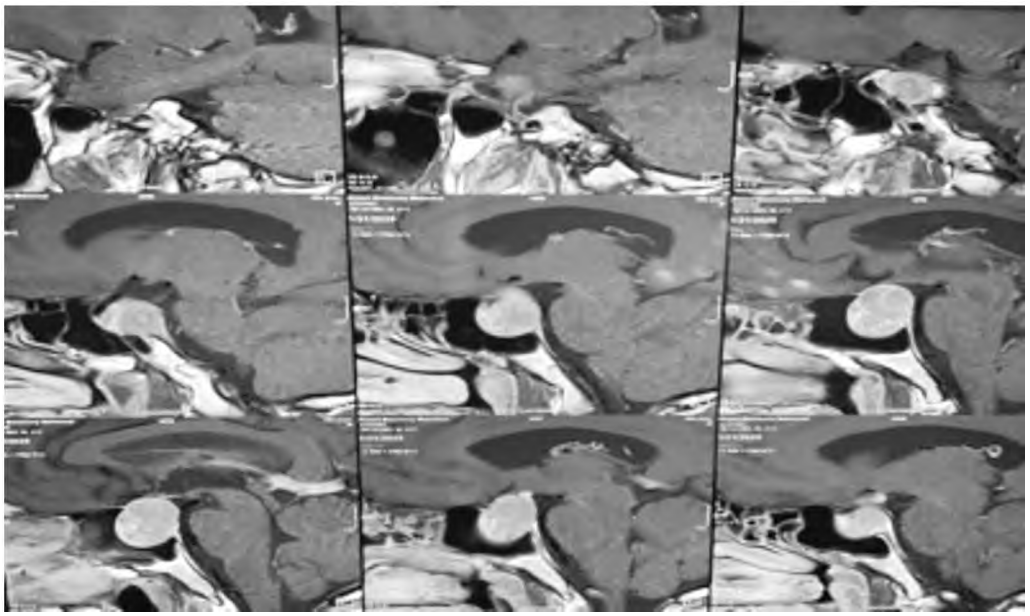

Fig. (1): Pre-operative MRI sagittal cuts of one of the patient.

Discussion

Endoscopic endonasal surgery is not only the standard approach for most of the pituitary tumors but also for a large proportion of other sellar lesions, CSF leak still remains the most important and common postoperative complication of the trans sphenoid approach **[11].**

The postoperative CSF leak experienced was influenced by many factors, such as surgical procedure, aggressiveness of resection, size and site of tumor, and relationship of the tumor with surrounding neurovascular structures (i.e, tumor adherence) lumbar drain were adopted previously to be effective way by many neurosurgeons to manage postoperative CSF leak complication **[10,13].**

However, many studies adopted a different point of view on the use of lumbar drain for the treatment of postoperative CSF leaks **[13,14]**. Ransom and his colleagues **[15]** concluded in their study that lumbar drain may increase the risk of complications related to postoperative CSF leaks, such as intracranial infection **[16,17].** Moreover, continuous lumbar drainage may add risks of postoperative intracranial hypotension and pneumocephalus **[18,19].**

In this study, only one patient experienced symptoms of intracranial hypotension and pneumocephalus who recovered conservatively. Pepper et al. **[19]** reported that 2 patients experienced postoperative coma after lumbar drain placement. In this study, no serious complications has occurred from placement of lumbar drain, most CSF leaks recovered conservatively within 1 week. Caballero et al. **[13]** concluded that 84% of patients who experienced postoperative CSF leak recovered spontaneously in 2 to 10 days, which may be the time of graft take. In our study, 71.5% of our patients who experienced CSF leak recovered and didn't need surgical intervention.

Conclusions:

Lumbar drains are commonly used for post-operative CSF diversion as a prophylactic measure and/or as first-line treatment for CSF rhinorrhea following trans-spheroidal approach of hypophysectomy. The risk of complication is low with the use of lumbar drain; however, it increases the length of hospitalization.

References

1- BIEN A.G., BOWDINO B., MOORE G. and LEIBROCK L.: Utilization of pre-operative cerebrospinal fluid drain in skull base surgery. Skull Base, 17: 133-9; 63: 244-256, 2007.

2- BRANDT M.T., JENKINS W.S., FATTAHI T.T. and HAUG R.H.: Cerebrospinal fluid: Implications in oral and maxillofacial surgery. J. Oral Maxillofac. Surg., 60 (9): 1049-56. 2002.

3- MORTINI P., LOSA M., BARZAGHI R., BOARI N. and GIOVANELLI M.: Results of transsphenoidal surgery in a large series of patients with pituitary adenoma. Neurosurgery, 56: 1222-1233.4, 2005.

4- SAWKA A.M., ANISZEWSKI J.P., YOUNG Jr. W.F., NIPPOLDT T.B., YANEZ P. and EBERSOLD M.J.: Tension pneumocranium, a rare complication of trans-sphenoidal surgery: Mayo Clinic experience 1976-1998. J. Clin. Endocrinol. Metab., 84: 1999.

5- CIRIC I., RAGIN A. and CRAIG B.: Complications of transsphenoidal surgery: Results of national survey, review of the literature, and personal experience. Neurosurgery, 40: 225-37, 1997.

6- SHILEY S.G., LIMONADI F., DELASHAW J.B., et al.: Incidence, etiology, and management of cerebrospinal fluid leaks following trans-sphenoidal surgery. Laryngoscope, 113: 1283–1288. 2003.

7- SHILEY S.G., LIMONADI F., DELASHAW J.B, BARNWELL S.L., ANDERSEN P.E., HWANG P.H., et al.: Incidence, etiology and management of cerebrospinal fluid leak following transsphenoidal surgery. Laryngoscope. 113: 1283-8, 2003.

8- KASSAM A.B., THOMAS A., CARRAU R.L., SNYDERMAN C.H., VESCAN A., et al.: Endoscopic reconstruction of the cranial base using a pedicled nasoseptal flap. Neurosurgery, 63: ONS44-52, 2008.

9- SAMADANI U., HUANG J.H., BARANOV D., et al.: Intracranial hypotension after intraoperative lumbar cerebrospinal fluid drainage. Neurosurgery, 52: 148–152, 2003.

10- ALLEN K.P., ISAACSON B., PURCELL P., et al.: Lumbar subarachnoid drainage in cerebrospinal fluid leaks after lateral skull base surgery. Otol. Neurotol., 32: 1522–1524, 2011.

11- WINN H.R.: Youmans Neurological Surgery. Philadelphia, PA: Elsevier Limited, Oxford, 2011.

12- ACKERMAN P.D., SPENCER D.A. and PRABHU V.C.: The efficacy and safety of preoperative lumbar drain placement in anterior skull base surgery. J. Neurol. Surg. Rep., 74:1–9, 2013.

13- CABALLERO N., BHALLA V., STANKIEWICZ J.A., et al.: Effect of lumbar drain placement on recurrence of cerebrospinal rhinorrhea after endoscopic repair. Int Forum Allergy Rhinol., 2: 222–226, 2012.

14- CASIANO R.R. and JASSIR D.: Endoscopic cerebrospinal fluid rhinorrhea repair: Is a lumbar drain necessary? Otolaryngol. Head Neck Surg., 121: 745–750, 1999.

15- RANSOM E.R., PALMER J.N., KENNEDY D.W., et al.: Assessing risk/benefit of lumbar drain use for endoscopic skull-base surgery. Int. Forum Allergy Rhinol., 1: 173–177, 2011.

16- ALLEN K.P., ISAACSON B., KUTZ J.W., et al.: The association of meningitis with postoperative cerebrospinal fluid fistula. J. Neurol. Surg B Skull Base, 73: 401–404, 2012.

17- HOROWITZ G., FLISS D.M., MARGALIT N., et al.: Association between cerebrospinal fluid leak and meningitis after skull base surgery. Otolaryngol Head Neck Surg., 145: 689–693, 2011.

18- ELOY J.A., KUPERAN A.B., CHOUDHRY O.J., et al.: Efficacy of the pedicled nasoseptal flap without cerebrospinal fluid (CSF) diversion for repair of skull base defects: Incidence of postoperative CSF leaks. Int. Forum Allergy Rhinol., 2: 397–401, 2012.

19- PEPPER J.P., LIN E.M., SULLIVAN S.E., et al.: Perioperative lumbar drain placement: An independent predictor of tension pneumocephalus and intracranial complications following anterior skull base surgery. Laryngoscope, 121: 468–473, 2011.

التركيز بشكل خاص على دور التصريف القطني المستمر فى إدارة تسرب السائل الدماغى الشوكى بعد العمليات الجراحية بالمنظار الأنفى: دراسة استعادية

إستئصال أورام الغدة عن طريق الأنف يعتبر أمن وفعال لأستئصال هدا النوع من الأورام ولكن لا يوجد جراحة بدون مضاعفات. واحدة من ضمن هذة المضاعفات هى خروج السائل المخى الشوكى عن طريق الانف. هذا البحث تضمن واحد وعشرون مريض عانوا من خروج للسائل المخى الشوكى عن طريق الأنف. ولقد تم تركيب البذل القطنى المستمر بعد الجراحة ولقد تم رفع البدل فى اليوم الخامس ما بعد الجراحة. ستة مرضى عانوا من نزول السائل المخى الشوكى بعد رفع البدل ولقد تم دخول العمليات مرة اخرى لترقيع قاع الجمجمة عن طريق الانف باستخدام المنظار.