Postoperative Complications of Transsphenoidal Pituitary Adenectomy: A Single Institution Based Experience

Koirala S, Shrestha BK, Lohani S, Bishokarma S, Devkota UP

Department of Neurosurgery,

Upendra Devkota Memorial National Institute of Neurological and Allied Sciences

Bansbari, Kathmandu, Nepal.

Corresponding Author

Sagar Koirala

Department of Neurosurgery,

Upendra Devkota Memorial National Institute of Neurological and Allied Sciences

Bansbari, Kathmandu, Nepal.

E-mail: sagarkoirala85@gmail.com

Citation

Koirala S, Shrestha BK, Lohani S, Bishokarma S, Devkota UP. Postoperative Complications of Transsphenoidal Pituitary Adenectomy: A Single Institution Based Experience. *Kathmandu Univ Med J.* 2019;66(2):123-5.

ABSTRACT

Background

Inside a cranium, pituitary gland seats in an area of complex anatomical construct. Further it holds a very important physiological role to maintain all bodily function. Pituitary adenoma being one of the commonest tumors of that intricate area is preferably tackled with transsphenoidal approach. However, as in any surgery, it is also not without postoperative complications.

Objective

To examine and categorize all the postoperative complications that we have encountered in our center after pituitary surgery.

Method

A retrospective study of patients who had undergone transsphenoidal pituitary adenectomy in past five years was conducted at a tertiary level neurosurgical center and various postoperative complications during hospital stay were noted and analyzed.

Result

In our series of 53 patients, we met different postoperative complications, out of which diabetes insipidus (DI) was the commonest. Other electrolyte abnormalities excluding diabetes insipidus was the second most common followed by Cerebrospinal fluid leak. Post-operative hematoma requiring re-exploration, panhypopituitarism, seizure and meningitis were among the rare complications. No statistically significant association was noted between tumor size, patient age and sex with surgical complications.

Conclusion

Postoperative complications should be anticipated in transsphenoidal pituitary surgery even though it is considered to be a relatively safe undertaking. Knowing about these complications is the first step in preventing them.

KEY WORDS

Complications, Pituitary tumors, Postoperative, Transsphenoidal surgery

INTRODUCTION

Pituitary tumors comprise about 10-15% of all intracranial tumors.[1] 90-95% of them are operated upon via a transphenoidal route.[2] Harvey Cushing proposed transseptal transsphenoidal approach and for many years of early twentieth century this was the standard of practice with mortality of 5.6% in Cushing's hands.[3] After Hardy started using microscope for this procedure, it started gaining wider acceptance.[2]

Anticipated post-operative complications of this surgery include diabetes insipidus, Cerebrospinal fluid (CSF) leak, meningitis, seizure, hematoma, carotid injury, hypothalamic injury, optic injury, septal perforation, sphenoid sinusitis etc. With improvement in surgical instrumentation, refinements in anesthesiology technique and precise delineation of tumor by MRI has revolutionized the safety profile of this surgery.[4] We aim to present our own experience at the National Institute of Neurological and Allied Sciences and compare it with the existing literature.

METHODS

This is a retrospective analytical case series. All patients who underwent transsphenoidal pituitary surgery within the study duration were included in the study. This study was conducted at the National Institute of Neurological and Allied Sciences, Bansbari, Nepal. This study was conducted over a period of five years from 2012 to 2016.

Preliminary diagnosis of pituitary adenoma was made based on clinical presentation and MR imaging. Patients were considered for surgical resection by transsphenoidal route unless there was significant lateral extension of tumor that demanded a different approach. Nasal swab was taken in all patients and treated with betadine nasal wash and antibiotics as needed based on culture sensitivity reports. X-ray skull lateral view was done to delineate sphenoid sinus anatomy which if unclear was followed by coronal cut CT of sphenoid sinus. Hormonal profile was studied. We favored surgical removal even for prolactinomas. Sub-labial transseptal transsphenoidal approach was our technique of choice. After resection, cavity was packed with a layer of fat and bilateral nasal packing was done to prevent CSF leak. Post-operatively patient was managed in ICU for close DI watch and treated with subcutaneous vasopressin as needed to prevent electrolyte imbalance. Nasal pack were removed after 72 hours and then shifted to ward for further recovery. Histopatholgical examination of paraffin embedded tissue sections were used to confirm or refute the diagnosis of pituitary adenoma. Data was analyzed using SPSS version 20. Chi square test and Mann Whitney U test was applied for the test of significance based on data distribution.

RESULTS

There were 53 pituitary cases of which three were operated via transcranial route (5.6%). Two were histopathologically proven to be craniopharyngioma, and one as Rathke's cleft cyst. One case was excluded due to loss in follow up. Overall 46 cases were included in the analysis. There were 31 males and 15 females with male to female ration of 2:1. Median patient age was 37 (range 15 to 72). Nonfunctional tumors were at the top of the list with 25 cases (54%), while prolactinomas were 15 (35%) and GH secreting tumors were 5 (11%). Thirty patients had tumor less than 3 cm (65.2%) while 16 had tumors 3 cm or larger (34.8%). Median tumor size was 2.85 cm (range 0.5 cm to 5 cm).

Thirteen surgeries were complicated with post-operative diabetes insipidus (DI) (28.2%). Occurrence of DI showed no correlation with tumor size (p value 0.48) or functional tumor type (p value 0.20). Seventeen patients developed electrolyte abnormalities other than DI (36%). There were nine instances of intraoperative CSF leak (19.6%) while four developed that in post-operative period (8.7%). Of all one required re-exploration. Three patients (6.5%) developed seizures in post-operative period. One patient developed post-operative hematoma requiring re-exploration and one other showed features of panhypopituitarism. One patient developed meningitis and succumbed to death (mortality 2.1%). Overall 45.7% developed one or the other complication that included DI, infection, hematoma, hypopituitarism, seizures, and CSF leak.

There was no significant difference in the median length of hospital stay among patients of different age or sex and among tumor of different sizes. (Table 1) Similarly there was no significant association between tumor size, patient age and sex with surgical complications. (Table 2)

Table 1. Difference in the median length of hospital stay

			p value
	< 40 yrs	> 40 yrs	
Median length of hospital stay in days	20	17.5	0.456
	< 3 cm	> 3 cm	
Median length of hospital stay in days	20	23	0.45
	Male	Female	
Median length of hospital stay in days	20	19	0.292

DISCUSSION

Trans-septal transphenoidal surgery for pituitary tumors is a well-established surgical technique. As compared to craniotomy, transsphenoidal surgery offers the advantage of low morbidity and mortality, preservation of normal pituitary function, lower incidence of permanent DI, lesser

Table 2. Association of various patient attributes to surgical complication

Variables	No complication	Complication	p value
Male	15	16	0.243
Female	10	5	
Size < 3 cm	19	11	0.094
Size > = 3 cm	6	10	
Age < 40 yrs	10	14	0.071
Age > 40 yrs	15	7	

trauma to frontal lobes and optic chiasm, less blood loss and no external scar.[5] Yet, like any other surgery, this is also fated with few inherent complications like DI, hypopituitarism, CSF leak, infection/meningitis, hematoma, seizures, carotid injury, hypothalamic injury, optic injury, septal perforation, sphenoid sinusitis etc.

Mean age of our patients was 37 years which is comparable to the literature.[4-7] We saw male preponderance in our series. This is comparable to other series.[4,6] Female preponderance has also been noted in few other series.[7,8]

Mean size of tumor was larger than that reported in other series.[4] While exceptionally in the series of 250 patients with giant pituitary adenomas, mean tumor size was 5.4 cm, much larger than 2.8 cm in ours.[9] Non-functional tumors are the most common followed by prolactinoma which is slightly different for other series where GH secreting are second to non-functional ones.[1,4,5,7] DI is the most common complication reported in the literature which concurs with our finding.[2] Our rate of CSF leak (28%) as well as overall complication (45%) is slightly in excess to those reported in the literature including higher incidence of DI.[1,10] Chowdhury et al. reported CSF leak to be more common than DI in their series.[5] We had only 2.1% of meningitis and post-operative hypopituitarism which has been reported to be as high as 5.5% and 22% respectively.[5]

Our mortality of 2.1% is less than that reported in Cushing's hands in early twentieth century but slightly in excess to the current literature.[1-4,6,7,11] Sinha et al. reported 4.4% mortality in a series with exclusive giant pituitary adenomas.[9]

Size and age has been found to be significantly associated to incidence of complications. But this association was not seen in our analysis.[4] Similarly Ciric et al. noted an inverse relationship between surgeon's experience and incidence of complications.[11]

CONCLUSION

Postoperative complications should be anticipated in transsphenoidal pituitary surgery even though it is considered to be a relatively safe undertaking. Knowing about these complications is the first step in preventing them.

AKNOWLEDGEMENT

Prof. Dr. UP Devkota, who guided us during the research is no more with us. We would like to dedicate this paper to him, for guiding us in this paper as well as our neurosurgical career.

REFERENCES

1. Esposito V, Santoro A, Minniti G, Salvati M, Innocenzi G, Lanzetta G, et al. Transsphenoidal adenomectomy for GH-, PRL- and ACTH-secreting pituitary tumours: outcome analysis in a series of 125 patients. *Neurol Sci.* 2004;25(5):251-6.
2. Sudhakar N, Ray A, Vafidis JA. Complications after trans-sphenoidal surgery: our experience and a review of the literature. *British Journal of Neurosurgery.* 2013;18:5:507-12.
3. Liu JK, Das K, Weiss MH, Laws ER, Couldwell WT. The history and evolution of transsphenoidal surgery. *J Neurosurg.* 2001;95(6): 1083-96.
4. Barzaghi LR, Losa M, Giovanelli M, Mortini P. Complications of transsphenoidal surgery in patients with pituitary adenoma: experience at a single centre. *Acta Neurochir (Wien).* 2007;149(9):877-85; 85-6.
5. Chowdhury T, Prabhakar H, Bithal PK, Schaller B, Dash HH. Immediate postoperative complications in transsphenoidal pituitary surgery: A prospective study. *Saudi J Anaesth.* 2014;8(3):335-41.
6. Duz B, Harman F, Secer HI, Bolu E, Gonul E. Transsphenoidal approaches to the pituitary: a progression in experience in a single centre. *Acta Neurochir (Wien).* 2008;150(11):1133-8; 8-9.
7. Mortini P, Losa M, Barzaghi R, Boari N, Giovanelli M. Results of transsphenoidal surgery in a large series of patients with pituitary adenoma. *Neurosurgery.* 2005;56(6):1222-33; 33.
8. Lopez-Arbolay O, Morales-Sabina O, Gonzalez-Gonzalez JL, Valdes-Lorenzo N. Transsphenoidal approach to prolactinomas. *Neurocirugia (Astur). Neurocirugia (Astur).* 2006;17 (3):226-31.
9. Sinha S, Sharma BS. Giant pituitary adenomas--an enigma revisited. Microsurgical treatment strategies and outcome in a series of 250 patients. *Br J Neurosurg*. 2010;24(1):31-9.
10. Shiley SG, Limonadi F, Delashaw JB, Barnwell SL, Andersen PE, Hwang PH, et al. Incidence, etiology, and management of cerebrospinal fluid leaks following trans-sphenoidal surgery. *Laryngoscope.* 2003;113(8):1283-8.
11. Ciric I, Ragin A, Baumgartner C, Pierce D. Complications of transsphenoidal surgery: results of a national survey, review of the literature, and personal experience. *Neurosurgery.* 1997;40(2):225-36; 36-7.