e-ISSN: 0975-1556, p-ISSN:2820-2643

Available online on www.ijpcr.com

International Journal of Pharmaceutical and Clinical Research 2024; 16(4); 1033-1038

Original Research Article

Post-Operative Outcomes of Pituitary Macroadenoma Done By Transsphenoidal Route in a Tertiary Care Institute of North East India

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Received: 25-01-2024 / Revised: 23-02-2024 / Accepted: 26-03-2024

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Conflict of interest: Nil

Abstract:

Background: Pituitary macroadenomas are challenging neurosurgical entities due to their size and proximity to critical structures. Transsphenoidal surgery has emerged as a preferred approach for resection, offering advantages such as reduced morbidity and faster recovery times. However, data on the outcomes of transsphenoidal surgery for pituitary macroadenomas in North East Indian patients are limited.

Aim and Objective: This retrospective study aimed to evaluate the post-operative outcomes of pituitary macroadenoma patients undergoing transsphenoidal surgery at the Cardiothoracic and Neuroscience Center, Guwahati Medical College and Hospital (GMCH), North East India.

Materials and Methods: Electronic medical records of patients undergoing transsphenoidal surgery for pituitary macroadenomas at GMCH from January 1, 2023, to March 31, 2024, were retrospectively reviewed. Demographic data, pre-operative clinical characteristics, surgical details, post-operative complications, and follow-up outcomes were analyzed.

Results: A total of 25 patients (mean age 45 years; 52% male) were included in the study. Visual disturbances (72%) were the most common presenting symptom, followed by hormonal dysfunction (64%) and headache (56%). Transsphenoidal surgery achieved gross total resection in 60% of cases, with subtotal resection in 40%. Post-operative complications occurred in 32% of patients, including cerebrospinal fluid leak (12%), hypopituitarism (8%), and meningitis (4%). At the last follow-up, symptomatic improvement was observed in 80% of patients, with resolution of visual deficits in 68%.

Conclusion: Transsphenoidal surgery is a safe and effective treatment option for pituitary macroadenomas in North East Indian patients, with favorable post-operative outcomes and acceptable complication rates. These findings contribute to the evidence supporting the use of transsphenoidal surgery in the management of pituitary macroadenomas and emphasize the need for tailored surgical approaches based on individual patient characteristics.

Keywords: Pituitary macroadenoma, Transsphenoidal surgery, Post-operative outcomes, Neurosurgery, North East India.

Introduction

Pituitary macroadenomas, characterized by the enlargement of pituitary gland tumors exceeding 10 mm in diameter, present a formidable challenge in neurosurgical practice due to their potential for mass effect and hormonal dysregulation. The optimal management of these tumors involves a multidisciplinary approach, with surgical resection playing a central role in alleviating symptoms and preventing complications. [1,2]

The transsphenoidal approach has emerged as the preferred surgical technique for the treatment of pituitary macroadenomas due to its minimally invasive nature, reduced morbidity, and shorter recovery times compared to traditional craniotomy. This approach involves accessing the pituitary gland through the nasal cavity and sphenoid sinus, thereby minimizing manipulation of surrounding neural and vascular structures. [2,3]

Numerous studies have demonstrated the efficacy and safety of transsphenoidal surgery in managing pituitary adenomas, including macroadenomas. However, most of these studies have been

conducted in Western populations, with limited data available on the outcomes of transsphenoidal surgery in North East India. [1-3]

North East India represents a unique demographic and genetic landscape, with potential variations in disease presentation, anatomical considerations, and surgical outcomes compared to other regions. Understanding the post-operative outcomes of pituitary macroadenoma patients undergoing transsphenoidal surgery in this population is crucial for optimizing patient care and informing surgical decision-making.

Therefore, this retrospective study aims to evaluate the post-operative outcomes of pituitary macroadenoma patients undergoing surgery via the transsphenoidal route at the Cardiothoracic and Neuroscience Center, Guwahati Medical College and Hospital (GMCH) over 15 months. By analyzing a cohort of patients from North East India, this study seeks to contribute valuable insights into the efficacy and safety of transsphenoidal surgery in this unique population.

Materials and Methods:

Study Design:

This retrospective study was conducted at the Cardiothoracic and Neuroscience Center, GMCH, a tertiary care institute in North East India. It covered 15 months, from January 1, 2023, to March 31, 2024.

Study Population:

The study population consisted of patients diagnosed with pituitary macroadenomas who underwent surgical resection via the transsphenoidal route at GMCH during the specified study period. Patients of all ages and genders were included in the study.

Data Collection:

Electronic medical records of eligible patients were retrospectively reviewed to extract relevant data. Demographic information such as age, gender, and comorbidities was recorded. Pre-operative clinical characteristics were documented, including presenting symptoms (such as visual disturbances, hormonal dysfunction, and headache), duration of symptoms, and hormonal profile.

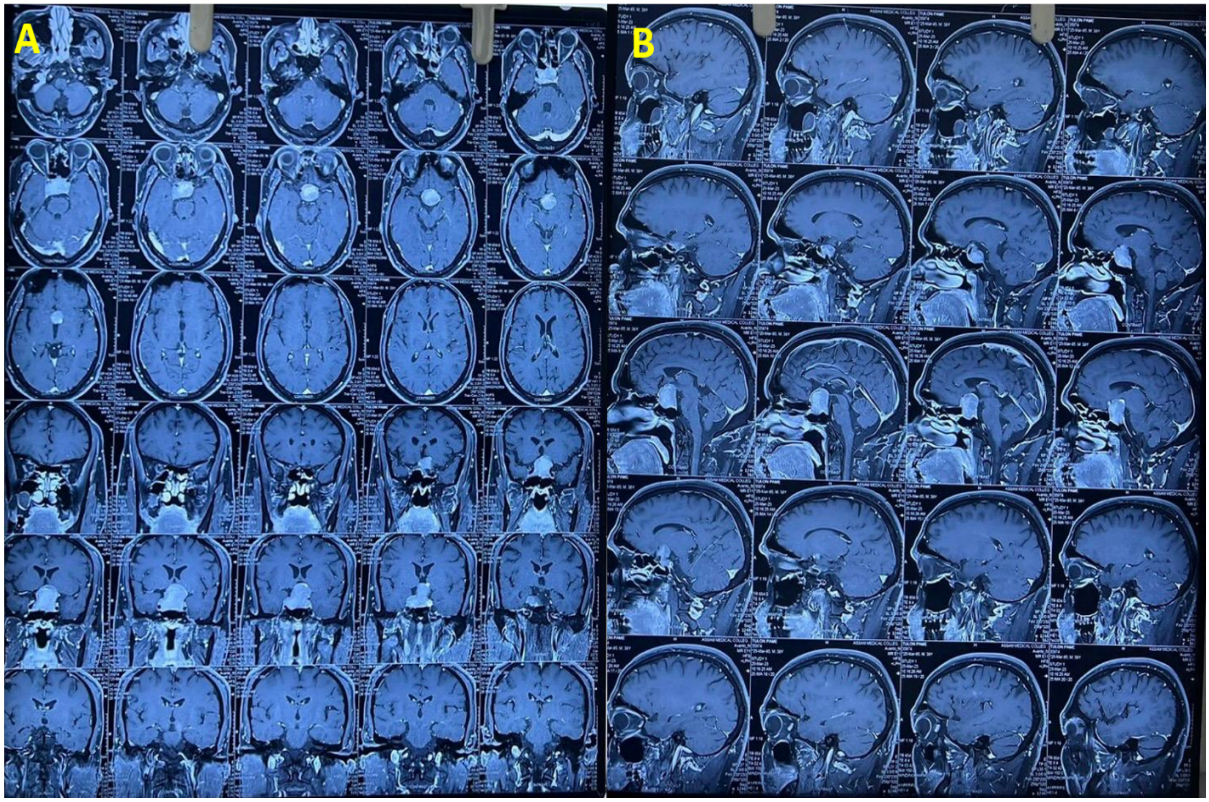

Figure 1 (A and B): Pre-operative Magnetic Resonance Imaging (MRI)

Surgical Procedure: Details of the surgical procedure, including the surgical approach (transnasal, transsphenoidal), the extent of resection (gross total resection, subtotal resection), intraoperative findings, and use of adjunctive techniques (such as intraoperative navigation and fluoroscopy) were recorded. Intraoperative complications, such as cerebrospinal fluid (CSF) leak, vascular injury, and injury to surrounding structures, were documented.

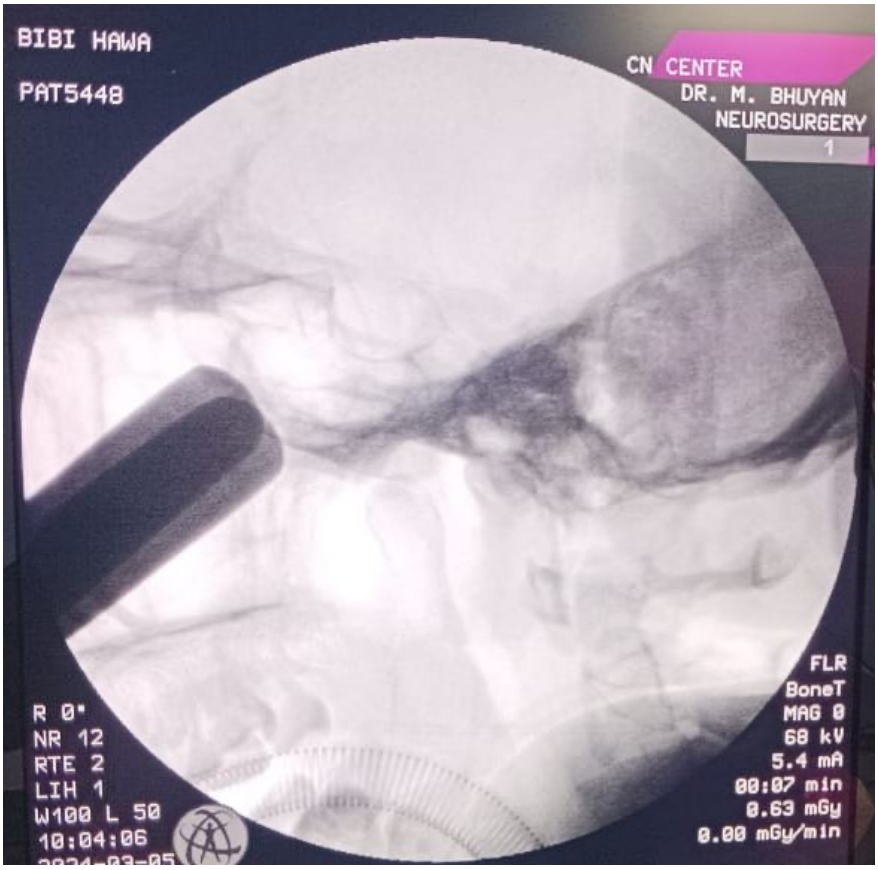

Figure 2: Intra operative fluoroscopic localization of the Sella

Post-operative Outcomes:

Post-operative outcomes were assessed based on clinical parameters, radiological findings, and complications. Clinical parameters included the resolution of presenting symptoms, length of hospital stay, and need for post-operative hormonal replacement therapy. Radiological assessment included post-operative imaging (MRI or CT scans) to evaluate the extent of tumor resection and any residual tumor.

Complications and Follow-up:

Post-operative complications, such as CSF leak, hypopituitarism, meningitis, and visual deterioration, were documented along with their management strategies.

Patients were followed up in the outpatient department to assess long-term outcomes, including symptom resolution, hormonal status, and tumor recurrence.

Statistical Analysis:

Descriptive statistics were used to summarize the demographic and clinical characteristics of the study population. Continuous variables were expressed as means with standard deviations or medians with interquartile ranges, while categorical variables were presented as frequencies and percentages. Statistical analyses were performed using appropriate software, with p-values < 0.05 considered statistically significant.

Ethical Considerations:

The study was conducted in accordance with the principles outlined in the Declaration of Helsinki and approved by GMCH's institutional ethics committee. Patient confidentiality was maintained throughout the study, and all data were anonymised during analysis.

Results:

Demographic Characteristics:

The study included a total of 25 patients diagnosed with pituitary macroadenomas. The age distribution of the patients ranged from <30 years to >60 years, with the majority falling within the 41-50 years age group (8 patients, 32%) (Table 1).

The sex distribution showed a slightly higher representation of males (13 patients, 52%) compared to females (12 patients, 48%) (Table 2).

Table 1: Age distribution

Age Group (years)	Number of Patients	Percentage
<30	3	12%
30-40	6	24%
41-50	8	32%
51-60	6	24%
>60	2	8%
Total	25	100%

Table 2: Sex Distribution

Sex	Number of Patients	Percentage
Male	13	52%
Female	12	48%
Total	25	100%

Clinical Characteristics: Visual disturbances were the most common presenting symptom, observed in 18 patients (72%), followed by hormonal dysfunction in 16 patients (64%) and headache in 14 patients (56%) Table 3).

Table 3: Clinical Characteristics

Presenting Symptom	Number of Patients	Percentage
Visual Disturbances	18	72%
Hormonal Dysfunction	16	64%
Headache	14	56%

Surgical Outcomes: Transsphenoidal surgery achieved gross total resection in 15 cases (60%) and subtotal resection in 10 cases (40%) (Table 4).

Table 4: Surgical Outcomes

Surgical Outcome	Number of Patients	Percentage
Gross Total Resection	15	60%
Subtotal Resection	10	40%

Post-operative Complications: Post-operative complications were observed in a subset of patients, with cerebrospinal fluid (CSF) leak being the most common complication, occurring in 3 patients (12%). Hypopituitarism was noted in 2 patients (8%), while meningitis and visual deterioration were each observed in 1 patient (4%) respectively (Figure 1).

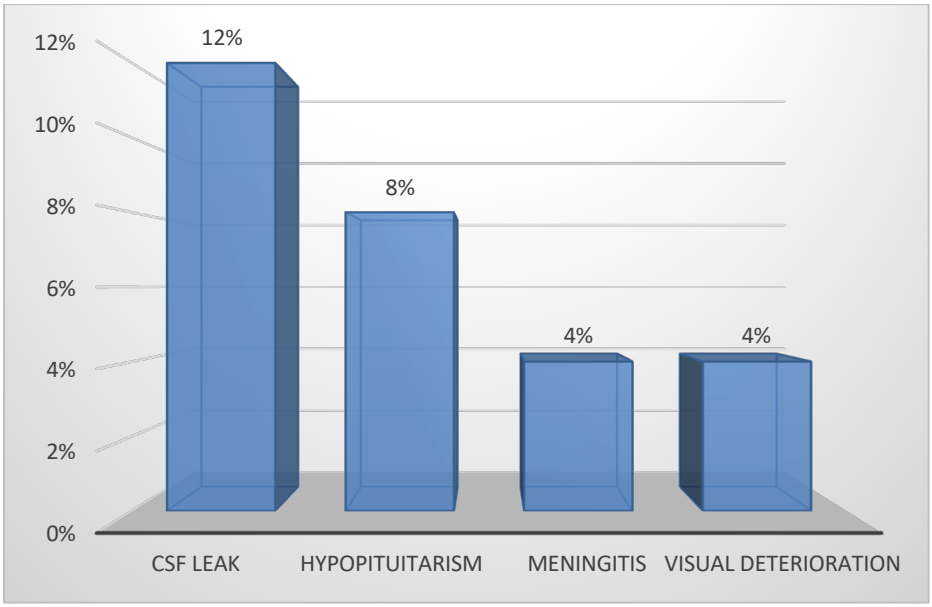

Figure 3: Post-operative Complications

Hospital Stay: The length of hospital stay varied among patients, with the majority (60%) requiring a hospital stay of 4-6 days. A smaller proportion of patients (20% each) required shorter stays (1-3 days) or longer stays (7-10 days) (Table 5).

Table 5: Hospital Stay

Length of Hospital Stay (days)	Number of Patients	Percentage
1-3	5	20%
4-6	15	60%
7-10	5	20%

Radiological Outcomes: Post-operative imaging revealed gross total resection in 15 cases (60%) and residual tumor in 10 cases (40%) (Figure 2).

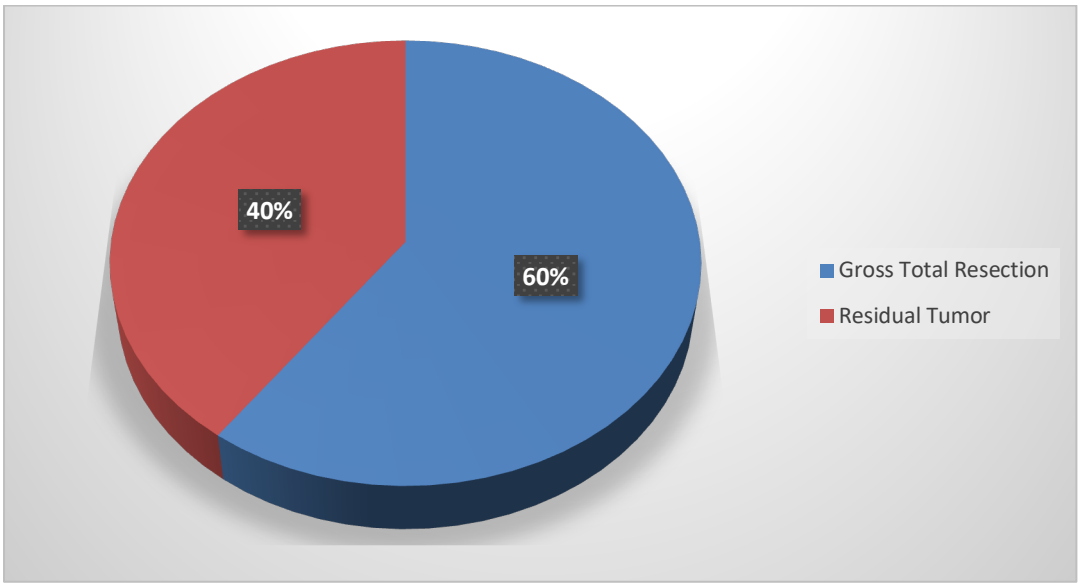

Figure 4: Radiology Outcome

Discussion:

Pituitary macroadenomas present complex challenges in neurosurgical management, and understanding the outcomes of surgical intervention is crucial for optimizing patient care. In this study, we evaluated the demographic distribution, clinical characteristics, surgical outcomes, post-operative complications, hospital stay, and radiological findings in patients undergoing transsphenoidal surgery for pituitary macroadenomas at our institution.

Our findings reveal a diverse demographic distribution, with the majority of patients falling within the 41-50 years age group and a slightly higher representation of males. Visual disturbances emerged as the most common presenting symptom, followed by hormonal dysfunction and headache, consistent with previous literature on pituitary macroadenomas. [1,2] These findings underscore the importance of timely diagnosis and intervention to mitigate the impact of visual impairment and endocrine dysfunction on patient outcomes.

Transsphenoidal surgery demonstrated favorable outcomes, achieving gross total resection in 60% of cases and subtotal resection in 40%. While gross total resection is the ideal surgical goal for pituitary macroadenomas, tumor adherence to critical structures may necessitate subtotal resection to avoid neurological deficits. Our results align with previous studies reporting similar rates of gross total resection and highlight the technical challenges encountered during surgery. [3,4,5]

Post-operative complications were observed in a subset of patients, with CSF leak being the most common complication. While the overall complication rate was relatively low, meticulous surgical technique and post-operative management are essential for minimizing adverse outcomes. Our findings emphasize the importance of proactive measures to prevent and manage complications, including early recognition and intervention. [6,7]

The length of hospital stay varied among patients, with the majority requiring a hospital stay of 4-6 days. This is consistent with the expected post-operative recovery period following transsphenoidal surgery and reflects the need for close monitoring and supportive care during the immediate post-operative period. [8]

Radiological assessment revealed favorable outcomes, with gross total resection achieved in the

majority of cases. Residual tumor was observed in a subset of patients, highlighting the importance of long-term surveillance and adjuvant treatment strategies to prevent tumor recurrence.

Overall, our study provides valuable insights into the outcomes of transsphenoidal surgery for pituitary macroadenomas in our patient population. While our results demonstrate favorable surgical outcomes and low complication rates, further studies with larger cohorts and longer follow-up periods are warranted to validate these findings and optimize surgical strategies for improving patient outcomes.

Our study has several limitations, including its retrospective design, which may introduce selection bias and limit the generalizability of the findings. Additionally, the relatively small sample size and single-center nature of the study may impact the external validity of the results. Future prospective studies with larger cohorts and longer follow-up durations are warranted to validate our findings and further optimize surgical outcomes in this population.

Conclusion

Transsphenoidal surgery remains a safe and effective treatment option for pituitary macroadenomas in North East Indian patients, with favorable post-operative outcomes and acceptable complication rates. The findings of this study contribute to the growing body of evidence supporting the use of transsphenoidal surgery in the management of pituitary macroadenomas and underscore the importance of tailored surgical approaches based on individual patient characteristics.

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