Clinical Characteristics and Surgical Outcome of Patients with Pituitary Tumour: Our Experiences at a Tertiary Centre

Gopal Sedain[1], Sandeep Bohara[2], Prabhat Jha[3], Anjan Singh Karki[4], Dipendra Kumar Shrestha[5], Amit Pradhanang[6], Sushil Krishna Shilpakar[7], Mohan Raj Sharma[8]

[1,2,3,4,5,6,7,8] Department of Neurosurgery, Tribhuvan University Teaching Hospital (TUTH)

Date of Submission: 4th April 2025 Date of Acceptance: 4th August 2025 Date of Publication: 15th September 2025

Abstract

Introduction : Pituitary tumours are a common heterogeneous group of lesions of the central nervous system. The overall prevalence of pituitary tumour in the general population is estimated to be 16.7%. Pituitary tumours present with a wide range of clinical spectrum. The standard of care for a pituitary tumour involves primary surgical intervention followed by radiotherapy/chemotherapy of the residual or recurrent tumour.

Materials and Methods: A retrospective study over a period of ten years (2013-2023 AD) of patients with pituitary tumour admitted to the Department of Neurosurgery was done. Pituitary tumour was confirmed by MRI brain with dynamic contrast whenever needed. Demographic profile of the patients, presenting complaints, radiological information about the tumour, intraoperative event, post-operative event were collected. The patients were followed up either in person or through telephone. All statistical analysis was done using SPSS software version 26.

Results: Of the 104 patients identified in the study period, 15 patients were excluded due to incomplete data and conservative management. Of the 89 patients included, there were 43 male patients. The mean age of the population was 47.9 (±13.97) years. The majority of the patients (66.3%) had non-functioning pituitary tumour. Most of the patients (52.8%) were managed with transcranial approach. The majority of the patients showed improved outcome in terms of visual symptoms, acromegaly features and hormone profile at 3 months post-surgery follow up.

Conclusion: Pituitary tumours are a heterogeneous group of lesions of the central nervous system presenting with a wide range of clinical spectrum. The management is primarily surgical with recent trend of surgical approach being endoscopic transnasal transsphenoidal.

Key Words: Central nervous system, Pituitary tumour, Transnasal transsphenoidal approach

Introduction

Pituitary tumors are a common heterogeneous group of lesions of the central nervous system[1]. The overall prevalence of pituitary tumor in the general population is estimated to be 16.7% [2]. The frequency varies greatly according to age and sex, with the tumors being slightly more frequent in females and between the ages of 40 and 60 years[3]. They were considered rare, but recent studies have shown that the prevalence is higher than previously thought due to the increase in diagnostic tests[1,4]. The prevalence from cancer registries is reported at approximately 130–230 cases per 100,000 population[5]. They are the second most common intracranial neoplasm after meningiomas. The prevalence of pituitary tumors was up to 40% in radiological series and 35% in autopsy[2].

Pituitary tumours present with a wide range of clinical spectrum. Non-functioning pituitary tumours present with symptoms such as headache, diplopia, visual loss and vomiting whereas functional pituitary tumours present mainly as Cushing's syndrome, acromegaly/gigantism, hyperthyroidism or hypogonadism due to hyperprolactinemia. Few tumours may present with features of apoplexy such as altered mental status and hormonal dysfunction[6]. Some pituitary tumours may result in slowly developing, insidious and non-specific complaints, thus delaying accurate diagnosis[7,8].

The standard of care for a pituitary tumour involves primary surgical intervention followed by radiotherapy/chemotherapy of the residual or recurrent tumour. Surgery remains the best treatment option as it provides immediate reduction of the tumour bulk, decompression of the visual apparatus and histopathological characterization of the tumour [9]. On the other hand, prolactinomas are best treated by medical

Access this article online

Website: https://www.nepjol.info/index.php/NJN

DOI: https://doi.org/10.3126/njn.v22i3.77294

HOW TO CITE
Sedain G, Bohara S, Jha P, Karki AS, Shrestha DK, Pradhanang AB, et al. Clinical Characteristics and Surgical Outcome of Patients with Pituitary Tumour: Our Experiences at a Tertiary Centre. NJNS. 2025;22(3):44-48

Address for correspondence:
Sandeep Bohara
Department of Neurosurgery, Tribhuvan University Teaching Hospital (TUTH)
Email: sandeepbohara@gmail.com

ISSN: 1813-1948 (Print), 1813-1956 (Online)

management unless they are large enough to cause mass effect which requires surgical decompression. Pharmacological agents to treat hyperprolactinemia are dopamine agonists as well as the serotonin antagonist [10]. The two main surgical approaches are transcranial surgery and the lesser invasive transsphenoidal surgery (TSS). The choice of each of these approach depends on the type of tumour, invasion, the extent of tumour removal and surgeons expertise [9,11].

Materials and Methods

We conducted a retrospective cohort study in our hospital, Department of Neurosurgery over time period 2013-2023 AD of all patients with pituitary tumour who underwent surgical resection. The patients who were managed conservatively were excluded from the study.

The diagnosis of pituitary tumour was based on clinical symptoms and positive findings on magnetic resonance imaging (MRI) brain. The patients were admitted to the neurosurgery ward. Ophthalmological evaluation was done for visual acquity, visual field and fundoscopy. Preanesthetic evaluation was done and the patients were subjected for surgical resection. The choice of surgical approach was decided by the operating surgeon. Post-operative management included careful monitoring of fluid and electrolyte, vitals and regular dressing of wounds..

Demographic data in terms of age, sex, type of tumour and duration of hospital stay were collected. Similarly, clinic-radiological factors such as presenting complaints, visual examination at presentation, hormone profile, characteristics and volume of the tumour, choice of surgical approach, intraoperative events, duration of surgery and postoperative complications were collected. The outcomes of the patients were measured with improvement in visual symptoms, bodily features and hormone profile at 3 months post-operative period. Ethical approval was taken from the institutional review committee of our institute. The data was analyzed in IBM SPSS version.[24] Continuous variables were summarized using means and medians and categorical variables were expressed as counts and percentages.

Results

A total of 104 patients with pituitary tumour were admitted in our department over the last 10 years. Fifteen patients were excluded due to incomplete data and conservative management. Thus, 89 patients were included in our study. The mean age of the study population was 47.9 (±13.97) years with a range of 22-83 years. The male to female ratio was 43:46.

The majority (85 patients) of the patients had pituitary macroadenoma. Only four patients had pituitary microadenoma. Of the 85 patients with pituitary macroadenoma, 74 patients were newly diagnosed macroadenoma, five patients were recurrent macroadenoma and six patients had presented with apoplexy.

Thirty (33.7%) patients had functional tumour and 59 (66.3%) patients had non-functional tumour. Of the patients with functional tumour, the majority (15 patients) had growth hormone secreting tumour (Figure 1).

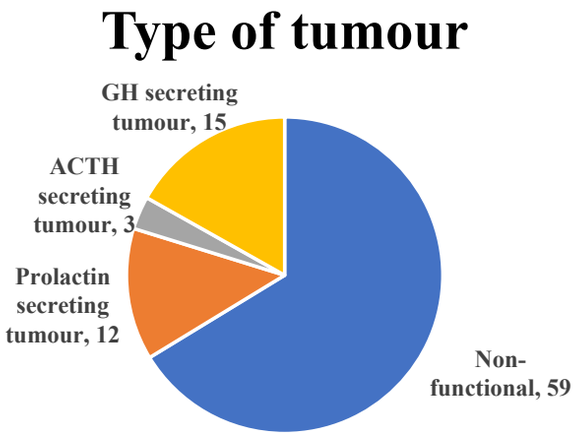

Figure 1: Type of tumour based on functional status

The most common presenting complaint in our study was headache (75 patients) followed by visual symptoms (73 patients) (Table 1).

Presenting complaints	Number of patients
Headache	75
Visual symptoms	73
Altered sensorium	8
Menstrual irregularities	2
Increase in size of hands and feet	10
Others	11

The mean volume of the tumour was 16.02 (±7.01) cm3 in our study with a range of 0.11-77.76 cm3 as seen from the pre-operative MRI brain. The majority of the patients had tumour in

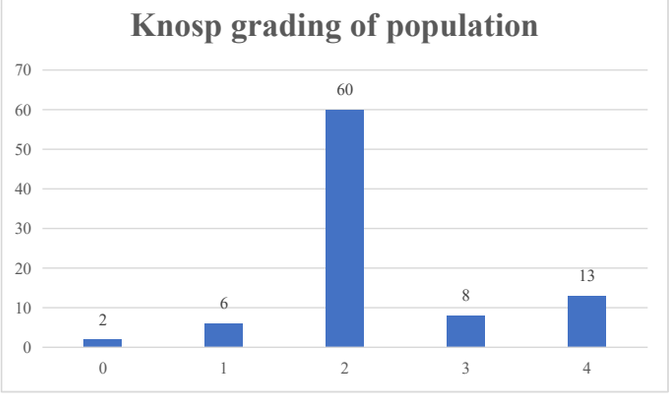

Figure 2: Knosp grading of the population

There were three surgical approaches used for resection of tumour in our study: transcranial, microscopic transsphenoidal and endoscopic transsphenoidal approach. We switched to endoscopic transnasal transsphenoidal approach three years back and since then we have been continuing the same. The majority of the patients (52.8%) underwent transcranial approach for the resection of tumour (Figure 3). Comparing the different

approaches, the mean duration of surgery was shorter in the endoscopic transsphenoidal approach whereas the mean volume of blood loss was lesser in the microscopic transsphenoidal approach (Table 2).

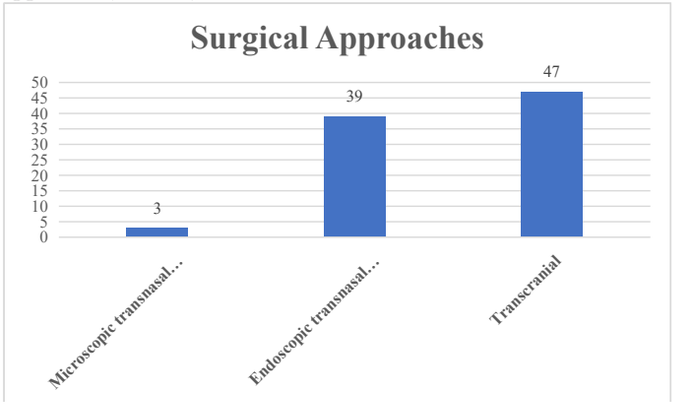

Figure 3: Surgical approaches used in the study population

Table 2: Mean duration of surgery and mean volume of blood loss in different surgical approaches

Surgical Approach	Mean duration of surgery (hrs)	Mean volume of blood loss (ml)
Microscopic transsphenoidal	5 ± 0.86	350 ± 50
Endoscopic transsphenoidal	4.83 ± 0.79	489.74 ± 101.24
Transcranial	8.26 ± 1.33	714.8 ± 107.8

The mean duration of hospital stay was 15.09 (±7.48) days including the pre-operative hospital stay. Seventy three (82%) patients required ICU stay. The mean duration of ICU stay was 4.28 (±2.9) days.

Of the 39 (43.82%) patients operated by endoscopic transsphenoidal approach, intra-operative CSF leak was seen in eight (20.51%) patients. Of these eight patients, six patients had CSF rhinnorhoea in the immediate postoperative period. Five patients were managed with lumbar drain and one patient was managed with sellar floor repair in the operating theatre.

Diabetes Insipidus (DI) was the most common post-operative complication which was seen in 33 patients. Of these, five patients had transient DI. The other post-operative complications were Syndrome of Inappropriate Anti-Diuretic Hormone Secretion (SIADH), limb weakness, 3rd cranial nerve palsy, tension pneumocephalus and hypopituitarism (Table 3).

Table 3: Post-operative complications in the study population

Post-operative complications	Number of patients
Diabetes Insipidus (DI)	33
Syndrome of Inappropriate Anti-Diuretic Hormone Secretion (SIADH)	7
Limb weakness	8
3rd cranial nerve palsy	2
Tension pneumocephalus	1
Hypopituitarism	9

We were able to retrieve the post-operative MRI brain report in only 47 patients. Of these 47 patients, near total excision of the tumour was done in four patients. All these four patients were operated by transcranial approach and are kept under regular follow up. The remaining 43 patients underwent gross total excision of the tumour.

There were four mortality in our study. Two patients had anterior cerebral artery (ACA) stroke with ventilator associated pneumonia (VAP) ultimately leading to death. Two patients withdrew support during the course of treatment.

We analyzed the outcome of the patients at three months post-surgery follow up in terms of improvement in visual symptoms, bodily features and hormone profile. Ten patients had bodily symptoms (increase in size of hands and feet) at presentation and all these patients showed improvement in resolution of these features (Table 4).

Table 4: Outcome of patients at 3 months post-surgery follow up

Parameter	Total number of patients	Number of patients improved
Visual symptoms (visual acquity/visual field)	73	58 (79.45%)
Acromegalic features (Resolution at different stages)	10	10 (100%)
Hormone secreting tumours (Hormone profile)	30	28 (93.33%)

(Figure 4, 5, 6). Some of our representative cases are presented below

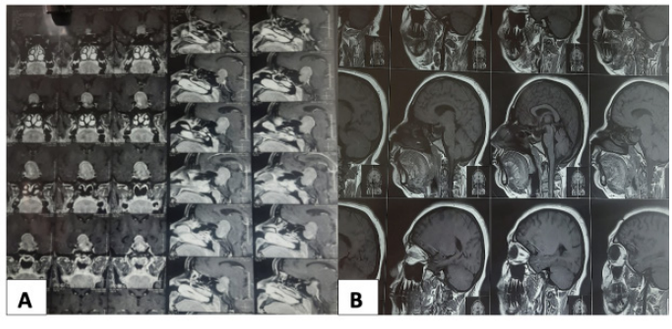

Figure 4: (A) Pre-operative and (B) post-operative MRI images of patient with non-functioning pituitary tumour operated via endoscopic transnasal transsphenoidal approach.

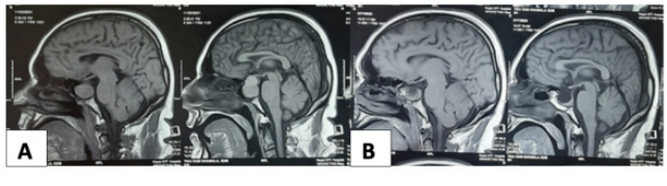

Figure 5: (A) Pre-operative and (B) post-operative MRI images of patient with non-functioning pituitary tumour.

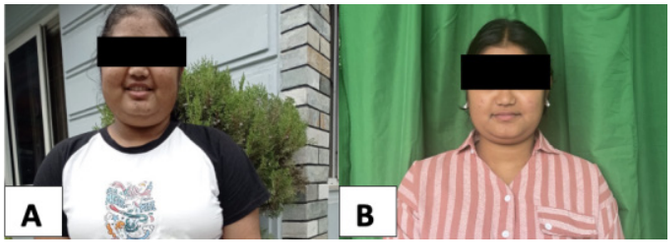

Figure 6: (A) Pre-operative and (B) post-operative images of patient with functioning pituitary tumour (Cushing's disease).

Discussion

The majority of the pituitary tumours are benign adenomas of the adenohypophysis. Tumours of the neurohypophysis are rare as are pituitary carcinomas. Pituitary adenomas are a group of diverse neoplasms that typically arise from the hormone-secreting epithelial cells in the adenohypophysis of the pituitary gland and rarely metastasize [12-14]. Microadenomas are defined to be neoplasms <1 cm contained within the sella turcica, while macroadenomas are neoplasms ≥1 cm that may be contained within the sella turcica but often extend into the superior, inferior and lateral extrasellar space [2,15]. Furthermore, pituitary neoplasms may be classified as functional or nonfunctional, where functional neoplasms present with clinical symptoms specific to increased hormonal secretion and activity. Nonfunctional pituitary adenomas commonly present due to mass effect or are identified incidentally on autopsy [16,17]. Pituitary neoplasms are estimated to be 10–15% of all central nervous system (CNS) tumors and constitute 25% of all surgically resectable CNS tumors [18,19]. A subset of pituitary neoplasms are subclinical and are discovered incidentally. According to the autopsy studies, pituitary neoplasms occur in approximately 1–35% of the general population [20-22].

Demographic Characteristics

The demographic characteristics in our study were similar to those observed in other series of patients with pituitary tumours. The mean age of the patients was similar to the mean age in other published studies. There was slight higher female sex predilection consistent with previously published studies [2,3].

Presenting complaints

The most common presenting complaint was headache seen in 75 (84.26%) patients in our series. However, visual loss (39%) was the most common presenting complaint followed by endocrine abnormality (21%) and headache (15%) in literature [23]. In a study from Iceland with 410 pituitary adenomas, most common tumour type was non-functioning adenomas (43%). Similar to our study with most common being non-functioning adenomas (66.3%) [24].

Surgical Approach

The most common surgical approach in our series was transcranial approach done in 47 (52.8%) patients. However, in recent years there is shift in surgical approach towards endoscopic transsphenoidal approach. Even though we have higher number of patients with transcranial approach, in the recent years we have shifted to doing more cases of endoscopic transnasal transphenoidal approach. Endoscopic transsphenoidal approach showed lower mean duration of surgery (4.83 ± 0.79 hours) and lower mean blood loss (489.74 ± 101.24 ml) in our series. In a meta-analysis in 2017, the transsphenoidal approach showed increased remission rates and lower chances of meningitis as compared to transcranial approach [25,26].

Complications

Diabetes Insipidus (DI) was the most common complication seen in 33 (37.07%) patients in our series. In the study by Fonte et al, DI was the most common complication, followed by CSF leak and hemorrhage [27]. However, Zhang et al in 2020 reported hypopituitarism (34.36%) as the most common complication followed by DI (17.18%) and hyponatremia (15.34%) [28].

Outcome

The outcome of the patients was evaluated at 3 months post-surgery follow up in terms of improvement in visual symptoms, bodily features and hormone profile. 79.45% of the patients with visual symptoms (visual acquity/visual field), 100% of the patients with acromegaly features and 93.33% of the patients with derangement in hormone profile showed significant improvement. Similar outcome were seen in other published literature following pituitary tumour resection [29-31].

Limitations

This is a single centre, single department study with a small sample size. Hence, the results may not be generalized.

Conclusion

Pituitary tumours are a common heterogeneous group of lesions with wide range of clinical symptoms presenting as functioning and non-functioning tumours. Different surgical approaches can be applied according to the extent of the tumour. Surgical resection remains the best treatment option with acceptable post-operative outcome.

Acknowledgement

We would like to thank all the people who have directly or indirectly helped us in preparation of this article. We would also like to thank all our patients for ther valuable support.

References

1. Aflorei ED, Korbonits M. Epidemiology and etiopathogenesis of pituitary adenomas. J Neurooncol. 2014;117(3):379–94. doi:10.1007/s11060-013-1354-5.
2. Ezzat S, Asa SL, Couldwell WT, Barr CE, Dodge WE, Vance ML, et al. The prevalence of pituitary adenomas: a systematic review. Cancer. 2004;101(3):613–9. doi:10.1002/cncr.20412.
3. Mindermann T, Wilson CB. Age-related and gender-related occurrence of pituitary adenomas. Clin Endocrinol (Oxf). 1994;41(3):359–64. doi:10.1111/j.1365-2265.1994.tb02561.x.
4. Nilsson B, Gustavsson-Kadaka E, Bengtsson BÅ, Jonsson B. Pituitary adenomas in Sweden between 1958 and 1991: Incidence, survival, and mortality. J Clin Endocrinol Metab. 2000;85(4):1420–1425. doi:10.1210/jcem.85.4.6488.
12. Slatkeviciene G, Liutkeviciene R, Glebauskiene B, Zaliuniene D, Kriauciuniene L, Bernotas G, et al. The Application of a New Maximum Color Contrast Sensitivity Test to the Early Prediction of Chiasma Damage in Cases of Pituitary Adenoma: The Pilot Study. Korean J Ophthalmol. 2016;30(4):295–301. DOI: 10.3341/kjo.2016.30.4.295. PMID: 27478357.
13. Organization WH. International Classification of Diseases, Tenth Revision (ICD-10). Sixth Edition. Vol. 2. Geneva: World Health Organization; 2019. 275 p.
5. Daly AF, Tichomirowa MA, Beckers A. The epidemiology and genetics of pituitary adenomas. Best Pract Res Clin Endocrinol Metab. 2009;23(5):543–554. doi:10.1016/j.beem.2009.05.008.
6. Drange MR, Fram NR, Herman-Bonert V, Melmed S. Pituitary Tumor Registry: A novel clinical resource. J Clin Endocrinol Metab. 2000;85(1):168–174. doi:10.1210/jcem.85.1.6277.
7. Karaca Z, Yarman S, Ozbas I, Kadioglu P, Akturk M, Kilicli F, et al. How does pregnancy affect the patients with pituitary adenomas: a study on 113 pregnancies from Turkey. J Endocrinol Invest. 2017;40(7):741–749. doi:10.1007/s40618-017-0709-8.
8. Perry A, Graffeo CS, Wetjen NM, Meyer FB, Marcellino C, Pollock BE. Pediatric pituitary adenoma: case series, review of the literature, and a skull base treatment paradigm. J Neurol Surg B Skull Base. 2018;79(1):91–114. doi:10.1055/s-0038-1625984.
9. van Lindert EJ, Grotenhuis JA. The combined supraorbital keyhole-endoscopic endonasal transsphenoidal approach to sellar, perisellar and frontal skull base tumors: surgical technique. Minim Invas Neurosurg. 2009;52(5):281–286. doi:10.1055/s-0029-1242776.
10. Acharya SV, Gopal RA, Menon PS, Bandgar TR, Shah NS. Giant prolactinoma and effectiveness of medicalmanagement. Endocr Pract. 2010;16(1):42–46. doi:10.4158/EP09221.OR.
11. Villwock JA, Villwock MR, Goyal P, Deshaies EM. Current trends in surgical approach and outcomes following pituitary tumor resection. Laryngoscope. 2015;125(6):1307–1312. doi:10.1002/lary.25120.
12. Al-Brahim NYY, Asa SL. My approach to pathology of the pituitary gland. Journal of Clinical Pathology. 2006 Dec;59(12):1245. PMID: 1860551.
13. Asa SL, Ezzat S. The cytogenesis and pathogenesis of pituitary adenomas. Endocr Rev. 1998 Dec;19(6):798–827. doi:10.1210/edrv.19.6.0350.
14. Asa SL, Ezzat S. The pathogenesis of pituitary tumours. Nat Rev Cancer. 2002;2(11):836–849. doi:10.1038/nrc926.
15. Atlas of Tumor Pathology: Tumors of the Pituitary Gland | American Journal of Clinical Pathology | Oxford Academic. https://academic.oup.com/ajcp/article-abstract/111/5/708/1758829?redirectedFrom=PDF
16. Asa SL, Ezzat S. The pathogenesis of pituitary tumours. Nat Rev Cancer. 2002;2(11):836–849. doi:10.1038/nrc926.
17. Scangas GA, Laws ER Jr. Pituitary incidentalomas. Pituitary. 2014;17(4):502–510. doi:10.1007/s11102-013-0517-x.
18. Melmed S. Pathogenesis of pituitary tumors. Nat Rev Endocrinol. 2011;7(5):257–266. doi:10.1038/nrendo.2011.40.
19. Asa SL, Ezzat S. The pathogenesis of pituitary tumors. Annu Rev Pathol. 2009;4:97–126. doi:10.1146/annurev.pathol.4.110807.092259.
20. Burrow GN, Wortzman G, Rewcastle NB, Holgate RC, Kovacs K. Microadenomas of the pituitary and abnormal sellar tomograms in an unselected autopsy series. N Engl J Med. 1981 Jan 15;304(3):156–8. doi:10.1056/NEJM198101153040306.
21. Costello RT. Subclinical Adenoma of the Pituitary Gland. Am J Pathol. 1936 Mar;12(2):205-216.1. PMID: 19970261.
22. Jiang X, Zhang X. The molecular pathogenesis of pituitary adenomas: an update. Endocrinol Metab. 2013;28(4):245–254. doi:10.3803/EnM.2013.28.4.245.
23. Ogra S, Nichols AD, Stylli S, Kaye AH, Savino PJ, Danesh-Meyer HV. Visual acuity and pattern of visual field loss at presentation in pituitary adenoma. J Clin Neurosci. 2014;21(5):735–740. doi:10.1016/j.jocn.2014.01.005.
24. Agustsson TT, Baldvinsdottir T, Jonasson JG, Olafsdottir E, Steinthorsdottir V, Sigurdsson G, et al. The epidemiology of pituitary adenomas in Iceland, 1955–2012: a nationwide population-based study. Eur J Endocrinol. 2015;173(5):655–664. doi:10.1530/EJE-15-0189.
25. Varlamov EV, McCartney S, Fleseriu M. Functioning pituitary adenomas – current treatment options and emerging medical therapies. Eur Endocrinol. 2019;15(1):30–40. doi:10.17925/EE.2019.15.1.30.
26. Phan K, Xu J, Reddy R, Kalakoti P, Nanda A, Fairhall J. Endoscopic endonasal versus microsurgical transphenoidal approach for growth hormone-secreting pituitary adenomas—systematic review and meta-analysis. World Neurosurg. 2016;96:709–718.e1. doi:10.1016/j.wneu.2016.10.029.
27. Fonte JS, Cunanan EC, Matawaran BJ, Mercado-Asis LB. Treatment outcomes of pituitary tumors at the University of Santo Tomas Hospital: 2004-2008. Philipp J Intern Med. 2009;47(47):121–8. doi:10.3860/pjim.v47i3.1654.
28. Zhang J, Wang Y, Xu X, Gu Y, Huang F, Zhang M. Postoperative complications and quality of life in patients with pituitary adenoma. Gland Surg. 2020;9(5):1521–1529. doi:10.21037/gs-20-690.
29. Mavromati M, Mavrakanas T, Jornayvaz FR, Schaller K, Fitsiori A, Vargas MI, et al. The impact of transsphenoidal surgery on pituitary function in patients with non-functioning macroadenomas. Endocrine. 2023 May 24;81(2):340. PMID: 10293445.
30. Wang MTM, King J, Symons RCA, Stylli SS, Daniell MD, Savino PJ, et al. Temporal patterns of visual recovery following pituitary tumor resection: A prospective cohort study. J Clin Neurosci. 2021;86:252–259. doi:10.1016/j.jocn.2021.01.007.
31. Poudel H, Khambu B, Shrestha R, Khadka N, Jha R, Bista P. Improvement of vision after resection of pituitary tumor. J Coll Med Sci Nepal. 2019;15(3):167–170. doi:10.3126/jcmsn.v15i3.24895.