Posterior Pituitary Tumor

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- Posterior pituitary tumors: an entity unto itself

A **posterior pituitary tumor (PPT)** is a rare, often benign neoplasm that originates from the **neurohypophysis**, also known as the **posterior lobe of the pituitary gland**.

In 2017, the WHO established that pituicytoma, granular cell tumor (GCT) and spindle cell oncocytoma (SCO) are posterior pituitary tumors (PPT). Data suggests that these tumours probably arise from the pituicytes and may constitute a spectrum of a unique histopathological entity.

Histological Subtypes

Posterior pituitary tumors comprise three main subtypes:

- pituicytoma
- granular cell tumor (GCT)
- spindle cell oncocytoma (SCO)

Although histologically distinct, these tumors likely represent a **spectrum of a single pathological entity** due to shared immunohistochemical markers and origin.

Clinical Presentation

Symptoms are often nonspecific and may resemble those of non-functioning pituitary tumors. Common findings include:

- headache
- visual impairment due to compression of the optic chiasm
- sexual dysfunction
- hyperprolactinemia (due to stalk effect)
- hypopituitarism
- Occasionally, diabetes insipidus (though less frequent than in other sellar lesions)

Diagnosis

- **MRI**: Typically shows a **solid sellar or suprasellar mass**, often isointense on T1 and T2, with homogeneous contrast enhancement.
- **Endocrine testing**: May reveal hormonal deficiencies or elevations.
- **Histology & Immunohistochemistry**:
  - Positive for: TTF-1, vimentin, S100 protein
  - Negative for: chromogranin A, cytokeratin
  - Ki67 index usually low but variable (e.g., 4–7% in SCO)

Treatment and Prognosis

- **Surgical resection** is the mainstay of treatment. Approaches include:
  - transsphenoidal approach
  - transcranial approach
- **Complications**:
  - Perioperative bleeding (may be fatal)
  - Postoperative hypopituitarism
  - diabetes insipidus
  - Recurrence (in up to 15–20% of cases)
- **Adjuvant therapy**: radiotherapy may be used in cases of residual or recurrent tumor.
- **Prognosis**:
  - Excellent tumor-specific survival (near 100% at 5 years)
  - Endocrine dysfunction often persists or worsens postoperatively

Retrospective cohort studies

A retrospective cohort study offers a valuable contribution to the limited literature on posterior pituitary tumors (PPTs), analyzing 19 patients treated over 23 years at a single academic center. Despite the rarity of these tumors—pituicytoma (PC), granular cell tumor (GCT), and spindle cell oncocytoma (SCO)—the authors manage to draw meaningful insights into their clinical presentation, surgical management, and long-term endocrine impact [1].

Including three distinct histological subtypes allows for a comparative analysis that reveals intriguing differences, such as the significantly higher preoperative BMI in GCT patients and the sharp postoperative increase in BMI, highlighting possible metabolic derangements associated with this tumor type. The predominance of symptoms like headache, visual impairment, and sexual dysfunction echoes the nonspecific but debilitating nature of sellar pathology.

One of the most striking findings is the persistence or worsening of endocrine dysfunction postoperatively, with minimal recovery over time. This aligns with other literature indicating that

surgery for PPTs, though often necessary, rarely restores pituitary function and may even exacerbate deficits. This point emphasizes the need for realistic patient counseling and robust endocrinological follow-up.

Surgical management was nearly evenly split between transsphenoidal and transcranial, a decision likely driven by tumor size and anatomical considerations. Gross total resection (GTR) was achieved in 58% of cases, with a 16% recurrence rate—relatively low, but not negligible, especially considering the benign histology of these tumors. All recurrences were managed with adjuvant radiation therapy, which raises questions about its early use in subtotal resections.

The study's strengths include its well-defined cohort, detailed subgroup analysis, and long-term follow-up. However, the small sample size and single-center design inherently limit generalizability. Moreover, the retrospective nature introduces potential bias in data collection and outcome assessment.

From a translational perspective, this work underlines a key clinical dilemma: the balance between oncological control and iatrogenic endocrine morbidity. Future prospective multicenter studies with standardized follow-up protocols could help establish evidence-based guidelines for PPTs, including early identification of patients at risk for metabolic deterioration.

This study is a sobering reminder that not all "benign" tumors are benign in consequence. While the tumor-specific survival was excellent (100% at 5 years), the lingering endocrine and metabolic sequelae merit equal attention. Clinicians managing these rare entities must prepare for a dual challenge: surgical precision and long-term systemic management.

Retrospective observational studies

A retrospective observational study was conducted at a single neurosurgical center over 10 years (2013–2023). The authors reviewed medical records and histopathological samples of patients diagnosed with primary TTF1-positive posterior pituitary tumors (PPT) [2].

Summary of Findings

Out of over a decade of surgical activity, only nine PPT cases were identified, reflecting the rarity of this tumor type, which constituted just 0.6% of all sellar/suprasellar operations at the institution.

Breakdown of tumor types:

- 6 spindle cell oncocytomas (SCO)
- 2 granular cell tumors (GCT)
- 1 pituicytoma

Key clinical observations:

- Median patient age: 53 years
- 66.7% male
- Frequent symptoms: panhypopituitarism, visual deficits, and headaches
- Common MRI features: isointense T1 signal, suprasellar extension in GCT and pituicytoma

Notable radiological clue:

- GCTs demonstrated a “star-like crack” pattern, which may aid in preoperative suspicion.

Critical Appraisal

Strengths

- The study is one of the few focused exclusively on TTF-1 positive PPTs with confirmed histopathology, adding valuable long-term clinical and imaging data.
- It provides rare insights into surgical outcomes, emphasizing the challenge posed by the firm and vascular nature of SCO.

Weaknesses

- As a single-center, retrospective study, external validity is limited. Multicentric studies would be needed to confirm the imaging-histopathology correlations suggested.
- The sample size is very small (n=9), limiting the statistical power and generalizability of the conclusions.
- The lack of a control group or comparative data restricts interpretation of surgical or radiotherapeutic outcomes.

Clinical Relevance

- Preoperative suspicion of SCO or GCT based on radiological features could impact surgical planning and patient counseling, given the tendency for subtotal resection and adjuvant therapy.
- The report underscores the importance of long-term follow-up due to the limited curative potential of these tumors, even with aggressive intervention.

Conclusion

This study serves as a useful reference for neurosurgeons and endocrinologists managing rare TTF-1-positive PPTs. It highlights the diagnostic difficulty, surgical complexity, and the need for improved strategies to manage these lesions. Future studies should aim to include multicenter cohorts, genetic profiling, and standardized protocols for treatment and surveillance.

Retrospective case series

The aim of Guerrero-Pérez F et al. from the Department of Endocrinology, Department of Pathology, Department of Endocrinology, Hospital Universitari de Bellvitge, Barcelona, Department of Endocrinology, Hospital Universitari Mutua Terrassa, Barcelona, Department of Endocrinology, Hospital Universitario Príncipe de Asturias, Madrid, Department of Neurosurgery, Hospital Universitario Miguel Servet, Zaragoza, Department of Endocrinology, Hospital Universitario Puerta de Hierro, Majadahonda, Madrid, Department of Endocrinology, Hospital General Universitario de Alicante, Spain is to report the clinical findings and surgical outcomes of 16 patients with PPT. They also evaluated the tissue specimens available in light of current knowledge.

PPT were 7 pituicytomas, 3 GCT and 6 SCO. Patients mean age was 55 years old and 75% were female. Basal hormonal study showed hyperprolactinemia (43.7%) and hypopituitarism (37.5%). There was no case of diabetes insipidus (DI). MRI showed sellar/suprasellar masses with mean size of 19.7mm. PPT was not suspected in any patient. Fifteen patients underwent surgery and complications were common: 20% had perioperative bleeding (one patient died because of a massive haemorrhage), 57.1% hypopituitarism, 35.7% permanent DI and 21.4% underwent a second surgery. Pathological findings shown positivity for thyroid transcription factor 1, vimentin and negativity for cytokeratin and chromogranin A in all specimens evaluated. S100 protein was positive in 88.8% of tumours. Ki67 was ≥ 3% in 66.6% and ranged from 4-7% in SCO.

PPT have similar histology, clinical features and are frequently misdiagnosed as nonfunctioning pituitary tumours. However, post-surgical complications including haemorrhage are common. A high clinical suspicion is needed to presume the diagnosis prior surgery and diminish the high morbidity of these tumours [3].

1)
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2)
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3)
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