

# Hidden in Plain Sight: Retroperitoneal Obturator Schwannoma - A Case Report

Preethi S, Selwyn J Kumar, Daniel Ravikumar, Harsha Vardhanan T\*, Sahasya Adalarasan

Schwannomas are benign, slow-growing tumors arising from Schwann cells of the peripheral nerve sheath. They are typically well-encapsulated and have a low risk of recurrence and extremely rare malignant potential. Although commonly found in the head and neck region and along peripheral nerves of the extremities, their occurrence in the retroperitoneum is uncommon, and involvement of the obturator nerve is exceptionally rare. We report the case of a female who presented with vague lower abdominal discomfort. Imaging revealed a well-circumscribed retroperitoneal mass adjacent to the pelvic sidewall. Surgical exploration identified the mass arising from the obturator nerve. Complete excision was achieved, and histopathology confirmed the diagnosis of benign schwannoma.

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## Introduction

Schwannomas, also known as neurilemmomas or neurinomas, are benign peripheral nerve sheath tumors arising from well-differentiated Schwann cells.<sup>1</sup> They most commonly occur at the cerebellopontine angle<sup>1</sup> and are typically slow growing, often presenting with minimal or no symptoms. These tumors are usually solitary and range from 1.5 to 3 cm in size, although multiple lesions may occasionally occur along a nerve. Malignant transformation is rare.<sup>2</sup> Peripheral nerve sheath tumors account for less than 5% of tumors of the extremities<sup>3</sup>, with schwannomas being the most common subtype in adults.<sup>3</sup> They demonstrate a predilection for the upper extremities, particularly the head and neck region, spinal nerves, and brachial plexus, where their incidence is approximately twice that of the lower extremities.<sup>4,5</sup> Pelvic schwannomas are uncommon, comprising only 1 to 3% of cases, and involvement of the obturator nerve is exceptionally rare.<sup>4</sup> Schwannomas can occur at any age but are most frequently seen in adults, with peak incidence between 30 and 60 years; pediatric cases are rare. The estimated annual incidence is 0.3 to

0.4 per 100,000 population.<sup>3,6</sup> Schwannomas account for approximately 8% of intracranial tumors and 29% of spinal tumors, with 12 to 19% occurring in the upper extremities and 13.5 to 17.5% in the lower extremities.<sup>4</sup> In 1920, Nils Ragnar Eugène Antoni described two distinct histological patterns in peripheral nerve sheath tumors, later recognized as schwannomas, based on the analysis of 30 cases. He identified a highly cellular, elongated, and fibrillary pattern termed *Antoni A*, and a contrasting loose, microcystic pattern termed *Antoni B*. These characteristic architectural patterns remain fundamental to the histological diagnosis of schwannomas.<sup>8</sup>

We report this case of a schwannoma arising from the obturator nerve in the retroperitoneum because of its rarity, diagnostic difficulty, and importance in the differential diagnosis of pelvic and retroperitoneal masses.

## Case presentation

A 53-year-old female presented with vague pelvic discomfort and numbness along the medial aspect of the left thigh. The symptoms were insidious in onset and gradually progressive. There was no history of acute exacerbation, fever, weight loss, loss of appetite,

Institute of General Surgery, Madras Medical College and Rajiv Gandhi Government General Hospital, Chennai, India

**Correspondence to:** Harsha Vardhanan T, Institute of General Surgery, Madras Medical College and Rajiv Gandhi Government General Hospital, Chennai, India. E-mail: harshavardhanan216@gmail.com

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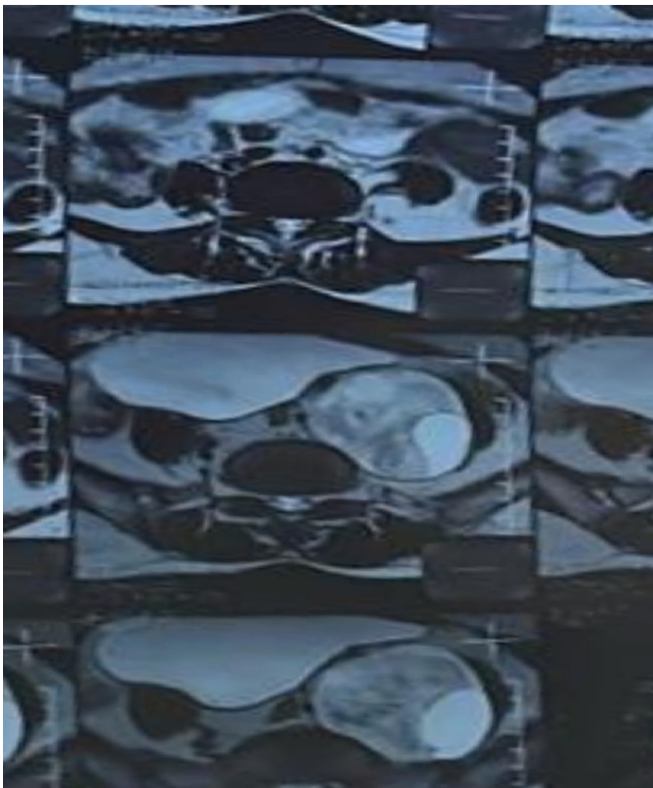
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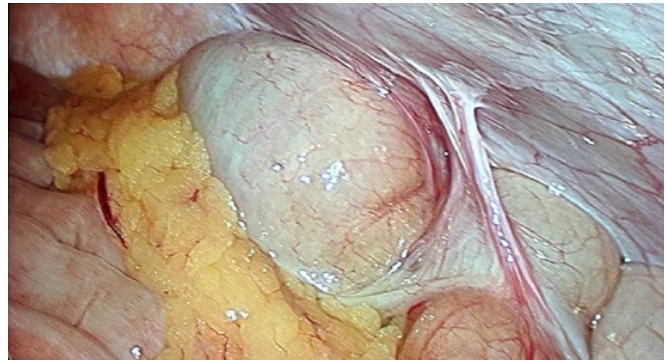
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bowel or bladder disturbances, lower-limb weakness, or other constitutional symptoms. There was no significant past medical or surgical history. On examination, the patient was conscious, oriented, and hemodynamically stable, with all vital parameters within normal limits. General physical examination was unremarkable, with no pallor, icterus, lymphadenopathy, pedal oedema, or neurocutaneous markers. Abdominal examination revealed mild lower-pelvic tenderness and a palpable mass in the left iliac fossa. The mass was firm and had limited mobility. No guarding or rigidity was noted, and bowel sounds were normal. Neurological examination demonstrated sensory changes along the medial aspect of the left thigh, with preserved motor power, intact reflexes, and no appreciable gait abnormality. Magnetic resonance imaging (MRI) demonstrated a well-circumscribed, heterogeneously enhancing lesion in the left retroperitoneal region measuring approximately  $12 \times 10 \times 7.8$  cm. The mass appeared closely related to adjacent neurovascular structures. Based on the imaging findings, a differential diagnosis of retroperitoneal sarcoma versus a neurogenic tumor was considered. Figure 1. Contrast-enhanced computed tomography image of the swelling.



**Figure 1:** Contrast-enhanced computed tomography image of the swelling



**Figure 2:** Intraoperative picture



**Figure 3:** Specimen picture

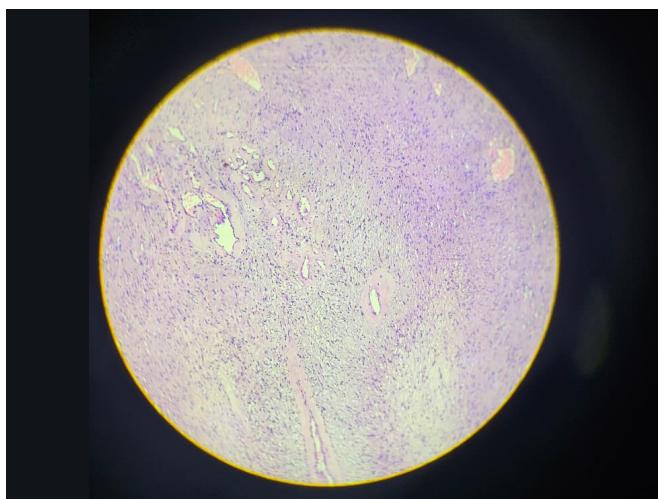


**Figure 4:** Post operative clinical picture

The patient was planned for surgical excision. A diagnostic laparoscopy was initially performed, during which the tumor was identified as arising from the obturator nerve in the left retroperitoneum. Given the lesion's size and anatomical location, the procedure was converted to an open approach, and a Pfannenstiel incision was made to achieve adequate exposure. Figure 2 shows an intraoperative picture.

Table 1: Tabular comparison of literature specific to the present case

| Characteristics                  | Present Case                                                                                                                                                                                             | Case 1                                                                                                                                                                                                                                                                                       | Case 2                                                                                                                                                           | Case 3                                                                                                                                                                                              |
|----------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Patient profile                  | 53-year-old Female                                                                                                                                                                                       | 19-year-old Female                                                                                                                                                                                                                                                                           | 40-year-old female, P4; history of celiac disease, hypothyroidism, varicose veins                                                                                | 51-year-old female                                                                                                                                                                                  |
| Chief complaints                 | Vague pelvic discomfort and numbness along the medial aspect of the left thigh                                                                                                                           | Lower abdominal distension and neuritic pain in the right thigh for 2 years associated with antalgic gait                                                                                                                                                                                    | Intermittent right lower quadrant pain for >1 year, exacerbated by sexual activity                                                                               | Left pelvic discomfort for 3 months; no bowel or urinary symptoms                                                                                                                                   |
| Tumor location and size          | Left retroperitoneal obturator nerve schwannoma measuring 12 × 10 × 7.8 cm                                                                                                                               | Pelvic retroperitoneum, 42×16×16 cm, right-sided                                                                                                                                                                                                                                             | Right pelvic retroperitoneum, within broad ligament along pelvic sidewall; ~4.6 × 3.3 × 3.6 cm; arising from obturator nerve                                     | Left pelvic retroperitoneum, medial and inferior to external iliac vessels; ~4.9 × 3.7 cm                                                                                                           |
| Imaging features                 | Well-circumscribed heterogeneously enhancing retroperitoneal mass closely related to adjacent neurovascular structures; differential diagnosis included retroperitoneal sarcoma versus neurogenic tumor. | Heterogeneous lobulated mass; displacing iliac vessels; right hydronephrosis                                                                                                                                                                                                                 | Complex cystic lesion on ultrasound; MRI showed a solid-cystic retroperitoneal mass abutting the right external iliac vessel; gradual increase in size over time | Well-defined extraperitoneal lesion along the left iliac vessels; vascularized, hypodense on CT; MRI suggestive of neural origin; displacement of the obturator artery and bladder without invasion |
| Surgical approach                | Diagnostic laparoscopy followed by conversion to open surgery with Pfannenstiel incision; complete excision of the tumor with sacrifice of the obturator nerve                                           | Midline laparotomy; en bloc resection; iliac veins + femoral & obturator nerves sacrificed; external iliac artery cut & reanastomosed                                                                                                                                                        | Initial diagnostic laparoscopy; later robotic-assisted excision; mass arising from the obturator nerve resected; adjacent structures preserved                   | Robotic-assisted laparoscopic excision; tumor arising from left obturator nerve; neural pedicle ligated; adjacent structures preserved                                                              |
| Histopathology                   | Benign schwannoma showing Antoni A and Antoni B areas                                                                                                                                                    | Ancient schwannoma (Antoni A/B, Verocay bodies)                                                                                                                                                                                                                                              | Schwannoma; S100 positive; cystic degeneration, hemorrhage, hemosiderin, nuclear atypia, perivascular hyalinization                                              | Encapsulated schwannoma; spindle cells with Antoni A areas and Verocay bodies; no necrosis or atypia; strong S100 positivity; low proliferative index (Ki-67 ~3%)                                   |
| Postoperative course and outcome | Uneventful postoperative recovery with no immediate complications                                                                                                                                        | Uneventful immediate recovery. Developed postoperative foot drop, quadriceps weakness, and patchy sensory loss (due to nerve resection). Managed with physiotherapy and foot drop splint; gradual functional improvement. Ambulatory without support at follow-up; no recurrence at 2 years. | Transient postoperative sensory and motor symptoms; improved with physiotherapy; no deficits at long-term follow-up (3 years)                                    | Uneventful recovery; minimal blood loss; early discharge; transient medial thigh pain resolving spontaneously; no motor or sensory deficit on follow-up                                             |
| References                       |                                                                                                                                                                                                          | 17                                                                                                                                                                                                                                                                                           | 18                                                                                                                                                               | 19                                                                                                                                                                                                  |



**Figure 5:** Biopsy image of the tissue collected

Intraoperatively, the mass was carefully dissected and completely excised. The tumor was found to originate from the obturator nerve, which was sacrificed to facilitate complete removal, given the minimal anticipated functional deficit. The excised specimen was sent for histopathological examination. Figure 3 shows a specimen picture.

The postoperative period was uneventful, and the patient recovered well without any immediate complications. Figure 4 shows a Postoperative clinical picture.

Further, the biopsy image confirmed the presence of a schwannoma as shown in Figure 5

## Discussion

### *Retroperitoneal schwannoma*

Schwannomas are benign, slow-growing tumors arising from Schwann cells of the peripheral nerve sheath.<sup>1</sup> Characterized histologically by alternating Antoni A and Antoni B areas.<sup>8</sup> Experimental models have demonstrated that disruption of normal Schwann cell axon signaling, particularly in the setting of NF2 gene dysfunction, may lead to failure of Schwann cell redifferentiation and subsequent activation of proliferative pathways, ultimately resulting in tumor formation.<sup>[2,7]</sup>

Clinically, schwannomas are frequently observed along nerves that are subjected to mechanical stress or confined to anatomical spaces, supporting the theory that chronic microtrauma or nerve injury may contribute to tumor development. Among the cranial nerves, the vestibular, trigeminal, and hypoglossal nerve are most often affected by schwannomas.<sup>9</sup> Along their anatomical course, all three nerves are confined

and therefore amenable to physical stress and injury. Only 0.3 to 3.2% of benign schwannomas are located in the retroperitoneum.<sup>10</sup> Due to their deep location and expansive potential space, these tumors often remain asymptomatic until they reach a considerable size, posing a diagnostic challenge and frequently mimicking other retroperitoneal neoplasms.

### *Histopathology of Schwannoma*

#### *Antoni A Areas*

Antoni A regions represent the highly cellular component of schwannomas, as originally described by Antoni.<sup>11</sup> These areas are composed of densely packed spindle-shaped Schwann cells with elongated nuclei arranged in parallel rows, forming characteristic nuclear palisading. A defining feature within Antoni A areas is the presence of Verocay bodies, which consist of alternating bands of aligned nuclei and anuclear eosinophilic zones.<sup>[12,13]</sup> Although commonly associated with schwannomas, Verocay bodies are not entirely specific and may be observed in other tumor types.<sup>14</sup> On ultrastructural examination, Antoni A tissue demonstrates elongated Schwann cell processes arranged in parallel arrays, separated by well-developed basement membranes.<sup>12,13</sup> These regions are rich in extracellular matrix components, particularly laminin and type IV collagen, which contribute to the organized architecture.<sup>15</sup> Immunohistochemically, Antoni A areas show strong and diffuse positivity for S-100 protein, reflecting their Schwann cell origin. This staining pattern is typically more intense than that seen in neurofibromas, where S-100 positivity is patchy, and in malignant peripheral nerve sheath tumors, where expression is often reduced and variable.<sup>15</sup>

#### *Antoni B Areas*

In contrast to the densely cellular Antoni A regions, Antoni B areas are relatively hypocellular and composed of loosely arranged Schwann cells within a myxoid stroma.<sup>16</sup> These regions are characterized by thin, elongated cells separated by microcystic spaces containing basophilic mucin. Although Antoni A and B areas often coexist within the same tumor, they are usually well demarcated, with the proportion of Antoni B tissue varying widely and occasionally being minimal or absent.<sup>16</sup>

Microcystic spaces within Antoni B regions may coalesce to form larger cystic areas, which can be detected radiologically. These regions often contain lipid-laden histiocytes, lymphocytes, and small blood vessels with

hyalinized walls.<sup>13</sup> A transitional zone between Antoni A and B regions is often identified, showing mixed histological features.<sup>17</sup> This zone may contain reduced S-100 expression, fibrin deposition, and remnants of basal lamina, supporting the concept that Antoni B areas represent degenerated Antoni A tissue.

### *Molecular Biology of Schwannoma*

Schwannomas are characterized by alterations in the NF2 gene on chromosome 22q12.2, resulting in loss of merlin, a tumor suppressor protein that regulates cell proliferation through pathways such as MAPK and PI3K.<sup>1,8</sup> In a study using conditional NF2 knockout mouse models, schwannoma formation was not observed spontaneously but was triggered following nerve injury, suggesting that disruption of Schwann cell-axon signaling combined with impaired nerve regeneration promotes tumor development.<sup>7</sup> In contrast, neurofibromas are associated with mutations in the NF1 gene on chromosome 17q12, leading to loss of neurofibromin, which normally inhibits the RAS signaling pathway. Deficiency of neurofibromin results in increased cellular proliferation, motility, and activation of downstream growth pathways. Despite advances in molecular understanding, the diagnosis of these tumors continues to rely predominantly on histopathological features.

In Table 1, A tabular comparison of the presentations and features of our case is made with that of a few cases published as case reports.

### *Surgical approach*

Surgical excision remains the gold standard for the management of retroperitoneal schwannomas, with the choice of approach guided by tumor size, location, and proximity to major neurovascular structures.<sup>20</sup> Open surgery is traditionally favored for large or complex lesions, as it allows optimal exposure, facilitates vascular control, and enables en bloc resection when required.<sup>17,20</sup> In our case, an open approach with a Pfannenstiel incision provided adequate access for safe dissection and tumor removal. Complete excision with preservation of the parent nerve is ideal; however, nerve sacrifice may be unavoidable in cases of extensive involvement, with acceptable postoperative functional outcomes reported in most series.<sup>17-19</sup> Minimally invasive approaches, including laparoscopic and robotic-assisted techniques, have increasingly been employed for smaller, well-circumscribed tumors.<sup>19</sup> These techniques offer advantages such as reduced intraoperative blood loss, shorter hospital stay, and faster recovery, along

with enhanced visualization of pelvic anatomy and precise dissection along tissue planes. However, their applicability is limited in large tumors or those with significant vascular involvement, where conversion to open surgery may be necessary to ensure safety and complete resection

### *Limitation*

Long-term follow-up regarding tumor recurrence, persistent neurological deficits, and overall functional outcome following obturator nerve sacrifice was limited. In addition, a detailed postoperative functional assessment, including gait analysis and quality-of-life evaluation, was not performed. Although MRI findings were described, a more comprehensive imaging pathological correlation and clearer radiological differentiation from other retroperitoneal neoplasms could have strengthened the report. Furthermore, the immunohistochemical findings specific to the present specimen were not discussed in detail. Finally, alternative nerve-preserving strategies, such as intraoperative nerve monitoring and microsurgical nerve-sparing techniques, were not explored prior to obturator nerve sacrifice.

### *Future Directions*

Recent advances in the molecular understanding of schwannomas have led to the exploration of targeted medical therapies, particularly in NF2-associated vestibular schwannomas.<sup>7,21</sup> Therapeutic agents targeting cell proliferation pathways, including receptor tyrosine kinase inhibitors such as lapatinib and erlotinib, as well as downstream kinase inhibitors like everolimus, have been investigated with variable outcomes.<sup>7</sup> In addition, anti-angiogenic therapy with bevacizumab targeting vascular endothelial growth factor (VEGF) signaling has demonstrated meaningful radiographic and hearing responses in selected patients.<sup>7,21</sup> In sporadic schwannomas, aspirin and other nonsteroidal anti-inflammatory drugs (NSAIDs) have also been studied for their potential role in modulating the tumor microenvironment and reducing inflammation-driven proliferation, although current evidence remains conflicting.<sup>7</sup> However, despite these emerging therapies, complete surgical excision remains the gold standard and most definitive treatment, particularly for symptomatic retroperitoneal schwannomas.<sup>17-19</sup>

### *Conclusion*

Retroperitoneal schwannomas of the obturator nerve are exceedingly rare, benign peripheral nerve sheath tumors

that often present with vague and nonspecific symptoms, leading to delayed diagnosis. Their deep pelvic location and close relationship to major neurovascular structures frequently pose significant diagnostic and surgical challenges, with imaging often mimicking other retroperitoneal neoplasms. Histopathological examination demonstrating Antoni A and Antoni B areas with S100 positivity remains essential for definitive diagnosis.

In the present case, the patient presented with pelvic discomfort and medial thigh numbness secondary to a large retroperitoneal obturator schwannoma. Complete surgical excision was successfully performed through an open approach with a Pfannenstiel incision, with sacrifice of the involved obturator nerve to achieve adequate tumor clearance. The postoperative course was uneventful, and histopathological evaluation confirmed the diagnosis of benign schwannoma. This case highlights the importance of maintaining a high index of suspicion for retroperitoneal nerve sheath tumors in patients presenting with persistent pelvic symptoms and demonstrates that complete surgical resection remains the cornerstone of management with favorable outcomes.

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