Intrapelvic sciatic notch schwannoma: microsurgical excision using the infragluteal approach

Case report

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Benign neurogenic tumors at the sciatic notch that are purely intrapelvic have rarely been reported. Because of this tumor’s particular position, a transabdominal or combined transabdominal-gluteal approach is usually used to achieve total resection. However, the transabdominal approach carries a remarkable surgical risk because of the manipulation of intraperitoneal organs. Here, the authors describe a 59-year-old woman harboring a purely intrapelvic sciatic notch schwannoma extrinsic to the sciatic nerve, which was totally removed via the infragluteal approach preserving sciatic function. The postoperative course was uneventful. The infragluteal approach can be safely used for the effective resection of intrapelvic benign neurogenic tumors at the sciatic notch that are extrinsic to the sciatic nerve, avoiding the more invasive and risky transabdominal approach.

Key Words • schwannoma • sciatic notch • infragluteal approach • transabdominal approach • peripheral nerve

Sciatic symptoms usually derive from lumbar disc herniation, but spinal MRI reveals positive findings in only 65%-75% of cases. An accurate evaluation of sciatica of nondisc origin is recommended using MRI and CT scanning of the pelvis, including the sciatic notch region. As regards other potential diagnoses, in a large series of 239 patients with sciatica of nondisc origin, sciatic nerve tumors were reported in only 1.7% of cases. Thus, neurogenic tumors of the sciatic nerve are infrequent causes of sciatic pain. Tumors at the sciatic notch are exceptional; they can be purely intrapelvic, purely extrapelvic, and intraextrapelvic dumbbell-shaped masses. Given the tumor’s rarity, clear management guidelines have not been established. Nonetheless, the transabdominal approach is generally accepted in treating the purely intrapelvic tumors and the intrapelvic portion of dumbbell-shaped intraextrapelvic sciatic notch tumors, with the extrapelvic part excised via a gluteal approach. However, the anterior transabdominal approach involves the manipulation of intraperitoneal organs, requiring the presence of a general surgeon in the operating room and exposing the patient to the risk of severe visceral and vascular damage. This is not the case for the gluteal approaches, which are routinely used by neurosurgeons and orthopedists to treat gluteal neurogenic tumors, either purely extrapelvic or part of dumbbell-shaped sciatic notch tumors.

Here, we report the case of a purely intrapelvic sciatic notch schwannoma that was totally removed via a posterior infragluteal approach.

Case Report

History and Examination. A 59-year-old woman was admitted to our department with a 1-year history of left sciatic pain. Neurological examination did not show pathological findings; needle electromyography imaging of the lower limbs was normal. Magnetic resonance imaging of the lumbosacral spine was unremarkable. Pelvic CT (Fig. 1) and MRI (Fig. 2A and B) showed a 44 × 42–mm ovoid...
mass at the left sciatic notch, which was purely intrapelvic. The tumor compressed and anteriorly dislocated the main trunk of the sciatic nerve.

Operation. At surgery, a traditional infragluteal approach was performed to obtain a wide exposure of the proximal sciatic nerve up to the piriformis muscle and the sciatic notch. Using intraoperative echography, we found the tumor under the piriformis muscle, which was sectioned to expose, medially to the course of the gluteal sciatic nerve, a small area of the tumor capsule. With the aid of

![Figures 1 and 2](https://example.com/image.png)
Infragluteal resection of sciatic notch intrapelvic schwannoma

of the operating microscope and the ultrasonic aspirator, a piecemeal resection was performed until complete tumor removal was achieved (Fig. 3 and Video 1).

Video 1. Video clip showing the operation for sciatic notch intrapelvic schwannoma removal. A classic infragluteal approach is performed, with sectioning of the piriformis muscle. Under the operating microscope and with the aid of intraoperative echography, a small area of the tumor capsule is exposed, medially to the main trunk of the sciatic nerve. After opening the tumor capsule, the tumor is removed in a piecemeal fashion. Note the importance of intracapsular progressive tumor removal and of so-called “water dissection” to facilitate separation of the tumor capsule from the surrounding structures and to obtain extensive mobilization of the tumor mass across a relatively small window while avoiding damage to healthy tissues. Click here to view with Media Player. Click here to view with Quicktime.

The tumor was extrinsic to the main trunk of the sciatic nerve, which was only displaced and compressed. Meticulous closure of the muscular planes and careful hemostasis were performed. On histological examination a diagnosis of schwannoma was made (Fig. 4).

Postoperative Course. The postoperative course was uneventful. The patient was allowed to stand without bracing the day after the operation and was discharged on the 2nd postoperative day. Postoperative needle electromyography was unremarkable. Three-month postoperative MRI confirmed total excision of the tumor (Fig. 2C and D). The patient was free from sciatic pain, gluteal dysfunction, and tumor recurrence at 18 months of follow-up.

Discussion

Sciatic notch schwannomas can be purely intrapelvic,2,5 purely extrapelvic in the gluteal region, and intraextrapelvic dumbbell-shaped masses.2,7,10,12 According to this distinction, the present case is a purely intrapelvic sciatic notch schwannoma (Figs. 1 and 4). This type of tumor is generally excised via a transabdominal approach, whereas in the present case we successfully used the classic infragluteal approach.

Both benign and malignant tumors have been described at the sciatic notch.7,5,14 In a series of 35 patients harboring tumors of the sciatic nerve, 11 tumors (1 schwannoma, 2 neurofibromas, and 8 malignant peripheral nerve sheath tumors) were found at the sciatic notch.14 Sciatic notch benign neurogenic tumors are considered difficult to treat.2,12 They can be intrinsic to the sciatic nerve, but more frequently they are extrinsic, arising from small nerve branches close to the main trunk of the nerve,12 as in the present case.

There is no general agreement about the best approach for treating benign neurogenic tumors of the sciatic notch. According to a literature review, any tumor in an intrapelvic location was always treated using only an anterior transabdominal approach,2,6,10 which in some cases was combined with a gluteal approach to treat the gluteal component of intraextrapelvic dumbbell-shaped masses.2,12 Of course, tumors confined to the buttock region were treated with a gluteal approach alone.9,11 Spinner et al.15 described 3 large sciatic notch dumbbell-shaped tumors that were totally resected using a combined transabdominal-gluteal approach. In contrast, Consales et al.2 successfully resected a dumbbell-shaped schwannoma at the sciatic notch using only an anterior transabdominal approach. Although there were no surgical complications, transabdominal surgery is objectively more complex and is associated with a higher risk of injury than gluteal surgery, involving mobilization of the sigmoid colon and upper rectum as well as retraction of the ureters and the iliac and gonadal vessels. Importantly, in both the Spinner12 and Consales1 cases, the sciatic notch was enlarged by the slow-growing tumor itself. Thus, a widened sciatic notch should facilitate tumor resection of such sciatic notch dumbbell-shaped schwannomas extrinsic to the sciatic nerve, using only a 1-way approach, anterior transabdominal or posterior infragluteal.

To expose the sciatic nerve in the buttock region, gluteal approaches have been used by neurosurgeons and orthopedists for almost a century,2 since the first report by Stookey in 1920.13 In the classic infragluteal approach, detachment of the gluteus maximus muscle from its bone insertions is considered to cause intense postoperative discomfort and a prolonged rehabilitation period.9,11 This is not the experience of the senior author (E.F.), however, who has used the infragluteal approach in several cases (unpublished data). Careful manipulation and meticulous reconstruction of soft tissues cause only moderate postoperative discomfort, and patients begin to gradually walk starting the day after surgery, without any bracing, as in the present case. More recently, nerve surgeons have started to use the transgluteal approach9,11 which is considered less traumatic to the gluteus maximus fibers and a less invasive approach causing negligible postoperative discomfort. One of the very few complications cited for the transgluteal approach is the possibility of retraction of the muscle arteries within the pelvis, which can be very hazardous, although it can routinely be avoided with standard microsurgical dissection and cautery techniques.9 Moreover, a recent cadaver study by Socolovsky

![Fig. 3. High-magnification intraoperative views. A and B: Progressive dissection of the schwannoma. C: Complete tumor removal.](image-url)
et al.\textsuperscript{11} has shown that the transgluteal approach permits exposure especially of the more proximal sciatic nerve, up to the sciatic notch. Nonetheless, we think that in comparison with the transgluteal approach, the infragluteal approach permits a wider and more comfortable way to treat a deep pathology such as a purely intrapelvic sciatic notch schwannoma.

In the present case, the problem was to decide if the purely intrapelvic sciatic notch tumor was resectable using the infragluteal approach, avoiding the transabdominal route. Our decision to use the infragluteal approach was made on the basis of the following considerations. 1) Preoperative imaging studies showed a well-encapsulated, apparently benign tumor at the entry of the sciatic notch, just under the piriformis muscle, which was accessible using the infragluteal approach. 2) Because tumors in this area are generally neurogenic, originating from small nerve branches close to the main trunk of the sciatic nerve,\textsuperscript{12} a diagnosis of extrinsic schwannoma was highly probable. 3) Excision of voluminous benign tumors across relatively small windows is routinely achieved in other fields of neurosurgery. At surgery, in fact, with the aid of the microscope and intraoperative echography, a small area of the tumor capsule was reached across the sciatic notch, medially to the gluteal sciatic nerve. Then a standard piecemeal resection\textsuperscript{3} of the tumor was performed until complete excision was achieved, with decompression of the sciatic nerve (Video 1).

The sciatic notch was not enlarged by the tumor as it is for dumbbell-shaped masses. Using their published images, we extrapolated sciatic notch diameters in the Spinner et al. Case 1\textsuperscript{12} and in the Consales et al. case,\textsuperscript{2} and these diameters were bigger than that in the present purely intrapelvic case (Fig. 5). Thus, for sciatic notch dumbbell-shaped schwannomas extrinsic to the sciatic nerve, excision of the intrapelvic component via the infragluteal approach should be facilitated by an enlarged sciatic notch, across which the intrapelvic and gluteal components are in wide continuity.

The transabdominal approach can be complicated by nerve, vessel, and visceral injuries (sacral plexus, sciatic nerve, sigmoid colon and upper rectum, ureter, and iliac and gonadal vessels), and the infragluteal approach can be complicated by nerve and vessel injuries (posterior femoral cutaneous and sciatic nerve, gluteal nerves, and gluteal veins and arteries). The infragluteal approach for benign sciatic notch intrapelvic tumors requires a piecemeal resection technique, which is used daily in neurosurgery (for example, for excision of giant skull base tumors through relatively small craniotomies). Incising

![Fig. 5. Schematic drawings of axial pelvic sections to show the relationships between the tumors and the width of the sciatic notch. A: Spinner et al. Case 1. B: Consales et al. case. C: The present case (as seen in Fig. 1 left). Notice that the sciatic notch (yellow oval) width was the smallest in the present case (6 cm vs 8.5 cm in the Spinner case and 6.5 cm in the Consales case). Asterisk indicates tumor (blue). Printed with the permission of Quintino Giorgio D’Alessandris, 2013.](image)
the capsule and debulking the tumor mass allow easy separation of the capsule from any surrounding structure, with consequent extensive mobilization of the tumor mass always performed under direct microscopic view. Therefore, “blind” maneuvers are not performed, and so the risk of damaging the surrounding neurovascular structures is not increased with the piecemeal procedure. Instead, in our opinion, this risk is increased by using the “en bloc” technique. Whereas some authors prefer to resect benign neurogenic tumors en bloc, we agree with Dr. Kline that piecemeal resection, aided by ultrasonic aspiration when necessary, is a safe and effective way to resect benign neurogenic tumors. Therefore, “blind” maneuvers are not performed, and the capsule and debulking the tumor mass allow easy separation of the capsule from any surrounding structure, with consequent extensive mobilization of the tumor mass always performed under direct microscopic view.

Note that tumors at the sciatic notch and intrinsic to the sciatic nerve represent a different problem. The infragluteal approach is indicated for safely treating the intrapelvic part of tumors that are extrinsic to the sciatic nerve.

Conclusions

In summary, although the present case represents a single experience, we think that benign neurogenic tumors at the sciatic notch, either purely intrapelvic or part of a dumbbell-shaped mass, extrinsic to the sciatic nerve, can be safely and effectively removed using the infragluteal approach alone. However, a larger number of treated cases is required to establish management guidelines for these tumors.

Disclosure

The authors report no conflict of interest concerning the materials or methods used in this study or the findings specified in this paper.

Author contributions to the study and manuscript preparation include the following. Conception and design: Fernandez. Acquisition of data: all authors. Analysis and interpretation of data: all authors. Drafting the article: D’Alessandris, Montano, Fernandez. Critically revising the article: all authors. Reviewed submitted version of manuscript: all authors. Approved the final version of the manuscript on behalf of all authors: D’Alessandris.

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