

## Complete resection of penile schwannoma without sexual dysfunction

Seksüel fonksiyon kaybı olmaksızın penil schwannomun tam çıkarımı

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### Abstract

Schwannomas originate from the neural sheaths of peripheral nerves, and are frequent in the head, neck, extremities, mediastinum, and retroperitoneum. In spite of the rich innervations of the external genitalia, schwannomas are rare in the penis. We reported a case of penile schwannoma with clinical presentation and management. A sexually active 28-year-old man presented with a painless, slowly growing, nodular mass on the dorsum of penile shaft of at least 2 years' duration. A nodular fixed mass about 4.0 cm in length was palpated on the dorsal aspect of the proximal penile shaft. Preoperative diagnosis was made with ultrasonography and magnetic resonance imaging. The mass was completely removed with preserving dorsal penile neurovasculature. Pathologic examination of the mass showed a benign schwannoma. No erectile dysfunction and penile curvature were observed over the six months after the surgery. Schwannoma of the penis is a rare benign tumor that can be diagnosed with the help of ultrasonography and magnetic resonance imaging. It should be treated by complete resection. Erectile function can be preserved by preserving dorsal penile neurovasculature.

**Key words:** Penis; schwannoma; sexual dysfunction; surgery.

### Özet

Schwannomlar periferik nöronların nöral kılıflarından kaynaklanır ve baş, boyun, ekstremiteler, mediasten ve retroperitonda sık görülür. Dış genital bölgenin yoğun sinir dokusuna karşın, schwannomlar peniste ender olarak görülmektedir. Burada penil schwannom olan bir vakanın klinik bulguları ve tedavi yaklaşımı sunulmaktadır. Seksüel olarak aktif 28 yaşındaki erkek hasta penis dorsumunda en az 2 yıl süreli ağrısız, yavaş büyüyen, nodüler kitle ile başvurdu. Proksimal penil şaftının dorsal yüzeyinde yaklaşık 4.0 cm boyutunda nodüler sabit kitle palpe edildi. Preoperatif tanı için ultrasonografi ve manyetik rezonans görüntüleme kullanıldı. Dorsal penil nörovasküler yapı korunarak kitle tamamen çıkarıldı. Kitlenin patolojik değerlendirmesi benign schwannom olduğunu gösterdi. Cerrahi sonrası 6 ay süresince erektil disfonksiyon ve penil kurvatür görülmeydi. Penil schwannoma ultrasonografi ve manyetik rezonans görüntüleme ile tanı konabilen ender bir benign tümördür. Tam olarak rezekt edilmelidir. Dorsal penil nörovasküler yapı korunarak erektil fonksiyon korunabilir.

**Anahtar sözcükler:** Cerrahi; penis; seksüel disfonksiyon; schwannom.

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Schwannoma, also known as neurilemmoma, is an encapsulated tumor originating from the neural sheaths of peripheral nerves.<sup>[1]</sup> Schwannomas may occur anywhere in the soft tissue, but are frequent in the head, neck, extremities, mediastinum, and retroperitoneum. In spite of the rich innervations of the external genitalia, schwannomas are rare in the penis. Only 27 cases have been reported in the English literature.<sup>[2]</sup> We report a case of penile schwannoma which was diagnosed and treated in our clinic.

### Case report

A 28-year-old circumcised man presented with a nodular lesion on the dorsum of his penile shaft for at least 2 years' duration. The mass had been growing slowly with less frequent pain during erection. He was a sexually active man who did not experience any erectile or ejaculatory dysfunction, and penile curvature. His Erectile Function (EF) domain score of the International Index of the Erectile Function (IIEF,

items 1 to 5 and 15) was 28, preoperatively. There was no history of penile trauma, sexually transmitted diseases, and auto-injection of vasoactive drugs. He has had bronchial asthma for 7 years, which has been treated by bronchodilator albuterol.

Physical examination revealed a 4.0x1.0 cm solid mass on the left dorsal aspect of the proximal penile shaft (Fig. 1). The painless mass was nodular and fixed. Penile skin was movable without adhesion to mass. The tactile, pain and temperature sensations of the dorsal and ventral surfaces of the penile shaft, glans penis, and frenulum were examined by using a wisp of cotton, the head of a pin, and test tubes filled with warm and ice water, respectively. Before and during the sensory examination of the penis, the patient was questioned as to whether abnormal sensations are experienced subjectively. Patient had no sensory disturbances on the penile skin, frenulum and glans. Superficial inguinal lymph nodes were not palpable. Blood chemistry and urinalysis were normal.

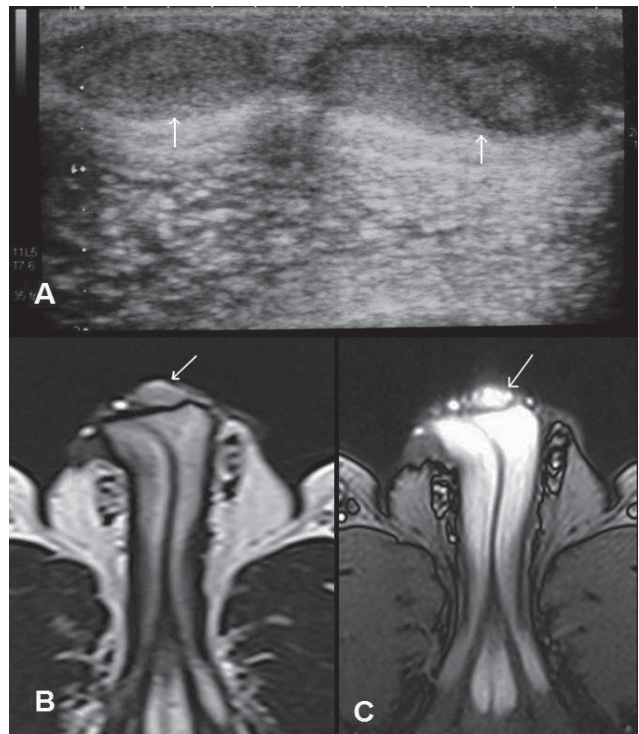
Gray scale ultrasonography showed a slightly hyperechoic, well-defined, heterogeneous subcutaneous mass (Fig. 2A). On color Doppler ultrasonography, this mass was hypervascular. Spectral analysis revealed arterial flow within the mass. Gray scale and color Doppler ultrasonography excluded dorsal venous thrombosis. Subsequently, magnetic resonance imaging was performed, and the mass was hypointense on T1 weighted images; hyperintense on T2 weighted images (Fig. 2B). On contrast enhanced T1 weighted images, the mass was markedly enhanced (Fig. 2C). Other soft tissues surrounding the mass were normal.

A subcoronal circumferential incision was made. The penile shaft was degloved to its base by sharply dissecting dartos fascia from underlying Buck's fascia, exposing the mass, with the splayed neurovascular bundles overlying the mass easily identified. The mass lied within Buck's fascia and lateral aspect of the left dorsal penile artery. A longitudinal incision was made on the Buck's fascia over the mass to expose the mass. Buck's fascial flaps containing the neurovascular bundles of the right and left side of the mass were created by meticulous dissection (Fig. 3A). The mass contained the left dorsal nerves (Fig. 3B). Buck's fascial flaps were retracted to left and right, exposing the mass. The mass was completely removed by fine dissection (Fig. 3C). Homeostasis was achieved, Buck's fascia was reconstituted, and the skin was closed (Fig. 3D).

Macroscopically the 4.0x1.0x0.4 cm mass was a well-defined gray-white soft tissue without signs of



**Figure 1** Penile mass located on the left dorsal aspect of the proximal penile shaft. The mass was nodular, firm, and fixed.



**Figure 2** A nodular solid mass on ultrasonography (arrows) (A). A hyperintense, well-defined mass on T2 weighted axial MR image (arrow) (B). The mass was markedly enhanced on contrast enhanced, fat suppressed axial T1 weighted MR image (arrow) (C).

necrosis or hemorrhage; a 3 cm long peripheral nerve segment was laterally attached. On hematoxylin&eosin stained slides, the tissue was encapsulated and consisted of nodules and serpentine cords of cellular tissue separated with poorly cellular connective tissue bands (Antoni A and Antoni B areas); cellular areas showed palisading rows of plump fusiform nuclei in an eosinophilic background. There were no necrosis, mitosis or atypia (Fig. 4). On immunohistochemi-



cal analysis, the tumor cells stained positively with S-100. Both morphologic and molecular findings were consistent with schwannoma.

There was no sensory loss on penile skin, frenulum and the glans penis, and no tumor recurrence after 12 months of follow-up. At 12 months postoperatively, his IIEF-EF domain score was 29. He had normal erectile function without penile curvature.

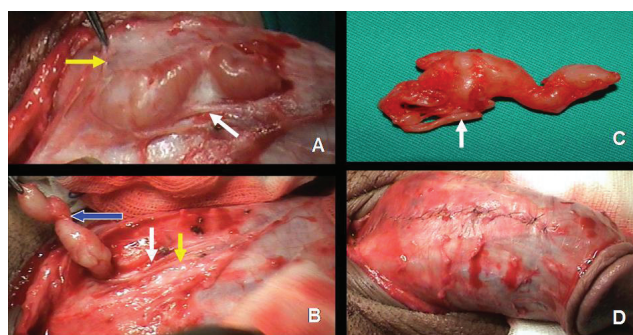
## Discussion

Schwannomas are benign neurogenic tumors originating from the Schwann cells of the peripheral nerve sheaths.<sup>[1]</sup> They generally occur in young and middle-

aged adults, but they were rarely reported in children.<sup>[3]</sup> Although they can occur anywhere in the body, they locate frequently on the head, neck, and flexor surfaces of the extremities.<sup>[1]</sup> Although external genitalia have rich innervations, schwannoma is very rare in the penis.<sup>[4,5]</sup> A total of 28 penile schwannoma cases, including the present case, have been reported in English literature.<sup>[2]</sup> The most of penile schwannomas are benign and unifocal, and tend to occur on the dorsal penile shaft, the location of the penile dorsal nerves. They can be located in the prepuce and glans.<sup>[2,4,6]</sup> Six patients with schwannoma locating on the glans penis were reported.<sup>[2]</sup> Sato et al.<sup>[6]</sup> reported five multifocal schwannomas of the penile shaft. Multifocality is not related to malignancy, and is often associated with neurofibromatosis type 2.<sup>[7]</sup> Only four malignant penile schwannomas have been described in the literature (three of them were associated with Von Recklinghausen disease), and none of the benign tumors were associated with this disease.<sup>[1,8]</sup>

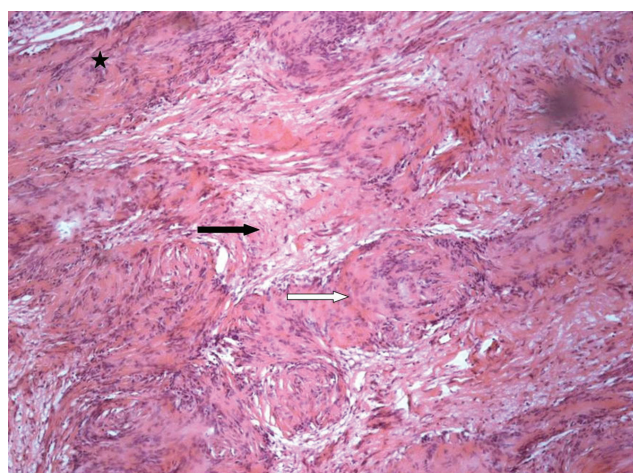
The clinical and radiographic findings of penile schwannoma are non-specific and the lesion may be misdiagnosed as Peyronie's disease plaques, fibroma, lipoma, leiomyoma, fibrosis because of intracavernosal injections for erectile dysfunction, xantho-granulomatous infection, angiomatous tumors, and other malignant tumors such as epithelioid sarcoma, leiomyosarcoma, carcinoma of the urethra, and metastatic penile tumours.<sup>[1,8-13]</sup> The most common sign of the penile schwannoma at presentation was a solitary, painless and firm penile mass. On the previous reports, they do not cause sexual dysfunction. Most of the penile schwannomas are located at the dorsum of the penis in the Buck's fascia. This location is uncommon for Peyronie's disease and for fibrosis due to intracavernosal injections. Leiomyoma is well-confined to the subcutaneous layer; nevertheless, it progressively increases in size and may become so large as to complicate surgical removal.<sup>[14]</sup> Lipoma is usually softer than schwannomas, which is helpful in the differential diagnosis.<sup>[8]</sup> Angiomatous tumors are soft and often painful, they can be distinguished from schwannoma in imaging studies.<sup>[15]</sup> The clinical presentation of epithelioid sarcoma includes penile nodularity or mass, urethral stenosis, penile curvature, dysuria and pain during erection.<sup>[13]</sup> In contrast to Peyronie's disease that usually is localized at the tunica albuginea, epithelioid sarcoma shows infiltrating lesions of the corpora cavernosa, and the young age is a risk factor for epithelioid sarcoma that occurred mostly in men under 40 years.<sup>[12]</sup>

Ultrasound and magnetic resonance imaging usually demonstrate an extracorporeal mass not infiltrating tunica albuginea and surrounding tissues.<sup>[8]</sup> In our



**Figure 3**

Surgical images of the mass within Buck's fascia (yellow arrow pointed Buck's fascia, white arrow pointed left dorsal penile nerve) (A); dissection of the mass (blue arrow shows mass, white arrow shows dorsal penile nerve, yellow arrow shows left dorsal penile artery) (B); removed mass with left dorsal penile nerve (white arrow) (C); and Buck's fascia was closed (D).



**Figure 4**

Nuclei rich dark staining areas (Antoni A, white arrow) are sharply demarcated the nuclei poor loose connective tissue like areas (Antoni B, black arrow). Nuclear palisading is prominent (star) (H&E x100).

patient, the preoperative imaging findings demonstrated no evidence of invasion of penile skin and tunica albuginea. Fine needle aspiration cytology of the penile schwannoma is often insufficient for diagnosis.<sup>[1]</sup>

Histologically, schwannomas consist of Antoni A areas and Antoni B areas. The Antoni A areas are composed of compact spindle cells with indistinct cytoplasmic borders arranged in interlocking cellular fascicles, whereas Antoni B areas are regions of looser Schwann cell proliferation.<sup>[1]</sup> The histological differential diagnosis includes mainly neurofibromas and leiomyomas.<sup>[1,8]</sup> Neurofibroma is an unencapsulated nerve sheath lesion. It has a single pattern with infiltrative borders to the adjacent tissue, microscopically.<sup>[8]</sup> Leiomyomas could be circumscribed tumors, microscopically, they are made up of intersecting fascicles of smooth muscle cells. The superficial location of the well encapsulated mass laterally attached to a nerve, together with microscopic and immunohistochemical features leaves no doubt about the tissue diagnosis of the penile schwannoma.

The most advisable treatment for penile schwannomas is surgical approach with complete excision of the mass.<sup>[2,5,9]</sup> Penile amputation is occasionally required. Although the tumor arised from the left dorsal penile nerve was removed in our case, sensory loss on the penile skin and glans did not developed. However, the dorsal nerves are presumed to act as sensory nerves supply to the penile shaft, glans and anterior urethra without an autonomic role. Yucel and Baskin<sup>[16]</sup> described that there was the extensive distribution of the dorsal nerves along the corporeal bodies, and intercommunication with the perineal and cavernous nerves. Therefore, on the reported cases, the complete resection of the penile schwannoma had not caused penile sensory loss postoperatively.<sup>[2,4-7]</sup> Cavernosal (venogenic) erectile dysfunction and penile curvature were not seen because of preserved integrity of tunica albuginea.

Regular follow-up is recommended because recurrence of benign schwannoma due to incomplete resection has been reported.<sup>[1]</sup> Our patient underwent complete resection and was doing well with no evidence of recurrence 12 months postoperatively.

As a conclusion, schwannoma of the penis is a rare benign tumor that can be preoperatively diagnosed with the help of ultrasonography and magnetic resonance imaging. It should be treated by complete resection. Sexual function can be preserved by preserving dorsal penile neurovasculature.

### Conflict of interest

No conflict of interest was declared by the authors.

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