Review

Clinical Features and Treatment of Penile Schwannoma: A Systematic Review

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Abstract

Schwannomas, although common in the head and limbs, are an exceedingly rare tumor of the penis. We conducted a systematic review to include 33 patients with schwannoma of the penile shaft or glans penis. Most patients presented with a single painless nodule on the dorsal aspect of the penile shaft. These nodules were slow growing, with an average of 62 months from the onset to presentation. Several cases were accompanied by sexual dysfunction. Most histologic studies were consistent, with a benign schwannoma that showed a palisading Antoni A and Antoni B pattern without malignant changes in cell morphology. Of the 14 studies in which a history of genetic disease was investigated, only 2 reported a connection to neurofibromatosis. These tumors were treated with surgical excision, and 4 malignant cases received additional chemotherapy or radiotherapy. All the patients had achieved full remission by the final follow-up examination. Given the rarity of this tumor, the present review of available case studies serves to comprehensively describe the clinical presentation and treatment approaches to penile schwannoma.

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Introduction

Schwannomas are neoplasms composed of Schwann cells, which are responsible for maintaining the myelin sheath of peripheral neurons. A loss of function in the *NF2* gene, which codes for the protein merlin, often gives rise to these tumors.[1] Abnormalities in this gene are also a causative factor in neurofibromatosis, a disorder leading to single or multiple nerve cell tumors. An estimated 3% of schwannoma cases will be associated with neurofibromatosis; thus, a family history of neurofibromatosis is an important clinical factor in these conditions.[2] Cranial nerve schwannomas are a relatively common finding and are discovered in 3% to 4% of patients at autopsy. Peripheral schwannomas, although not uncommon, have a lower incidence of 0.6 per 100,000 people annually, with the vast majority of these tumors found on the flexor surfaces of limbs.[1] Primary tumors of the penis, however, are exceedingly rare, with penile schwannomas even rarer, still. An estimate of as few as 1640 cases of penile cancer were diagnosed in the United States in 2014.[3]

Although the histologic features and morphology of penile schwannomas has yet to be extensively studied, such features of general schwannomas are well known. Formerly termed "neurilemmomas," conventional schwannoma histologic findings will demonstrate Antoni A patterns of nuclear palisades surrounding Verocay bodies with alternating Antoni B patterns. In contrast, cellular schwannomas might show a nonspecific pattern, and plexiform schwannomas might have almost entirely Antoni A with little Antoni B structure.[4] The classic immunohistochemical marker for schwannomas is S100 protein, because they are of neural crest cell origin. This staining marker is useful not only for differentiating neural crest-derived cells from mesenchymal lineages, but also for differentiating between benign and malignant schwannomas. It has been reported that in some cases of malignant transformation, these cells may lose S100 positivity.[5] Benign schwannomas are usually minimally invasive and contained within a capsule. Given this, wide surgical excision has been the standard of care. Malignant transformation of these cells is uncommon, and the prognosis for patients with single lesions is usually excellent.[6]

Schwannomas have been shown to occur most commonly in the extremities and head and neck region, and cases affecting the penis are exceedingly rare. To date, < 35 instances of penile schwannoma have been reported in the published data, with all of them published in the "case report and literature review" form. Thus, the present report is a review of the published studies to comprehensively analyze the available patient data to more definitely explain the clinical presentation and treatment options for penile schwannoma.

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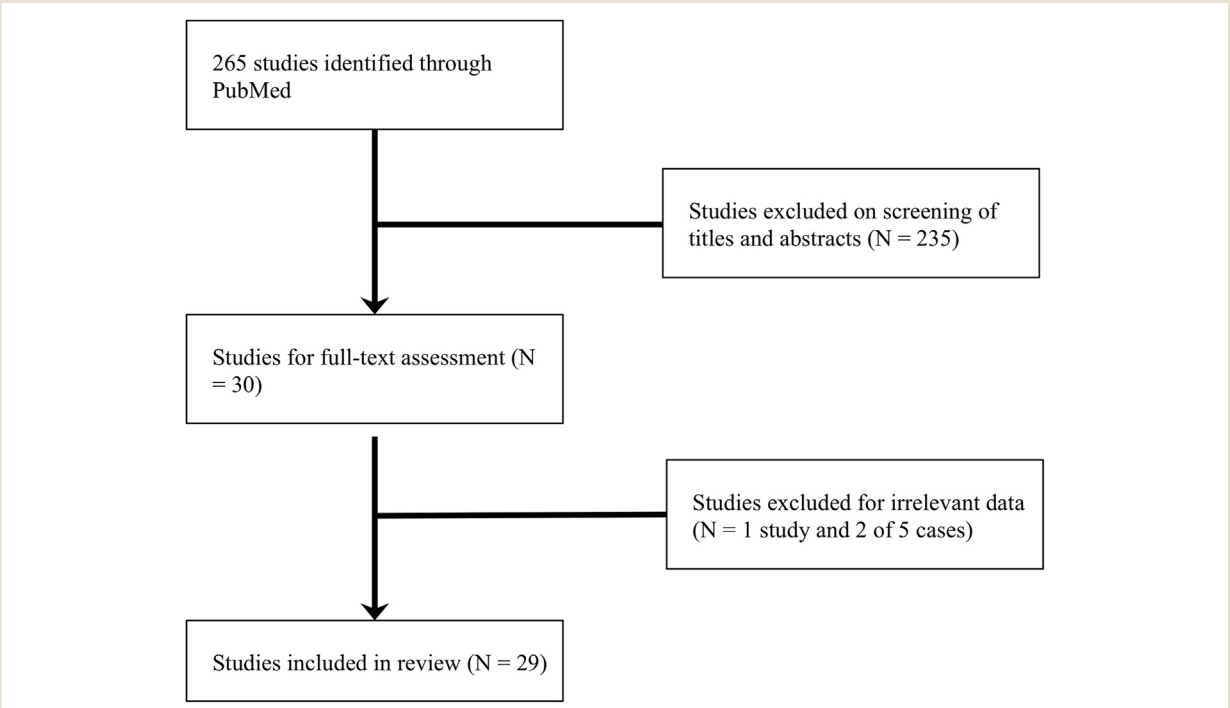
Figure 1 Systematic Search of PubMed Returned 265 Studies. After a Review of the Titles, Abstracts, and Full-Text, 29 Studies Were Included in the Present Review



Materials and Methods

The National Library of Medicine's PubMed database was systematically searched to August 2015. The following search terms were used: "penile" and "penis" combined with "schwannoma," "neurilemmoma," "nerve sheath tumor," "Schwann cell tumor," and "neurofibrosarcoma." The titles and abstracts were screened for possible inclusion, and, subsequently, the full text of the potentially relevant studies were retrieved for review. The studies were excluded if not written in English, not of primary human subjects, or not of malignancies of the penis (ie, schwannomas affecting the scrotal and pelvic regions were excluded).

Results

An initial search of PubMed returned 265 studies (Figure 1). After screening the titles and abstracts for relevance, the full text of 30 reports were retrieved for review. On full text review, 1 report and 3 of 5 cases in a second report were excluded because they discussed schwannomas not affecting the penis. Ultimately, 29 studies were included in the present review, consisting of 33 cases total.[7-35] All included studies were case reports (25 studies) or case series (4 studies). The greatest number of cases was reported in the United States (8 studies), followed by China and India (5 studies each). A summary of the study characteristics are reported in Table 1.

Clinical Presentation

The mean patient age was 39.2 years (range, 14 months to 78 years). The clinical presentation of the 30 included cases (with sufficient information reported) is summarized in Table 2. Most of the lesions presented on the dorsal aspect (n = 18; 60.0%) of the penis and the penile body or shaft (n = 13; 43.3%). Patients presented with a single nodule (n = 20; 66.7%) or multiple nodules (n = 10; 33.3%), with a high of 5 nodules in 1 case. The lesions were generally painless, with only 5 patients reported to have experienced pain or discomfort. Sexual dysfunction was a common complaint, including erectile dysfunction in 3 (10.0%), abnormal penis curvature in 2 (6.7%), pain with ejaculation in 2 (6.7%), impotence in 1 (3.3%), pain with intercourse in 1 (3.3%), and a history of Peyronie's disease in 2 (6.7%). A delayed visit to a medical professional was common, with a mean of 62.0 months (range, 0.25-300 months) after the onset of symptoms. The most common symptom that prompted patients to seek medical care was sexual dysfunction.

Workup

The blood and urine chemistry values were rarely reported. In the 5 patients for whom blood analyses and/or urinalyses were performed, all test results returned within normal limits. The histopathologic findings, summarized in Table 3, were described in 25 cases, of which 6 were graded as malignant. Generally, the histologic findings of penile schwannoma included spindle-shaped or elongated cells (n = 17; 68.0%), often palisading (n = 5; 20.0%) in an Antoni A pattern (n = 17; 68.0%). An Antoni B pattern was observed in 12 cases (48.0%). Many of the lesions were well delineated and/or encapsulated (n = 4; 16%). Signs of aggressive malignancy were rarely seen, although a few cases were reported to have a high number of mitoses (n = 1; 4.0%), necrosis (n = 1;