Hemorrhagic Ganglion of the Tibialis Anterior Tendon: Report of an Unusual Variant

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While clinicians have encountered heme-laden ganglion cysts in the past, to our knowledge the condition has never been described in the literature as a distinct pathological entity, namely, the hemorrhagic ganglion. Because hemorrhage may alter the appearance of an aspirate obtained from a ganglion cyst, and hemosiderin deposition within a ganglion cyst may alter the signal characteristics observed on a magnetic resonance image, such that both of these diagnostic methods may suggest the presence of a solid mass tumor rather than a ganglion cyst, it is important for clinicians and surgeons to be aware of the possibility of the presence of a hemorrhagic ganglion cyst. In this report, we present a case wherein a hemorrhagic ganglion cyst of the tibialis anterior tendon was identified and excised. Level of Clinical Evidence: 4 (The Journal of Foot & Ankle Surgery 47(6):571–575, 2008)

Key Words: aspirate, cyst, heme-laden, hemorrhagic ganglion, hemosiderin, magnetic resonance image, tibialis anterior tendon

Ganglion cysts are gelatinous fluid filled, encapsulated soft tissue masses that typically occur adjacent to a joint or tendon (1). Their diagnosis is usually straightforward, and based primarily on the history and clinical examination (2–4). The history often entails description of a lesion that slowly evolved and enlarges with repetitive or strenuous movement of the involved extremity, and palpation usually displays a nodule that is deep to, and freely moveable under, the skin, and one that may be slowly fluctuant and rarely tender. Aspiration of the cyst characteristically reveals clear to straw-colored, viscous, gelatinous fluid, which is diagnostic (5, 6). If the ganglion cyst is deep to the deep fascia, or if it has been present for a long period of time, it may be difficult to determine the extent of the cyst, and its contents may be more firm and suggestive of a more ominous lesion. In such cases, aspiration may not yield enough fluid to be of use in making a clinical diagnosis, and magnetic resonance imaging (MRI) may be indicated in such cases. The characteristic findings observed upon MRI of a ganglion cyst include a homogenous, bright signal on T2-weighted images, indicative of the presence of a fluid-filled ganglion cyst (5). In the presence of substantial hemosiderin deposition, however, the MRI characteristics will be altered such that the fluid will display low-to-intermediate intensity on T2-weighted images, a finding that could falsely suggest the presence of a solid rather than fluid-filled mass. To the best of our knowledge, this finding has not been described in relation to a ganglion cyst, and for this reason we present the following case in an effort to illustrate the diagnosis and management of a hemorrhagic ganglion cyst associated with the tendon of tibialis anterior in the foot.

Case Report

A 59-year-old female complained of an enlarging mass localized to the dorsal and anterior aspect of her right foot and ankle. She first identified the mass approximately 2 months prior to her clinical visit, and related that although it was not directly painful, it had enlarged to such a degree that it was interfering with her shoes. The patient’s only medical problem was osteoporosis, for which she was taking alendronate sodium by mouth. Physical exam demonstrated a 3-cm nonmovable nodule deep to the tibialis anterior tendon, just distal to ankle. The mass was firm with no associated pain or paresthesia upon palpation, and there was no associated erythema or local increase in the overlying skin temperature. The overlying skin was mobile with full ankle range of motion, and clinically not adherent to the subcutaneous nodule. She displayed well-perfused feet with symmetrical, intact sensation. Standard radiographs re-
revealed a soft tissue shadow (increased soft tissue density and volume) at the level of the talonavicular joint, corresponding to the location of the soft tissue mass. No ectopic calcifications, fractures, or focal osseous lesions were noted (Figure 1). Aspiration was not performed because the mass was firm, and did not suggest the presence of fluid. Magnetic resonance (MR) images were obtained in an effort to better identify the lesion, and these revealed a 2.8 × 1.5 × 1.6-cm well-circumscribed, homogeneous mass at the level of the talonavicular joint surrounding the tibialis anterior tendon. The signal intensity was low on both T1-weighted and T2-weighted images (Figure 2), and rim enhancement was identified with gadolinium infusion. The tendon was intact without any evidence of tear or tendinosis, and there were no erosions of the adjacent bones or joints. Based on these findings, the lesion was considered to be a solid mass soft tissue tumor, and the differential diagnosis included giant cell tumor of the tendon sheath and, albeit less likely, synovial sarcoma.

After consideration of the treatment options, the decision was made to surgically inspect and, based on the operative findings, to excise the lesion. With the patient supine on the operating room table, using local anesthesia combined with an intravenous sedative, and without the use of a tourniquet for hemostasis, the mass was directly accessed through an anteromedial incision that was placed parallel and adjacent to the tibialis anterior tendon. The lesion was evident as a dense, firm nodule situated immediately deep to the skin. It displayed a deep purple coloration, well demarcated, lobulated, measured 3 × 2 cm, and it surrounded the tibialis anterior tendon. Upon palpation, it was obvious that the lesion represented a fluid-filled nodule and, when perforated, a deep purplish, gelatinous fluid drained from the mass (Figures 3 and 4). The mass enveloped the tibialis anterior tendon but did not invade that structure. There was no visible tear, degeneration, or discoloration of the tendon. The mass was positioned over the talonavicular joint, but did not appear to invade the joint. Intraoperative assessment of the lesion suggested the presence of a ganglion cyst with hemorrhagic fluid and hemosiderin deposition, and the lesion was excised en toto with preservation of all of the normal appearing surrounding anatomical structures. Thereafter, the wound was closed in layers and a gently compressive sterile dressing was applied without immobilization of the extremity.

The patient’s postoperative course progressed in a completely unremarkable fashion. Histopathological evaluation of the excised lesion revealed a solitary irregularly shaped fragment of lobulated ligamentous connective tissue that measured 3.2 × 2.0 cm (Figures 5 and 6), with gross and microscopic evidence of focal hemorrhages and heme deposition within the lesion (Figure 7). The histopathological findings were consistent with a diagnosis of ganglion cyst, and this was in keeping with the findings observed at the time of the operation.

Discussion

Ganglion cysts typically contain a gelatinous, clear to straw-colored, translucent fluid, and the diagnosis of a ganglion cyst is usually a rather straightforward process that is based on the history and physical examination of the patient. Needle aspiration of a subcutaneous ganglion cyst can be diagnostic as well as therapeutic (4). MR imaging can also aid in the diagnosis of a ganglion cyst, and such images usually highlight fluid by displaying the pathognomonic homogenous, intensely bright signal on T2-weighted images. However, when heme fills the ganglion cyst, alteration of the MR signal characteristics can be interpreted as suggestive of a solid mass tumor rather than a cyst. Hemosid-
FIGURE 2 Preoperative magnetic resonance image demonstrates a well-defined soft tissue mass (white arrow) with decreased signal intensity on both T1-weighted (A) and T2-weighted (B & C) images. The tibialis anterior tendon is surrounded by the mass.

FIGURE 3 Intraoperative photograph illustrating the deep purple, well-demarcated 3 × 2-cm lobulated soft tissue mass (hemorrhagic ganglion) held by the forceps. Note the mass to be inferior to the tibialis anterior tendon (arrowhead).

FIGURE 4 Intraoperative photograph after excision of the hemorrhagic ganglion.
erin deposition within soft tissues is well known to affect MR signal characteristics, resulting in low signal intensity on T1-weighted and T2-weighted images (7–10). A ganglion cyst, which is a benign lesion, is typically associated with a relatively predictable and noncomplicated treatment course. However, if such a lesion were to be misdiagnosed as a solid mass tumor, it could result in unnecessary preoperative anxiety and unnecessary intervention and/or an inappropriate treatment course.

When performing diagnostic aspiration of a suspected ganglion cyst, it is not uncommon to notice some blood intermixed within the gelatinous fluid. We suspect that the aspirate would be more likely to be blood-tinged in cases involving aspiration of a hemorrhagic ganglion cyst, although we did not aspirate the non-fluctuant cyst observed in the patient described in this report. While encountering a blood-tinged aspirate in association with a suspected ganglion is not unheard of, we are not aware of a clinical report that distinctly describes this particular entity.

In general, the etiology and pathogenesis of ganglion cysts is still not completely understood (4). Synovial herniation or mucoid degeneration of dense collagen tissues due to repetitive trauma has been implicated as a probable cause (11). It has also been suggested that fibroblasts in adults have pluripotential properties that may react to injury and inflammation by forming periarticular joint-like structures, such as a ganglion cyst (12). It is unclear how a hemorrhagic ganglion becomes heme-laden. We believe local trauma to be the likely cause, although it remains possible that a hemorrhagic ganglion cyst may develop de novo. Additionally, it is unclear how much heme is necessary to effect enough of a pigment change to alter the signal characteristics of an MRI, or to alter the physical appearance of the ganglion cyst at the time of surgical dissection. Based on our experience with the patient described in this report, we suggest that a ganglion cyst that displays low signal intensity on T1-weighted and T2-weighted MR images, a deep purple cyst wall, blood-tinged drainage, and heme-laden histopathology, be considered a distinct clinical variant, namely, a hemorrhagic ganglion cyst.

In conclusion, this report describes the case of a patient who underwent excision of a hemorrhagic ganglion cyst, a distinct clinical entity that should be considered by surgeons undertaking the management of soft tissue lesions in the foot and ankle. While the clinical and treatment course remain identical to that of a conventional ganglion cyst, the MR signal characteristics may be different, and this distinction can make the diagnosis difficult. Hemorrhagic ganglion should be considered in the differential diagnosis of a soft tissue mass that displays homogeneous, low-intensity T1-
weighted and T2-weighted MR images, especially when the results of a diagnostic aspiration of the lesion fail to yield enough fluid for analysis, display hemorrhagic fluid, or if an aspiration has not been undertaken.

References