



Large Piezogenic Nodule with a Novel Approach Surgical Excision: Case Report

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Purpose

Piezogenic papules are usually asymptomatic soft tissue masses resulting from fat herniating through the dermis. Most commonly seen in the plantar heel, piezogenic papules have previously been treated conservatively with successful results. Our patient failed a reasonable course of conservative therapy and underwent a successful surgical excision of the mass, which was radiographically and histologically identified as a piezogenic papule. The lesion identified in this case is believed to be the largest piezogenic papule in the literature to date, measuring 3.5 x 3.0 x 0.5 cm, which is more correctly termed a piezogenic nodule. While the literature overwhelmingly points towards conservative therapy, surgical excision for larger symptomatic lesions may be a viable option and should be considered in the clinical evaluation and treatment of cutaneous lesions such as piezogenic nodules.

Background

Piezogenic papules occur most commonly at the weight-bearing plantar aspect of the heel near the glabrous junction. Symptoms can range from painful on ambulation and palpation to completely asymptomatic. They occur when subcutaneous fat tissue herniates through the dermis and thin fascial layers of the heel. The glabrous junction is the anatomically weakened area where the skin transitions from thick plantar skin to the thinner skin of the dorsum of the foot. These papules occur worldwide and can affect individuals of all ages, though infantile piezogenic papules may differ in presentation from adult piezogenic papules. While most cases are idiopathic, there is evidence that links the condition to collagen disorders, such as Ehlers-Danlos syndrome. A physical and pathologic examination should be considered in order to arrive at an accurate diagnosis and to differentiate these lesions from more serious conditions and malignancies.

While piezogenic lesions are typically treated conservatively, the patient had an atypical presentation that was symptomatic and failed a reasonable course of 22 months of conservative management. Due to the symptoms of the patient and clinically significant and increasing size of the mass, the decision was made to surgically excise the lesion. It is also important to note that like any herniation in the body, after repeated piston motion of the protruding adipose tissue, the lesion may increase in size over time. This is likely due to a tearing of the cutaneous portal in the dermis.

To our knowledge all prior literature recommends conservative care with satisfactory results. After failing conservative therapy, we believe that surgical intervention may be a viable option when considering a large, symptomatic, piezogenic lesion. We also believe that this to be the largest documented piezogenic nodule reported in the literature at 3.5 x 3.0 x 0.5cm in size. It is important to note that although musculoskeletal ultrasound, MRI and histology reported this case as a piezogenic papule, the term piezogenic nodule is deemed more appropriate. After 19 months of follow up care, our patient has no complaints or signs of recurrence to date. We consider surgical excision for larger symptomatic lesions to be a viable option that should be included as a treatment option for piezogenic papules and nodules.

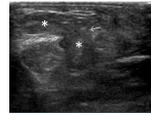
Literature Review

Piezogenic papules were first described by Shelly et. al. in 1968 [1] as painful feet due to the herniation of fat tissue through the dermis. Classified as piezogenic by Cohen et al. [2] 1970 and further defined by Schlappner et al. [3] 1972, in adults. These cutaneous herniations are prominent upon application of pressure to the sole and thus by definition piezogenic [3]. Larralde et al. described these nodules, external adipose alveoli of the talar fibroadipose pulvinar representing an exaggeration of a physiological phenomenon [4]. Larger lesions occur due to herniation of internal fibroadipose elements of the heel pulvinar from piezogenic action transmitted in the form of hydraulic pressure which is intense enough to cause the disruption of the most internal and thickest trabeculae [5]. Piezogenic lesions of the hand were described in 1973 by Plewig and Braun-Falco [6] and later the wrist in 1991 by Laing et al [7]. In 1975 Stintz and Schrieber corrected the nomenclature of a large painful piezogenic papule[8], which was also a term formally recognized by Grintspan Bozza and Reizner in 1989 [9]. While there are various descriptions and definitions the consensus on these lesions is the characteristic of an adipose herniation through the dermis.

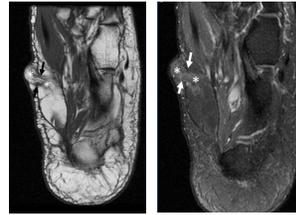
It is known that piezogenic papules are a condition that occurs worldwide (up to 80% of the population) and can affect individuals of all ages. They generally present asymptotically, though there have been reported painful cases of both pedal and hand piezogenic papules [10,11,12]. The pain associated with these papules can be associated with ischemia, which results from the extension of fat into the dermis along with its vessels and nerves [10], similar to the concept of an abdominal hernia with incarcerated bowel. Adult piezogenic papules result from normal subcutaneous fat tissue herniating through the dermis and thin fascial layer of the heel [12]. Piezogenic papules can also be more marked on the medial aspect of the heel due to displacement of the fat pad [10], often in a valgus heel or foot type.

In 6% of newborns and 40% of infants, piezogenic papules have differed in presentation from adult cases. They present as nodules, occurring in the medial plantar aspect of the foot, and lacking of conditions such as connective tissue disorders, obesity, of pesplanovalgus dermofmatias that are often factors associated with piezogenic [4,11]. One study shows, plantar piezogenic papules which are generally considered an isolated lesion might be a predictor of some cardiac diseases associated with connective tissue abnormalities such as mitral valve prolapse [13]. Differential diagnoses that may present similarly to adult piezogenic papules may include xanthomas, tophi, and skeletal abnormalities [9]. While there is no specific cause for these papules, such as an inherent connective tissue defect, piezogenic papules may be more common in people who are overweight or spend a significant amount of time in a weight-bearing posture, standing, or with repetitive loading. Mechanical dermatoses are often experienced by ice-skating athletes and can manifest as piezogenic pedal papules[13]. Piezogenic papules may also occur genetically [14,15], and is even more likely to occur in individuals with collagen disorders, such as Ehlers-Danlos [16] or Prader-Willi syndrome [17]. Medical treatment for painless piezogenic papules in healthy patients is usually ineffective and unnecessary. For painful piezogenic nodules, restriction of excessive weight bearing activity, off-loading using an orthotic device or heel cup, and compression stockings has been shown to be effective non-surgical therapies [18,19].

To our knowledge, there is no supporting literature to suggest that there is an effective surgical treatment for either painless or painful piezogenic papules. However, in cases of painful piezogenic papules in individuals who also presented with Ehlers-Danlos syndrome, Doukas et al. reported an effective non-surgical approach that also considered the inherent collagen disorder. They injected betamethasone and bupivacaine in equal parts (1-2 mL/injection) into an Ehlers-Danlos patient and reported 50% relief of pain with one injection. Three months later, a second injection yielded a further 20% reduction in pain. After 5 more months, a third injection yielded total relief of pain. At 5-year follow-up, the patient remained asymptomatic [18].



(Fig. 1) Ultrasound and (Fig. 2) axial T1-weighted, and (Fig. 3) Axial T2-weighted MR images showing a region of fat (asterisks) in the medial aspect of the foot herniating through a fascial layer into the subcutaneous tissues (arrows: neck of hernia)



Methods

A 36 year old female presented in May 2013 after failing 11 months of conservative care at an outside facility. The patient presented with complaints of pain to the left medial midfoot, with a gradual onset, denying trauma to the area. Patient had a failed prior aspiration of the lesion from a previous doctor and tried many forms of accommodative foot wear. On exam, the patient presented with otherwise normal dermatologic, vascular, and neurologic pedal exam and an orthopedic exam remarkable for an increased height in the medial longitudinal arch, and a soft, non-mobile, fluctuant, tender mass with a 2 cm diameter. The patient was initially started on oral anti-inflammatories and diagnostic musculoskeletal ultrasound was obtained. Both conservative and surgical options were discussed offered.

In March 2014, the patient returned to clinic with her diagnostic ultrasound results (Fig. 1): herniation of fat through the dermis (a large piezogenic papule), and complaints of the lesion increasing in size and painful while driving and walking. She stated she had some relief with NSAIDs. At this point, the lesion increased in size measuring 3cm x 2.5cm and, in addition to pain on direct palpation, was tender proximal and distal to the mass within the plantar fascia. At this point, diclofenac gel was prescribed as well as an MRI for evaluation of the extent of the lesion for pre-operative planning. A year later, the patient returned to the office with complete MRI (Fig. 2/3) for further evaluation, showing herniation of subcutaneous fat through superficial fascia and dermis on the medial aspect of the foot in keeping with a piezogenic papule. At this point in time, patient is no longer working because she of difficulty driving with the mass and presented requesting surgical intervention.

The patient underwent surgical resection of the soft tissue mass which was noted to be in keeping with an adipose tissue nodule with noted restriction from the glabrous junction. The histology report confirmed the diagnosis of a piezogenic papule measuring 3.5 x 3.0 x 0.5 cm (Fig. 4, Fig. 5). Cultures were taken to rule out infection, all cultures were negative. The follow up care for the patient was carried out to the standard protocol of the surgeon. The patient was initially non-weight bearing for two weeks, at which point all epidermal sutures were removed and the patient was instructed to begin weight bearing as tolerated. At a time of 19 months of follow up through November 2015, the patient has no signs of recurrence or pedal complaints.



Piezogenic papule measuring 3.5 x 3.0 x 0.5 cm (Fig. 4 in vivo, Fig. 5 on backtable)

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