Management of an Epidermal Inclusion Cyst with Rare Presentation on the Sole of the Foot: A Case Report

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Abstract

Epidermal Inclusion Cysts (EIC) commonly result from traumatic implantation of epidermal epithelium into the dermis or subcutaneous tissue. While typically asymptomatic, these benign soft tissue lesions can cause pain if they become inflamed or compress local nerves. These lesions can form anywhere on the body but only very rarely form on the glabrous skin the foot. The aim of this case report is to highlight the management of an Epidermal Inclusion Cyst which formed over the course of a year in the glabrous skin of the foot which was causing significant pain and negatively affecting gait.

Introduction

Epidermal Inclusion Cysts (EIC) are common benight intradermal or subcutaneous soft tissue masses that form after implantation and proliferation of squamous epithelium secondary to trauma [1]. Usually, an EIC will form after trauma occurs to the pilosebaceous unit of a hair follicle [1]. Therefore, it is rare to see an EIC see form in glabrous skin such as the palms and soles [1]. Less than 10% of EICs are observed in glabrous skin [2] Due to the rarity of EICs forming on the sole of the foot, diagnosis can be difficult.

It has been theorized that EICs in the glabrous skin may be caused Human Papilloma Virus (HPV) infecting the eccrine ducts [3] although further research is needed. EICs have also been found to be iatrogenically caused following surgery [4] so this may provide another etiology for their rare formation on the sole of the foot.

Early diagnosis and treatment are important because malignant transformation of EICs has been observed, with them developing into basal cell carcinomas and squamous cell carcinomas [5,6]. Additionally, while these benign lesions are generally asymptomatic, when on a load bearing surface such as the sole of the foot, they can cause significant discomfort and impact gait.

The aim of this case report is to highlight the management of an Epidermal Inclusion Cyst which formed over the course of a year in the glabrous skin of the foot which was causing significant pain and negatively affecting gait.

Case Report

We present the case of a 60-year-old male patient with past medical history of left foot drop secondary to trauma, peripheral neuropathy, and alcohol dependence. The patient presented with a painful soft tissue mass located on the plantar aspect of third metatarsal head of his LEFT foot which had been present for over a year, had significantly increased in size during the previous six months, and was causing significant pain. Patient reported no known prior trauma or inciting incident. During the initial visit a thorough history was obtained which was comprised of their past medical history, current medications, allergies, surgical history, and social history. A complete review of systems was performed, and a lower extremity focused exam was conducted which included vascular, dermatologic, neurologic, musculoskeletal and biomechanical exam. Radiographs were obtained of the lower extremity and routine blood tests were performed.

The patient had no known drug allergies and had no history of tobacco use. Physical exam demonstrated palpable pedal pulses and diminished protective sensation. Musculoskeletal and biomechanical exam revealed complete loss of dorsiflexion in the left foot with noticeable muscle wasting, hammertoe deformities and pes planus. During the physical examination of the patient's left foot, a 2.4 x 2.4 x 1.6 cm oval-shaped, well circumscribed, non-mobile, soft tissue mass with a central punctum was identified on the plantar aspect of the third metatarsal head.

An MRI was obtained of the left foot favored a nonaggressive soft tissue lesion based on its morphological appearance, signal and enhancement characteristics, and thickness. The lesion was heterogeneous, with T2 hyperintense signal centrally and a T1/T2 hypointense signal at the periphery of the capsule.

Figure 1 Initial Presentation of Epidermal inclusion Cyst

Our differential diagnosis included a complex sebaceous cyst, stigmata of prior infection, foreign body granuloma formation, chronic hematoma and non-aggressive soft tissue lesions such as complex plantar fibroma/fibromatous lesion and subdermal/dermatologic lesions. Radiographic images did not reveal any osseous erosion of adjacent structures.

Surgical and non-surgical treatments were discussed in depth with the patient. The patient had already tried and failed multiple conservative therapies and elected to pursue surgical intervention.

The patient was taken to the operating room and after a local anesthetic block was performed, the foot was prepped and draped in the usual aseptic manner. The left ankle was padded with ample cast padding and a pneumatic ankle tourniquet was applied. Attention was then directed to the plantar distal left forefoot at the third metatarsal base where the soft tissue mass was present.

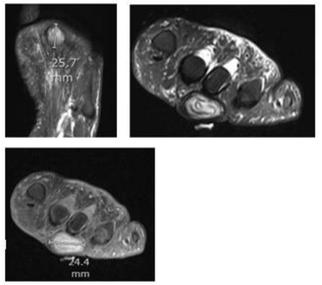

Figure 2 MRI Imaging of the left foot.

A 4.0cm curvilinear incision was made distally to the mass within the toe sulcus. Care was taken to retract all vital and neurovascular structures. All bleeders were promptly cauterized. En bloc excision of the soft tissue mass was performed using sharp and blunt dissection. The soft tissue mass was then passed from the surgical field and sent for pathology examination. The area was examined thoroughly for any further abnormalities, and none were noted. After resection of the soft tissue mass, the area was flushed with copious amounts of sterile saline. The deep structures were reapproximated utilizing 3-0 Vicryl.

Skin was approximated utilizing 3-0 nylon and 4 mL injection of dexamethasone was given. The foot was then dressed with betadine-soaked Owen silk, sterile gauze, cast padding and an elastic compression bandage.

The pathology report obtained from soft tissue mass noted a pale gray-tan cystic structure measuring 2.6cm x 2.4cm x 1.3cm which upon sectioning contained grumous gray-tan material. Microscopic examination confirmed diagnosis of epidermal inclusion cyst.

Figure 3 Intraoperative photo of left foot following soft tissue mass excision.

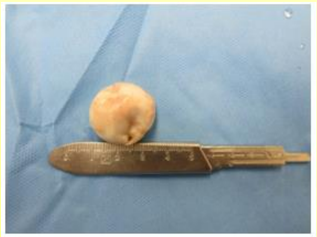

Figure 4 Soft tissue mass following en bloc excision.

At three days postoperatively, the patient was seen at our clinic. The surgical site was examined, and we reviewed the pathology results with the patient. The patient continued to offload his left foot and perform regular dressing changes for two weeks afterward. After two weeks had passed, the patient was seen again in clinic for suture removal. And the patient was cleared for full weight bearing.

Six months following the procedure, the patient reported no post-operative pain, the surgical incision was fully healed, and no recurrence of the soft tissue mass was observed.

Discussion

Epidermal inclusion cysts are benign lesions that respond well to total excision, but they are rarely seen on the non-hair bearing surfaces of the body, which is why it is so important to perform a thorough history and physical exam to ensure that your differential diagnosis is comprehensive and doesn't miss rare presentations such as the one reported in this case study. Since 2000, only three EICs have been reported in scientific literature in the foot [7]. It is important to avoid rupturing the cyst or performing incomplete excision as this can lead to recurrence or the formation of keratin granuloma [8].

Conclusion

When presented with this case our goals of therapy were to alleviate the patient's discomfort, confirm our diagnosis with surgical pathology, and to completely excise the soft tissue mass to avoid future complications. The outcome of this case supports surgical excision as the treatment of choice for EICs. Imaging obtained at the end of therapeutic period demonstrated no reoccurrence of the soft tissue mass. Full resolution of the pain was accomplished, and restoration of full function to the limb was attained.

Conflict of Interest Statement

The authors of this article declare no conflict of interest. The companies involved had no role in the design of the study; in the collection, analyses, or interpretation of date; in the writing of the manuscript, or in the decision to publish the results.

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