Epidermal Inclusion Cyst of the Plantar Foot: A Clinicopathological Review and Case Report

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Statement of Purpose

This case study provides a unique clinical scenario involving an epidermal inclusion cyst (EIC) located on the plantar foot. The study aims to explore the clinical characteristics, treatment optimization enhanced with a multidisciplinary team, and management strategies specific to EICs in this region. Secondarily, the confluency of the removed tissue represents one of the largest EICs by volume in the foot reported in the literature.

Literature Review

EICs arise from the infundibular portion of hair follicles. Less than 10% are found on glabrous skin [1]. Etiology of glabrous EICs often occur through implantation of epithelial cells into subcutaneous tissue, most commonly via trauma [2]. Definitive treatment is surgical excision of the cyst [3]. Although these cysts are benign, rare cases of malignancies in the form of squamous or basal cell carcinoma have been reported, making the diagnosis important to recognize and treat [4]. General histology of EICs can be seen below [1].

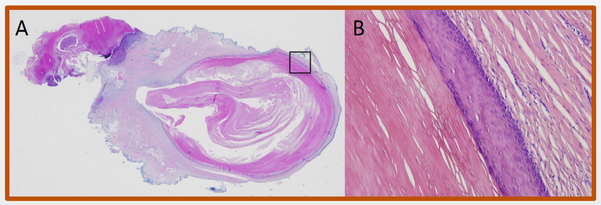

Figure 1: Adapted from Posthuma et al [1]. EIC stained with hematoxylin and eosin revealing (*A*) a well-capsuled cyst (magnification × 5), (*B*) with lined stratified squamous epithelium and lamellated keratin (magnification x100).

Methodology

A 37-year-old female presented with a worsening painful mass on the plantar foot that interfered with ambulation. On exam, the mass was well circumscribed and raised; non-fluctuant on palpation. In-office aspiration was performed but no fluid was retained. Radiographs showed soft tissue swelling at the medial ankle without concern for osseous involvement. A musculoskeletal ultrasound showed a compressible encapsulated cyst without concern for abscess. MRI results indicated two subcutaneous masses, with possible communication, on the medial and lateral plantar heel measuring 5.0 x 5.7 x 2.2 cm and 2.0 x 1.0 x 2.6 cm, respectively. Heterogeneity of the masses varied. There was interposition of the mass extending between the plantar fascia, abductor hallucis, flexor digitorum brevis, and abductor digiti minimi muscle bellies. Interventional radiology obtained a fine needle biopsy which displayed non-specific, benign fibrous connective tissue and synovium with extensive fibrinous/necrotic material. After a thorough, team-based approach, the patient elected to undergo surgical excision due to pain with ambulation.

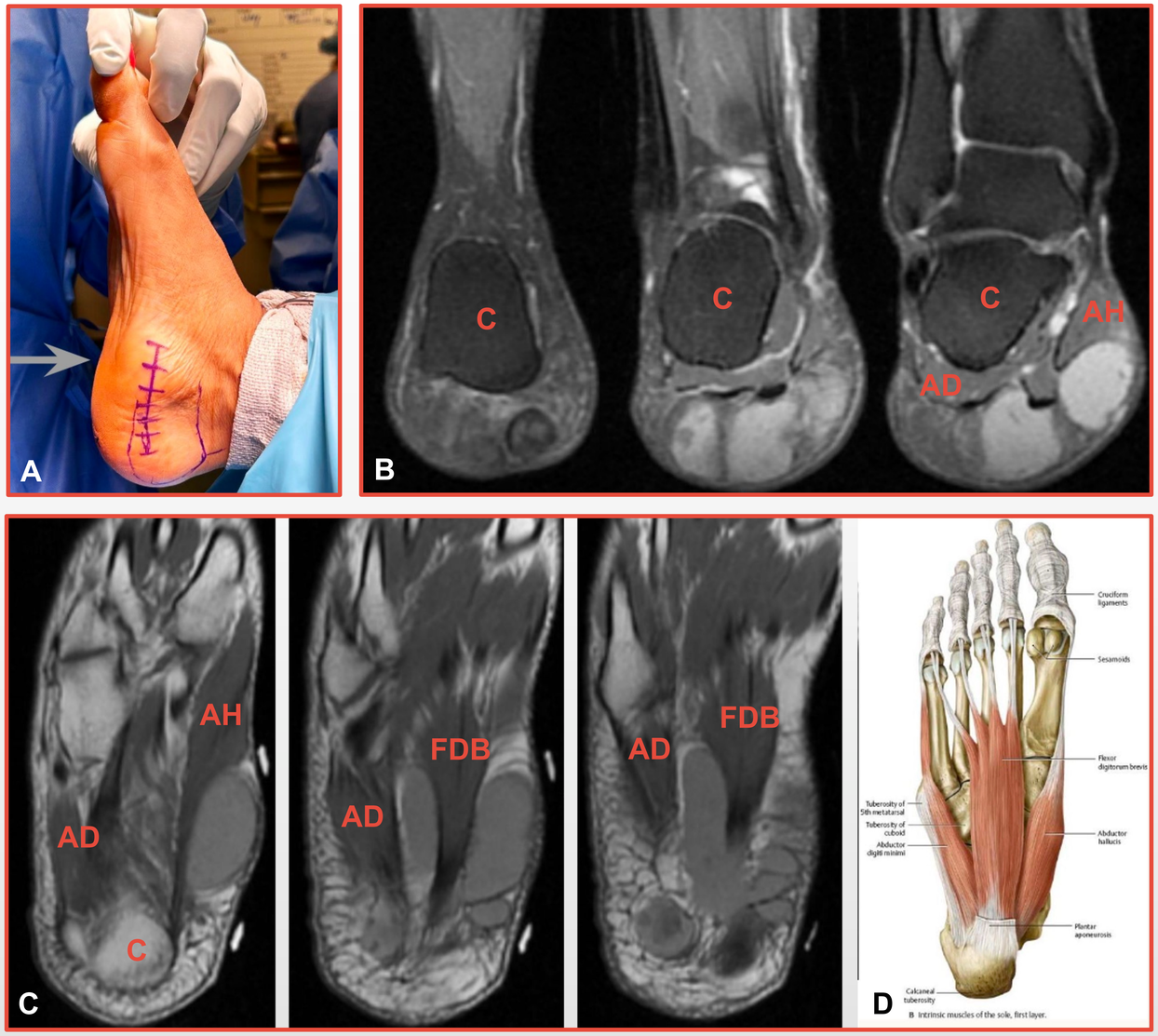

Figure 2: A clinical picture (*A*) is displayed above. Coronal (*B*) and Axial (*C*) MRI cuts are displayed with labeled anatomical structures including the calcaneus (C), abductor hallucis (AH), flexor digitorum brevis (FDB), and abductor digiti minimi (AD) muscle bellies. For reference an anatomical rendition of the first muscular layer of the plantar foot is attached (D).

Results

The patient underwent radical resection of the soft tissue tumor with a single curvilinear medial heel incision with exploration across the plantar hindfoot. Careful discrimination between the native and foreign structures were made during dissection. The mass was avascular throughout removal and well encapsulated on visualization. There was a fluid filled sack medially, which was penetrated and deflated during removal. The mass was excised in its entirety. The drained sack measured approximately 7.0 x 5.0 cm. A second, firm nodule was excised posteromedially and appeared to communicate with the entire cyst. Both were sent for microscopic examination. The remaining plantar fat pad was compressed and atrophic. The surgical pathology report indicated an EIC with areas of rupture including acute and chronic inflammation, fibrosis, and foreign body giant cell reaction. The patient was seen five days postoperatively with minimal swelling. The drain was pulled at this time and sutures were removed at 3 weeks. The patient progressed back into regular shoe gear at one month. At her 6 month post-op visit, patient relates pain is still present but much improved. There are no signs of return of the mass and the heel is well cushioned. Of note, the patient developed another cyst on the contralateral foot (confirmed on CT) which impedes her daily activities.

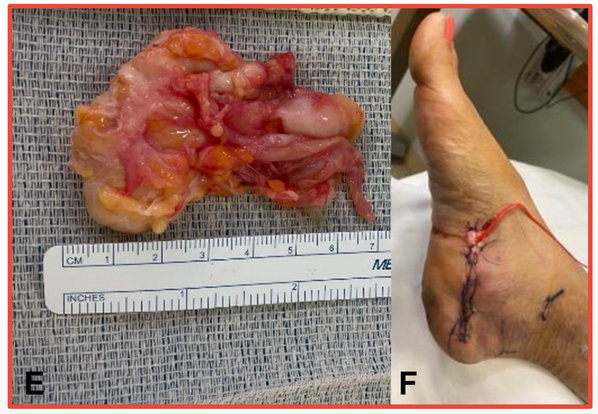

Figure 3: A portion of the excised EIC (*E*) and a clinical picture (*F*) five days postoperatively with a drain in place.

Discussion

While EICs on the plantar foot are infrequent, understanding their clinical presentation, diagnostic nuances, and effective surgical management is essential in order to improve long-term outcomes for patients. A multidisciplinary approach is vital for treatment of EICs on the plantar foot. Interventional radiology, diagnostic radiology, pathology and podiatric surgery all played a role in establishing a proper diagnosis and care. Recent case reports show EICs can occur iatrogenically with minimally invasive foot and ankle surgery. Therefore recognition is paramount [1][5]. **The confluency of the removed tissue represents one of the largest EICs by volume in the foot reported in the literature.** The response of the patient's plantar fat pad remains unknown.

Level of Evidence

Level of Evidence: IV

References

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Disclosures

The authors have no financial disclosures to report.