Epidermal Inclusion Cyst with Rupture & Foreign Body Giant Cell Reaction Treated with Surgical Excision and Rotational Flap Closure: A Case Report & Review of the Literature

Nathaniel LP Preston, DPM a, Michael K Johnson, DPM b, Randall C Thomas, DPM, AACFAS b,c
a Resident, Grant Medical Center Foot and Ankle Surgery Residency Program (PMSR&RRA), Columbus, Ohio
b Assistant Director, Grant Medical Center Foot and Ankle Surgery Residency Program (PMSR&RRA), Columbus, Ohio
c Private Practice, Clintonville Foot and Ankle, Columbus Ohio

Introduction

Epidermal inclusion cysts (epidermoid cysts) occur from the sequestration of epidermal cells that become entrapped in the underlying dermal tissue (1,4,6). They are most commonly found on the scalp, face, neck and back with a reported incidence of 10% on the extremities (4). They generally range in size from 0.2 to 5 cm and can be solitary or multiple masses. Epidermal cysts are typically unilateral, although bilateral inclusion cysts have been reported, and they can be of traumatic origin (5,6). Lateralisogenic cysts occur in the setting of improper wound-edge excision upon skin closure or if epidermal cells are driven into the wound during any surgical procedure (2).

Literature Review

After implantation into the dermis, epidermal cysts can slowly grow, producing a lipid and keratin-filled cystic cavity. Epidermoid cysts vary in size, but in some cases they can enlarge enough to interfere with surrounding tissue, often adhering to nerves or eroding bone (1,2,4). If growth continues and the cyst ruptures, the released keratin is physiologically perceived as a foreign body, triggering a giant cell reaction with subsequent formation of a keratoclastic granuloma of giant cells (1,2).

Epidermoid cysts with or without giant cell reaction will present with a nonspecific increase in soft tissue density on plain film radiographs (6). If evidence of ossive involvement exists on plain film CT should be ordered for further evaluation, otherwise, MRI is more specific for soft tissue masses and will typically reveal a semi-solid mass with several interspersed fluid-filled cavities (4,6). A benign epidermal inclusion cyst cannot be differentiated from a malignant transformation on CT or MRI, the incidence of which varies from 0.01 - 9.2% (2,4,7). The use of ultrasound, however, has been shown to differentiate between benign and malignant lesions (7).

Epidermal inclusion cyst treatment requires complete excision, including the wall of the cyst (2). The importance of removing the cyst without rupturing it must be emphasized. Rupture leads to a higher recurrence rate and increases the risk of setting off a giant cell reaction as previously discussed (1). Most importantly, the cells must be confined because of the possibility of malignant transformation. All soft tissue masses removed should be sent to pathology to rule out malignancy.

Case Report

The patient is a 53 year old female with past medical history significant for non-insulin dependent diabetes mellitus, diverticulosis, HTN, GERD, tobacco use disorder, fibromyalgia, chronic low back pain and generalized anxiety disorder. She was referred to the attending physician’s office for evaluation and possible excision of a painful plantar foot mass. The mass was insidious in onset and per the patient, has been present for several years. The patient denies traumatic onset and insists she has noticed a recent increase in size and pain impacting her ability to perform activities of daily living. Clinically there was an appreciable protrusion in the area of the plantar left 3rd intermetatarsal space measuring 1.8cm by 2.4cm by 0.5cm which was firm with palpation and painful to direct pressure. (Figure 1)

No frank fracture dislocations or abnormalities were present on plain film radiographs. An MRI of the left foot with and without contrast was obtained which showed a soft tissue mass along the plantar aspect of the left 3rd intermetatarsal space measuring approximately 2.4cm in cranio-caudal dimension, 1.7 cm in transverse dimension and 1.9 cm in AP dimension. The mass was insonous to motion on the T1 weighted images and showed mild-to-moderate hyperintensity on the fluid sensitive sequences.

After thorough discussion with the patient she elected to pursue surgical removal of the mass and understood the potential need for flap closure requiring her to discontinue smoking peri-operatively for the purpose of wound healing and vascular studies were within normal limits. The patient was evaluated by her PCP and felt to be an acceptable risk for surgical intervention with her most recent HbA1c being 6.0.

Operative Technique

Pituitary and saphenous nerve block. Attention was directed to the plantar aspect of the left foot. RSTL were within lesion and notably exuding 0.3cm from the foot medial corner of this mass there did appear to be an extra skin fold. This was lobulated and mobile deep within the interosseus. A circumferential incision was performed surrounding this tissue with a greater than 6 mm margin. (Figure 5) This lesion was contiguous with the skin as well as the subcutaneous tissue adherent to the plantar fascia. There was a significant amount of atypical presentation of the adipose tissue at this site. There was a readily identifiable feeder arterial vessel into this lesion stemming from the plantar aspect.

The feeder vessel was ligated and removed. The nerve endings of the inter-metatarsal nerve were transected as they branched into the digit at the level of the 3rd web space and proximally the lumbrical muscle belly. The mass was excised en toto with then passed to the back table. The specimen was well encapsulated with a violaceous hue and measured 2.4cm in length, 2.1cm in width, and 2.3cm in depth. (Figures 2,3,6) The mass was collected in formalin and sent to Pathology for histopathological evaluation.

Upon inspection of the surgical site, a significant full-thickness void could be appreciated at the level of the plantar foot. A decision was made to perform a local single-lobe rotational flap skin closure to allow for the purpose of wound healing and vascular studies were within normal limits. The patient was evaluated by her PCP and was able to proceed for primary closure using nylon suture. (Figure 7) Vascular status was intact clinically to the flap site.

Post-Operative Course

The patient was discharged to home per PACU protocol. She was given prescriptions for oral antibiotics, opioids, and VTE prophylaxis with Lovenox. She remained strictly non-weight bearing to the left foot for 6 weeks. Sutures were removed post-op week 2 and capillary fill time remained immediate to the incision site and full thickness rotational flap. No signs of clinical infection were appreciated, and the soft tissue healed without incident.

She was then transitioned into a short leg cast for 4 weeks. At post op week 6 she progressed to full protected weight bearing in a CAM boot. At post op week 10 she was progressed to full unrestricted weight bearing in her normal shoe wear. The pathology report was obtained from the operative specimen and confirmed the diagnosis of epidermal inclusion cyst with giant cell reaction.

The patient followed post-operatively at weeks 1, 2, 6, and 10 with her final post-op follow up appointment being greater than 12 months after the injury. The surgical site was healed without incident, showed no signs of recurring lesion and she was able to ambulate pain free in her normal shoe wear with full weight bearing and no shoe modifications or orthotics. (Figure 4) She has had no restrictions or signs of return of the lesion and is very pleased with the outcome.

Discussion

First described by Wernher in 1855, epidermal inclusion cysts have been generally noted to occur on the plantar-lateral aspect of the foot with peak incidence between the ages of 20-35 (8,10). Epidermal inclusion cysts are the 5th most common benign soft tissue lesion and account for 3.2% of all soft tissue masses of the foot (11). Although typically sporadic in nature, they have been noted to occur in patients with a family history of polyposis, fibrous tissue tumors, osteochondromas and Gardner’s syndrome. Malignant transformation is rare, ranging from 0.33% - 9.2%, and usually leads to the formation of squamous cell carcinoma (4).

With the cyst presented above, repeated trauma from daily ambulation lead to rupture into the adjacent soft tissue which elicited significant inflammation and the formation of foreign body giant cells. In this case the lesion grew such that it completely encompassed the 3rd common digital nerve as well as its distal branches requiring complete excision of the nerve in order to remove the lesion in its entirety. This case was novel in that the size of the lesion required the use of a unit lobe full thickness rotational skin flap to achieve complete tension-free closure.

Although largely benign, these lesions must remain a part of an exhaustive differential diagnosis in the work-up of plantar foot soft tissue masses.

References

2) Grant Medical Center, P. C. Assistant Director, Grant Medical Center Foot and Ankle Surgery Residency Program. Epidermal inclusion cyst: a foreign body giant-cell reaction. J Am Podiatr Med Assoc. 83(8):410-413, 1983.