

Giant Rheumatoid Synovial Cyst of the Plantar Foot: Review and Case Report

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INTRODUCTION

Rheumatoid arthritis (RA) is a chronic, systemic, auto-immune disorder of unknown etiology. The condition is characterized by the degree of joint destruction, deformity, and disability that it causes. The RA disease process begins in the synovial membrane of joints. Initially, the synovial tissue undergoes immune-mediated microvascular injury (venous distension, capillary obstruction and thrombosis, and peri-vascular hemorrhage) (1). This results in a rheumatoid pannus - synovial tissue edema and synovial cell proliferation. The swollen, hypertrophied synovium protrudes into the surrounding joint where an immune-mediated cascade of events releases hydrolytic enzymes, oxygen radicals and arachidonic acid metabolites (1). This is directly responsible for joint destruction and peri-articular tissue damage.

Rheumatoid foot manifestations are frequent and occur in up to 90% of RA patients (2). Peri-articular tissue damage results in laxity of the joint-stabilizing ligaments and tendons. Severe hallux valgus with lateral dislocation of the lesser metatarsophalangeal joints is common. The ankle and rearfoot could alternatively be affected. These manifestations are usually bilateral and symmetrical. As the involved joints are affected and dislocations ensue, localized plantar pressures can lead to the development of a cyst, bursa, or rheumatoid nodule (2).

Rheumatoid nodules are the most common extra-articular RA manifestation, occurring in 30-40% of RA patients (3). Nodules can develop on any tendon, ligament, fascia, or periosteum (4). Since these tend to occur in pressure-bearing areas, they can become inflamed, infected, or debilitating; however, nodules are generally asymptomatic and are therefore not treated. When nodules affect daily living, the following options are considered: padding/offloading, disease-modifying anti-rheumatic drugs, corticosteroid injections, and surgical excision (3).

It can be difficult to differentiate nodules from less common neoplasms and pseudo-tumor soft tissue lesions (5). Definitive diagnosis is confirmed with biopsy. Here, we present a case report of a rare, giant rheumatoid-associated synovial cyst in a foot.

CASE REPORT

An 82-year-old female presented to the emergency department with a right lower extremity infection. Her medical history included RA, chronic obstructive pulmonary disease, coronary artery disease, PAD, early dementia, and gout. At presentation, she had been ambulatory with a walker due to her chronic rearfoot dislocation. Her white blood count was 18.9. Her ABIs were falsely elevated and toe pressures were adequate for healing.

The patient's right plantar foot had an unusual appearance (Figure 1). A softball-sized mass was located on the plantar medial rearfoot. A 2.0 x 2.0 x 0.2 cm wound with a draining sinus communicated to the mass. It was initially believed to be a rheumatoid nodule. Her family explained that this mass was previously excised twice and has redeveloped slowly over several years. It had been removed due to infection (3 and 4 years prior). After both excisions, she had wound healing complications but eventually healed her last excision after a lateral plantar artery flap procedure that was performed by a general surgeon. At the time of presentation, the recurring



Figure 1. Initial presentation of the right lower extremity plantar mass and draining sinus.

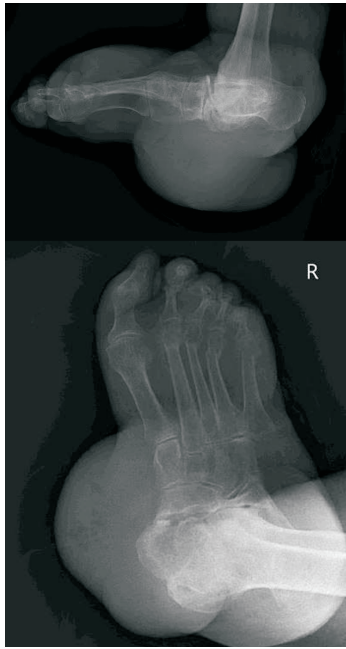


Figure 2. Preoperative radiographs of rheumatoid-associated peri-talar subluxation and giant synovial cyst.

mass was the largest it had ever been. Previous pathology reports described the mass as benign and fibrotic.

Radiographs were obtained for further evaluation. The plantar rearfoot mass was obvious. Rheumatoid rearfoot destruction and chronic peri-talar subluxation was severe (Figure 2). It was not possible to have a current magnetic resonance image (MRI) because the patient recently had a pacemaker implanted. However, an MRI had been performed 3 years previously (prior to the initial surgical excision) (Figure 3).

The patient was made aware of the risk for below knee amputation but elected limb salvage. She was consented for surgical excision and biopsy. A longitudinal excision was created along the course of the mass. Dissection was carried down to the deep fascial layer overlying the giant mass. The well-demarcated, encapsulated mass was gently dissected from the soft tissues and a stalk was traced to the dislocated talonavicular joint. The mass was excised in toto (measuring 10 x 10 x 6 cm) and sent to pathology for analysis (Figure 4). Wound cultures were also obtained. Upon removing the giant mass, an overabundance of soft tissue was addressed via a 3:1 longitudinal elliptical excision along the length of the incision. A smaller transverse 3:1 elliptical incision was also performed at the midline of the longitudinal excision, creating a T-shaped closure. This closure effectively eliminated dead space, allowed for wound excision and provided closure of the subcutaneous tissue and skin layers without significant tension. She was placed in a posterior splint and kept non-weightbearing as she continued to receive intravenous antibiotics.

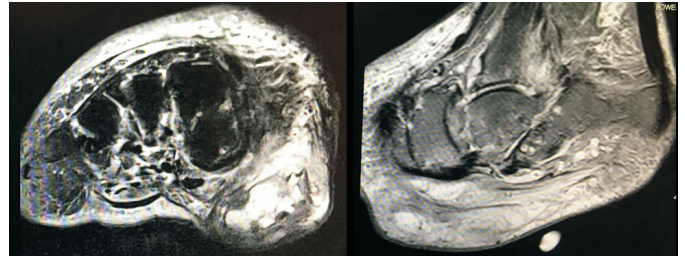


Figure 3. Magnetic resonance image of the mass was performed 3 years prior to presentation.

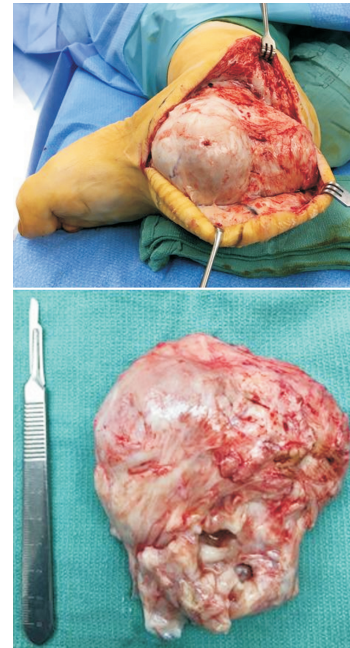


Figure 4. Intra-operative photographs of the excised giant synovial cyst, measured 10 x 10 x 6 cm.

Pathology reported that the mass was benign and was not a rheumatoid nodule. As shown in Figure 5, histology revealed hypertrophied synovial tissue with central cystic degeneration, consistent with a synovial cyst. The wound culture resulted as vancomycin-resistant enterococci and she was subsequently managed by the infectious disease department.

Following surgical excision, her incision dehiscd. She was managed with debridement and wound VAC application less than 2 weeks after mass excision. On 2 subsequent occasions, an Integra bilayer matrix graft was used to promote healing. Local wound care, splinting and non-weightbearing allowed her to progressively heal over the course of 8 months (Figure 6). She has not had a recurrence of the mass or infection after 15 months of follow-up. Due to her chronic peri-talar subluxation, she remains largely non-weightbearing. She wears a CROW device, rarely when limited weightbearing with a walker is necessary. There are no plans for surgical reconstruction.

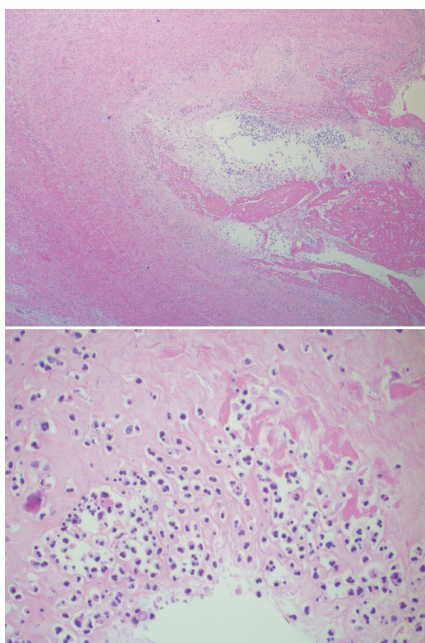


Figure 5. Histology slides of the synovial cyst; 4x (top) and 40x (bottom) magnification.

DISCUSSION

Severe rearfoot dislocation and localized pressure to the talar head allowed for the development and recurrence of the mass. The mass was very large and impressive, and gradually evolved as a cushion to pad and protect the dislocated rearfoot. The large size of the mass, itself, made the mass somewhat disabling as she could not place her foot flat on the ground. Over time, pressure to the mass caused it to break down and ulcerate, and infection developed. Excision was not indicated until infection developed due to the benign history, the patient's comorbidities and past healing complications. At the time of presentation, the patient had a severe and worsening infection. In attempts to salvage her leg, excision was performed. In this setting, our patient was not suitable for reduction and fusion of her dislocated joints. In a more suitable patient, excision of the mass with joint fusion procedures may yield successful and more definitive outcome.

As expected, our patient again had difficulty healing. She was managed without postoperative infection or serious complication. Although her limb was salvaged, she remains largely non-ambulatory and must be mindful to offload her rearfoot even when sitting in her wheelchair. Although she



Figure 6. The patient is healed but remains predominately non-weightbearing due to chronic rearfoot dislocation. She is not a good candidate for surgical reconstruction.

would presumably be more functional with a below knee amputation, she is very happy with her current outcome. We continue to monitor her. The mass previously recurred twice and it would not be surprising if it developed again. In a healthier patient with multiple recurrences, early excision may be preferred since the mass progressively becomes larger until debilitating or infection develops.

Rheumatoid nodules are the most common extra-articular manifestation of RA. Giant rheumatoid-associated synovial cysts in the foot have only been reported once (6) in the literature according to our PubMed search. Giant synovial cysts are most common in the knee but only rarely reported with RA pressure-bearing joints: the hip (7), the shoulder (8), and in areas of dislocation (atlantoaxial subluxation) (9). Although synovial tissue edema and proliferation is normal in RA, the development of such a giant synovial mass in the foot is rare in our experience and review.

Surgical excision is generally required when a giant synovial cyst of the foot becomes infected or disabling. Biopsy should be performed of any such mass as it provides a definitive diagnosis. Further understanding of the immune-modulated cascade of events leading to synovium hyperplasia and proliferation may allow for development of medications to inhibit these pathways. A recent study suggests that moxibustion, a traditional Chinese herb, has been shown to be effective in inhibiting these abnormal activation pathways (TLR 4-MyD 88-NF- κ B pathways) in synovial tissue of RA rats (10).

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