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CASE REPORT
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A Case Report of *Candida albicans* Costochondritis after a Complicated Esophagectomy

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Summary: We present an unusual case of *Candida albicans* costochondritis after a complicated Ivor Lewis esophagectomy. This case exhibits that pain, erythema, and swelling over the costal cartilages should alert the possibility of infective costochondritis, especially in a postoperative patient. If a fungal agent is identified, aggressive surgical debridement and early commencement of antifungal therapy are likely determinants for a satisfactory outcome. *(Plast Reconstr Surg Glob Open 2016;4:e608; doi: 10.1097/GOX.0000000000000599; Published online 22 January 2016.)*

Osteomyelitis of the sternum and ribs is a well-documented complication of surgery performed using median sternotomy.[1,2] However, infection of the bone or cartilage of the chest wall is rare after lateral thoracotomy, with fungal costochondritis alone reported in a few cases.[2,3] The majority of instances of fungal costochondritis have occurred after the dissemination of candidiasis, in the setting of intravenous heroin use.[4,5] As this problem is rare after thoracotomy, information for guiding treatment is sparse.[2] Here, we report an unusual case of *Candida albicans* costochondritis after Ivor Lewis esophagectomy and discuss possible diagnosis and management options. To the best of our knowledge, this association has not been previously reported.

CASE REPORT

A 69-year-old man, who had previously undergone 3 fundoplication procedures and a Collis gastroplasty for gastroesophageal reflux, presented with intractable esophageal dysmotility, gastroesophageal reflux, aspiration, and dysphagia. He had distorted gastroesophageal anatomy, a distended intrathoracic post-Collis gastroplasty gastric segment, and a failed fundoplication. Endoscopic esophageal dilations yielded temporary relief of dysphagia but failed to relieve the other symptoms.

After workup, he underwent an Ivor Lewis esophagectomy via an upper midline abdominal incision and right posterolateral thoracotomy via the sixth intercostal space. This procedure was technically challenging because of upper abdominal adhesions and distorted anatomy, and the postoperative recovery was complicated by an anastomotic leak on the second postoperative day, which led to mediastinitis and sepsis, requiring return to the operating theatre on that day. After spending 40 days in the intensive care unit with a prolonged and complicated recovery and further 10 days on the surgical ward, he was discharged from hospital.

Three months later, he represented with swelling, erythema, and pain over the right costal margin, below and medial to the end of the right thoracotomy wound. On evaluation, costal osteomyelitis was suspected, and a noncontrast CT was ordered. Results of this investigation supported suspicions of osteomyelitis and/or osteochondritis. A bacterial cause was assumed, and clindamycin 300 mg 3 times a day was prescribed. Surgical options were initially declined. Two months after commencing antibiotics,

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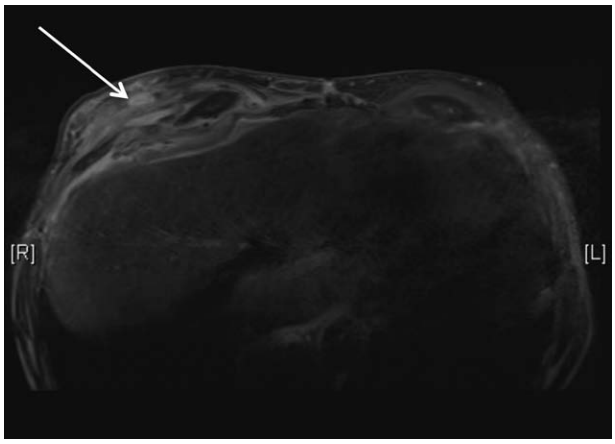

Fig. 1. T2 weighted MRI of the chest showing enhancing area of the necrotic tissue over the right sixth rib, with underlying phlegmonous changes.

the patient reported no change in symptoms, and medical and surgical options were discussed again. Two weeks later, the patient elected to have surgical intervention.

Preoperative magnetic resonance imaging (MRI) demonstrated an enhancing collection overlying the sixth rib at the right anterior chest wall, phlegmonous changes involving the anterior and lateral right chest wall, and an oblique sinus tract extending from the collection to the seventh costal cartilage with an associated rib fracture (Fig. 1). He underwent elective surgical debridement and washout of the right costal cartilage and surrounding inflamed soft tissue. Tissue samples sent for microscopy and culture showed the growth of *C. albicans*. This was initially thought to be a contaminant rather than the causative organism. He was discharged with a treatment plan of oral clindamycin 300 mg for 6 weeks.

When reviewed 2 weeks after discharge, the surgical wound remained tender, swollen, and warm (Fig. 2). The microbiology results were re-evaluated, and oral fluconazole 400 mg was commenced. One week later, he had only marginally improved, and he was readmitted for intravenous fluconazole and clindamycin. During the admission, he developed skin breakdown and cellulitis over the affected area, and he was taken back to the theatre for further debridement and washout plus resection of his right anterior fifth and sixth ribs (Fig. 3). Tissue samples again showed the growth of *C. albicans*. The patient then made a good recovery, with a 6-month course of oral 400 mg fluconazole.

DISCUSSION

Whether it be of acute or chronic onset, pain, erythema, and swelling over the costal cartilages should alert the possibility of infective

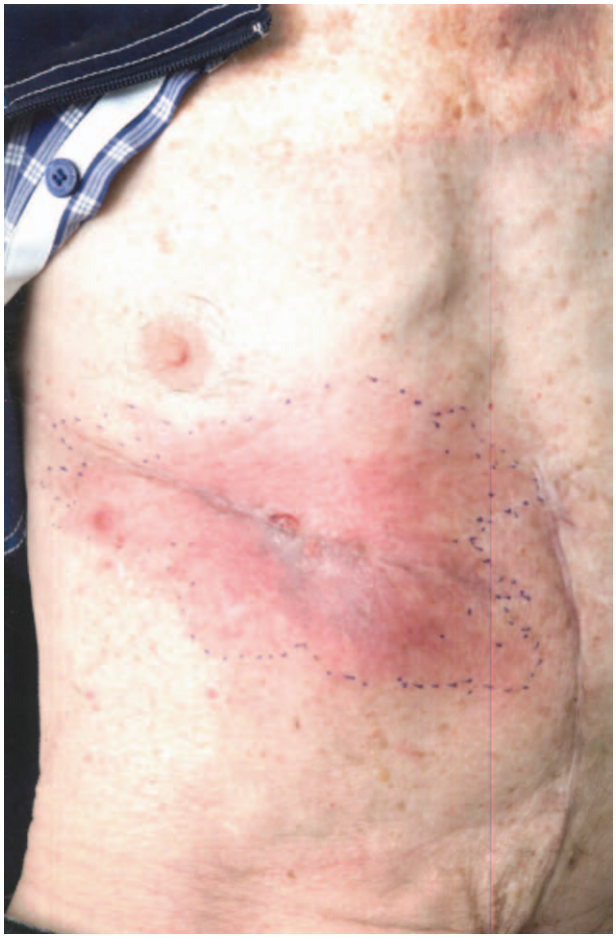

Fig. 2. Anterior chest wall with surrounding erythema, swelling, and skin breakdown.

costochondritis.[2] Fungal costochondritis is reported less frequently than its bacterial counterpart, with *Candida*, *Aspergillus*, *Blastomyces*, *and Actinomyces* being the main fungal organisms responsible for it.[2,6] In the last 50 years, fungal costochondritis has been increasingly cited in patients who have undergone median sternotomy or an open injury to the chest wall.[3,4] Most cases entail either a fungal sternal wound infection or mediastinitis.[7] Our case was somewhat unusual as the development of costochondritis was delayed for 3 months after the original septic event. The likely precipitating event was the esophageal anastomotic leak, with seeding of infection either directly via contamination of the thoracotomy wound or subsequent hematogenous spread.

Costochondritis was diagnosed clinically and confirmed by MRI. Fungal infection was confirmed by culture of the debrided tissue at subsequent surgery. Previous cases had undergone chest x-ray, computed tomography (CT), bone scintigraphy, MRI, and tissue cultures in isolation or combination.[2,4,6–8]

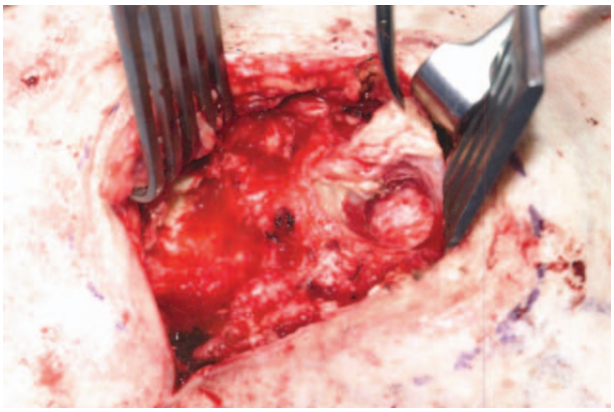

Fig. 3. Debridement and resection of the fifth and sixth intercostal cartilages.

Heckenkamp et al[4] had used chest x-ray, ultrasonography, and MRI and had suggested that chest x-ray and ultrasonography did not reveal infective costochondritis well and should be used only to rule out other diagnoses. Volterrani et al[9] had also suggested that the use of ultrasound is limited to revealing inhomogeneous increases in echogenicity in the pathological cartilage compared with an opposite normal side. Their study further recommended that MRI, if available, is superior to CT for detecting cartilaginous damage and bone marrow edema. This was in the context of costochondritis in 12 patients with Tietze's syndrome and not infective costochondritis.[9] Although CT scans are commonly utilized when costochondritis is suspected, a negative radiological report does not exclude the diagnosis even with associated osteomyelitis.[2,8] Massie et al[8] had described 4 cases in which bone scintigraphy was used to diagnose infective costochondritis, and in one of those cases, CT imaging had not detected cartilage involvement.

Surgical treatment for *Candida* costochondritis generally entails aggressive debridement and washout of soft tissues plus complete resection of the pathological structures, including dead cartilage, as was performed in our case.[2,4,5,7,10] For wound closure, we used a rotational flap in our first debridement, similar to that described in the case report by Heckenkamp et al.[4] For our second debridement, the wound was left open, and that strategy offered safe management. Medical management varies between cases. Previously reported cases have used either amphotericin B, ketoconazole, or fluconazole.[7,8] Fluconazole has also been used in *Candida* sternal osteomyelitis.[2,8] Icatronazole was recommended by Mirhosseini et al[6] for *Aspergillus flavus* costochondritis. Early commencement of an antifungal agent should be an adjunctive therapy to aggressive surgical debridement for a satisfactory outcome, as demonstrated in this case.

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REFERENCES

1. Singh K, Anderson E, Harper JG. Overview and management of sternal wound infection. *Semin Plast Surg.* 2011;25:25–33.
2. Chicarilli ZN, Ariyan S, Stahl RS. Costochondritis: pathogenesis, diagnosis, and management considerations. *Plast Reconstr Surg.* 1986;77:50–59.
3. Malani PN, McNeil SA, Bradley SF, et al. *Candida albicans* sternal wound infections: a chronic and recurrent complication of median sternotomy. *Clin Infect Dis.* 2002;35:1316–1320.
4. Heckenkamp J, Helling HJ, Rehm KE. Post-traumatic costochondritis caused by *Candida albicans*. Aetiology, diagnosis and treatment. *Scand Cardiovasc J.* 1997;31:165–167.
5. Zapatero J, López Longo J, Monteagudo I, et al. Costal chondritis in heroin addicts: a comparative study with postsurgical chondritis. *Br J Dis Chest* 1988;82:341–346.
6. Mirhosseini SJ, Salehi M, Ali-Hassan-Sayegh S, et al. Costochondritis caused by *Aspergillus flavus* following cardiac surgery. *Acta Med Iran.* 2013;51:733–735.
7. Clancy CJ, Nguyen MH, Morris AJ. Candidal mediastinitis: an emerging clinical entity. *Clin Infect Dis.* 1997;25:608–613.
8. Massie JD, Sebes JI, Cowles SJ. Bone scintigraphy and costochondritis. *J Thorac Imaging* 1993;8:137–142.
9. Volterrani L, Mazzei MA, Giordano N, et al. Magnetic resonance imaging in Tietze's syndrome. *Clin Exp Rheumatol.* 2008;26:848–853.
10. Gimferrer JM, Callejas MA, Sánchez-Lloret J, et al. *Candida albicans* costochondritis in heroin addicts. *Ann Thorac Surg.* 1986;41:89–90.