Case Report

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Insidious Onset Multifocal Chest Wall and Spinal Abscess Caused by Previous Candidemia: A Case Report

칸디다혈증 이후 잠행성으로 발생한 다발성 흉벽 및 척추 농양: 증례 보고

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Abscess formation due to *Candida albicans* infection is extremely rare. Radiological diagnosis of an atypical abscess at an uncommon site is challenging. In this study, we present a case of insidious onset multifocal chest wall and spinal abscess after candidemia in a young woman in the intensive care unit due to postpartum bleeding.

Index terms Abscess; Candidemia; *Candida albicans*; Computed Tomography, X-Ray

INTRODUCTION

Soft tissue abscess formation is an uncommon condition that occurs spontaneously as a result of hematogenous spread of bacterial, fungal, or mycobacterial pathogens originating from distant sites or secondary to open trauma or thoracic wall surgery (1). Extrapulmonary multifocal abscess formation due to *Candida albicans (C. albicans)* infection is extremely rare, even in immunocompromised patients (2).

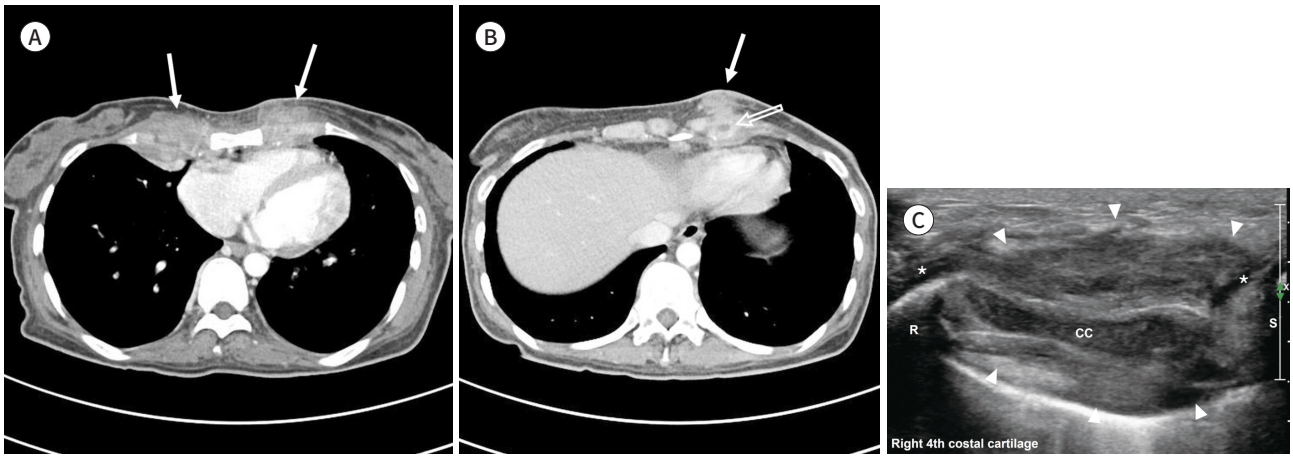
Radiologic differential diagnosis of an abscess as a result of an uncommon infectious con-

dition, especially that caused by an uncommon pathogen, is challenging. Imaging findings of an abscess may not differ according to the primary pathogen. Most cases show organized fluid collections with peripheral enhancement and surrounding fat stranding (3). Only a few cases of *Candida* chest wall abscess have been reported. However, there is limited knowledge about their radiological characteristics (2). In the present study, we discuss a radiologic misdiagnosis case showing insidious onset multifocal chest wall and spinal abscess after candidemia in a young woman in the intensive care unit (ICU) due to postpartum bleeding.

CASE REPORT

A 34-year-old female patient presented with a palpable mass around the right lower sternal border and lower rib area. Laboratory test results revealed a white blood cell count of 10.40 × 10^3/μL (reference range of 3.9–9.3 × 10^6/L), hemoglobin of 13.5 g/dL (≥ 12g/dL), platelet count of 545 × 10^3/μL (150–450 × 10^3/μL), aspartate aminotransferase level of 92 U/L (13–30 U/L), and alanine aminotransferase level of 22 U/L (7–23 U/L). As no remarkable systemic signs and symptoms were found, serum inflammatory markers such as C-reactive protein and erythrocyte sedimentation rate were not included in the initial laboratory evaluation. According to her medical record, about 4 months before she presented with a palpable mass, she was hospitalized for approximately 75 days, including 45 days of ICU care due to severe postpartum bleeding. She was diagnosed with bacteremia and candidemia at that time, which were confirmed by blood and central venous catheter tip cultures. After treatment with prolonged antibiotics and antifungal therapy, she was discharged one and a half months before presenting with a chest wall mass. The patient underwent chest CT. There were heterogeneously enhancing soft tissue masses without remarkable perilesional infiltration at the bilateral fourth costochondral portion of the lower anterior chest wall and several other heterogeneously enhancing soft tissue masses at the right eighth costal cartilage and third to fifth levels of the left costal cartilages. The largest one was approximately 4.9 cm in size in the right fourth costochondral portion. Some lesions showed an inner cystic or necrotic portion (Fig. 1A, B). All lesions were found in bilateral costochondral locations with irregular and unclear margins, without remarkable perilesional streaky infiltration. There was no evidence of intrapulmonary inflammatory or lung abscess-like lesions in either lung. Furthermore, there were additional similar characteristics of bilateral paraspinal soft tissue masses and multifocal osteolytic erosion at the end plates of vertebral bodies on scans that covered the T12, L1, and L2 areas (Fig. 1D, E). Initially, we considered that multifocal cold abscesses were probably associated with tuberculosis infection. However, because the paraspinal mass was enhanced with osteolytic skeletal system involvement, multiple myeloma and metastasis were also included in the differential diagnosis. A surgical bone biopsy of the vertebral body of L1 and chest wall excisional biopsy were performed. Malignant evidence was not found in bone or chest wall soft tissue biopsies. Excisional biopsy of the chest wall soft tissue lesion revealed chronic inflammation with fibrosis, indicating the presence of an abscess. Tissue culture of the excisional chest wall lesion was also performed. The patient tested positive for *C. albicans*. To treat the *Candida* abscess, the patient underwent incision and drainage under general anesthesia during the admission period. Antifungal therapy with intravenous flucon-

Fig. 1. Insidious onset multifocal chest wall and spinal abscess after candidemia in a 34-year-old young female.
A, B. Initial contrast-enhanced axial chest CT images show several infiltrative heterogeneously enhancing soft tissue masses (arrows) involving the anterior chest wall at the level of the bilateral fourth costal cartilages (A) and the left fifth costal cartilage (B). The masses have irregular and unclear margins without remarkable perilesional infiltration. There is a small portion of fluid density (open arrow) in the mass in the left fifth costal cartilage.
C. Initial ultrasound image shows a large heterogeneous hypoechoic mass (arrowheads) around the right fourth CC between the right fourth rib and sternum. The mass has an irregular and ill-defined border, with a coarse internal echo containing multiple small anechoic foci (*).
CC = costal cartilage, R = rib, S = sternum



azole (400 mg/day) was administered for 1 month. After discharge, the patient was continuously administered oral fluconazole (400 mg/day) with outpatient follow-up. After 6 months of systemic antifungal agent therapy, abscesses involving the chest wall and paraspinal area, including endplate erosion at vertebral bodies, showed improvements on follow-up chest CT scans (Fig. 1F).

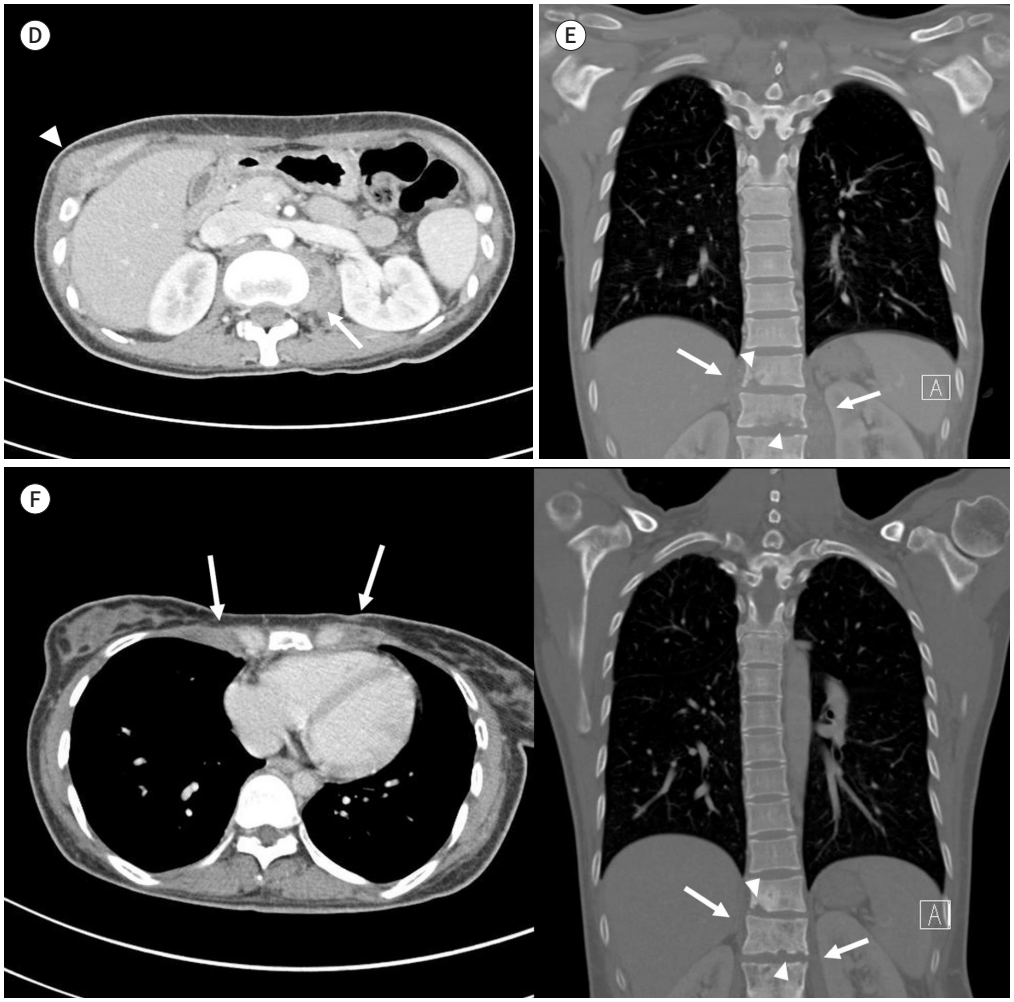
Written informed consent was obtained from the patient.

DISCUSSION

We report a rare and unusual case of multifocal fungal abscess. It develops at the bilateral costochondral, paraspinal area, and vertebral bodies involving the musculoskeletal system, mimicking cold abscess or multiple myeloma in immunocompetent conditions. It was finally diagnosed as an insidious-onset fungal abscess caused by *C. albicans* that developed 3 months after candidemia.

Candida spp. are commensal yeasts that are part of the normal skin and mucous membrane flora, including the oropharynx, vagina, and colon (4). Multifocal colonization is common among ICU patients, mainly among those who have spent more than 7 days in the ICU. Multiple colonizations, broad-spectrum antibiotic therapy, total parenteral nutrition, hemodialysis, Acute Physiology and Chronic Health Evaluation II (APCHE II) score > 20 points, central venous catheters, and candiduria > 10^5 colony forming unit (CFU)/mL are the known risk factors associated with *Candida* infections (4). When *Candida* spreads hematogenously, it usually invades the kidneys, brain, myocardium, and eyes (5). Our patient had multiple risk factors for an invasive *Candida* infection, although these were unfortunately missed. During ICU care, colonization of *C. albicans* was confirmed in urine samples with > 10^5 CFU/mL. The

Fig. 1. Insidious onset multifocal chest wall and spinal abscess after candidemia in a 34-year-old young female.
D. Initial contrast-enhanced axial chest CT image at the level of the upper abdomen shows a heterogeneously enhancing paravertebral soft tissue mass (arrow) in the left L1 area. The mass shows a similar appearance to the above-mentioned chest wall mass with small central cystic or necrotic foci. Another chest wall abscess located in the right 8th costal cartilage is also seen (arrowhead).
E. Initial coronal chest CT with bone window setting image shows multifocal irregular osteolytic erosions (arrowheads) at the end plates of vertebral bodies at covered T12 and L1. Bilateral paravertebral soft tissue masses are also seen with bulging contoured lesions at the level of T12–L2 (arrows).
F. On follow-up CT images after 6 months of systemic antifungal agent (fluconazole) therapy with incision and drainage, multifocal cold abscess at the bilateral fourth costal cartilages and paraspinal area show nearly complete resolution (arrows). Furthermore, osteoblastic change with decreased extent of osteolytic lesions is seen at the covered T12 and L1 areas (arrowheads).



patient had a central venous catheter inserted. Broad-spectrum antibiotics were administered. Eventually, she was infected with *C. albicans* with candidemia confirmed by blood culture, which contributed to disseminated disease in uncommon sites such as the chest wall and spine, although insidious onset and multifocal involvement of the musculoskeletal system are rare. The spine lesions were not confirmed to be positive by culture. However, the improvement of lesions after systemic fluconazole treatment suggests a high probability of infection by the same pathogen.

For cases predominantly involving abscesses at the multifocal bilateral costal cartilage portion of the anterior chest wall, as in our case, the costal cartilage has a relatively poor blood supply. Thus, hematogenous metastasis is rare, and antibiotic treatment effects are low (6). Therefore, transmission of hematogenous infection may be uncommon in the costal cartilage. However, in our case, most chest wall abscesses occurred in the costal cartilage. Considering that antibiotic treatment is relatively ineffective due to poor costal cartilage blood supply, spontaneous reactivation of infection in latent lesions that are not completely treated with antifungal agents during previous hematogenous dissemination might be considered. Therefore, previous reports on *Candida* osteomyelitis have suggested that prolonged antifungal treatment of at least 6 months or longer is necessary because early discontinuation of antifungal agents is the main cause of infection recurrence. However, antifungal therapy alone is insufficient. Therefore, surgical debridement is recommended (7).

Infection and subsequent abscess of the chest wall are often misdiagnosed clinically (3). The most commonly encountered organisms in chest wall infections are *Staphylococcus aureus and Mycobacterium tuberculosis* (3, 8). In patients who are immunocompromised or have diabetes, other less common pathogens, including fungal organisms, may be encountered (3). Chest wall abscesses caused by *C. albicans*, especially those with insidious onset, are extremely rare. There is insufficient evidence for radiological differentials. In general, abscesses appear as organized fluid collections with peripheral enhancements. They often show surrounding fat stranding on CT images (3). Cold abscess, which is a swelling without inflammation, is a characteristic of chest wall tuberculosis (9). In the present case, there were multifocal bilateral costochondral abscesses and paravertebral spinal abscesses. A previous study reported that *Candida* spondylitis should be considered when infectious lesions involve contiguous vertebrae with small paraspinal abscesses or phlegmon (10). Less intervertebral disk involvement may also suggest *Candida* and tuberculous spondylitis rather than pyogenic spondylitis (50% in *Candida* vs. 30% in tuberculous vs. 93% in pyogenic spondylitis) (10). Subligamentous spread and large paraspinal abscess are also significant imaging features suggestive of tuberculous spondylitis rather than *Candida* or pyogenic spondylitis (10). The paraspinal inflammatory mass involving the contiguous T12 to L2 vertebrae with a small portion of the central cystic or necrotic area suggestive of a small abscess cavity in our case is consistent with what has been reported to date.

We believe that early diagnosis of fungal abscess depends on a high index of suspicion and clinical judgement according to known risk factors, such as multiple colonization, broad-spectrum antibiotic therapy, total parenteral nutrition, hemodialysis, APACHE II score > 20 points, central venous catheters, and candiduria > 10^5 CFU/mL. Radiologic findings may aid in the diagnosis. Fungal chest wall abscesses are rare. However, such cases have not been sufficiently evaluated in previous studies.

In conclusion, we present an unusual and unique case of insidious-onset multifocal *C. albicans* abscess involving the musculoskeletal system of the anterior chest wall and spine, mimicking tuberculous cold abscess in a patient with experience of ICU care and candidemia.

Author Contributions

Conceptualization, K.D.E., K.S.S.; supervision, K.S.S., C.S., K.J.H., K.H.; writing—original draft, K.D.E.; and writing—review & editing, K.D.E., K.S.S.

Conflicts of Interest

The authors have no potential conflicts of interest to disclose.

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칸디다혈증 이후 잠행성으로 발생한 다발성 흉벽 및 척추 농양: 증례 보고

권다은[1] · 김성수[1*] · 천신혜[2] · 김진환[1] · 권혜영[1]

Candida albicans 감염에 의한 농양 형성은 매우 드물며, 흔하지 않은 위치에 비 전형적인 형태로 관찰되는 경우, 영상의학적 진단을 내리기가 쉽지 않다. 저자들은 산후출혈로 집중치료실에 입원하여 칸디다혈증 진단 후 치료를 받고 퇴원했던 젊은 여성에서, 잠행성으로 발생한 다발성의 *Candida albicans* 흉벽 및 척추 농양 증례에 대해 보고하고자 한다.

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