Case report

Renal actinomycosis—An unusual cause of a renal abscess


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Abstract

We report an uncommon case of a renal abscess with actinomycosis infection in a 59-year-old female, who had stage 5 chronic renal disease and type 2 diabetes mellitus. Abdominal computed tomography revealed an enlarged right kidney infiltrated with multiple cyst-appearing lesions of homogeneous, low-density contents. A nephrectomy was performed due to persistent toxic signs after treatment with antibiotics. The patient was well 1 year following surgery. We also review previous cases reported in the literature.

Keywords: abscess, actinomycosis, kidney, nephrectomy, tumor

1. Introduction

Actinomycosis is an uncommon infection caused by Actinomyces bacteria. Abdominopelvic actinomycosis accounts for 10–20% of all reported cases of actinomycosis. Genitourinary involvement appears only sporadically and mostly manifests as renal or perirenal masses. Since 1990, 12 cases with renal actinomycosis have been reported in the English literature, and eight (66.7%) of these patients received a nephrectomy due to the failure of medical management or percutaneous drainage plus antibiotic treatment. The surgical outcomes were quite good. Herein, we report a case of a renal abscess with actinomycosis infection in a 59-year-old female, who ultimately received a nephrectomy due to failure of antibiotic treatment.

2. Case report

A 59-year-old woman with stage 5 chronic kidney disease, secondary to type 2 diabetes mellitus, presented with a 2-week history of right-side loin pain associated with constitutional symptoms comprising fever, anorexia, and general fatigue. She had been on hemodialysis over the preceding 7 years. She also had a history of a cardiovascular accident with a sequela of left-side weakness. On physical examination, she was anemic and pyrexial, with a blood pressure of 141/66 mmHg, a regular pulse of 104 beats/minute, and a respiratory rate of 21 breaths/minute. A knocking pain over the right costovertebral angle was present. Laboratory investigations revealed leukocytosis (total white cell count, 37,900/μL), serum creatinine of 7.2 mg/dL, and C-reactive protein of 27.4 mg/dL. Urinalysis showed pyuria and hematuria. A cystic renal mass approximately 13 cm across was identified as having an irregular solid rim on abdominal ultrasonography. Empirical therapy with intravenous ceftriaxone was immediately given while awaiting the culture results, without amelioration of symptoms.

An enlarged right kidney infiltrated with multiple cyst-appearing lesions of homogeneous low-density contents, was demonstrated on computed tomography (CT). There were also strands in the right perinephric space, reactive pleural effusions, and ascites, indicative of an inflammatory process (Fig. 1). Meanwhile, whole-body gallium-67 (67Ga) scintigraphy exhibited an increased uptake of radioactivity in the right kidney as well, which ruled out potential foci other than the right kidney (Fig. 2). Urine culture revealed no specific growth of bacteria, while blood culture

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yielded *Actinomyces* species. Penicillin G was substituted for ceftriaxone, however, after penicillin G was prescribed for 4 weeks, it seemed to have minimal effects in the patient.

A preoperative diagnosis of pyonephrosis infected with *Actinomyces* species was made. A right nephrectomy through a right flank incision was carried out. The kidney was jammed in the retroperitoneal space and firmly tethered to adjacent structures by inflammatory tissues. On sectioning, the architecture was severely distorted by multilocular abscesses embedded in gelatinous pus material (Fig. 3). A microscopic examination showed marked interstitial fibrosis, moderate chronic inflammation, hyalinization of glomeruli, and intravascular furring colonies (Fig. 4), which were compatible with *Actinomyces* species infection. The patient remained well 1 year following surgery.

3. Discussion

*Actinomyces* is an uncommon subacute to chronic bacterial infection caused by *Actinomyces* bacteria, usually *Actinomyces israelii*. *Actinomyces* organisms are Gram-positive anaerobic bacteria that exist as normal flora in the oral cavity, tonsilar crypts, and gastrointestinal and genitourinary tracts. *Actinomyces* is implicated in bacterial invasion of a host’s mucosal barrier, with subsequent infiltration of adjacent tissues. It is characterized by contiguous spread, and supplicative and granulomatous inflammation, associated with the formation of multiple abscesses and sinus tracts that may discharge sulfur granules. Human actinomyosis occurs at various sites in three forms, including cervicofacial, thoracopulmonary, and abdominopelvic actinomyosis. abdominopelvic actinomyosis accounts for 10–20% of all reported actinomycosis, among which genitourinary involvement appears only sporadically and mostly manifests as renal or perirenal masses. It is also of interest that actinomycosis usually occurs in immunocompetent people, but it may also be seen in those with diminished host defenses.

There have been only 12 previously reported cases of primary renal actinomycosis documented in the literature since 1990, and these are summarized, with the present case, in Table 1. Primary renal actinomycosis means that *Actinomyces* bacteria are primarily growing in the kidney rather than contiguously invading through an adjacent organ, and renal lesions are the only infection foci which can be identified (according to symptoms, imaging, or a gallium scan). Among the 13 patients, including the present case, there were eight men and five women, reflecting a male predominance of 1.6:1. The suppurrative disease can affect individuals of any age, ranging from 16 to 68 years. Of those who had a diagnosis of renal actinomycosis, four were <30 years old. It showed no predilection for side, arising on the left in six patients and on the right in seven patients.

Renal actinomycosis commonly represents a chronic process of inflammation. The symptoms are usually nonspecific and may mimic B-symptoms of lymphoma. Abdominal or loin pain is the most common presenting complaint, recorded in nine instances (69%). Loss of body weight was observed in eight patients (61.5%), fever in seven (53.8%), increasing fatigue in four (30.8%), and night sweats in two (15.4%). Hematuria seemed to be relatively more uncommon than those symptoms. Lower urinary tract symptoms may also be present.

Investigations, such as intravenous urography (IVU), angiography, and ultrasonography, are not diagnostic. CT is a reliable imaging modality to locate lesions and provide sufficient information on the anatomical extent of renal actinomycosis to help the surgeon. However, the findings on CT are nonspecific and vary with the stage of the disease and the regions involved. Most patients presented with a solid renal mass of variable contrast enhancement (9 of 13 reported cases), among whom some had initially been diagnosed as having a renal neoplasm, especially a malignant lymphoma, rather than inflammation. The cases with a non-mass pattern (4 of 13 reported cases) may manifest as cystic lesions retaining thickened walls or with the presence of an infiltrating process. Inflammatory reactions of adjacent structures, the retroperitoneum, and psoas muscle are frequently seen. Inasmuch as actinomycosis does not usually spread via a lymphatic or hematogenous route, regional lymphadenopathy is not a common finding. This disease also exhibits unusual aggressiveness, which invades normal anatomical boundaries, crosses fascia planes, and involves multiple compartments. Drainage sinuses or fistulas may subsequently develop. Accordingly, CT should be done to delineate the extent of local infiltration.

Some authors advocate that magnetic resonance imaging (MRI) can be a useful tool to distinguish actinomycosis from other entities, such as malignant lymphomas. The image of actinomycosis is characterized by a low intensity mass to an isointense mass on T1-weighted MRI and a low intensity mass on T2-weighted MRI, whereas a lymphoma is characterized as an isointense mass to a high intensity mass on T2-weighted MRI. A definitive diagnosis is generally based on histological identification of the actinomycotic granules, or culture of *Actinomyces*, or both. Therefore, an ultrasound-guided percutaneous biopsy or fine-needle aspiration, both of which were suggested to have a higher rate of an accurate diagnosis than that of blood or urine culture, should be carried out with clinical suspicion. It is noteworthy that the present case resembled an infection clinically typical of *Actinomyces*, despite the paucity of *Actinomyces* species and sulfur granules identified in the nephrectomized specimen, in what was assumed to be a sequel to prolonged administration of antimicrobial agents.

In selected cases, therapy with antimicrobial agents is capable of completely eradicating actinomycosis, and high-dose penicillin or ampicillin is the treatment of choice (penicillin G of 10–24 million units/day by an intravenous route for 2–6 weeks, followed by oral penicillin V 2–4 g/day for 6–12 months, or intravenous ampcillin...
Fig. 2. Gallium-67 scintigraphy revealed increased uptake of radioactivity in the right kidney.

Fig. 3. Macroscopic appearance. The architecture was severely distorted by multilocular abscesses embedded in the gelatinous pus material.

Fig. 4. Microscopically, the kidney showed marked interstitial fibrosis, moderate chronic inflammation, hyalinization of glomeruli, and intravascular furry colonies compatible with Actinomyces species (H&E stain, 100×).
50 mg/kg/day for 2–6 weeks, followed by oral amoxicillin 1.5 g/day for 6–12 months. However, the first case of isolated renal actinomycosis treated without a nephrectomy was not reported until after 1995. The results following conservative treatment with antibiotics were obscure and only a few patients described in the literature have avoided a nephrectomy or at least a surgical exploration. While a nephrectomy remains the last resort for treatment of renal actinomycosis, the rate of survival is high, as documented in nine (69.2%) of 13 reported cases.

In conclusion, a diagnosis of renal actinomycosis is difficult to make, on the basis of nonspecific clinical presentations and radiological modalities. However, suspicion should arise when patients present with loin pain, fever, loss of body weight, and leukocytosis associated with characteristic findings on a CT scan. With awareness of this pathological condition in mind, thorough examinations with a percutaneous biopsy/fine needle aspiration or MRI may help make a definitive diagnosis. Once a diagnosis is made histologically, penicillin-based therapy is required to completely eradicate the infection. In general, the prognosis is good with full convalescence.

**Conflicts of interest statement**

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