Renal Parenchymal Brucellosis — a Rare Manifestation of a Common Zoonosis

Drs. Hugh Wright, Megan Turner, Hemamali Samaratunga, Jenny Robson
Department of Microbiology, Sullivan Nicolaides Pathology, Brisbane, Australia

Introduction
Brucellosis is a zoonosis of worldwide distribution associated with a systemic febrile illness with a host of manifestations. In Australia, feral swine are the reservoir for the only endemic cause of brucellosis, Brucella suis\(^1\). Focal manifestations of the disease are apparent in a significant minority of cases, with osteoarticular and genitourinary sites most commonly involved. Renal parenchymal disease itself is only very rarely seen, with only a handful of cases reported in the literature to date\(^2-5\).

We report two cases of renal brucellosis, with granulomatous destruction of the kidney. Both patients underwent nephrectomy with cultures of renal tissue positive for brucella suis.

Case One
A 48 year old man from Gin Gin with a background seonegative polyarthritis on immunosuppression was referred to a general surgeon for review. The patient had undergone a series of investigations for mild renal impairment with radiological evidence of right sided ureteric strictures with significant pelviccalyceal dilatation on ultrasonography (US). There was no history of flank or abdominal pain and the patient denied fevers, night sweats or weight loss. No lower urinary tract symptoms were reported.

Physical examination was unremarkable and the patient was afebrile with no significant peripheral lymphadenopathy. He had been employed in a variety of pastoral occupations, including work in cattle tuberculosis eradication programs. Computed tomography (CT) of the abdomen confirmed the US findings and showed significant nodularity of the renal parenchyma noted at this stage, suggesting granulomatous disease with only a thin rim of preserved parenchyma seen. The appearance raised the possibility of tuberculosis. Tissue was obtained which included the possibility of mycobacterium bovis infection given the epidemiological link. A Tc-99m diethylene-triamine-penta-acetic acid (DTPA) scan was performed showing minimal residual function in the affected kidney and a decision was made to proceed to right nephroureterectomy.

The patient underwent laparotomy without significant complications. The macroscopic appearance intra-operatively was of a hard nodular kidney with widespread purulent caseous material seen on division. Tissue was sent for histopathology and microscopy and culture including Zeil Neelsen (ZN) stain and mycobacterial culture.

The histopathology showed extensive necrotising granulomatous inflammation largely replacing normal parenchyma, with the largest lesions several centimetres in diameter. No organisms were described. The granulomatous lesions became positive at day four with a gram negative bacillus that was identified as brucella suis. Serology was performed with positive IgM and IgG detected via EIA and positive CFT with a titre of 1:64.

The patient was commenced on doxycycline and rifampicin and a six week course of dual therapy was completed. No adverse effects were noted and the patient has remained well post treatment. Repeat serology performed six months post treatment showed no significant change.

Case Two
A 39 year old man with a background of ureteric strictures requiring re-implantation was referred for specialist review for stricture recurrence. He reported no major symptoms with no fevers or rigors. There was no history of weight loss or night sweats. The patient lived on a farming property in a rural community and was involved in shooting and processing feral pigs for export. No other relevant medical history was obtained. Physical examination was unremarkable.

Sterile pyuria had been detected on multiple urine specimens obtained. Previous ureteric surgery had shown evidence of granulomatous disease and again tuberculosis was considered as a possible aetiology though cultures from previous operative specimens had remained negative. Imaging including renal US and CT of the abdomen showed multiple cystic strictures within the right kidney with replacement of the parenchyma. Right sided hydrothorax was prominent with thickening of the ureter with evidence of destruction in the distal ureter. The patient proceeded to nephrectomy. The macroscopic appearance of the kidney showed cortical and medullary distortion with irregular thinning, with extensive caseating necrosis varying from military type lesions to large lesions up to several centimetres in size. The microscopic appearance showed replacement of the renal parenchyma by caseating granulomas with extensive interstitial fibrosis and inflammation. No micro-organisms were identified on gram and ZN stains. Cultures of kidney tissue were positive for brucella suis. Serology was performed with a positive IgG detected via EIA and positive CFT with a titre of 1:64.

The extent of disease seen in both cases, with almost complete replacement of normal parenchyma with caseating granulomas and abscesses up to several centimetres in size, and the serological profiles seen in both these cases are indicative of chronicity. Of note neither patient reported systemic symptoms, commonly seen in both acute and chronic disease, despite the severity of the renal involvement.

Transmission of brucellosis to humans can occur through consumption of infected animal milk products or via direct contact with animal body fluids. The incidence in Australia has declined with the eradication of bovine brucellosis though it remains a notifiable disease, with most cases reported from Queensland. The major risk factor for transmission seen in Australia remains recreational or occupational handling of feral swine.

Both patients in question reported significant risk exposure with hunting, skinning and processing of these animals.

Discussion
Brucellosis is a systemic disease that can manifest in acute and chronic forms. An intracellular pathogen, brucella is ingested by polymorphonuclear cells and macrophages and is able to prevent phagosome-lysosome fusion allowing persistence and replication of the organism\(^6\).

A highly variable disease, the most common presentation in acute disease is of a febrile illness with night sweats, myalgias, arthralgias, fatigue and other non specific features. Focal disease can be seen in up to 30% of cases with involvement of every organ system reported. Genitourinary tract involvement is not uncommon with epidymitis-orchitis reported in up to 20% of men with brucellosis. Cysts, prostatitis and urethral infection can also be seen. Upper renal tract involvement is rare with interstitial nephritis, pyelonephritis and glomerulonephritis recognised complications. Renal abscess formation appears rarer still, with only a handful of cases reported in the literature to date\(^2\). The widespread granulomatous infiltration of the kidney with the almost complete destruction of normal tissue seen in the cases reported here appears to be a highly unusual form of a disease known to have protein manifestations. Brucella can cause granulomatous disease most commonly seen in the liver and spleen given the organisms’ relative tropism for the reticuloendothelial system, though formation of granulomas in other organ systems can occur. As such it can mimic extra-pulmonary tuberculosis, a diagnosis considered in both these cases.

Conclusion
Renal parenchymal involvement in brucellosis, while rare, can be severe leading to destruction of the infected kidney. Extensive granulomatous disease can mimic renal tuberculosis. It should be considered as a possible aetiologic agent in this setting especially in the presence of known epidemiological risk factors.

References
5. eFG. 2010. e-Therapeutic Guidelines – Antibiotic version 14: Brucellosis.