

***Pediococcus pentosaceus* SEPTIC ARTHRITIS OF KNEE: A CASE REPORT**



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ABSTRACT

A diabetic man with chronic liver disease developed septic arthritis of knee. The joint infection was caused by Gram positive cocci called *Pediococcus pentosaceus*.

INTRODUCTION

Pediococcus spp. are Gram positive aerobic cocci that belong to lactic acid bacteria, they are catalase-negative, non-spore forming ⁽¹⁾. Although *Pediococci* appear to be closely related to streptococci by morphologic and physiologic criteria, but they are more closely related to lactobacilli ⁽²⁾. Among the *Pediococcus* spp. only *P. acidilactici* and *P. pentosaceus* have been isolated from clinical sources ⁽³⁾ and few reports blame them responsible for bacteremia ⁽⁴⁾ and septicemia ⁽⁵⁾. We reported a diabetic man with chronic liver disease who developed septic arthritis of knee caused by infection with *Pediococcus pentosaceus*.

Keywords: *Pediococcus pentosaceus*, *Septic Arthritis*, *Chronic Liver Disease*, *Diabetes mellitus*.

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CASE REPORT

A 65 years old Kurdish male taxi driver presented complaining from left knee pain, swelling for 2 weeks with limping and fever. The condition started after he was gardening as fever and rigor, and after 2 days felt pain and warmth in his left knee, the patient denied any trauma to his knee. On initial examination there was left knee swelling, tenderness and effusion, (figure 1). There was no pain or swelling in other joints and no morning stiffness.

He was admitted to hospital and was found febrile (39°C), jaundiced with tremor but no flapping, abdomen was distended with an everted umbilicus and caput medusa was observed (figure 2). There was positive shifting dullness and 2 cm palpable spleen from the costal margin and liver was palpable (3 cm below coastal margin). There was bilateral leg edema, deep brownish lesion at the shin of left tibia with left knee swelling. Limitation of movements and palpable soft tissue mass at the popliteal fossa was observed.

There was no past surgical history while past medical history revealed chronic active hepatitis due to HBV infection since 2009 and diabetes mellitus 2 months ago. He was admitted on May 2009 complaining from upper gastrointestinal bleeding (fundal varices) that was treated with blood transfusion and cyanoacrylate injection. The patient was past smoker (15 cigarettes/day) and quit smoking 15 years ago.

Investigations revealed hyperglycemia as random blood sugar was 315 mg/dl (17.48 mmol/L), HbA1C 6.5 (49 mmol/mol) and glycosuria. Biochemical values were as following: urea nitrogen 19 mg/dl (6.78 mmol/L); creatinine 0.7 mg/dl (53.38 µmol/L); uric acid 2 mg/dl (118.97 µmol/L); total serum bilirubin 1.7 mg/dL (29.04 µmol/L), alkaline phosphatase 538 U/L; alanine transaminase 51 U/L; aspartate aminotransferase 54 U/L; albumin 3.1 g/L while serum electrolytes were within normal ranges and 24 hour collected urine for protein was 0.03 g/L.

Hematology showed: hemoglobin 11.8 g/dL; total white cells 5800/µL (lymphopenia), platelets 89000/L; ESR 86 mm/hr; PT 17.5 sec; INR1.7; and D-dimer 4682 ng/mL (4682 µg/L. Blood film showed normochromic corpuscles with anisocytosis, lymphopenia, and platelets were

reduced in number. C-reactive protein positive and blood culture was negative

Virology markers for the patient were as following; HBS Ag: positive; HBe Ag: negative; Anti HBe Ab positive; Anti HBc IgM: negative; Anti HBc IgG; positive; Anti HCV Ab negative; Anti HIV Ab negative and HBV viral load 740 copies/ml.

Doppler US examination of left lower limb veins revealed a heterogeneous deeply seated space occupying lesion, 5 by 2.5 cm in the popliteal fossa just lateral to the midline and in contact with posterior bony surface of tibia associated with mild to moderate knee joint effusion. There was thin septation and periarticular soft tissue edema and mild hyperemia. No baker cyst detected, the conclusion of Doppler US examination suggested local inflammatory process and arthritis.

Ultrasonography of abdomen showed enlarged spleen 18 cm, mild enlarged liver with coarse texture and no focal lesion; mild to moderate ascites, thick wall gall bladder and rest of examinations was normal.

Echocardiography showed no significant findings (no vegetation).

Esophagogastroduodenoscopy revealed evidence of previous band ligation, grade II esophageal varices and portal hypertensive gastropathy, duodenum was normal.

The left knee was investigated; imaging with MRI revealed moderate joint effusion and a 7 by 2 cm soft tissue mass with heterogeneous enhancement suggestive of soft tissue tumor but hematoma was not excluded. There was moderate joint effusion, normal meniscus, cruciate and collateral ligaments, there was no bone lesion and biopsy was recommended. Left knee joint fluid aspirated and the fluid was yellowish pussy in nature. Synovial fluid analysis reported turbid yellow color aspirate (figure 3), full field WBC with 90% neutrophil and 10% lymphocytes. RBCs were 20 cells/ml. Biochemically the fluid contained 5.3 mg/dL protein and 17 mg/dL sugar. Bacteriology of the sample showed no acid fast bacilli while Gram stain smears revealed Gram positive cocci with cluster arrangement. Primary culture on blood agar followed by biochemical investigation reported *Pediococcus pentosaceus* and this was confirmed by Vitek® (bioMérieux, France), (figure 4).

The patient was treated with parenteral antibiotics including Cefotaxime injection 1 gm b.d. and Metronidazole infusion 500 mg t.i.d. and after two days the pain and swelling reduced. The antimicrobial treatment was carried out for 7 days while the following drugs were given during the hospitalization period: Insulin (Glargine) 12 units SC daily, Spironolactone tablets 100 mg daily, Propranolol tablets 20 mg b.d., Lactulose syrup 15 mL b.d.

Arthroscopy of left knee joint was performed after the improvement of the patient's condition. Synovectomy sample sent for histopathologic examination showed nonspecific active chronic synovitis consistent with infectious arthritis.

In the follow up, the patient was seen fortnightly after hospital discharge, his condition was stable, there was no fever and left knee swelling remarkably diminished.



Figure 1 . Left knee showing swelling, erythema and effusion.



Figure 2. The abdomen of the patient was distended with an everted umbilicus and caput medusa.



Figure 3. The synovial fluid aspirate from the left knee with a yellowish pussy appearance.

Selected Organism : <i>Pediococcus pentosaceus</i>		Isolate Number: 1	
		Last Updated: May 9, 2013 08:36 CDT	
Source: Synovial fluid		Collected:	
Comments:			
Identification Information		Analysis Time: 6.00 hours	Status: Final
Selected Organism	93% Probability	<i>Pediococcus pentosaceus</i>	
Organism Quantity:	Bionumber:	010000060323011	
ID Analysis Messages			

Figure 4. The result of bacterial identification using automated Vitek® system.

DISCUSSION

Protection from infection is the function of intact immune system. Whether innate or adaptive immunity is considered, diminished function will result in a variety of infections even with opportunistic pathogens. The above reported bacterial joint infection was in a patient with chronic liver disease and diabetes both of which may affect immune system function and compromise it.

Chronic viral hepatitis is a result of infection with hepatitis viruses such as hepatitis B virus (HBV), hepatitis C virus (HCV), hepatitis D virus, and in some circumstances by hepatitis E virus. This may lead to complications such as cirrhosis, portal hypertension, hepatic failure, and hepatocellular carcinoma. Factors associated with progression of chronic hepatitis B include: older age, HBV genotype C, alcohol abuse, smoking, and diabetes mellitus⁽⁶⁾. Liver cirrhosis and acute on chronic liver failure (ACLF) are characterized by a dysfunctional immune response. This frequently manifests as a systemic inflammatory immune response syndrome with paradoxical functional immunoparesis. This process appears to be driven by an increase in circulating bacterial products, most commonly endotoxemia as a consequence of bacterial translocation⁽⁷⁾. Infection is a common feature of ACLF, it complicates the natural history and is associated with significant morbidity and mortality⁽⁸⁾. Dysfunction of neutrophils, macrophages was observed in liver cirrhosis and this failure in innate immunity leads to bacterial infection⁽⁷⁾.

Another factor affecting immune function is diabetes mellitus⁽⁹⁾. Diabetic patients appear to be more prone to infections, and the accumulating evidence for an immunological defect superimposed upon the metabolic abnormalities of diabetes is becoming increasingly convincing. Both clinical and *in vitro* studies of leucocyte function suggest that infection is more likely if glycaemic control is poor⁽¹⁰⁾. Host-specific factors such as hyperglycemia-related impairment of immune response, vascular insufficiency, sensory peripheral neuropathy, autonomic neuropathy, and increased skin and mucosal colonization of bacteria/yeast have all been hypothesized as potential reasons behind increased diabetic infections^(9, 11, 12). Hyperglycemic patients have shown decreased chemotaxis, phagocytosis, and lysis of organisms in these individuals⁽¹³⁾. Decreased inflammatory and immune response may be the result of thickened capillary walls and compromised vasculature which serves as a physical barrier and impedes diffusion of nutrients and movement of leukocytes to the site of injury⁽¹⁴⁾. Skin infection in diabetes include fungal infection caused by *Candida*, *Phycomycetes* and Mucormycosis while bacterial skin infection include *Staphylococcus aureus* causing variety of problems, and *Pseudomonas aeruginosa* causing malignant otitis externa⁽¹⁵⁾. Other infections commonly observed in diabetes include urinary tract infection, periodontal diseases, and post-operative infections⁽¹⁰⁾.

Joint infection is not a common infection; the reported incidence of native-joint septic arthritis in the general population is between 2 and 10 cases per 100,000 per year^(16, 17). Bacterial

arthritis is usually hematogenously acquired during overt or occult bacteremia, including that due to endocarditis⁽¹⁸⁾. Nongonococcal septic arthritis is caused by a multitude of pathogenic bacteria, the most common etiology in adults is *S. aureus*, followed by Streptococci and gram negative rods⁽¹⁹⁾. Predisposing factors to such infection include joint disease, chronic systemic disease such as diabetes mellitus, chronic liver disease, immunosuppression and trauma⁽¹⁶⁾.

The reported patient with *Pediococcus* joint infection had liver problem and diabetes. Presenting with variceal bleeding and HBV infection four years ago and diabetes mellitus recently, which was uncontrolled, both factors lead to impairment of innate immunity that may predispose to infection^(7,9). *Pediococci* are labeled as lactic acid bacteria that commonly found in fermented vegetables, in dairy products, probiotics, and in meat⁽²⁰⁾. Bergey's Manual of Systematic Bacteriology documented nine species of *Pediococcus*, some strains has been associated with infection in humans and may be considered as opportunistic pathogens⁽²¹⁾. *Pediococcus* spp. are moderately susceptible to Penicillin G, Imipenem, Gentamicin, and Netilmicin while they are resistant to Vancomycin and Tetracycline⁽²²⁾.

Pediococci were isolated from stool specimens⁽³⁾ while *Pediococcus pentosaceus* were reported in few infections such as cases of bacteremia and meningitis⁽⁴⁾, a case of septicemia⁽⁵⁾, a catheter-associated infection in an infant with gastroschisis⁽²³⁾ and in necrotizing infections of abdominal wall⁽²⁴⁾. In all these infections there were some underlying host problem so that the hosts were immunocompromised and the pathogen can be labelled an opportunistic pathogen.

The clinical presentation of this patient was similar to deep venous thrombosis or ruptured baker cyst both of which were excluded by investigations. In this patient, the predisposing factors for such infection are present and it is likely that the condition started with *Pediococcus pentosaceus* bacteraemia followed by haematogenous spread of the bacteria to the left knee joint causing septic arthritis. A report of concomitant septic and gouty arthritis caused by *Pediococci* spp. was reported in one patient⁽²⁵⁾ but this reported joint infection did not have any joint problem.

We reported septic arthritis of knee caused by *Pediococcus pentosaceus* in immunocompromised adult with chronic viral liver disease and diabetes mellitus.

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