A Novel Approach to Isolating a Rare, but Treatable Pathogen

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A Novel Approach to Isolating a Rare, but Treatable Pathogen

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Case Study Summary: Acute pericarditis in a patient treated with adalimumab for psoriatic arthritis. Common oral pathogen identified as the aetiological agent.

Although rare, purulent pericarditis is a potentially life threatening condition. Very few cases of pericarditis are caused by bacterial infections, however, in the setting of immune-modulator therapy, such infections may be more common. Isolation of the pathogen and in turn treatment are challenging since blood cultures rarely reveal the organism. With no specific infectious agent identified next-generation sequencing (NGS) may be a useful tool.

The authors present a 55-year-old man who presented with acute pericarditis, and inflammation of the sack around the heart while on the biologic immune-modulator adalimumab for psoriatic arthritis and recurrent polychondritis. Pericarditis typically presents with pleuritic chest pain with or without fevers, chills and sweating. As the lining of the heart becomes inflamed it can become stiff and accumulate more fluid around the heart leading to restriction of the normal contraction and function of the heart. This fluid accumulation is called a pericardial effusion and can result in hemodynamic compromise called pericardial tamponade if the volume of the fluid rises acutely. As described in this patient, the resultant restrictive heart failure can lead to end organ dysfunction, renal failure in this case, low blood pressure and generalized edema.

The treatment for pericardial tamponade is emergent and consists of removal of the pericardial fluid via surgical or percutaneous (through the skin with a needle) methods. Once the pressure is relieved and cardiovascular stability restored, the aspirated fluid was sent for cultures as well as NGS. Prompt administration of broad-spectrum antibiotics in indicated and was initiated with levofloxacin and amikacin. As is often the case, blood cultures returned negative for pathogens while pericardial fluid cultures isolated Bacteroides thetaiotaomicron (BT), a gram stain negative anaerobic bacteria that normally resides in the human intestine. BT is a well known opportunistic pathogen. The sensitivity of BT to antibiotics was examined and treatment switched to amoxicillin-clavulanate (Augmentin), and Clindamycin, which led to an observable decrease in makers of inflammation and infection. NGS produced a weak positive BT presence and unexpectedly, a strongly positive result for Porphyromonas gingivalis (PG) a resident bacterium of the mouth.

Ten full days of antibiotic therapy were completed and testing of residual pericardial fluid via indwelling drain and utilizing NGS revealed an absence of BT DNA while levels of PG DNA remained significant. The patient’s symptoms of constrictive heart failure persisted and led to surgical treatment consisting of pericardectomy and decortication (removal of part of the pericardium and stripping of inflammatory tissue around the heart). The pericardial specimens were cultured with no evidence of mycobacterium or BT. The patient recovered completely and was without symptoms one year later.

Summary and Discussion

The authors present a compelling case of a rare but life threatening pericarditis in an immune compromised patient on biologic immune-modulating therapy for psoriatic arthritis and recurrent polychondritis. Patients being treated with anti-TNF-α medications are at increased risk of bacterial infections. Two cases of infective purulent pericarditis were previously reported in this patient population with one of those isolating another common oral bacteria, Peptostreptococcus micros.

PG is a gram stain negative anaerobic bacterium residing in the mouth that can become pathogenic with aggressive tooth and gum disease. The presence of another bacteria, Fusobacterium nucleatum in this case, may have enhanced the effect of PG by facilitating it’s invasion of the gum wall. The BT infection was likely not the direct cause of the pericarditis as evidenced by continued pericardial pus following treatment. The PG bacterium is able to directly enhance the preexisting immune suppression in patients on TNF-α. PG is also capable of resisting antibiotic therapy by protecting itself with a biofilm. It was advantageous that both pathogens were susceptible to the same drugs however; the use of NGS could be instrumental in arriving at a correct diagnosis in cases where the treatments are different. This case is the first where next generation sequencing was used in this way highlighting it’s role as a potentially life saving diagnostic tool in patients treated with biologic immune-modulating drugs.

Key Points

- Prolonged treatment with adalimumab can pave the way to opportunistic infections.
- In patients treated with immune-modulator drugs presenting with acute pericarditis and pericardial effusion, opportunistic infection should always be suspected and carefully excluded.

In a case of constrictive pericarditis with severe and persistent haemodynamic impairment which cannot be controlled either by medical therapy or by pericardiocentesis, surgical pericardiectomy should be considered.
Advanced microbiological techniques can be of great help to make an accurate aetiological diagnosis.

Next-generation sequencing is a culture-independent method; thanks to the large number of samples that can be analyzed at the same time it can provide useful information for the clinical practice at an affordable price; the cost-effectiveness is maintained even in the presence of multiple coinfections.

References:


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