CASE REPORT

Late *Streptococcus bovis* infection of total knee replacement complicated by infective endocarditis and associated with colonic ulcers

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SUMMARY

Streptococcus bovis is rare cause of late infections after total knee replacement (TKR). This report presents a case of confirmed late septic arthritis following TKR caused by *S bovis* that was further complicated with infective endocarditis resulting in aortic valve insufficiency in an immunocompetent patient. As an association between *S bovis* and gastrointestinal malignancies is suggested, a workup for such malignancies was performed that revealed non-malignant ulcers in patient's ascending colon. The patient is currently recovering from his aortic valve replacement surgery and is scheduled to have annual colonoscopies. His knee joint has improved; however, he developed constant pain because of underlying chronic infection in the affected joint and has difficulties mobilising. Therefore, a revision TKR is considered but postponed until he fully recovers from his heart valve surgery.

BACKGROUND

Streptococcus bovis is a rare cause of septic arthritis after joint arthroplasty.^{1–5} The organism is also associated with endocarditis,⁶ meningitis,⁷ brain abscesses,⁸ and peritonitis⁹ as well as gastrointestinal malignancies.^{1–5 10 11} We report a case of confirmed infection with *S bovis*, presented in a unique combination of late infection of a TKR, severe infective endocarditis and non-malignant colonic ulcers.

CASE PRESENTATION

A previously healthy, immunocompetent, 73-year-old man, who underwent a very successful bilateral TKR using a contemporary cemented prosthesis for primary osteoarthritis, presented 3 years later complaining of sudden onset of pain and swelling in his left knee. He was unable to weight bear. He also complained of vomiting and was not able to tolerate either liquid or solid food.

On examination, he was pyrexial (38.6°C) and his left knee was warm, tender and erythematous. The range of movement of the affected knee was reduced to only 10° of active flexion. Radiographs of his affected knee joint (figure 1) revealed a well-fixed cemented AGC (Anatomical Graduated Component, Biomet, Warsaw, Indiana, USA) TKR with good alignment of the components. Blood tests showed a microcytic anaemia, an increased white cell count ($16.7 \times 10^9/l$) and raised C reactive protein (315 mg/l). Blood culture samples taken from a peripheral vein remained negative.

Based on the clinical presentation and primary laboratory tests, septic arthritis of the replaced joint

was suspected. Subsequently, joint fluid aspiration was performed under sterile condition in theatre with laminar air flow system. The aspirated fluid was turbid yellow in colour and Gram-staining revealed the presence of Gram-positive bacteria.

Initial management included arthroscopic washout and debridement of the infected joint as well as intravenous antibiotic treatment according to the sensitivity testing and recommendations of the microbiologist. A further open debridement and washout was planned; however, 2 days following admission to the hospital, the patient developed severe dyspnoea, anxiety and sweating. His jugular venous pressure was raised. Clinical examination suggested severe pulmonary oedema.

INVESTIGATIONS

Microbiology culture from the joint fluid aspirate confirmed an infection with *S bovis*. Antibiotic

Figure 1 Anteroposterior radiograph of the left knee shows a well fixed cemented anatomical graduated component total knee replacement with good alignment of the components.

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sensitivity tests were performed, the treatment regime was adjusted accordingly and included high dose of intravenous penicillin.

Regarding the acute pulmonary oedema a series of tests were performed including chest x-ray (figure 2), chest CT-scan and ECG. An echocardiogram revealed multiple vegetations on the aortic valve, which confirmed the diagnosis of acute aortic valve insufficiency leading to pulmonary oedema.

Because of the known association of *S bovis* with colorectal malignancy and the initial presentation with microcytic anaemia, a work-up for gastrointestinal lesions was performed after the patient's recovery from cardiothoracic surgery. This included CT scans as well as gastroscopy and colonoscopy. The patient's colonoscopy showed evidence of colonic ulcers in the ascending colon that were biopsied and sent for histopathology. This revealed acute inflammatory changes; however, there was no evidence of malignancy in histopathology evaluation of the ulcers.

TREATMENT

Septic arthritis was managed with an arthroscopic joint washout and intravenous antibiotics in the initial phase. Open debridement was considered; however, the patient developed severe infective endocarditis requiring aortic valve replacement. The patient was transferred to a cardiothoracic centre, where he underwent aortic valve replacement surgery. Subsequently he was transferred to a rehabilitation unit where he received supportive treatment. As a result, the patient's cardiac condition improved and his vital signs returned to normal.

OUTCOME AND FOLLOW-UP

The range of movement of the affected knee joint improved as a result of systemic antibiotics and arthroscopic joint washout. He is able to mobilise using elbow crutches; however, he developed constant pain because of underlying chronic infection in his knee joint. He is awaiting revision TKR as one-stage procedure. The patient's recovery from cardiothoracic surgery was uneventful. Although no gastrointestinal malignancy was detected, the patient is under a surveillance programme that included annual colonoscopies.

DISCUSSION

Infection remains one of the most serious complications after joint replacement surgery. The incidence rate for infection after

TKR is estimated to be between 0.5% and 5%. Nevertheless because joint replacements have become one of the most common orthopaedic procedures worldwide, the number of patients affected by postprocedure infection is high.^{4 12} The majority of such infections are caused by *Staphylococcus epidermidis* or *Staphylococcus aureus*.^{3 12}

Management of infected TKR remains difficult. Infection can be subdivided into superficial and deep. Infection can present early (perioperative or postoperative) or late (acute haematogenous or chronic infection).¹³ Management options include antibiotic suppression, arthroscopic washout, open debridement, resection arthroplasty, arthrodesis, amputation and revision surgery (one or two stages).¹⁴

Treatment regime depends on multiple factors as time of infection, patient's general health, soft tissue condition, infective organism and fixation of the prosthesis.¹³ In many cases the initial treatment aims to retain the implant and includes arthroscopic washout or open debridement in combination with appropriate antibiotics. If these measures fail, revision surgery may be indicated in patients with chronic infection, loose prosthesis and drug resistant organisms.

In the current case revision surgery was indicated as the patient developed chronic knee pain which suggest chronic infection or prosthetic loosening. This procedure needed to be postponed until the patient recovers from his heart valve surgery.

There are a few published reports that present cases with late infection associated with *S bovis* after TKR.¹⁻⁴ Similar to our case, all four published reports describe patients in their 70s, presenting with signs and symptoms of septic arthritis 4-40 months after their knee replacement. Patients received different interventions, ranging from arthroscopic washout to revision knee surgery. None of the other four patients were diagnosed with endocarditis. The work-up for gastrointestinal malignancies was performed in all cases. Histopathology findings included mucinous adenocarcinoma of colon, diverticulosis, clear cell carcinoma of colon and villous adenoma of colon.¹⁻⁴ In our case, colonoscopy revealed colon ulcers without any evidence of malignancy. We believe that this patient initially had colonic ulcers and following a bacteraemia he developed acute septic arthritis and endocarditis. However, septic arthritis was the presenting symptom.

To our knowledge, this case is the first published report to present a combination of late septic arthritis affecting TKR, severe infective endocarditis and non-malignant colonic ulcers in the presence of a confirmed *S bovis* infection. We advocate a high index of suspicion for both infective endocarditis and gastrointestinal malignancies when dealing with a confirmed case of infection involving *S bovis*.

Figure 2 Radiograph of the chest shows bilateral perihilar consolidation consistent with severe pulmonary oedema. The patient is intubated with central line in situ.

Learning points

- ▶ Early diagnosis of septic arthritis is important and every attempt should be performed to identify the responsible organism, especially when the patient underwent a previous joint replacement.
- ▶ In cases of infection with *Streptococcus bovis*, there should be a high index of suspicion for endocarditis. In suspected cases urgent multidisciplinary management is advised.
- ▶ The association between *S bovis* and gastrointestinal malignancies has been described before. We advocate a conservative approach in which a full work up is performed and patient is placed under a surveillance programme for early diagnosis of such malignancies.

Competing interests None.

Patient consent Obtained.

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REFERENCES

- 1 Apsingi S, Kulkarni A, Gould KF, *et al.* Late *Streptococcus bovis* infection of knee arthroplasty and its association with carcinoma of the colon: a case report. *Knee Surg Sports Traumatol Arthrosc* 2007;15:761–2.
- 2 Thota PN, Sanaka MR, Conwell DL. A 76-year-old man with septic arthritis. *Cleve Clin J Med* 2002;69:549–53.
- 3 Vince KG, Kantor SR, Descalzi J. Late infection of a total knee arthroplasty with *Streptococcus bovis* in association with carcinoma of the large intestine. *J Arthroplasty* 2003;18:813–15.
- 4 Hernandez-Vaquero D, Cuervo-Olay MC, Suarez-Vazquez A. Association of *Streptococcus bovis* haematogenous infection in total knee replacement with large intestine carcinoma. *Orthopedics* 2008;31:92.
- 5 Emerton ME, Crook DW, Cooke PH. *Streptococcus bovis*-infected total hip arthroplasty. *J Arthroplasty* 1995;10:554–5.
- 6 Dunham WR, Simpson JH, Feest TG, *et al.* *Streptococcus bovis* endocarditis and colorectal disease. *Lancet* 1980;1:421–2.
- 7 Gerber JS, Glas M, Frank G, *et al.* *Streptococcus bovis* Infection in young Infants. *Pediatr Infect Dis J* 2006;25:1069–73.
- 8 Emiliani VJ, Chodos JE, Comer GM, *et al.* *Streptococcus bovis* brain abscess associated with an occult colonic villous adenoma. *Am J Gastroenterol* 1990;85:78–80.
- 9 Vilaichone RK, Mahachai V, Kullavanijaya P, *et al.* Spontaneous bacterial peritonitis caused by *Streptococcus bovis*: case series and review of the literature. *Am J Gastroenterol* 2002;97:1476–9. Review.
- 10 García-Porrúa C, González-Gay MA, Monterroso JR, *et al.* Septic arthritis due to *Streptococcus bovis* as presenting sign of 'silent' colon carcinoma. *Rheumatology (Oxford)* 2000;39:338–9.
- 11 Klein RS, Recco RA, Catalano MT, *et al.* Association of *Streptococcus bovis* with carcinoma of the colon. *N Engl J Med* 1977;297:800–2.
- 12 Gallo J, Kolár M, Novotný R, *et al.* Pathogenesis of prosthesis-related infection. *Biomed Pap Med Fac Univ Palacky Olomouc Czech Repub* 2003;147:27–35.
- 13 Maripuri SN, Debnath UK, Mehtha H, *et al.* Management of infected TKR. *Curr Orthop* 2007;21:314–19.
- 14 Parkinson RW, Kay PR, Rawal A. A case for one-stage revision in infected total knee arthroplasty? *Knee* 2011;18:1–4.

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