CASE REPORT

Combined infection of vertebroplasty and aortic graft after intravesical BCG treatment

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SUMMARY

We report a 58-year-old man with spondylodiscitis by *Mycobacterium bovis-BCG* 3 years after intravesical BCG treatment, and shortly after a vertebroplasty. Further examination showed a psoas abscess and oedema around an endovascular aortic graft, which had been placed 1 year earlier. Puncture of the psoas abscess also grew *M bovis-BCG*. The patient recovered with a combination of antituberculous treatment and surgery. With hindsight a mycotic aneurysm had been present at the time of aortic graft placement and spondylodiscitis at the time of vertebroplasty. This case shows that low grade and longstanding infections may occur following intravesical BCG installation.

BACKGROUND

I think this case is important, because it shows that infectious complications of BCG installation like aortitis and spondylodiscitis can present lately, insidious, simultaneously at different sides and can be initially misdiagnosed. Although surgical removal of the endovascular repair of the aorta (EVAR) was mandatory for the mycotic aneurysm, treatment with antituberculous drugs alone was successful for spondylodiscitis despite the presence of foreign material.

CASE PRESENTATION

A 58-year-old man with long-standing low back pain and previously established discopathy of vertebra L4–L5 was admitted for vertebroplasty. There were no fever, rigours or night sweats and neurological examination was normal. His medical history included myocardial infarction, stroke and prostatectomy. In addition, the patient received repeated BCG bladder instillations (Onco-Tice), for a minimal invasive bladder carcinoma 3 years before presentation, and an EVAR because of an abdominal aortic aneurysm 12 months before presentation.

INVESTIGATIONS

Blood examination showed a C reactive protein (CRP) of 10 mg/l and blood sedimentation rate (ESR) of 20 mm/h. An x-ray of the thoracolumbal spine showed a collapsed vertebra at level Th8–Th9. A dual energy x-ray absorptiometry scan showed osteoporosis with a bone density T score of −2.5. MRI confirmed a vertebral compression fracture of Th8–Th9 with a local oedema. There was some loss of the intervertebral space, but no signs of spondylodiscitis. It was concluded that the patient suffered from a collapsed vertebra due to osteoporosis and he was admitted for vertebroplasty. The vertebroplasty procedure was preformed without any complication, but the low back pain persisted and now weight loss and night sweats occurred. A new MRI of the spine 3 months later, showed progression of the loss of the intervertebral space and signs of a low-grade spondylodiscitis. A biopsy was performed and revealed necrotising granulomas, with cultures positive for *Mycobacterium bovis-BCG*. A CT scan of the abdomen showed a swelling around the EVAR and an abscess of the left psoas muscle (figure 1). In retrospect, CT scans of the aortic aneurysm diagnosed 14 months earlier showed a soft tissue swelling around the calcined aneurysm wall compatible with an inflammatory or mycotic aneurysm. At that time our patient was clinically well, without fever or weight loss and with normal CRP and ESR. Therefore it had been concluded that the patient suffered from an inflammatory and not a mycotic aneurysm and an EVAR was performed.

Needle aspiration of the psoas abscess showed acid-fast bacilli on microscopic examination, PCR was positive for *Mycobacterium tuberculosis* complex.

TREATMENT

Initially, the patient was treated with isoniazid, rifampicin, pyrazinamide and ethambutol. Moxifloxacin was added because of good penetration in tissue and graft material. Pyrazinamide and ethambutol were stopped after cultures showed *M bovis-BCG*.

OUTCOME AND FOLLOW-UP

Six months after the start of therapy psoas abscess and swelling around the aorta persisted. The

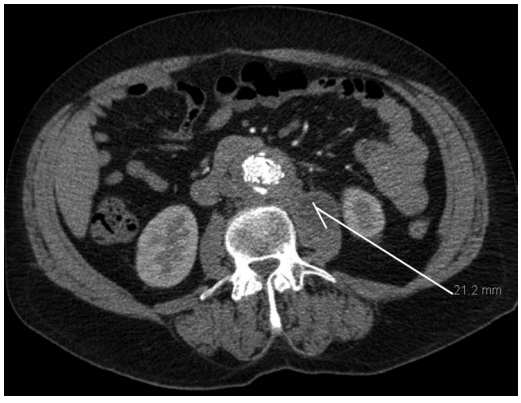

Figure 1 An abdominal CT scan of our patient: an abscess in the left musculus psoas (arrow) and the mycotic abdominal aortic aneurysm with an endovascular graft in it.

To cite: Santbergen B, Vriens PHWE, de Lange WCM, *et al*. *BMJ Case Reports* Published online: [*please include* Day Month Year] doi:10.1136/bcr-2012-008161

endovascular graft was removed following surgical debridement of the infected abdominal aorta, and spiral vein reconstruction of the aorta was performed using the greater saphenous vein. Cement of the vertebroplasty remained in situ. Tuberculostatic agents were continued for another 6 months after surgery after which the patient made a full recovery.

Until now, 18 months after discontinuation of antituberculous drugs, the patient is in good health. MRI of the spine shows no signs of infection and the vascular function of the spiral vein is adequate without signs of infection.

DISCUSSION

BCG is a live, attenuated strain of *M bovis*, which is used as immunotherapy in patients with bladder cancer. The antitumour activity of BCG appears to be a local phenomenon, in which the mechanism of action of BCG in bladder cancer probably is the specific anti-BCG cell-mediated immunity. This results in inflammation and elimination of tumour cells.[1–6]

Side effects of BCG-treatment can be divided into hypersensitivity reactions and infectious complications. The latter can present early after the treatment that is within 3 months or late, until many years after BCG-installation.

Late side effects consist of reactivation of the infection after apparent initial immunological control of early dissemination. They occur more than 1 year after the first BCG treatment. Most affected areas are the genitourinary tract, vertebral bones, blood vessels and retroperitoneal tissues. Our patient is an example of a late side effect with clinically disseminated infection in both vertebra and aorta.[2]

Our patient is unique because prosthetic material was inserted at two different sites without awareness of a low-grade infection with *M bovis-BCG*. Mycotic aneurysm and spondylodiscitis after BCG-immunotherapy are rare, but with serious complications. The exact prevalence is unknown.

About 17 cases have been described in the international literature of patients suffering from a mycotic aortic aneurysm due to *M bovis* after intravesical immunotherapy with BCG.[7–22] In most of these cases the diagnosis was delayed as the infection was not recognised. The exact mechanism of spread is not known. Three possible mechanisms have been described. The first mechanism is haematologically spread through the vasa vasorum. The second mechanism is lymphatically spread by retroperitoneal lymph nodes and the third mechanism is contiguously spread from an infectious focus as a psoas abscess or spondylodiscitis to the aorta.[6]

In our patient however, the spondylodiscitis was located on level Th8–Th9, whereas the mycotic aneurysm was at a lumbar level. Therefore haematogenous spread through the vasa vasorum is the most likely mechanism of dissemination to the aorta in our patient.[7–10]

In a review of 31 patients with aneurysms after BCG-immunotherapy, 16 of them had an aneurysm of the abdominal aorta. The mean time of diagnosis was 23 months after BCG-therapy (range 4–69 months). The most frequent clinical symptoms at presentation were abdominal or back pain (57%), general malaise, a pulsatile or a painful abdominal mass and fever.[10] Our patient suffered from back pain, weight loss and night sweats.

There is a discussion whether the aneurysms precede BCG-immunotherapy and become secondarily infected with *M bovis-BCG* or that the aneurysms are a direct result of a mycotic infection with *M bovis-BCG*. Some authors recommend screening for abdominal aneurysms before starting treatment with intravesical BCG-immunotherapy.[11] Our patient was not screened for aneurysms, therefore it is unknown whether or not an aneurysm was already present at the time of the BCG-installation.

Surgical debridement is the cornerstone in treating an infected abdominal aneurysm. However, resection of the abdominal aorta and suture closure of the stump followed by an extra-anatomical bypass contains the risk of blow out of the aortic stump. Therefore, in situ reconstruction is preferred. Owing to the low virulence of *M bovis-BCG* it seems relatively safe to insert a prosthetic graft, provided this is combined with antituberculous drugs.[10 12–15] Persistence or recurrence of an infection remains a risk and recently a new technique to reconstruct the infected abdominal aorta has been developed by vascular surgeons. The greater saphenous vein is harvested with hardly any morbidity to the leg. The vein is cut open longitudinally and the venous ribbon is sewn as a spiral in order to create a tube to reconstruct the aorta. The technical success rate of this method is almost 100% with a relatively low morbidity and mortality and the advantage of absence of foreign material.[23 24] Patients who are not treated after surgery with antituberculous drugs have an increased risk to develop recurrence of mycotic aneurysm. Therefore, additional treatment with antituberculous drugs is mandatory.[10] The duration of antimycobacterial regimes after vascular infection differ widely in the literature between 3 months and 1 year after the diagnosis. *M* bovis is usually resistant to pyrazinamide, but sensitive for isoniazid, rifampicin and ethambutol. The combination of these tuberculostatic agents should be initiated after results of sensitivity testing.[7 8 10 12]

Spondylodiscitis due to BCG-immunotherapy has been described in 12 previous cases in the Anglo-Saxon literature.[8 25–35] It may be the result of haematogenous spread to the anterior vertebral corpora where arterial supply of the vertebra converges. In most cases the thoracolumbar vertebrae are involved. The time between BCG-immunotherapy and presentation of BCG-spondylodiscitis differs from 3 months to 12 years.[25 26] Back pain is the most frequent symptom of BCG-spondylodiscitis which was also present in our patient and was initially mistaken for osteoporosis. Complications of BCG-spondylodiscitis are instability of the spine and abscess formation of the vertebrae.[8 25 27] Neither there are case reports describing BCG-spondylodiscitis after vertebroplasty and nor there is any literature on the outcome after placing cement in a vertebra with a low-grade infection like our patient. Treatment of BCG-spondylodiscitis consists of antimycobacterial treatment and surgical intervention. Surgical intervention is necessary in the case of spinal instability or abscess formation.[25] In these cases surgical intervention is simultaneously combined

Learning points

- Infectious complications of BCG installation like aortitis and spondylodiscitis can present lately, insidious, simultaneously at different sides and can be initially misdiagnosed.
- Always evaluate if an aortic aneurysm can be of mycotic origin before you place foreign material in it.
- Low-grade tuberculous spondylodiscitis can be easily misdiagnosed. In the case of a relatively young man presenting with a collapsed vertebra, osteoporosis should not readily be excepted as the only diagnosis.
- Treatment with antituberculous drugs alone can be successful for spondylodiscitis despite the presence of a foreign material.

with antituberculous drugs.[29 30] The duration of treatment varies between 9and 12 months.[25–29 31 34 35] In our patient the spine had already stabilised because of the cement. The key question was whether the infection could be cured with foreign material in situ, since the treatment with antituberculous drugs was delayed for more than half a year after installation of the cement. In our patient the antituberculous drugs were continued for a total duration of 12 months (6 months after vascular repair).

Competing interests None.

Patient consent Obtained.

Provenance and peer review Not commissioned; externally peer reviewed.

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