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Case Report Open Access

Mycobacterium Bovis mycotic aneurysm of the visceral aorta after intravesical BCG therapy

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Abstract

Case report of a 73-year-old man with Mycobacterium bovis BCG supra renal saccular aortic aneurysm eight months after intravesical BCG therapy.

Introduction

Adjuvant immunotherapy by intravesical instillation of the attenuated live stain of Mycobacterium bovis, Bacillus Calmette-Guérin (BCG) is recommended for patients with intermediate and high risk urothelial non muscle invasive bladder cancer (NMIBC) and carcinoma in situ[1]. Most frequent adverse effects due to intravesical BCG therapy are local bladder symptoms such as cystitis (67%), fever (25%), macroscopic hematuria (23%) and urination frequency (71%). BCG-sepsis prevalence is less than 0.5%[2].

We reported the surgical management of an asymptomatic supra renal sacciform aneurysm secondary to *Mycobacterium bovis* infection eight months after intravesical BCG therapy.

Case Report

We report the case of a 73-year-old man with a history of chronic renal failure due to renal colic recurrence since 2009. He already presented with acute renal failure in 2013 and benefited from double J stenting and endocorporeal laser lithotripsy. In August 2021 a high risk urothelial NMIBC (pT1a) was diagnosed and treated with transurethral resection and intravesical BCG. Intravesical instillations were stopped after 5 weekly rounds because of systemic reaction with fever, general state alteration and granulomatous pneumonitis. The patient also had clinical symptoms of cystitis. Bacteriological urine culture demonstrated positive leukocytes, and more than 3 bacteria types. The patient received 10 days of oral antibiotherapy with ofloxacin. A CT-scan did not demonstrate any aortic aneurysm at this time. (Figure 1) The patient did not undergo anti-tuberculous therapy because of negative blood culture and spontaneous recovery.

Eight months after the last round of intravesical BCG, the patient was hospitalized for a general state alteration and acute renal failure (281µmol/L). Renal ultrasound and D-scan of the renal arteries were normal. Because of tubular proteinuria (1g/l) and renal colic history, a tubulo-interstitial nephropathy was suspected. A transjugular renal biopsy was planned. A CT-scan was performed to search urothelial cancer recurrence. It demonstrated a 6 cm in diameter sacciform aneurysm of the supra-renal aorta, posterior

in regard of the superior mesenteric artery level. (Figure 2) Hemodynamic parameters and physical examination were within normal limits. White blood cell count was 5.22G/L and protein C reactive 33mg/L. Blood culture were negative. Leukocyte scintigraphy was negative. PET-scan showed intense fixation of the aneurysm. Diameter, morphology of the aneurysm and it's high evolutive character made surgery mandatory. Surgery performed through a left retroperitoneal approach, consisted after supra-coeliac aortic clamping and general heparin, on an aneurysm complete resection. Aortic graft reconstruction was performed with the Dacron graft with end-to-end proximal and distal aortic anastomosis. Celiac trunk and SMA were reimplanted on two short PTFE grafts previously anastomosed laterally on the main aortic graft. The surgery lasted 160 minutes and was uneventful. Refeeding was allowed after resumption of normal bowel, during the first post-operative week. Alteration of the renal failure was noticed during the post-operative course (419µmol/L) without dialysis criteria. Improvement of the renal function was noticed at day 8 after surgery.

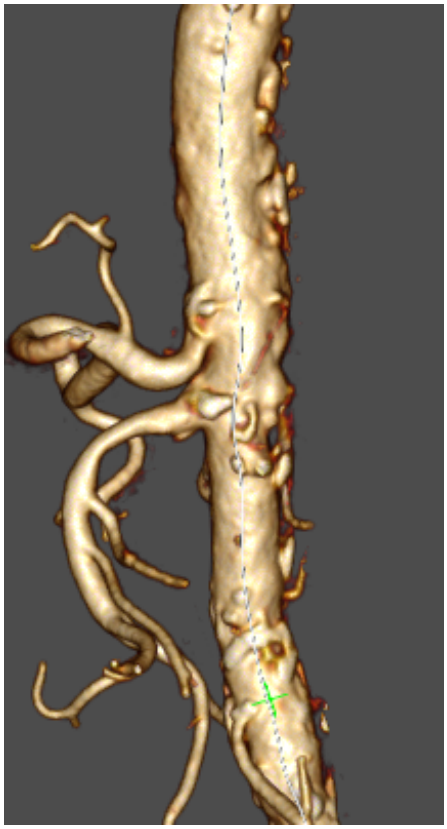

Figure 1: CT-scan, 15th November 2021, showing no signs of aneurysm of the posterior thoracic aorta

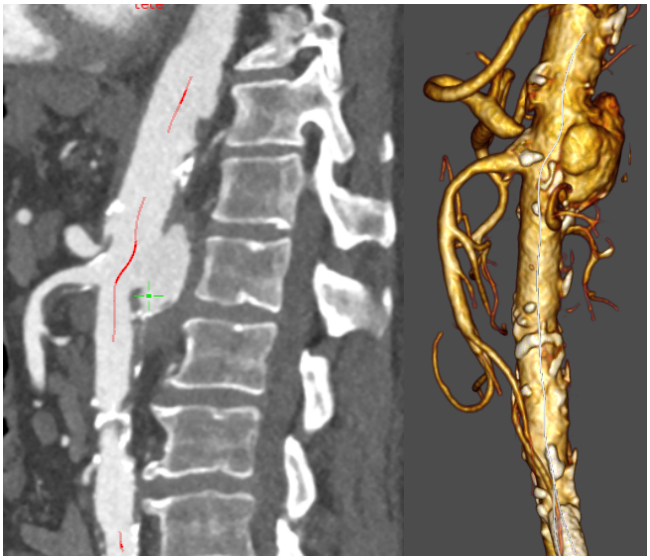

Figure 2: sagittal CT-scan and 3D reconstruction, 18th March 2022, showing aneurysm of the supra-renal aorta posterior from the superior mesenteric artery

Pathological analysis from the excised segment of the supra renal aortic wall demonstrated chronic inflammation, calcium deposits and endothelial ulceration. Pathology from the superior mesenteric artery demonstrated endothelial ulceration with bleeding and inflammation. Results were matching with atherosclerosis and chronic inflammation. The specimen sent for culture was segment of the supra renal aortic wall. Sample tested positive for Acid-Fast Bacillus with auramine stain showing acid fast organism exhibiting bright yellow-green fluorescence against an orange red backround. Because of positive auramine stain, the Ziehl-Neelsen (ZN) staining method was performed and showed pink rods against blue backround. Culture of the abdominal aortic wall sample was positive for Mycobacterium tuberculosis complex (BACTET MGIT 960 system, Becton Dickinson Microbiology System, Sparks, NV, USA). Incubation showed growth of Mycobacterium bovis BCG (GenoType system, HAIN LifeScience, Germany)

Medical therapy with isoniazid, rifampicin and ethambutol was then introduced.

Blood culture remained negative. Ethambutol was stopped at day 15 because of ocular toxicity. Because of chronic renal failure, post-operative CT-scan was not performed but duplex-scan demonstrated good aortic graft patency. The patient was discharged at day 24. Anti-tuberculosis therapy was prescript for 9 months with regular biological and clinical checking. Three months after the surgery the patient was well and had no abdominal symptoms but suffered from persisting renal dysfunction (308µmol/L). An arterio-venous fistula was then created for dialysis.

Discussion

We reported the case of a 73-year-old man with mycotic aneurysm of the thoracic aorta due to *Mycobacterium Bovis*, 8 months after intravesical BCG-therapy.

Serious systemic adverse reactions following instillations are less than 5%, with granulomatous prostatitis, pneumonitis, hepatitis, hypersensitivity reactions and sepsis[2].

The pathogenesis of the systemic infection is poorly understood and can involve a combination of the infectious potential of Mycobacterium and local inflammation with hypersensitivity[3]. BCG systemic infection is a clinically based diagnosis, microbiologic and histopathologic evidence of *Mycobacteria* are usually negative[4]. In our case, the patient presented several signs of early complications such as fever, general state alteration and granulomatous pneumonitis. However, the patient did not receive antibiotherapy. Several authors showed that the prognosis of systemic infection is good if the treatment is started early[5].

Between 1989 and 2015, only 26 cases of BCG-related vascular infection have been reported[6]. Among them, 14 involved the infrarenal aorta, 4 the femoral arteries, 1 the aortic arch, 3 the carotid arteries, 3 the supra renal aorta and 1 the popliteal artery. Risk factors for these complications are traumatic catheterization, concurrent cystitis, short interval between surgery and instillation and all kinds of immunosuppression[7]. To avoid these rare but life-threatening complications, BCG instillation two weeks after a transutheral resection or an overt traumatic catheterization is considered an absolute contraindication[1].

In the literature, average time between initial BCG therapy and aortic aneurysm diagnostic is 19 months[6]. In our case, the aortic aneurysm diagnosis occurred only 8 months after initial BCG therapy. We know that chronic kidney disease predisposes patients to an increased risk of infections, virus-associated cancers and a diminished vaccine response[8]. In our case, it could be a predisposing factor. The prevalence of mycotic aneurysm is 0.6%-2% of all aortic aneurysm in Europe and USA[9]. The rarity of the disease implies a lack of consensus regarding diagnostic criteria and reporting standards. There is no quality evidence to support either open surgical repair (OSR) or endovascular aortic repair (EVAR) as the primary repair strategy. The ESVS guidelines recommend that the surgical repair is based on patient status, local routines and experience, with EVAR being an acceptable alternative to OSR (Class IIa, Level of Evidence C)[9].

Open surgical repair includes resection of the aneurysm, extensive local debridement and revascularization by extra anatomical bypass or in situ reconstruction. Options for in situ reconstruction include autologous vein, cryopreserved arteries, bovine pericardium or if unavailable prosthetic graft (PTFE, Dacron or antibiotic soaked Dacron grafts). EVAR raises concerns about leaving the infected tissue in place. In emergency situations EVAR may be a bridge to later definitive surgery and for those unfit for OSR be a permanent or palliative treatment[9]. In a retrospective cohort of 26 patients, DANG et al[10] demonstrated acceptable clinical outcomes with OR and EVAR at 1 year of follow up. A recent large European multicenter study including 123 patients with 130 MAA showed a 91% survival at 30 days and 55% survival at five years after EVAR[11]. In a German single center study on 33 patients, the 30 days survival was 63% and 5-years survival 15% after OSR[12].

In our case, we didn't consider any endovascular repair option. Indeed, because of the aneurysm location on the visceral aorta a multibranched or fenestrated graft would have been mandatory. Moreover, delivery's delay of such tailored graft seemed too long to us in regard of the aneurysm rapid evolution. The option of an open repair with prosthetic graft reconstruction was consistent with patient's good general state without cardiac comorbidity. Surgery was also followed with a 9 months oral antibiotherapy.

Conclusion

We presented the case of a 73-year-old man with *Mycobacterium bovis BCG* supra-renal saccular aortic aneurysm discovered only 8 months after intravesical BCG therapy. An open surgical strategy allowed a complete aortic repair and confirmation of the mycobacterial etiology.

There has been no duplicate publication or submission elsewhere, and all authors have read and approved the manuscript. None of the authors report conflict of interest.

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