

Inflammation and Infection

Case Presentation: Lung Consolidation as Sequelae of BCG Sepsis After Combined Intravesical and Intraurethral BCG



Jeffrey R. Strich^a, Sam Brancato^b, Rebecca Dolan^b, Mahir Maruf^b, Mohammad R. Siddiqui^b, Thomas Sanford^b, Christa Zerbe^a, Piyush K. Agarwal^{b,*}

^a Division of Clinical Research, National Institute of Allergy and Infectious Diseases, National Institutes of Health, Bethesda, MD 20892, USA

^b Urologic Oncology Branch, National Cancer Institute, National Institutes of Health, Bethesda, MD 20892, USA

ARTICLE INFO

Article history:

Received 10 April 2017

Accepted 20 April 2017

Keywords:

BCG

Sepsis

Urethral carcinoma

ABSTRACT

BCG sepsis is rarely seen with modern intravesical therapy and therefore its presentation may not be apparent to recently trained urologists. We describe BCG sepsis occurring in a patient treated with combined intravesical and intraurethral BCG which resulted in lung consolidation with acid-fast bacilli requiring cessation of BCG and initiation of systemic antibiotic therapy.

© 2017 Published by Elsevier Inc. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

Introduction

Intravesical therapy with *Bacillus Calmette–Guérin* (BCG) after transurethral resection of bladder tumor (TURBT) is frequently used in patients with intermediate- to high-risk non-muscle invasive urothelial carcinoma of the bladder. Serious toxicity from BCG is rare, and follows systemic absorption of BCG. Referred to as BCGosis, this complication presents with generalized symptoms, and may be accompanied by lung and liver involvement. Pulmonary manifestations of BCGosis typically present as a characteristic diffuse miliary pattern on imaging. Here we report an atypical pulmonary manifestation of BCGosis.

Case presentation

A 66-year-old gentleman developed recurrent Ta/T1 high grade bladder urothelial carcinoma (UCC) and low grade UCC in the prostatic and penile urethra after induction BCG. He refused cystectomy, and therefore was scheduled for 6 weeks of BCG therapy alternating weekly with intraurethral or intravesical administration.

Following the fourth BCG treatment (2nd intraurethral administration), he developed hematuria, chills, and fever of 101.5°F. Work-up included bacterial/mycobacterial blood cultures,

transesophageal echocardiogram, and full body imaging, which were all negative. Bone marrow aspirate showed non-necrotizing granulomas, concerning for disseminated BCG (Fig. 1A). He was started on isoniazid, rifampin, and ethambutol, and his fever improved.

A week later, he presented with persistent fevers, and CT chest showed mass-like peripheral consolidations in the right and left lower lobes (Fig. 1B). The right lower lobe peripheral consolidation was biopsied showing few acid-fast bacilli (Fig. 1C). Systemic antibiotic therapy was continued and he improved. He completed 9 months of systemic therapy, and follow-up CT chest showed that these findings had resolved (Fig. 1D). He ultimately underwent a cystourethrectomy with urinary diversion. This case supports presentation of disseminated BCG with a multifocal pulmonary pneumonia as a sequela after intravesical/intraurethral therapy rather than the classic miliary lung pattern.

Discussion

Intravesical BCG in patients with non-muscle invasive bladder cancer is a well tolerated therapy, and serious complications are rare. In addition to generalized symptoms, such as fever and malaise, dyspnea and eventual respiratory failure may follow. While pulmonary complications are rare they classically are associated with 2 forms: pneumonitis and disseminated miliary.¹ CT imaging in these patients' typically show nodular or interstitial patterns, different than the consolidation seen this patient. In any case, a disseminated BCG infection is thought to be due to hematogenous spread, and as such, traumatic catheterization or recent TURBT can put patients at

* Corresponding author. Center for Cancer Research, National Cancer Institute, Building 10 – Hatfield CRC, Room 2-5952, Bethesda, MD 20892-1210, USA.

E-mail address: piyush.agarwal@nih.gov (P.K. Agarwal).

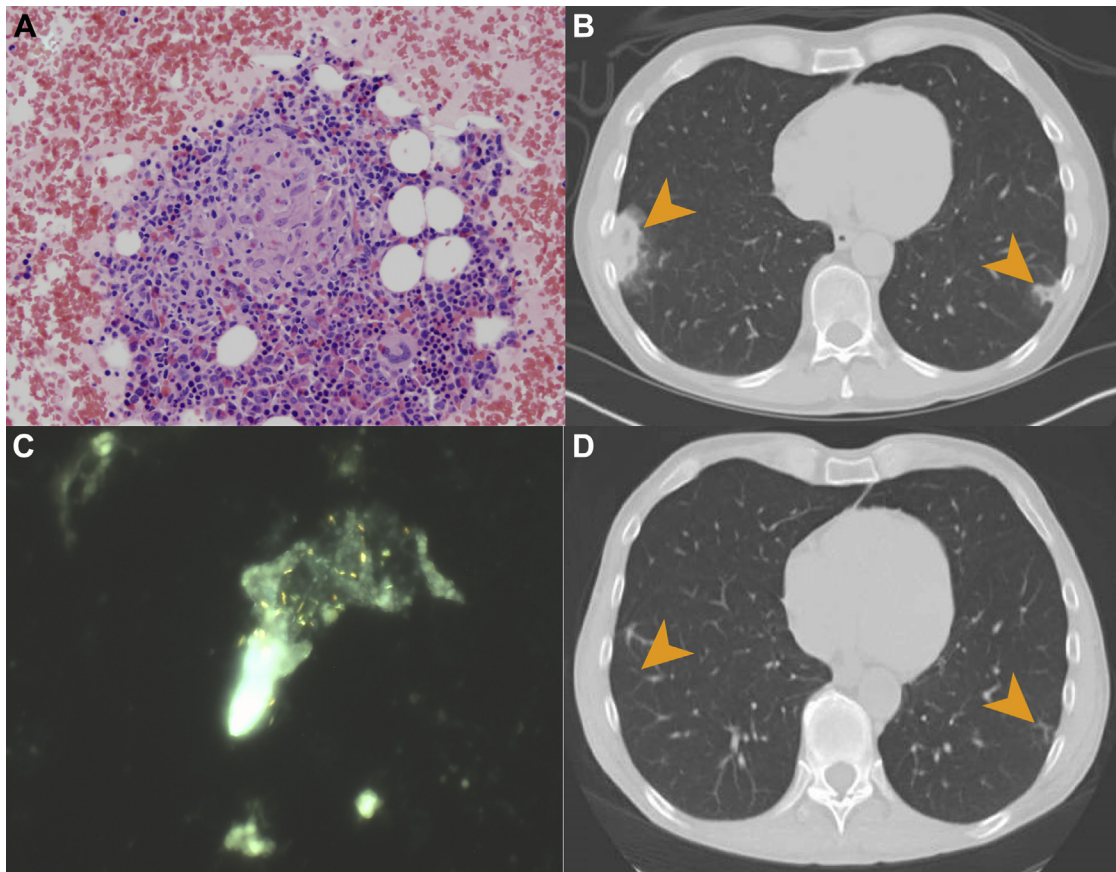


Figure 1. A) Bone marrow biopsy showing granulomatous inflammation, B) Initial CT scan with peripheral right lower lobe consolidation and small left lower lobe consolidation (Orange arrows), C) Auramine-rhodamine stain showing acid-fast bacilli, D) Follow up CT scan showing resolution of bilateral lung consolidations (Orange arrows).

risk for such complications.² We hypothesize the microtrauma and disruption of urethral mucosa from catheterization as a risk for BCG sepsis in patients treated with intraurethral BCG instillation.³ Although the prevalence of BCGosis in intraurethral administration is unknown, providers seeking to administer intraurethral BCG should counsel patients about the potential risk factor of BCGosis and should monitor patients during treatment.

The mechanism of subsequent BCGosis may be a combination of an infectious process by the attenuated *Mycobacterium bovis*, and a delayed hypersensitivity reaction (type IV).⁴ Pathologic findings of miliary BCG yield granulomas that are often negative for acid-fast bacteria, thus supporting the theory of a systemic BCG induced hypersensitivity reaction. Moreover, blood, sputum, and bronchoalveolar lavage cultures are frequently negative for mycobacteria.⁵ Mass-like consolidations in the lungs are a rare presentation of pulmonary complications from intravesical BCG. Nonetheless, consolidations in the lungs, such as the ones seen in this patient's CT chest, suggest an infectious component to these pulmonary complications. Acid-fast bacteria seen on biopsy further implicate the attenuated *M. bovis* in infectious involvement. In this patient, multi-drug therapy led to a clinical and radiographic improvement in his condition. It remains imperative that antibiotics be administered even in the absence of observable mycobacteria or positive cultures, and physicians should have a high index of suspicion for BCGosis despite atypical pulmonary presentation.

Conclusion

Disseminated BCG is a rare complication of intravesical BCG therapy for non-muscle invasive bladder cancer, and usually

presents in a miliary pattern. This patient's CT imaging demonstrated multi-focal pulmonary consolidations with acid-fast organisms seen on biopsy suggestive of an atypical presentation. Additionally, the presence of acid-fast organisms in this case provides evidence for an infectious component to BCGosis.

Conflict of interest

There is no conflict of interest.

Acknowledgements

This research was supported by the Intramural Research Program of the NIH, National Cancer Institute, Center for Cancer Research (ZIA BC 011528).

References

1. Jasmer RM, McCowin MJ, Webb WR. Miliary lung disease after intravesical bacillus Calmette-Guerin immunotherapy. *Radiology*. 1996;201(1):43–44.
2. Lamm DL, Steg A, Boccon-Gibod L, et al. Complications of Bacillus Calmette-Guerin immunotherapy: review of 2602 patients and comparison of chemotherapy complications. *Prog Clin Biol Res*. 1989;310:335–355.
3. Stensballe J, Looms D, Nielsen PN, Tvede M. Hydrophilic-coated catheters for intermittent catheterisation reduce urethral micro trauma: a prospective, randomised, participant-blinded, crossover study of three different types of catheters. *Eur Urol*. 2005;48(6):978–983.
4. Delimpoura V, Samitas K, Vamvakaris I, et al. Concurrent granulomatous hepatitis, pneumonitis and sepsis as a complication of intravesical BCG immunotherapy. *BMJ Case Rep*. 2013;2013.
5. Colmenero JD, Sanjuan-jimenez R, Ramos B, Morata P. Miliary pulmonary tuberculosis following intravesical BCG therapy: case report and literature review. *Diagn Microbiol Infect Dis*. 2012;74(1):70–72.