Complications of Intravesical BCG Immunotherapy for Bladder Cancer

Bacillus Calmette Guerin, a live attenuated strain of Mycobacterium bovis developed in Lille, France in the early 20th century as a vaccine to address the European tuberculosis epidemic, is an effective adjuvant treatment when administered into the bladder following transurethral resection of intermediate and high-grade non-muscle invasive bladder cancer. Interestingly, one of the earliest observations showing the utility of BCG as a form of cancer immunotherapy was noting the decreased incidence of cancer in patients with tuberculosis and the higher incidence of healed TB in cancer survivors. In this multi-institutional paper in the current issue, Dr. Daniel Green and colleagues briefly review and illustrate the entity of non-muscle-invasive bladder cancer and the role of BCG in treatment. Adverse effects of intravesical BCG are divided into local and systemic and are listed in table format. The diagnosis of BCG-related complications requires histopathologic identification of granulomas, ideally with a BCG-positive culture. Local complications can involve the bladder, prostate, scrotum, upper urinary tract, and penis. Granulomatous prostatitis is the most common and diagnostically challenging of the local adverse effects, as prostatic involvement can mimic prostate cancer on multi-parametric MR. Systemic complications are rare, but include spondylodiscitis mimicking Pott disease from TB, arteritis with mycotic pseudoaneurysm formation, and miliary pulmonary involvement. The final section of the paper addresses the difficulties in obtaining a definitive diagnosis, particularly the distinction from malignancy when BCG complications present as masses.

Imaging of Histiocytosis in the Era of Genomic Medicine

Recent advances in the identification of oncogenic driver mutations in patients with histiocytosis has redefined this entity, which is characterized by proliferation of macrophage or dendritic cells, as a neoplastic disorder. The classification of histiocytic disorders is provided in Table 2, with Langerhan cell histiocytosis the most common of these rare entities. Following a brief review of the BRAF and MEK1 mutations seen in up to half of all patients with LCH and Erdheim Chester Disease, including a summary on the use of vemurafenib as a targeted BRAF inhibitor in lieu of standard chemotherapy, the paper begins with an extensive review of the imaging manifestations of LCH. LCH is best divided into single site and multisite disease; single site disease, for example a single lytic bone lesion, most often affects the bones, skin, and lymph nodes and has a favorable prognosis. Multisystem LCH is more unpredictable, with involvement of a risk organ such as the liver, spleen or bone marrow associated with the BRAF mutation and a less favorable prognosis. It is important for the radiologist to raise the possibility of BRAF-mutant LCH when identifying risk organ involvement on imaging, as it can have prognostic and therapeutic implications. The less common histiocytic disorders are then discussed; Erdheim Chester disease is characterized by lipid-laden histiocytic tissue infiltration and is distinguished from LCH primarily by clinical presentation and histologic and immunocytochemical analysis. Table 6 lists the imaging manifestations of ECD in different organ systems; bilateral symmetric cortical osteosclerosis of long bones sparing the epiphyseal regions is virtually pathognomonic. Rosai Dorfman Disease is more common in children and manifests most commonly as nodal disease, although extranodal involvement is seen in up to 43% of patients. Histiocytic sarcoma and interdigitating dendritic cell sarcoma are extremely rare, but the paper provides imaging examples of each of these disorders.
Transcatheter Aortic Valve Replacement: Alternative Access beyond the Femoral Arterial Approach
RadioGraphics 2019; 39:30-43
Demetrios A. Raptis, MD • Michael A. Beal, MD • David C. Kraft, MD • Hersh S. Maniar, MD • Andrew J. Bierhals, MD, MPH

While the retrograde transfemoral approach remains the most common access route for performance of transcatheter aortic valve replacement or TAVR for patients with aortic stenosis, alternative approaches may need to be considered in a significant minority of patients. In this paper from the radiology and surgery departments at the Washington University School of Medicine, the authors review the imaging issues related to each of these alternate approaches. The subclavian approach, in particular using the left subclavian artery, is the preferred alternative access route when a transfemoral approach cannot be utilized. Factors for the radiologist to note and report are similar to those of a transfemoral approach and include a narrowed vessel (<6 mm), severe calcification, and excessive tortuosity. Other important things to note include left internal mammary artery to left anterior descending coronary artery bypass grafts and the presence of an ipsilateral dialysis fistula. A transaortic or direct aortic access for TAVR is considered in patients who are ineligible for transfemoral or subclavian arterial approaches. An aortotomy is made via a mini-sternotomy or right anterior thoracotomy in approximately 1/3 of patients succumbing to the disease. Associated with tuberculosis is also well documented; the histopathologic manifestations of tuberculous EPS are distinct from those of tuberculous peritonitis. Primary or idiopathic EPS comprise the remaining cases without clear etiology. The presenting symptomatology of EPS are typically vague and non-localizing, characterized by those of subacute intestinal obstruction. Radiographic, fluoroscopic and US findings include the presence of ileal loops clustered in a fixed, serpentine or concertina-like configuration in the central abdomen; the paper provides several illustrative cases with typical radiographic, barium and US findings. Oral and IV-enhanced CT is obviously the modality of choice for diagnosis, and routinely depicts the encapsulating membrane and centralized small bowel loops in affected patients. While dilated small bowel and angulation and kinking of loops may be seen, no transition point is usually identified; visceral peritoneal calcification also may be evident. Findings on abdominal MRI and FDG-PET findings have been described in EPS, but these modalities are not typically employed for diagnosis. Intraoperative findings of EPS include the identification of a whitish, opaque and thickened peritoneal membrane; histopathologic examination reveals a fibrocartilaginous membrane with minimal inflammatory infiltrate; epithelioid granulomas can be seen in tubercular EPS. The differential diagnosis includes peritoneal carcinomatosis and internal hernias, conditions usually readily distinguished from EPS. Management has shifted, particularly in those diagnosed late in their course of disease, from surgical membrane resection to more conservative treatment with discontinuation of peritoneal dialysis and the administration of ACE inhibitors, immunosuppressants, and tamoxifen. The overall prognosis is poor with approximately 1/3 of patients succumbing to the disease.

Encapsulating Peritoneal Sclerosis: The Abdominal Cocoon
Manphool Singhal, MD • Satheesh Krishna, MD • Anupam Lal, MD • Sabarish Narayanasamy, MD • Amanjit Bal, MD • Thakur D. Yadav, MS • Rakesh Kochhar, MD • Saroj K. Sinha, MD • Niranjan Khandelwal, MD • Adnan M. Sheikh, MD

In their review of this rare but serious condition that can produce bowel obstruction, a multi-institutional group from Canada and India detail the imaging findings associated with encapsulating peritoneal sclerosis or EPS. Previously known by a variety of names including sclerosing peritonitis and abdominal cocoon, this condition is most commonly recognized in association with peritoneal dialysis and is seen in up to 20% of patients receiving continuous peritoneal dialysis for more than 8 years. An association with tuberculosis is also well documented; the histopathologic manifestations of tuberculous EPS are distinct from those of tuberculous peritonitis. Primary or idiopathic EPS comprise the remaining cases without clear etiology. The presenting symptomatology of EPS are typically vague and non-localizing, characterized by those of subacute intestinal obstruction. Radiographic, fluoroscopic and US findings include the presence of ileal loops clustered in a fixed, serpentine or concertina-like configuration in the central abdomen; the paper provides several illustrative cases with typical radiographic, barium and US findings. Oral and IV-enhanced CT is obviously the modality of choice for
Revisiting Prostatic Cancer Recurrence with PSMA PET: Atlas of Typical and Atypical Patterns of Spread
Felipe G. Barbosa, MD • Marcelo A. Queiroz, MD • Rafael F. Nunes, MD • Publio C. C. Viana, MD • José Flávio G. Marin, MD • Giovanni G. Cerri, MD, PhD • Carlos A. Buchpiguel, MD, PhD

Prostate cancer recurrence following curative-intent radical prostatectomy or radiation therapy occurs in 30-50% of patients in the first 10 years after initial therapy. PSMA PET is an accurate imaging modality in the assessment of patients with biochemical recurrence and can display patterns of disease spread not previously appreciated. The authors begin their paper with a review of the anatomy unique to the infant that predisposes to various injuries from nonaccidental trauma. Assessment for possible skull fractures from AHT can be difficult; interested readers can refer to a September 2015 RadioGraphics article by Idriz and colleagues that reviews normal and developmental skull anatomy https://doi.org/10.1148/rg.2015140177. Subdural hematoma is the most common intracranial finding in AHT; an interhemispheric or posterior fossa location is highly associated with AHT. The paper addresses the distinction of subdural hematoma from prominent subarachnoid spaces as seen in benign enlargement of the subarachnoid spaces and discusses the issue of mixed-attenuation collections. Rupture and eventual thrombosis of bridging veins can be seen due to acceleration/deceleration and rotary motion of the head; extra-axial blood clots with a tubular shaper in the parasagittal regions should suggest bridging vein thrombosis. A variety of parenchymal injuries can be seen in AHT. These include cerebral contusions, which while not specific for AHT are uncommon in infants, diffuse axonal injury, and hypoxic ischemic injury, which is seen in about 1/3 of patients with AHT. Parenchymal lacerations are unique entities in infants < 5 months of age and result from shaking or direct trauma with shearing of the white matter. Spinal injuries in AHT are more common than was previously realized, and include posterior ligamentous complex cervical spine injury, thoracolumbar spinal subdural hematoma, and spine fracture. Retroclival hematomas are identified in 32% of patients who are less than 3 years of age that sustain AHT. Finally, retinal hemorrhage is seen in 85% of AHT cases and although typically a clinical diagnosis should be sought on gradient echo MR images through the orbits.

Pediatric Central Nervous System Imaging of Nonaccidental Trauma: Beyond Subdural Hematomas
RadioGraphics 2019; 39: 213–228
Divya Gunda, MD • Benjamin O. Cornwell, DO • Hisham M. Dahmoush, MD • Sammer Jazbeh, MD • Anthony M. Alleman, MD, MPH

Abusive head trauma or AHT is the term now used to describe nonaccidental central nervous system trauma in children. In this important paper in this month’s pediatric section of the journal, Divya Gunda and colleagues from the University of Oklahoma and Stanford University School of Medicine begin their paper with a review of the anatomy unique to the infant that predisposes to various injuries from nonaccidental trauma. Assessment for possible skull fractures from AHT can be difficult; interested readers can refer to a September 2015 RadioGraphics article by Idriz and colleagues that reviews normal and developmental skull anatomy https://doi.org/10.1148/rg.2015140177. Subdural hematoma is the most common intracranial finding in AHT; an interhemispheric or posterior fossa location is highly associated with AHT. The paper addresses the distinction of subdural hematoma from prominent subarachnoid spaces as seen in benign enlargement of the subarachnoid spaces and discusses the issue of mixed-attenuation collections. Rupture and eventual thrombosis of bridging veins can be seen due to acceleration/deceleration and rotary motion of the head; extra-axial blood clots with a tubular shaper in the parasagittal regions should suggest bridging vein thrombosis. A variety of parenchymal injuries can be seen in AHT. These include cerebral contusions, which while not specific for AHT are uncommon in infants, diffuse axonal injury, and hypoxic ischemic injury, which is seen in about 1/3 of patients with AHT. Parenchymal lacerations are unique entities in infants < 5 months of age and result from shaking or direct trauma with shearing of the white matter. Spinal injuries in AHT are more common than was previously realized, and include posterior ligamentous complex cervical spine injury, thoracolumbar spinal subdural hematoma, and spine fracture. Retroclival hematomas are identified in 32% of patients who are less than 3 years of age that sustain AHT. Finally, retinal hemorrhage is seen in 85% of AHT cases and although typically a clinical diagnosis should be sought on gradient echo MR images through the orbits.

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