



Acute Myeloid Leukemia with Central Nervous System extension and subdural seeding of Vancomycin-resistant *Enterococcus faecium* after bilateral subdural Hematomas treated with subdural Daptomycin administration

Nicholas Dietz

Georgetown University School of Medicine, USA

Abstract

Traumatic brain injury (TBI) is a major health concern in children and adults as it has been proposed as a risk factor for the development of subsequent neurologic diseases that often lead to irreversible brain damage or death. A meta-analysis of TBI identified several key associations, notably etiological pathology and complications from the nature of the injury, and various clinical presentations. The exact mechanism of cellular injury is not well understood. This novel device allows for varied shockwave propagation to simulate cellular injury and independently study the role of shockwave pressure change and shear force damage. The purpose of this device is to determine the overall consequences of traumatic exposure to brain tissue, and to provide a system in which tissue could be directly observed during and immediately after exposure to shockwave propagation. The pneumatic air-gun based device delivers a blast via a quick release valve directly to the 96-well culture plate positioned on top of a microscope. Modulating the volume of fluid in the well allows for independent control over shear forces generated by the blast shockwaves. The device is used in a laboratory controlled system with high temporal and spatial resolution. Novelities include real-time cellular imaging and analysis of explosive shockwaves, screening for pharmacological compounds that may ameliorate the effects of a brain trauma, testing materials capable of protecting cells from trauma, and identifying the best treatment and diagnostic path based on injury from head trauma. Future applications will be used to study pharmacological effects of calcium signaling in response to trauma, search for additional signaling pathways in response to varying intensities, and expand the system to allow for study of entire organs.



Biography

We present a rare case of comorbid relapsed acute myeloid leukemia (AML) with involvement of the central nervous system (CNS) and subdural seeding of vancomycin-resistant-*Enterococcus faecium* (VRE). The safety profile, treatment approach with pharmacokinetic considerations, and evaluation of success for bilateral subdural administration of daptomycin after subdural hematoma is assessed. A 45-year-old male with history of AML who underwent chemotherapy (induction with 7+3) was admitted to oncology with relapsed AML confirmed by bone marrow biopsy, complicated by neutropenic fever and VRE bacteremia. After acute neurological changes with image confirmation of mixed-density bilateral subdural hematomas secondary to thrombocytopenia, the patient was admitted to the neurosurgery unit and underwent bilateral burr-hole craniotomies for subdural evacuation with placement of left and right subdural drains. Culture of the subdural specimen confirmed VRE seeding of the subdural space. The patient received the first dose of daptomycin into the bilateral subdural spaces two days after evacuation and was noted to have acute improvement on neurological exam, followed by a second administration to the left subdural space 5 days after evacuation with bilateral drains pulled thereafter. In this patient, the complication of relapsed AML may have contributed to the rare extension of VRE into the CNS space. Screening for patients at risk of AML with CNS involvement and addressing coagulopathy and risk of infection may help mitigate morbidity. Bilateral administration of subdural daptomycin bolused into the subdural space was tolerated and possibly contributed to the patient's neurological improvement during an extended hospital course.

Publications

1. Enhanced recovery after surgery (ERAS) for spine surgery: a systematic review.
2. Inflammaging: age and systemic, cellular, and nuclear inflammatory biology in older adults.
3. Bundled payment models in spine surgery: current challenges and opportunities, a systematic review.
4. A systematic comparative outcome analysis of surgical versus percutaneous techniques in the management of symptomatic sacral perineural (Tarlov) cysts: a meta-analysis.
5. Outcomes of decompression and fusion for treatment of spinal infection

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