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What is This?
Cerebral Spinal Fluid Leak Associated with Bone-Anchored Hearing Aid Screw Removal

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Keywords
bone-anchored hearing aid, complications of BAHA

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The bone-anchored hearing aid (BAHA) is an osseointegrated implant that was introduced in 1977. It has proven to be well tolerated and successful in restoring conductive, mixed, and unilateral sensorineural hearing loss. Despite the success and good tolerability, soft tissue and skin reactions around the percutaneous implant site remain the most frequently encountered complication.1 Complications other than adverse skin reactions are relatively rare, including implant extrusion, wound infection, and flap necrosis. Patients rarely choose to have the implant removed from adverse outcomes. To date, no significant complications have been reported from the BAHA hardware removal. We report a case of cerebral spinal fluid leakage (CSF) and bony spicule dislodgement, resulting in an episode of seizure.

Case Presentation
The patient is a 10-year-old healthy African American girl with grade III microtia and aural atresia. She underwent microtia repair 5 years ago, followed by aural atresia repair. Postoperatively, she underwent multiple revision surgeries due to keloid formation at the surgical sites. Ultimately, the family chose the BAHA option rather than undergoing any further revision canoplasty. A 4-mm titanium fixture + 5.5-mm abutment was placed without evidence of CSF intraoperatively. Unfortunately, she again developed keloid around the abutment 6 months postoperatively. Kenalog injections failed to resolve the problem, ultimately requiring a longer (8.5-mm) abutment. Approximately a year later, she again presented with the same problem, and the family at this point wanted all the BAHA hardware to be removed. The BAHA hardware was removed using the company-supplied wrench without difficulty. Immediately after the screw was removed, clear fluid was seen emanating from the site. This was presumed to be CSF leak as it persisted. Tisseel fibrin glue was applied to fill the defect where the screw was removed with no further drainage noted. The patient was admitted for observation. The next morning, she developed a grand-mal seizure. She was afebrile with stable vital signs, and no evidence of CSF leak was noted. Anticonvulsants and vancomycin were administered. Head computed tomography (CT) scan was obtained that showed a 3.5-mm bony spicule embedded ~4 mm from the inner cortex (Figure 1). Magnetic resonance imaging (MRI) was obtained to better assess the brain parenchyma. Figure 2 shows abnormal signal intensity on T2-weighted MRI imaging in the right parietal/temporal lobe, representing contusion deep to the depressed bony fragment. A lumbar puncture was performed to rule out meningitis. No white blood cells were found on the initial gram stain, and the final culture showed no growth. Subsequent CT showed no new hemorrhage, and she had no more seizure activity. An electroencephalogram was performed that showed no epileptiform activity. She was discharged 48 hours later. In subsequent clinic follow-up visits, she has remained seizure free, and the wound site has completely healed.

Discussion
In the pediatric BAHA population, up to 36% can have dural exposure due to their thin cortical bone. In addition, cases of sigmoid sinus exposure have also been reported.2 The most frequently encountered postoperative complication associated with BAHA implantation is skin or scar tissue growth over the abutment in 5% to 7.4% of patients.3,4 Implant extrusion or osteointegration failure in children younger than 5 years and those 5 to 10 years is 40% and 8%, respectively.2 Serious complications of BAHA implantation are rare, and there has only been 1 case report of epidural hematoma immediately after implantation that required emergent craniotomy for hematoma evacuation.5 To our knowledge, this is the first case report of temporal lobe contusion resulting in an episode
of seizure after BAHA hardware removal. Our patient’s cortex at the site where the fixture was removed measures 5.3 mm. Therefore, it is unlikely that the 4-mm fixture that was removed was the primary cause of the bony spicule dislocation. We speculate that during the fixture removal, although minimal force was applied to the wrench, it was enough to perhaps loosen the inner cortical bone that migrated inward.

This report serves to make the readers aware of the rare but serious complication that may result from BAHA hardware removal. If removal is necessary, we recommend removal of the abutment only and to leave the fixture in place. This case is being reported with IRB exemption approval (e-13.01-NYEEI).

**Author Contributions**

**Fung M. Chan**, literature review, chart review, writing the drafting, review and revision of the manuscript; **Harry Pantelides**, chart review, review and revision of the manuscript; **Ana H. Kim**, conceptualization and clarification of the purpose of this case report, review and revision of the manuscript.

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**References**


