

Sonolucent cranioplasty

Previously, sonographic evaluation of the intracranial contents was limited to intraoperative use following [bone flap](#) removal, with placement of the [probe](#) directly on the [cortical surface](#) or through a transsulcal tubular retractor. [Cranioplasty](#) with [sonolucent implants](#) may represent a postoperative window into the brain by allowing [ultrasound](#) to serve as a novel bedside imaging modality. The potential [sonolucency](#) of various commonly used [cranial implant](#) types was examined in a study.

A 3-phase study was comprised of cadaveric evaluation of [transcranioplasty ultrasound](#) (TCU) with cranioplasty implants of varying materials, intraoperative TCU during right-sided cranioplasty with clear implant made of poly-methyl-methacrylate (PMMA), and bedside TCU on postoperative day 5 after cranioplasty.

The TCU through clear [PMMA](#), [Polyetheretherketone](#), and opaque PMMA cranial implants revealed implant sonolucency, in contrast to [autologous bone](#) and porous-[polyethylene](#). [Intraoperative ultrasound](#) via the clear PMMA implant in a single patient revealed recognizable ventricular anatomy. Furthermore, postoperative bedside ultrasound in the same patient revealed comparable ventricular anatomy and a small epidural fluid collection corresponding to that visualized on an axial computed tomography scan.

Sonolucent cranial implants, such as those made of clear PMMA, hold great promise for enhanced diagnostic and therapeutic applications previously limited by cranial bone. Furthermore, as functional cranial implants are manufactured with implantable devices housed within clear PMMA, the possibility of utilizing ultrasound for real-time surveillance of intracranial pathology becomes much more feasible ¹⁾.

¹⁾

Belzberg M, Shalom NB, Yuhanna E, Manbachi A, Tekes A, Huang J, Brem H, Gordon CR. Sonolucent Cranial Implants: Cadaveric Study and Clinical Findings Supporting Diagnostic and Therapeutic Transcranioplasty Ultrasound. J Craniofac Surg. 2019 Mar 27. doi: 10.1097/SCS.00000000000005454. [Epub ahead of print] PubMed PMID: 30939550.

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