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The Role of Intraoperative Computed Tomography Scanning in Facial Reconstructive Surgery

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The Role of Intraoperative Computed Tomography Scanning in Facial Reconstructive Surgery

Abstract

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#113. Mandibular Reconstruction Using Custom TMJ Concepts Prosthesis After Resection of Conventional Ameloblastoma From Left Mandible: A Case Report

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Mentor: Adam B. Robinson

Program: Oral & Maxillofacial Surgery

Type: Case Report

Background: Ameloblastoma is the most common odontogenic tumor with a global incidence of ~0.9 cases per million. They are slow growing, locally invasive tumors that can cause malocclusion and facial deformity. Affected patients usually present asymptomatically or with progressive, painless swelling. Standard treatment entails en bloc resection with 1.0-2.0 cm bony margins due to high recurrence rate (50-90%) with curettage alone. Various reconstructive options exist, including custom prostheses, non-vascularized, and vascularized bone grafts. We present a case of a gentleman who underwent resection of an ameloblastoma involving his temporomandibular joint, which was reconstructed using a custom temporomandibular joint (TMJ) prosthesis to avoid donor site morbidity from a vascularized graft.

Case: A 74-year-old male presented to clinic with a slowly growing, firm mandibular mass. He reported a history of two recurrent left mandible cysts which were treated with enucleation and curettage (E&C) at another clinic. Cone-beam computed tomography (CBCT) showed multilocular radiolucent lesion extending from mandibular body to the sigmoid notch with cortical expansion **(Figure 1A-B**). Final pathology of the biopsied lesion showed conventional ameloblastoma. Using 3D medical modeling, a custom fitted TMJ Concepts prosthesis was fabricated along with custom cutting guides. Patient was brought to the OR where the tumor was resected and successfully reconstructed with the custom prothesis (**Figure 1C-D**). Consent was obtained to use this case for educational purposes.

Conclusion: Ameloblastomas are locally aggressive, benign tumors of odontogenic epithelium. Custom prostheses are viable options to restore form and function accurately and predictably in patients hoping to reduce donor site morbidity.

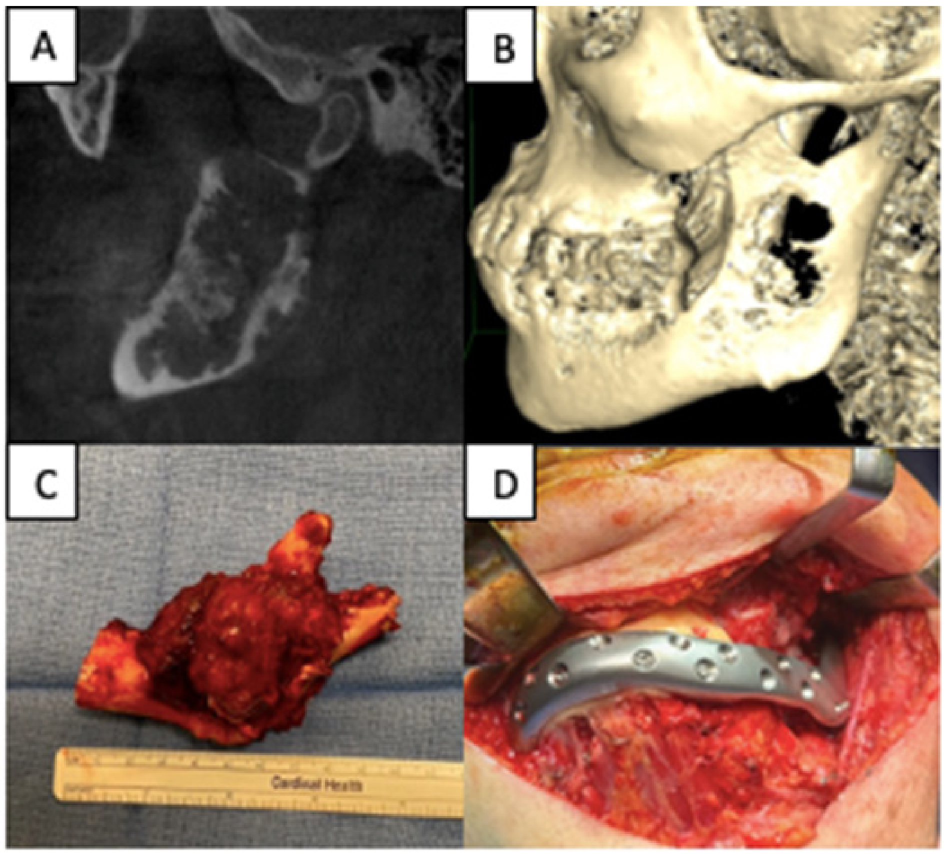

Figure 1. (A) Sagittal CT Showing multilocular radiolucent lesion in left mandible. **(B)** 3D reconstruction of CT scan showing left mandibular lesion with cortical involvement. **(C)** En bloc tumor resection specimen. **(D)** Intra-op photo of custom TMJ Concepts Prosthesis.

#114. Use of Patient Specific (Custom) Plating in Complex Craniomaxillofacial Trauma Revision Surgery

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Mentor: Jason Untrauer

Program: Oral & Maxillofacial Surgery

Type: Case Report

Background: Advancements in virtual surgical planning (VSP) and 3-dimensional (3D) printing have dramatically improved reconstructive options in craniomaxillofacial surgery. Facial trauma surgery, for decades, was rooted in re-establishing primary stability for plating, anticipating a margin of error with post-operative facial asymmetry. Patient specific engineering has shifted that ethos in which surgery can address restoring facial harmony, whilst maintaining a functional reconstruction.

Case: A 64-year-old female was referred for revision surgery following trauma. She was previously involved in a rollover motor vehicle crash sustaining mandible, LeFort, naso-orbito-ethmoid (NOE), and zygomaticomaxillary fractures, along with right globe rupture. She underwent appropriate initial surgical fixation and management. Upon examination, she had telecanthus, a depressed right mid-face with volume loss, nasal-valve obstruction, and CT imaging revealed orbital and NOE plate malposition. KLS Martin was enlisted for VSP and printing of custom plates (**Figure 1A-B**). Intraoperatively, multiple approaches were used including a coronal flap, transconjunctival incision with lateral canthotomy and open rhinoplasty approaches (**Figure 1C-D**). Custom drill-guides allowed for predictive holes, followed by fixation of patient specific plates along the orbital rim, floor, and right NOE areas (**Figure 1E**). Abdominal fat graft was obtained for autologous volume augmentation of the mid-face and a cadaveric cartilage graft was used as dorsal strut to address nasal projection with overlying peri-cranial flap coverage (**Figure 1F**). Recovery was uneventful with the patient extremely satisfied.

Conclusion: VSP and 3D printing continue to evolve as a compliment to long-standing surgical principles in craniomaxillofacial trauma. Successful management of complex trauma can be achieved with the compliment of surgeon expertise and state-of-the-art technology.

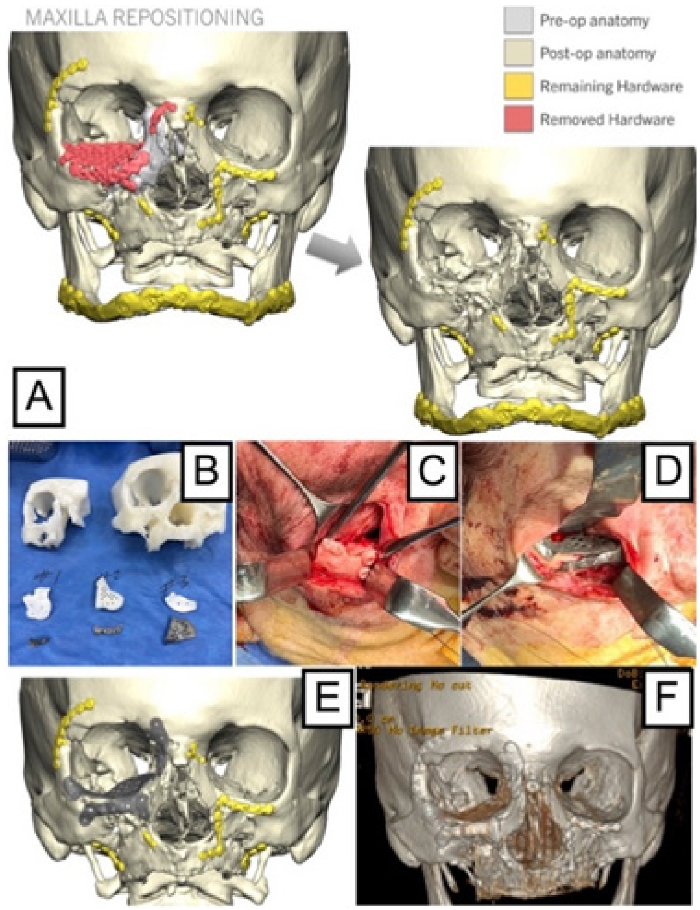

Figure 1. (A) 3D reconstruction of pre-operative to post-operative positioning and hardware replacement reconstruction. **(B)** Intraoperative surgical guides [white] and patient specific hardware [titanium]. **(C)** In vivo view of orbital rim reconstruction with custom guide. **(D)** In vivo positioning of patient specific orbital rim and floor reconstruction. **(E)** Preoperative planned reconstruction plate positioning. **(F)** Post-operative CT Maxillofacial showing actual positioning consistent with planning goals.

#115. Bilateral Submandibular Gland Atrophy Secondary to Chronic Sialolithiasis

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Mentor: Jason Untrauer

Program: Oral & Maxillofacial Surgery

Type: Case Report

Background: Sialolithiasis, or salivary stones, is a condition affecting salivary glands, the pathogenesis of which is thought to be multifactorial. Salivary gland dysfunction can result in gland atrophy. Salivary stones form from the aggregation of calcium phosphate crystals, typically when transit of saliva becomes stagnant. We report a case of bilateral chronic sialolithiasis with clinical and radiographic findings indicative of significant glandular atrophy and obliteration.

Case: A 77-year-old male presented with complaint of left lower facial swelling, mildly elevated floor of mouth, and referred otalgia, all of which were exacerbated when attempting to eat. The patient was noted to have significant xerostomia. Panoramic imaging obtained at this time revealed a large sialolith of the left submandibular gland. Management included systemic antibiotics and sialagogues. On short interval follow-up, clinical exam revealed significant improvement with minimal left mandibular swelling and non-elevated floor of mouth with continued xerostomia. Computed tomography (CT) at that time revealed sialoliths of the left submandibular gland and duct, small stones present in the right submandibular gland, and atrophy of the submandibular glands bilaterally (**Figure 1**). Treatment options were discussed with the patient including surgical excision versus monitoring. Patient elected for monitoring and has been subsequently stable on continued follow-up.

Conclusion: This case demonstrates the compounding effects of long-standing occlusion of salivary flow by sialoliths in which submandibular glands can undergo significant atrophy and resultant clinical xerostomia. Timely identification and diagnosis of sialolithiasis is helpful in treatment and prevention of glandular atrophy to preserve function and decrease risk of infection.

Figure 1. (A) Axial CT showing large sialoliths of left submandibular duct and left submandibular gland measuring 12.0mm x 3.85mm and 14.1mm x 7.99mm, respectively. Near complete obstruction of the left submandibular gland can be seen. **(B)** Axial CT showing unmeasured sialolith of right submandibular gland and concomitant gland atrophy. **(C)** Coronal CT revealing sialoliths of submandibular glands bilaterally with evidence of bilateral gland atrophy. **(D)** Panoramic film showing large sialolith of left submandibular gland.

#116. The Role of Intraoperative Computed Tomography Scanning in Facial Reconstructive Surgery

Steven Santarossa[1], Chad Sloan[1], Jason Untrauer[1]

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Mentor: Jason Untrauer

Program: Oral & Maxillofacial Surgery

Type: Case Report

Background: Intraoperative imaging offers the benefit of immediate feedback for fracture reduction and visualization of hardware, and 20-26% of cases result in real-time adjustment, reducing revision surgery. In cases of significant fracture comminution in craniomaxillofacial trauma, computed tomography (CT) has become an increasingly effective tool in reconstructive surgery.

Case: A 39-year-old male arrived via trauma activation with an obvious facial injury sustained from impact by a metal door swinging open, causing bony and soft tissue defects to the right mid-face. The patient complained of diplopia, facial asymmetry, and obstructed nasal airflow. Initial CT imaging revealed multiple sites of comminuted and displaced fractures of the naso-orbito-ethmoid (NOE) complex in addition to nasal bones, septal fracture, right orbital rim and floor fractures, and maxillary wall (**Figure 1A**). Intraoperatively, significant comminution was appreciated, adding to the difficulty to re-establish primary bony stability (**Figure 1B**). A Stryker MedPor Titan plate was utilized for the orbital floor and medial wall. Following placement of the plate, intraoperative CT provided critical insight as it revealed malposition of the orbital floor implant (**Figure 1C**), which had not been visualized in the surgical field due to soft tissue swelling and degree of comminution. The orbital plate was re-positioned and repeat imaging confirmed proper placement, providing immediate improvement in surgical outcome (**Figure 1D-F**).

Conclusion: This case demonstrates the utility of intraoperative CT for facial reconstructive surgery. The imaging provided immediate feedback of poor positioning of the orbital implant. We advocate consideration by reconstructive surgeons for CT imaging as an additional tool readily available to enhance the surgical outcome.

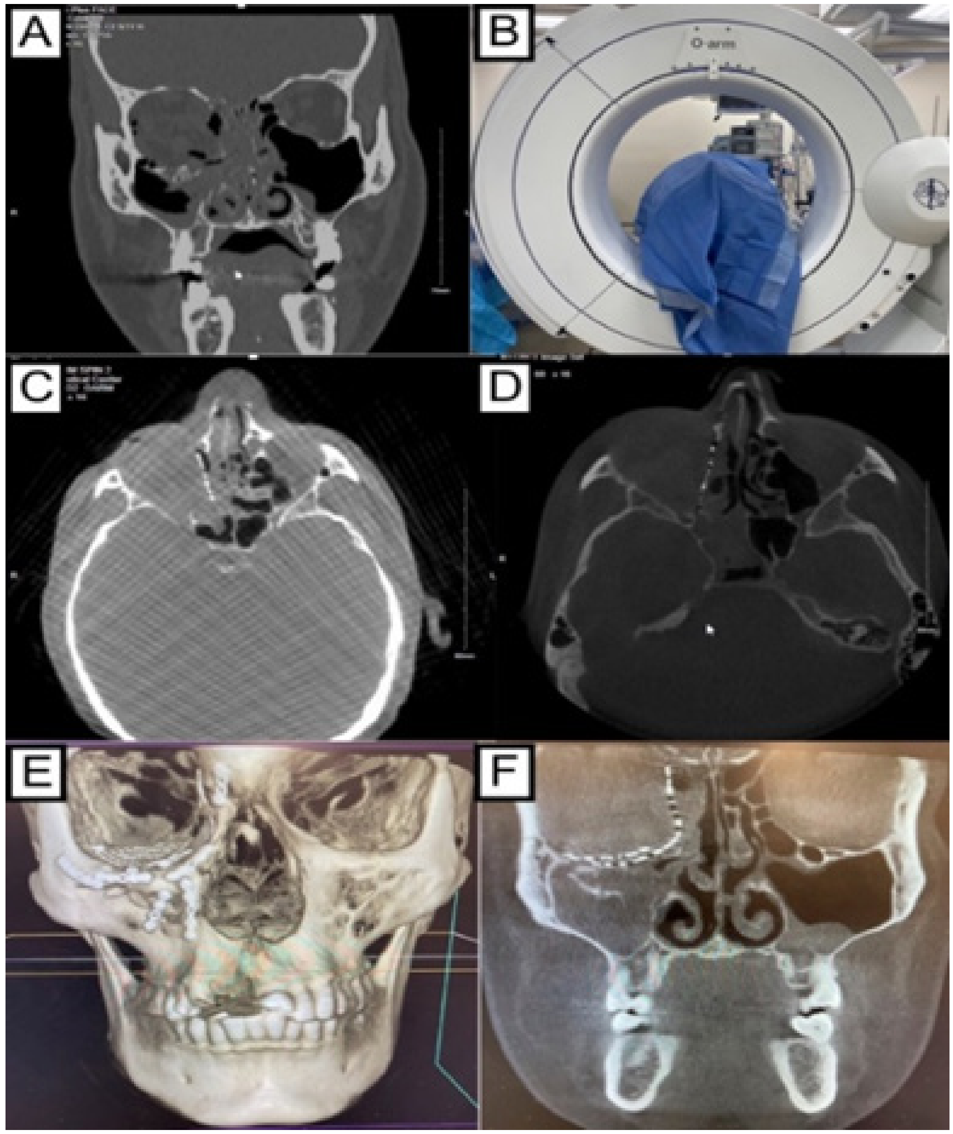

Figure 1. (A) Pre-operative coronal CT view of injury showing significant comminution of the right orbit and mid-face. **(B)** Intraoperative O-Arm CT scanner. **(C)** Intraoperative CT scan revealing malposition of the medial-posterior aspect of the reconstruction plate. **(D)** Post-operative CT showing well-positioned orbital reconstruction plate. **(E)** 3-dimensional reconstruction showing good coaptation compared to contralateral side. **(F)** Coronal CT shows appropriate position of orbital floor and rim plates.

#117. Incompatible Batteries With Potential Hazard in MRI Environment

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Mentor: Stephanie Shin

Program: Anesthesiology – Pediatrics

Type: Case Report

Background: A magnetic resonance imaging (MRI) incompatible battery was found in the laryngoscope handle during an MRI case after the handle was pulled into the magnet

Case: A 1-year-old patient was brought into the MRI scanner zone 4. Prior to intubation, the magnetic resonance-conditional laryngoscope handle flew into the scanner with no injuries to the patient or staff. Upon further evaluation, an MRI-incompatible battery was found in the laryngoscope handle (**Figure 1**). There was no determination as to where the incorrect battery came from.

Conclusion: Since this incident, there was an immediate change of practice; another step was added to the morning checklist. Multiple personnel (MRI tech, anesthesia techs, anesthesia team) are required to check the battery inside the laryngoscope handle to assure that it is MRI-safe.

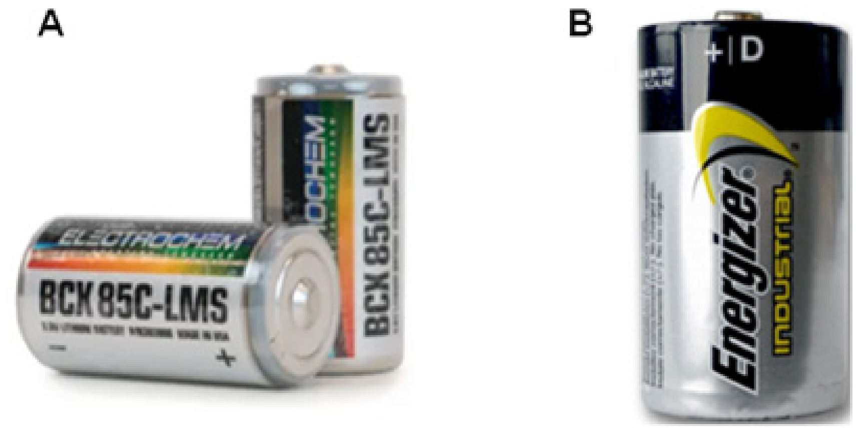

Figure 1. A Compatible MRI Batteries (Lithium). **B** Incompatible Steel Alkaline Batteries.