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**BACKGROUND:** Microsurgical free flaps have supplanted myocutaneous pedicled flaps as the gold standard for head and neck cancer reconstruction in terms of lending a superior functional and aesthetic result. However, factors relating to postoperative complications based on type of reconstruction have not been well-defined in the literature. In this study, we used the American College of Surgeons-National Surgical Quality Improvement database to compare outcomes of patients who underwent free flap, myocutaneous pedicled flap, or no reconstruction after resection for head and neck cancer.

**METHODS:** Patients undergoing head and neck reconstruction were identified in the 2011–2016 American College of Surgeons-National Surgical Quality Improvement database using ICD codes for head and neck cancers and current procedural terminology codes to filter by reconstructive technique used. Demographics were analyzed and covariates balanced using overlap propensity score-based weighting between groups. Logistic regression was used for binary outcomes, and Gamma GLM was used for length of stay. Outcomes were defined based on major surgical complications, wound complications, and medical complications within 30 days postoperatively.

**RESULTS:** Four thousand seven hundred twelve patients met inclusion criteria: 1,297 patients (28%) underwent reconstruction with free flap, 208 patients (4%) with myocutaneous pedicled flap, and 3,207 patients (68%) had no reconstruction. In unadjusted analyses, patients who underwent pedicled flap reconstruction had a higher incidence of surgical site infection, wound dehiscence, pneumonia, and hospital readmission compared with free flap reconstruction or no reconstruction ($P < 0.001$). After adjustment, pedicled flap reconstruction was found to have a higher risk of developing DVT (OR, 2.64; CI, 1.02–6.85; $P = 0.045$), sepsis (OR, 2.95; CI, 1.52–5.71; $P = 0.001$), and infection (OR, 2.03; CI, 1.39–2.96; $P < 0.001$) compared with free flap reconstruction. However, pedicle flap reconstruction had a shorter mean operative time (unadjusted 440 versus 574 minutes; $P < 0.001$), lower incidence of bleeding requiring transfusion (adjusted OR, 0.65; CI, 0.50–0.85; $P = 0.002$), and lower incidence of prolonged mechanical ventilation after 48 hours (adjusted OR, 0.33; CI, 0.12–0.92; $P = 0.04$) compared with free flap reconstruction.

**CONCLUSION:** Myocutaneous pedicled flaps are associated with an overall higher short-term postoperative complication rate compared to free flaps in reconstruction for head and neck cancer, despite having a shorter operative time and lower requirement for transfusion and prolonged intubation. These differences in postoperative complications could reflect selection bias, as patients likely to undergo pedicled flap reconstruction in today’s era may not be candidates for free flap reconstruction, be undergoing salvage procedures, or be at centers without the ability to perform free tissue transfer. However, this study once again confirms the superiority of free flaps in head and neck reconstruction.

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**Surgical Management of Gunshot Wounds to the Face**

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**PURPOSE:** Gunshot wounds (GSW) to the face are high-velocity injuries often resulting in significant destruction of tissues and substantial displacement and comminution of fracture fragments. As a result, operative intervention is commonly an integral part of their care and frequently requires multiple staged procedures. This
study was designed to evaluate the surgical management of these injuries.

**METHODS:** A retrospective chart review of GSW injuries to the face from January 2009 to December 2017 was performed using the database of a major metropolitan level 1 trauma center. Inclusion criteria were patients who had a GSW to the face, survived more than 48 hours and received care at the admitting institution. Data collected included demographics, type of firearm, structures injured, bones fractured, antibiotic administration, and surgical details. Complex reconstruction was defined as autologous soft-tissue flap, bone flap, or bone graft. Univariate and multivariate statistical analyses were performed to examine the relationships between injury specifics and surgical treatment.

**RESULTS:** A total of 270 patients met the inclusion criteria for the study. The cohort was predominantly male (82.6%) with an average age of 31.7 ± 15.5 years. The ethnicity breakdown of the group was 40.4% Black, 31.9% White, 19.6% Hispanic, 3.0% Asian, and 5.4% other. The majority of patients (207%) had at least 1 facial surgical procedure. The average day of the first surgical procedure was 3.03 ± 4.00 days (range, 1–43). However, 62% of patients went to the operating room within 24 hours of their injury. Of those that had surgery, the average number of procedures was 1.6 ± 1.8. Intermaxillary fixation was used in 40.6% of all patients, and it was highest when the mandible was involved (79.2%). Open reduction internal fixation was necessary in 45.4% of patients and occurred on day 9.9 ± 9.97. An external fixation device was used in 12.6% patients. Complex reconstruction had the following breakdown: soft-tissue flaps were required in 11.1% of patients, bone grafts in 7.2%, and bone flaps in 5.3%. Factors that resulted in a higher likelihood for surgery were teeth involvement (89%), comminuted fracture (86%). All patients who had a shotgun or rifle injury required operative management. On multivariate analysis, patient age ($P = 0.019$), injured teeth ($P = 0.018$), and oral cavity involvement ($P = 0.009$) were associated with higher number of surgeries.

**CONCLUSIONS:** Surgical intervention is often an integral part to the management of GSWs to the face. An aggressive, early initiation of care is the rule with injuries resulting from a gunshot or rifle, those involving the teeth and oral cavity and comminuted injuries, more likely to require operative management. Multiple procedures are often required with a delayed approach to definitive management of the comminuted facial skeleton.

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**Three-dimensional Printed Rhinoplasty Simulator With Replaceable Nasal Module**

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**BACKGROUND:** Surgical simulation serves as a key tool in medical training. Three-dimensional (3D) printing technology may be useful in this effort by allowing for rapid prototyping of affordable, custom anatomic models which can be optimized to target specific surgical skills. Carefully designed simulators can accelerate the learning curve of junior residents, especially for procedures that may be difficult to learn in the live operative setting. One procedure that is particularly difficult to master in early training is rhinoplasty; residents often report lack of comfort with performing the osteotomy portion of the procedure. Herein, the purpose of this project was to develop a 3D printed osteotomy training model that is cost-effective and durable, providing educational utility that can be translated to the operating room.

**METHODS:** Our osteotomy trainer consists of 3 parts: a reusable facial bone base, a replaceable nasal bone cartridge, and a reusable soft tissue envelope. Data obtained from a healthy patient’s head CT scan were used to segment relevant bony structures (orbit, nasal bone, maxilla) to create the reusable facial bone base, and Blender Software (Amsterdam, The Netherlands) was used to design the nasal bone cartridge. Both of these units were printed from ABS Filament on a UPrint SE+ 3D printer (Stratasys, Eden Prairie, MN). The nasal bone cartridge, which is meant to be broken with an osteotome, is firmly fastened to the facial bone via digitally incorporated pegs and can be easily replaced for repeat use. Finally, to generate the silicone-based “soft tissue” of the face, we designed 3D printed a mold derived from the same patient CT scan. Once cured, these reusable silicone soft tissue envelopes were draped over the bony structures (facial bone base with fastened nasal cartridge) to complete the setup of our osteotomy trainer. For a beginner model, we used transparent silicone to allow for easy visualization of the underlying bones. For an advanced model, we used skin-colored silicone, which removes the