



Pandemics and facial plastics and reconstructive surgery



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The purpose of this article is to review the impact of COVID-19 on the specialty of Facial Plastic and Reconstructive Surgery. Initially, COVID-19 caused significant disruption to facial plastic surgeon practices and patient care with cancellation of surgery and clinical practice. As medical practices resumed, facial plastic surgeons were resilient and adaptive. Reliance on technology helped to meet the needs of patients. There was a surge of facial plastic surgery interest and procedures as the pandemic wore on with recovery of many physician practices. COVID-19 created numerous challenges for facial plastic and reconstructive surgeons but also many opportunities. The facial plastic surgery community and the American Academy of Facial Plastic and Reconstructive Surgery worked together to achieve best outcomes.

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Introduction

The COVID-19 pandemic took the world by storm starting early 2020, initially presenting as numerous cases of pneumonia of unknown etiology in Wuhan, China in December 2019.¹ The news of this devastating and deadly illness rapidly spread throughout Asia and Europe while the American medical world watched and waited. On January 20, 2020, the first case was confirmed in the United States. By March 2020, the WHO declared COVID-19 a worldwide pandemic and the U.S. began to issue mandatory stay-at-home orders to minimize the spread of COVID-19.¹⁻³ On March 18, 2020, the Centers for Medicare & Medicaid Services (CMS) announced all elective surgeries, non-essential medical, surgical, and dental procedures be delayed in order to conserve critical healthcare resources

and limit exposure of patients and staff to SARS-CoV-2 infection⁴, a decision supported by the American Academy of Facial Plastic and Reconstructive Surgery.⁵

With cancellation of elective operative cases, cessation of nonessential services and clinic closures, many facial plastic surgeons felt sidelined in the early stages of the pandemic. For academic and hospital-based surgeons, clinical practice was restructured to ensure adequate resources and staff for the emergency department and COVID wards. Many physicians were reassigned to ICU wards or COVID testing sites. Fellows, residents, and medical student roles were adjusted to minimize exposure and conserve personal protective equipment (PPE). For surgeons in private practice, difficult decisions were made regarding maintaining a practice with an unknown duration of elective surgery holds and limited clinical visits. Physician practices closed, staff was minimized, and governmental assistance was often required using Paycheck Protection Program (PPP) loans supported by the Coronavirus Aid, Relief, and Economic Security Act (CARES Act) to keep practices afloat.⁶

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Initial challenges

The SARS-CoV-2 virus is transmitted through aerosols, aerated solids, fluid from human secretions or discharges, droplets from normal breathing, coughing, sneezing, and surface contact. Aerosolized viral particles can remain in the air for 3 hours.⁷ The virus is known to be in high concentration in the upper respiratory tract, nose, and mucous membranes.⁸ Facial Plastic and Reconstructive surgeons were at an increased risk from COVID-19 due to the elevated viral load in the upper aerodigestive tract and the risk of aerosol-generating procedures.⁹ Examples of aerosol generating procedures (AGP) include high-speed energy instrument use, energy-based procedures, and nasal endoscopy or other instrumentation that may increase the risk of coughing, sneezing, etc. Early reports of high mortality of otolaryngologists and ophthalmologists in the Wuhan region of China encouraged aggressive AGP protocols to maximize safety.¹⁰ The key challenges facing the medical community became finding safe ways to deliver necessary medical care to patients while minimizing risk of COVID-19 infection to medical staff, hospital workers, and caregivers.

Prioritization of patients became essential due to the limited supply of personal protective equipment (PPE), staff, beds, ventilators, and COVID testing. Acute craniomaxillofacial trauma and head and neck cancer recon-

struction posed challenges early in the pandemic given the high acuity and time-sensitive needs of these patients, but also with the increased risk of exposure to the virus in the upper aerodigestive tract. Numerous best practice guidelines were published to guide safe management, focusing on patient screening, conservative treatment when possible, timing of interventions, and optimal choice of PPE.^{7,10,11}

Craniofacial trauma

Due to the high risk of viral exposure during standard treatment of acute maxillofacial trauma, there was a great need to form a consensus on how and when to treat these patients while minimizing the risk to healthcare providers. DeSerres et al. published best practice guidelines for the management of acute craniomaxillofacial trauma and encouraged non-operative management if results would be comparable to operative treatment results.⁷ The guidelines recommended dividing patients into emergent versus urgent categories with urgent procedures delayed until after patients were confirmed COVID negative. In order to minimize time in the operating room, the simplest operation to resolve or temporize the injury was chosen. Whenever possible, the surgeon should defer definitive reconstruction in complex trauma until 2 negative PCR COVID tests were obtained. However, even with negative testing the surgeon was encouraged to wear a powered air purifying respirator (PAPR) when available or an N95 mask and a face shield.⁷ Modified operating techniques to limit aerosolization of viral particles were recommended by numerous authors and a combined list is shown in [Table 1](#).

Table 1 Techniques to minimize potential aerosolization of viral particles during operative treatment of craniomaxillofacial trauma.

- Substitute closed reduction for open approaches, if appropriate
- Avoid intraoral incisions with preference for transcutaneous approaches
- Use a scalpel rather than monopolar cautery for mucosal incisions
- Use bipolar cautery on lowest power setting for hemostasis
- Avoid repeated suctioning and irrigation
- Avoid power instrumentation, if possible, and use self-drilling screws
- When drilling is required, limit irrigation and use a low-speed drill
- Use self-drilling MMF screws or Hybrid arch bars over traditional MMF with wires
- Any later manipulation of MMF should only be done after proven COVID negative status
- Cover a patient's mouth and nose with occlusive dressing, whenever possible, unless required for surgical access
- Use a throat pack when operating in the mouth to minimize risk from an endotracheal tube cuff leak
- For fractures near the sinuses, consider primary bone grafting from a safe surgical site rather than extensive reconstruction of the fracture site with broken bone fragments
- Consider preoperative chlorhexidine gluconate or povidine-iodine swish and spit.
- If osteotomy is required, consider an osteotome instead of a power saw
- For midface fractures, utilize a Carroll-Girard screw for reduction to avoid an intraoral incision, if 2-point fixation via the orbital rim and zygomaticofrontal suture is sufficient for stabilization.
- Consider delay of nonfunctional frontal bone/sinus procedures
- Avoid endoscopic endonasal procedures, if possible
- When performing frontal sinus obliteration or cranialization, consider manual mucosal stripping and avoiding use of a burr or power equipment.

Adapted from the Best Practice Guidelines for Acute Craniomaxillofacial Trauma During the COVID-19 Pandemic⁷ and the AO CMF International Task Force Recommendations on Best Practices for Maxillofacial Procedures During COVID-19 Pandemic¹⁰.

For emergent cases, Hsieh et al a precaution protocol when insufficient time was available to complete COVID testing or if not readily available.¹² For symptomatic patients, or those in which a history could not be obtained, PAPR use was recommended. For asymptomatic patients, enhanced airway precautions utilizing an N95 mask and face shield were recommended. Surgeon-specific recommendations were also presented, encouraging those at increased risk (>60 years, immunosuppression, cardiac or chronic pulmonary conditions, or other at-risk comorbidities) to avoid performing facial trauma surgery when possible.¹²

Edwards et al developed multidisciplinary maxillofacial trauma management recommendations with significant emphasis on coordinated efforts during the triage process and prior to hospital transfer.⁹ To limit exposure and conserve vital PPE, evaluation and workup of facial trauma patients was performed by the emergency medicine provider, and management decisions were made via video or telephone with the maxillofacial trauma team attending. When intervention was needed, every effort was made to be as expeditious as possible, limit the number of providers involved, and provide care in the Emergency Department (ED) on an outpatient basis. They put forth that most soft tissue injuries should be managed by ED providers, and most bone injuries can be managed in a delayed fashion. This delay may be up to 2 weeks, allowing for negative COVID testing confirmation and swelling to resolve, determining if cosmetic and functional deformities persist. In some, delay may be continued longer, with focus on secondary reconstruction in the future. Exceptions included injuries to critical structures such as the facial nerve, eyelids, lacrimal system, skin avulsions, globe injury, orbital entrapment, septal hematomas, and orbital hematomas threatening vision. If intermaxillary fixation was needed, the authors recommended it be performed in the ED under local anesthesia with drill-free screws to avoid the increased risk associated with nasal intubation in the OR.⁹ Others have recommended the creation of outpatient laceration clinics to ease the burden on the emergency department.¹³

Most facial trauma guidelines recommended limiting the use of powered instrumentation and associated irrigation, presuming this would worsen the amount of particle generation. Interestingly, a study performed by Gadkaree et al. evaluated the safety and particle generation of multiple procedures by quantifying the level of airborne particulate generation during rhinoplasty and facial trauma procedures.¹⁴ During mandibular plate screw drilling without the use of irrigation the authors found that significant particulate was generated at the surgeon's mouth level. This was decreased to nonsignificant levels when irrigation was added. As expected, cranial bone drilling and piezoelectric saw use created significant particulate generation however nasal osteotomies and nasal rasping did not.¹⁴ These results contradicted most protocols and demonstrated the importance of irrigation to minimize aerosol generation. It also showed that nasal osteotomies and rasping during rhinoplasty surgery was safe.

Head and neck reconstructive surgery

Head and neck reconstructive surgery posed increased concerns for numerous reasons during the initial course of the pandemic. Treatment was often time-sensitive, patients were more medically fragile and at higher risk of complications from COVID-19. Surgical treatment often requires 2 operative teams, both ablative and reconstructive, therefore depleting more PPE and hospital resources. Postoperatively, these patients were typically managed in the intensive care unit, utilizing precious resources in short supply for COVID-19 patients. However, delaying treatment may promote worse oncological outcomes.

Desai et al offered a protocol for prioritizing head and neck cancer patients into varied acuity levels based on the Centers for Medicare and Medicaid (CMS) surgical guidelines.^{8,4} The authors encouraged reconstructive surgeons to utilize less complicated reconstructions, when possible.⁸ It was recommended that complex cutaneous defects be reconstructed in a staged fashion with initial treatment utilizing secondary intention healing, skin grafts or allografts, with more complex reconstruction delayed until resources were more available.¹⁵ For larger ablative defects, increased utilization of well-established locoregional pedicled flaps was encouraged, including the pectoralis major myocutaneous, temporalis muscle, facial artery Musculo mucosal (FAMM), submental island (SMIF), and supraclavicular artery island flaps.¹⁵⁻¹⁸ Delayed bony reconstruction could also be performed by using a pedicled flap with a metal reconstruction plate.^{15,18} Avoiding microvascular reconstructive procedures offered decreased length of operative time and hospital stays, conservation of PPE and ICU resources, and less personnel exposure by eliminating flap checks and microvascular takebacks to the OR. Some institutions implemented a team-based cohort approach, alternating the same group of ablative and reconstructive providers on a weekly basis to minimize exposure risk and have a week off to quarantine if unknown exposure occurred.^{8,17} When microvascular reconstruction was performed, some intuitions initiated new postoperative flap monitoring protocols with increased reliance on venous and arterial implantable Doppler sonography and decreased reliance of intraoral skin paddle assessment.¹⁷

Clinic and office-based procedures

With the lockdown, cancellation of elective surgery, and delay of all elective ambulatory provider visits, facial plastic surgeons had limited options regarding patient interaction and visits.¹⁹ With temporary shuttering of many practices, attention quickly turned to telemedicine to maintain relationships with existing patients and to initiate interactions with new patients. The ability to communicate with these patients in real time using the camera on a patient's smartphone, tablet, or computer became a safe alternative to in-person visits. Most commercial health plans and CMS embraced the use of telehealth by waiving copays and

Table 2 Recommendations to resume safe facial plastic surgery practice.

- Promote telemedicine whenever feasible
- Create a physical patient flow plan for clinic appointments to maintain appropriate social distancing
- Maintain a minimum of 2m [6ft] between patients in waiting areas
- Hand sanitizer and hand-washing facilities should be readily available
- Temperature testing upon arrival
- Face masks to be worn by all patients and during procedures, if possible
- Avoid internal or endoscopic examination of the nose unless absolutely necessary
- Consider CT scan to assess the nasal septum and sinuses, if necessary
- During surgery, intranasal splints should be avoided and absorbable suture material should be utilized to minimize postoperative viral exposure
- All routine postoperative care should be completed via video visit
- Nasal medications should be administered with pledgets rather than a spray
- Procedure rooms without negative pressure, continual HEPA filtration, and air turnover should remain vacant before cleaning, with timing based on a room's ability for air handling and duration of time spent in the room
- Energy-based procedures of the head and neck (ie, Laser, light, and heat) may be considered an aerosol generating procedure (AGPs) and maximal PPE is recommended including N95 masks
- Smoke evacuators should be utilized for energy-based procedures, but commonly used cooling positive air pressure devices should not be used for pain management

Adapted from Recovery of Elective Facial Plastic Surgery in the Post-Coronavirus Disease 2019 Era¹⁹, Coronavirus Disease-19 and Rhinology/Facial Plastics¹⁷, and Considerations for the otolaryngologist in the era of COVID-19³

extending coverage of these services.²⁰ While limitations existed, including the inability to perform a comprehensive physical exam and lack of in-person human connection, the safety, patient convenience, and efficiency were vital to continue providing care to patients.²¹ Salehi et al. performed a survey of American facial plastic and reconstructive surgeons and found 91% of respondents utilizing telemedicine in their practice, with 77% initiating use during the COVID-19 pandemic. The majority of responders (71%) plan to incorporate the use of telemedicine into their practice in the future.²²

Less clinical load during this time allowed physicians to stay current with continuing education requirements by attending online courses and continuing maintenance of certification requirements. The clinical downtime also offered time to focus on non-clinical aspects of the practice and developing strategic plans to prepare for re-opening with new safety protocols in place.

Opening back up

By May 2020, the United States began to shift attention toward safely resuming elective patient care.²¹ New office-based protocols were developed to help facial plastic surgeons ensure a safe office and operating environment for patients and staff (Table 2).^{3,21,23} On May 13, 2020, the AAFPRS Guidance on Resumption of Elective Facial Plastic Surgical Procedures was issued, along with additional resources and policies to guide safe reopening of facial plastic surgery practices and resuming elective surgical procedures.²⁴ This comprehensive guideline focuses on education and communication with both patients and staff regarding COVID-19, proper safety and screening protocols, and procedures in the clinic and OR to mitigate the risk of viral spread. Best practice protocols were initiated

with pre-visit phone calls, followed by detailed recommendations during initial patient interactions, office visits, surgical scheduling, preoperative preparation, intraoperative processes, and postoperative care.²⁴ Similar safety guidelines were created by the International European Academy of Facial Plastic Surgery focus group regarding nonsurgical facial aesthetic procedures with specific precautions to be implemented before visiting the clinic, during the clinic visit, and after the clinic visit. These precautions also focus on education, communication, safety protocols and use of telemedicine when possible.²⁵

Bouncing back

The COVID 19 pandemic created numerous challenges and unexpected opportunities for the facial plastic and reconstructive surgery field. As the world came out of lockdown, FPRS has shown good recovery. With more of the world looking at themselves on screens with videoconferencing for work and social interaction, there has been a resurgence in cosmetic surgery and minimally invasive procedures. A study by Eggerstedt et al. evaluated online search volumes for lower and upper facial procedures during the start of the pandemic and then during the recovery phase.²⁶ During the recovery phase, all procedures showed higher-than-predicted query volumes, with rhinoplasty the highest.²⁶ In another study, Cristel et al. evaluated the role of video conferencing on perceptions of facial appearance.²⁷ The study found 55% of survey respondents had concerns about their facial appearance, with the nose being the area of most concern, followed by forehead and glabellar rhytids, skin texture, and the submental/neck region. Forty percent of subjects who had no previous history of cosmetic procedures were planning to pursue treatments based on these concerns.²⁷

The results of the 2020 AAFPRS Annual Member Survey revealed a surge in cosmetic surgery demand despite the temporary hold on all elective surgical cases during the initial months of the pandemic.²⁸ Seventy percent of responding facial plastic surgeons reported an increase in both bookings and treatments over the course of the pandemic with surgical procedures being most prevalent. This trend continued during the following year with the 2021 AAFPRS Annual Member Survey showing another 40% increase in procedures from 2020, with rhinoplasty, facelifts, and blepharoplasty as the most common procedures for both years.²⁹ This increase in surgical demand was attributed to the “Zoom effect”, more disposable income as people were no longer dining out, traveling, or spending their money elsewhere, and flexibility for post-operative recovery.

The “Zoom effect” was named after a popular videoconferencing platform (Zoom Video Communications, Inc., San Jose, CA) that skyrocketed in popularity early in the pandemic.³⁰ Videoconferencing offers a unique method for communication in that participants can view oneself from an observer’s perspective and examine one’s own appearance over an extended period of time. Evaluating this Zoom effect, Pikoos et al found 37% of survey respondents using videoconferencing over the prior week identified a new aspect of their appearance they disliked. They also concluded new appearance concerns lead to increased interest in obtaining non-surgical cosmetic procedures³⁰. Sharma et al found other common motivating factors for cosmetic surgery included increased privacy from friends and work colleagues during the lockdown and not requiring extending leave of absence from work while working from home.³¹

AAFPRS

The American Academy of Facial Plastic and Reconstructive Surgery (AAFPRS) has been proactive since the early stages of the pandemic, offering guidance and resources for facial plastic surgeons. The Academy established a COVID-19 Resources Center on their website, helping to keep their members up to date with the latest news and practice management resources.³² The Academy encouraged good stewardship in its members, creating a ventilator loaner program to temporarily reallocate unused ventilators to hospitals in need, encouraging the donation of scarce PPE, and community involvement.^{3,32} The annual meetings of the AAFPRS were quickly changed to a virtual format with the addition of a lecture series for members and students to continue their education during the shutdown.

Conclusion

The COVID-19 pandemic had a dramatic impact on the facial plastic community. Despite the tremendous strain on our healthcare system and challenges at seemingly every

turn, working together we have been able to navigate what appears to be the worst of the pandemic and focus on the future. Even with lockdowns, travel bans, and isolation protocols, technology has provided opportunities with telemedicine and remote learning to bring patients, colleagues, and the global community safely together. Undoubtedly there are more challenges ahead of us. Facial plastic surgeons have proven resilient and committed to our profession and our patients and are ready to take on these adversities together.

Disclosures

The authors report no proprietary or commercial interest in any product mentioned or concept discussed in this article.

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