Virtual Surgical Planning in Oral and Maxillofacial Surgery

Jack Hua, Shahid Aziz, and Jonathan W. Shum

Virtual surgical planning provides the ability to visualize the patient anatomy and pathologic condition, establish pertinent reference points, and simulate osteotomies and reconstruction design in advance of the surgery. Virtual surgical planning is also an ideal environment for improved communication between the patient and the surgical team.

Surgical Navigation for Oral and Maxillofacial Surgery

Nagi Demian, Craig Pearl, Timothy Charles Woernley III, James Wilson, and Justin Seaman

This article reviews the basic setup and function of surgical navigation and displays a variety of applications in oral and maxillofacial surgery. The use of surgical navigation for dental implant placement is discussed elsewhere in this issue.

Dynamic Navigation for Dental Implant Surgery

Neeraj Panchal, Laith Mahmood, Armando Retana, and Robert Emery III

Dynamic navigation (DN) has been used by many fields previously and recently applied to dental implant surgery. DN allows the implant surgeon to evaluate a patient, scan the patient, plan the implant position, and perform the implant surgery in the same day without the delay or cost of fabrication of a static surgical guide stent. The current DN workflow requires (1) cone-beam computed tomography with fiducials, (2) virtual implant planning, (3) calibration, and (4) implant placement in accordance to the 3-D image on the navigation screen. This technology allows for improved precision and accuracy in the placement of dental implants.

Evolving Technologies for Tissue Cutting

Jonathon S. Jundt, Jose M. Marchena, Issa Hanna, Jagtar Dhanda, Matthew J. Breit, and Andrew P. Perry

This article reviews evolving and lesser known technologies for tissue cutting and their application in oral and maxillofacial surgery.

Minimally Invasive Endoscopic Oral and Maxillofacial Surgery

Mohamed A. Hakim, Joseph P. McCain, David Y. Ahn, and Maria J. Troulis

Advances in technology and specialized instrumentation allow surgeons to study, refine, and modify minimally invasive surgery (MIS) to replace standard operations. This has occurred across many surgical specialties. The benefits of MIS include less swelling, less pain, shorter hospital stay, and faster return to daily activities. Oral and
Maxillofacial endoscopic techniques are used for access to the ramus condyle unit, maxillary sinus, zygoma, orbit, temporomandibular joint, and salivary ductal system. Although endoscopic techniques are also used in facial cosmetic surgery, this discussion focuses on noncosmetic procedures.

Adjunctive Strategies for Benign Maxillofacial Pathology
Zachary S. Peacock

Benign cysts and neoplasms of the maxillofacial region can vary in behavior, with some growing rapidly and resulting in destruction of surrounding structures. Despite their benign histology, many require often-morbid treatment to prevent recurrence of these lesions. Several less invasive and adjunctive medical treatments have been developed to lessen the morbidity of surgical treatment. As the molecular and genomic pathogenesis of these lesions is better understood, more directed treatments may lessen the burden for patients.

Current Methods of Maxillofacial Tissue Engineering
James C. Melville, Victoria A. Mañón, Caleb Blackburn, and Simon Young

For several decades, the multidisciplinary field of tissue engineering has striven to improve conventional methods of dental, oral, and craniofacial rehabilitation for millions of people annually. Several bone tissue engineering strategies are now readily available in the clinic. Enrichment of autologous products, growth factors, and combination approaches are discussed as ways to enhance the surgeon’s traditional armamentarium. Lastly, cutting-edge research such as customized 3-dimensional printed bone scaffolds, tissue engineering strategies for volumetric muscle loss, and temporomandibular joint disc and condyle engineering are briefly discussed as future applications.

The Use of Patient-Specific Implants in Oral and Maxillofacial Surgery
Michael F. Huang, David Alfi, Jonathan Alfi, and Andrew T. Huang

This article summarizes the current use of patient-specific implants in oral and maxillofacial surgery.

Practice Management in Oral and Maxillofacial Surgery
James Baker, Austin Leavitt, and Jonathon S. Jundt

Managing an oral and maxillofacial surgery (OMS) practice has undergone dramatic changes. Electronic health records, privacy laws, revenue cycle management, online marketing, and the rise of dental service organizations (DSOs) present increased daily complexity for oral and maxillofacial surgeons in private practice, hospital-based employees, and academic surgeons. This article is structured to discuss the role of DSOs, private equity in OMS, online practice marketing, accounting and tax considerations, and modern essentials of practice management.

Advances in Anesthesia Monitoring
Yi Deng, Jovany Cruz Navarro, and Sandeep Markan

During surgery, one of the primary functions of the anesthesiologist is to monitor the patient and ensure safe and effective conduct of anesthesia to provide the optimum
operating conditions. Standard guidelines for perioperative monitoring have been firmly established by the American Society of Anesthesiologists. However, in recent years, new advances in technology has led to the development of many new monitoring modalities, especially involving the neurologic and cardiovascular systems. This article presents a targeted review to discuss the functions and limitations of these new monitors and how they are applied in the modern operating room setting.

**Advances in Surgical Training Using Simulation** 621
Kamal F. Busaidy

Simulation involves the re-creation of real-life situations, processes, or structures for the purpose of improving safety, effectiveness, and efficiency of health care services: simulation provides a controlled and safe environment for training and assessment. In an age in which regulatory burdens, fiscal challenges, and renewed focus on patient safety increasingly constrain surgical residency programs, innovation in teaching is vital for the future of oral and maxillofacial surgery (OMS) training. Of the simulation technologies in modern day health care education, many have found their way into OMS training. This article reviews these technologies, and some examples of their uses in OMS.

**Advances in Functional Imaging in the Assessment of Head and Neck Cancer** 627
David Q. Wan

This article discusses the application of fludeoxyglucose PET/computed tomography (CT) technology in head and neck cancer diagnosis and management, as well as advantages and disadvantages relative to traditional imaging modalities. A successful scan relies on precise patient preparation, and compliance to specific protocols before and during the scan. Finally, this article briefly introduces a PET/CT scan recently approved by the Food and Drug Administration for neuroendocrine tumors.

**Preparation of the Neck for Advanced Flap Reconstruction** 637
Jonathan W. Shum, James C. Melville, and Marcus Couey

Microvascular free tissue transfer has revolutionized the reconstruction of complex maxillofacial defects. These cases often necessitate a 2-teamed approach, with an ablative surgeon at the head and a reconstructive surgeon at a distant site for flap harvest. Careful attention to recipient vessel identification and preservation establishes the foundation for successful reconstruction. This article describes the surgical landmarks of the frequently utilized arteries and veins, vessel handling techniques, and general principles for the preparation of free tissue transfer recipient sites in head and neck reconstruction.