



New Trends Oral and Maxillofacial Surgery Past Two Decades

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Editorial

The specialty of Oral & Maxillofacial Surgery (OMFS), as we know it now, will inevitably change in our lives. The use of new scientific and technological achievements has revolutionized field of oral and maxillofacial surgery [1].

With unique training in oral and maxillofacial surgery underpinned by medical and dental science, OMS surgeons expanded into speciality areas and many now participate in craniofacial surgery and aesthetic facial surgery. OMS is, in itself, an integral field that encompasses aspects of science, clinical techniques and esthetics and constantly re-creates itself.

Over the past two decades, the field of Oral and Maxillofacial Surgery (OMS) has grown significantly, and every breakthrough in the history of our field has taken occurred due to the ingenious step to invent a new technique, and also because of the many practitioners who later learned about the technique, saw its significance, then popularized and perfected it [2].

With the rapid development of science and technology, oral and maxillofacial reconstructive surgery has kept pace with time to bring a prosperous future. OMS reconstructive surgery was focused on with major achievements made in the following aspects: transplantation of revascularized tissues, bone graft substitutes, platelet-rich plasma, tissue engineering, distraction osteogenesis, microsurgery, arthroplasty, dynamic repair, lazer surgery, computer-assisted design.

Microvascular tissue transfer was one of the most important stages in the reconstruction of the lower jaw and upper jaw after ablative tumor surgery. Modern methods using a vascularized composite fibula flap together with dental implants have led to successful rehabilitation in terms of speech, mastication and facial esthetics [3-5].

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In tissue engineering, cells, stimulatory factors (growth factors) and scaffold materials as the three main factors, provide the opportunity to create various tissues and organs with their forms and functions by changing combinations of these three factors [6].

The search for the ideal bone graft substitutes is an actual problem of oral surgery and oral implantology. Bone grafting material should provide scaffolds for bone regeneration (osteoconduction) and, at the same time, should promote the recruitment of bone forming cells and induce new bone formation (osteinduction) [7].

The use of autogenous bone has been considered the gold standard in bone regeneration procedures for many years, but donor site morbidity, pain, and prolonged hospitalization have prompted the search for bone graft substitutes [8].

Study showed demonstrated favorable bony healing in guided regenerative surgery procedures using demineralized tooth graft is able to maintain the autogenous growth factors (such as osteopontin, dentin sialoprotein and BMP) [9,10].

Recently, an innovative medical device (TT Tooth Transformer SRL, Milan, Italy) using patient's tooth and that can process and transform extracted tooth into bone graft material in a short time [11].

The autogenous demineralized tooth graft contains of BMP-2 (Bone Morphogenic Proteins that stimulate bone growth) and guarantees absolute com-patibility with the recipient site [12].

However, clinical and histological studies with a long follow-up period are necessary in order to better assess the potential of demineralized dentin auto grafts.

Applications of 3D printing in medicine and allied fields are quite diverse which includes bioprinting, tissues and organs, creation of customized prosthesis, anatomic models for high risk surgeries [13].

Depending on the application, appropriate printing technique is selected, for example, Fused Deposition Modelling (FDM), Stereo Lithography (SLA), and Selective Laser Sintering (SLS), inkjet bioprinting, extrusion bioprinting and laser-assisted bioprinting [14].

The use of three-dimensional printing (3D) application technology in maxillofacial surgery include trauma surgery, pathology induced defects, complex temporomandibular joint reconstruction and correction of complicated facial asymmetry [15].

Prerequisites for three-dimensional (3D) visualization and programs for computer-assisted 3D planning of surgical procedures have been established [16-18].

There is an increasing use of 3-dimensional (3D) imaging applications for pre-surgical planning and transfer of oral implant treatment [19,20].

The effectiveness of the navigation system for oral and maxillofacial surgery has been confirmed by clinical applications including

complex fractures of the middle and facial region, reconstruction of orbital trauma, removal of a foreign body, surgery based on the skull, orthognathic surgery and provides more safe and accurate guidance in the field of maxillofacial surgery [21].

Preoperative surgical simulations with 3D models, such as stereo lithographic models, are useful to evaluate treatment plans and to acquire precise representations of the underlying skeletal anatomy of the patient [22].

In this digital age, we have also embraced the revolutionary changes that modern computer technologies have brought to our field. From anatomical scans using imaging techniques such as Magnetic Resonance Imaging (MRI) and Computed Tomography (CT) scans, computer-aided design/computer-aided manufacturing to surgical navigation to robotic surgery. Transoral robotic surgery is also gathering steam with the prospects of offering surgeons greater precision, sensitivity and flexibility to overcome challenges associated with conventional approaches.

Computer-aided surgery has gradually become an indispensable part of our modern practice-one with greater accuracy, safety and simplicity. Computer-assisted navigation has gained acceptance in maxillofacial surgery with application in an increasing range of procedures [23].

Intraoperative computer-assisted navigation continuously monitors the surgical field and carries out surgical navigation in accordance with the preoperative plans of the doctor.

The development of navigation assisted surgery has improved execution and predictability, allowing for greater precision during oral and maxillofacial surgery [24,25].

The use of a navigation system for osteotomy and resection in tumor surgery, particularly at the skull base, allows the procedure to be performed more quickly, safely, and precisely. The use of navigation for areas where surgical approaches are difficult and areas requiring anatomical attention provides confidence in the approach. In the near future, the application of computer-assisted surgery is expected to further reduce operative risks and time, accompanied with a considerable decrease in patient stress. Therefore, the use of a navigation system will also be effective and feasible in oral and maxillofacial surgery.

Since the emergence of endoscopic surgery, minimally invasive procedures have garnered popularity among surgeons in every discipline. The last 20 years endonasal endoscopic sinus surgery increased. Now endoscopic surgery is successfully performed for processes involving the maxillary sinus. Advantages of the endoscopic approach include shorter operative time, decreased bleeding, decreased pain and provides better surgical access [26,27].

In OMS, arthroscopy of the temporomandibular joint and sialendoscopy are now routinely performed. TMJ arthroscopy an effective and minimally invasive form of surgical intervention for treating TMJ disorders [28,29].

The use of new technologies also played an important role in the diagnosis and treatment of cancers maxillofacial region. Positron Emission Tomography / Computed Tomography (PET/CT) is used diagnosis for many types of cancers and detecting lymph node metastases.

The main clinical application of Positron Emission Tomography (PET) in head and neck oncology is the diagnosis of squamous cell carcinoma [30,31].

Over the years, we have witnessed simple modifications to procedural steps setting forth paradigm shifts in the field; we have also seen innovations in other disciplines being borrowed and adapted to aid our cause.

OMS is, in itself, an integral field that encompasses aspects of science, clinical techniques and esthetics. A review of recent progress in our field reveals the importance of an active and critical scholarly forum that allows the development of revolutionary concepts and innovative ideas such as functional and minimally invasive surgical approaches as well as the computer-aided surgical techniques. The development of oral and maxillo-facial surgical technique is still constantly evolving and we sincerely hope that our special issue keeps up with the waves of change.

Purpose of this special issue entitled “Oral and Maxillofacial Surgery” is to explore major advancements in the field of OMS.

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