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Navigating Controversies in Oral and Maxillofacial Surgery: A Multidisciplinary Review

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Abstract

Oral and maxillofacial surgery (OMFS) is undergoing a dynamic transformation, driven by technological advancements, ethical considerations, and increasingly complex clinical demands. As the scope of the specialty broadens—from routine dentoalveolar interventions to intricate craniofacial reconstructions-its trajectory is shaped by persistent controversies that challenge conventional practices and stimulate scholarly and clinical innovation.

This review critically examines key debates across major subspecialties:

- *Dentoalveolar Surgery:* Ongoing discussions focus on the indications for third molar removal, evolving extraction protocols, and the judicious use of antibiotics in perioperative care.
- *Maxillofacial Trauma:* Divergent approaches to fracture fixation, optimal timing of surgical intervention, and the assessment of long-term functional and aesthetic outcomes remain central to trauma management.
- *Orthognathic Surgery:* The interplay between aesthetic refinement and functional correction continues to provoke debate, particularly in the context of virtual surgical planning, occlusal stability, and postoperative relapse.
- *Reconstructive Surgery:* Controversies persist regarding donor site morbidity, the comparative efficacy of autogenous versus alloplastic grafts, and the integration of digital technologies such as CAD/CAM-assisted workflows in complex reconstructions.

Through a comprehensive appraisal of current literature, clinical protocols, and emerging technologies, this review underscores the nuanced and multifactorial nature of decision-making in OMFS. It advocates for individualized, evidence-based strategies that are responsive to patient-specific needs while remaining cognizant of the limitations inherent in existing data. Importantly, it positions controversy not as a barrier, but as a catalyst for ethical reflection, methodological rigor, and progressive clinical practice.

Keywords: third molar; MRONJ; orthognathic surgery; virtual surgical planning; flap monitoring; maxillofacial trauma

Introduction

Oral and maxillofacial surgery (OMFS) continues to advance rapidly, with ongoing controversies serving not as obstacles but as drivers of clinical and academic refinement. Rather than signalling uncertainty, these debates reflect the inherent complexity and evolving nature of surgical practice. This review examines contemporary issues across key subspecialties of OMFS, highlighting the value of multidisciplinary collaboration and the imperative for evidence-informed decision-making in navigating these challenges.

Dentoalveolar Surgery

The Third Molar Debate: A Predictor of Periodontal Pathology

The management of third molars (M3) remains a persistent and evolving controversy in oral and maxillofacial surgery, particularly regarding the prophylactic removal of asymptomatic teeth. Emerging evidence suggests that partially impacted third molars may contribute to periodontal deterioration, especially at adjacent second molars (M2) [1]. Data from the NHANES 2009–2012 cycles indicate that nearly half of U.S. adults exhibit signs of periodontitis, yet third molars are often excluded from periodontal assessments, limiting insight into their true impact. Recent literature challenges the assumption that asymptomatic M3 are benign,

highlighting their potential role as reservoirs for subclinical inflammation and attachment loss [2]. Studies consistently report increased probing depths and periodontal compromise adjacent to partially erupted third molars, even in the absence of symptoms. These findings underscore the need to revisit current management protocols, emphasizing individualized risk assessment and long-term surveillance [3].

Medication-related osteonecrosis of the jaws (MRONJ)

Drug Holidays: A Contested Strategy in Risk Reduction: MRONJ is a serious complication associated with antiresorptive therapies such as bisphosphonates and denosumab. To mitigate risk, some clinicians advocate for a temporary discontinuation of these agents-a "drug holiday"-before invasive dental procedures. However, the clinical utility of this approach remains uncertain.

Rationale: Antiresorptive agents suppress bone turnover, with bisphosphonates exhibiting prolonged skeletal retention due to their affinity for hydroxyapatite. The theoretical benefit of a drug holiday lies in allowing partial recovery of bone remodelling, potentially reducing surgical risk [2].

Supportive Perspective: The American Association of Oral and Maxillofacial Surgeons (AAOMS) suggests considering a two-month drug holiday in high-risk individuals-particularly those on long-term therapy exceeding four years-coordinated with the prescribing physician.

Counterarguments

Limited Human Evidence: Most data stem from animal studies or retrospective reviews; robust clinical trials are lacking.

Persistent Drug Activity: Bisphosphonates remain active in bone for extended periods, limiting the impact of short-term cessation.

Therapeutic Risk: Interrupting treatment may compromise control of osteoporosis or metastatic disease.

Guideline Variability: While AAOMS cautiously endorses drug holidays in select cases, other bodies, such as the ADA, emphasize individualized assessment due to inconsistent evidence.

In summary, while biologically plausible, drug holidays lack definitive clinical validation and should not be routinely recommended without careful risk-benefit evaluation [4].

Oral Infections and Systemic Implications: The Rationale for Dental Clearance

Dental Clearance: Bridging Oral and Systemic Care

Periodontal and endodontic infections rank among the most widespread chronic conditions globally. Though traditionally viewed as localized, accumulating evidence underscores their systemic implications, prompting increased emphasis on dental clearance prior to major medical interventions.

Biological Pathways Linking Oral and Systemic Disease

Transient Bacteraemia: Routine activities such as brushing or dental procedures can introduce oral bacteria into the bloodstream, especially in individuals with periodontal disease.

Inflammatory Cascade: Chronic oral inflammation elevates systemic cytokines like IL-6 and TNF-α, contributing to endothelial dysfunction and immune modulation.

Microbial Dissemination: Periodontal pathogens have been detected in distant tissues, including atherosclerotic plaques and pulmonary sites.

Associated Systemic Conditions

Cardiovascular Disease: Periodontitis has been linked to increased risks of myocardial infarction and stroke, though causality remains under investigation.

Diabetes Mellitus: A bidirectional relationship exists-hyperglycemia exacerbates periodontal inflammation, while periodontal therapy may improve glycemic control.

Adverse Pregnancy Outcomes: Inflammatory mediators from periodontal disease have been associated with preterm birth and low birth weight.

Respiratory Infections: Aspiration of oral pathogens may contribute to pneumonia, particularly in immunocompromised or elderly patients.

Clinical Importance of Dental Clearance

Dental clearance is routinely recommended before initiating immunosuppressive therapy, organ transplantation, chemotherapy, or cardiac surgery to:

- Reduce infection risk in neutropenic patients.
- Prevent infective endocarditis in those with cardiac valve pathology.
- Minimize complications during head and neck radiotherapy.

Controversies and Limitations

Despite strong associations, causality remains debated due to:

- Confounding factors such as smoking, nutrition, and socioeconomic status.
- Limited interventional studies.
- Concerns over antibiotic overuse and resistance.

While definitive causal links are still under investigation, the role of untreated oral infections in systemic disease progression is increasingly recognized. Dental clearance remains a prudent strategy, particularly for medically vulnerable populations, reinforcing the need for interdisciplinary collaboration in patient care [3].

Alveolar Ridge Preservation: Balancing Predictability with Selective Indication

Rationale, Indications, and Controversies

Alveolar ridge preservation (ARP) encompasses techniques aimed at minimizing post-extraction bone resorption, which can result in up to 50% ridge width loss within the first year. While ARP is widely adopted, its routine use remains debated due to cost, patient morbidity, and variable long-term outcomes.

Selective Indications

Current guidelines support a site-specific approach, with ARP favoured in cases involving:

- Thin gingival biotype, especially in the anterior maxilla.
- Buccal bone defects.
- Delayed implant placement.
- High aesthetic demands.

Arguments Supporting ARP	Arguments Against Routine Use
Volume Preservation: Prevents collapse of the buccal plate, critical for aesthetics and implant stability.	*Variable Healing:* Posterior sites with thick cortical bone often heal adequately without intervention.
Simplified Prosthetic Planning: Reduces the need for secondary augmentation procedures.	*Resource Burden:* Additional materials, time, and cost may not be justified in all cases.
Soft Tissue Maintenance: Preserves gingival contours and papilla height.	*Complication Risk:* Includes graft exposure, infection, and delayed healing, particularly in high-risk patients.
Marginal Bone Stability: Associated with reduced bone loss compared to delayed grafting.	*Uncertain Long-Term Benefit:* Evidence linking ARP to improved implant survival remains inconclusive.

Additional Risk Factors for Marginal Bone Loss

- History of periodontitis, especially aggressive forms.
- Smoking, with greater impact in maxillary sites.
- Gender differences, with men showing higher bone loss rates.

An individualized, evidence-based approach remains the standard, balancing clinical efficacy with patient-specific considerations.

Key Controversies in Dentoalveolar Surgery

Tooth Removal Criteria: The prophylactic extraction of asymptomatic third molars and non-pathologic impacted teeth remains contentious, with clinicians weighing preventive benefits against surgical risks.

Bone Grafting and Regeneration: No consensus exists on optimal graft materials or protocols. Decisions are shaped by clinical goals, cost, availability, and emerging data.

Dry Socket Debate: While some view dry socket as a distinct clinical entity, others question its pathophysiological basis, prompting re-evaluation of its aetiology and management.

Drug Holiday Dilemma: Temporary cessation of antiresorptive therapy before surgery is biologically plausible but lacks consistent evidence. Guidelines vary across professional bodies.

Instrument Preferences: Surgeon preferences for basic instruments such as elevators and forceps vary widely, influenced by training, case complexity, and personal technique [1-4].

Maxillofacial Trauma

The Presence of Teeth within The Mandibular Fracture Line

Particularly, third molars in angle fractures remain a topic of clinical debate. Up to 85% of mandibular angle fractures are associated with third molars. Current guidelines recommend retaining these teeth unless they obstruct fracture reduction or exhibit pathology. The decision to extract or preserve involves weighing potential infection risk, impact on fracture stability, and long-term functional outcomes [5,6].

Key Perspectives from the Literature

Retention vs. Extraction: Teeth within fracture lines are typically retained if they are vital, intact, and do not obstruct reduction, particularly when rigid fixation and antibiotic coverage are employed. Extraction is recommended when teeth are severely luxated, fractured, or associated with pathology such as pericoronitis, advanced caries, or periodontal disease [7].

Infection Risk: Fractures involving the periodontal ligament space are considered open and contaminated, necessitating systemic antibiotic

therapy. Advances in fixation techniques and antimicrobial protocols have significantly reduced infection rates, supporting more conservative tooth management [7].

Tooth Buds and Developing Teeth: Emerging evidence indicates that displaced tooth buds may continue normal development and eruption, challenging earlier assumptions that favoured routine removal [5].

Postoperative Monitoring: Teeth retained in fracture lines should undergo clinical and radiographic follow-up for at least one year to monitor for late complications and avoid unnecessary endodontic intervention [8].

Clinical Implications

Decision-making should be case-specific, integrating ethical considerations and long-term patient outcomes. Synthesizing current evidence can inform refined guidelines and contribute meaningfully to the literature [6-8].

Open vs. Closed Reduction for Condylar Fractures: A Controversial Perspective

Condylar fractures represent 25–35% of mandibular fractures and remain a contentious topic in trauma management. The debate centers on choosing between open reduction and internal fixation (ORIF) versus closed reduction with maxillomandibular fixation (MMF), each with distinct benefits and risks.

Closed Reduction

Traditionally favoured for non-displaced fractures, closed reduction avoids surgical risks and preserves facial nerve integrity. However, it may result in prolonged immobilization, malocclusion, restricted mandibular movement, and potential temporomandibular joint (TMJ) dysfunction.

Open Reduction (ORIF)

ORIF allows anatomical restoration, early mobilization, and improved functional outcomes. Despite its advantages, it carries risks such as facial nerve injury, infection, and scarring. Advances in surgical techniques and hardware have increased its adoption, particularly for displaced fractures [9,10].

Controversies and Evidence

Functional Outcomes: Meta-analyses show comparable long-term results between both approaches, with ORIF offering better outcomes in mouth opening deviation.

Facial Nerve Risk: Recent data suggest no significant difference in nerve injury rates between open and endoscopic techniques.

Endoscopic-Assisted ORIF: Provides reduced morbidity and improved visualization but requires specialized training and equipment [9].

Current Consensus

Treatment should be individualized based on fracture characteristics, patient age, occlusal status, and available surgical expertise. While ORIF is increasingly preferred for displaced fractures in adults, closed reduction remains appropriate for select cases [9].

Comminuted Fractures

Fixation Strategies in Mandibular Fractures: The choice between conservative management and rigid internal fixation remains a subject of clinical debate, influenced by bone quality, soft tissue status, and surgeon preference. Fixation system selection is primarily dictated by anatomical site and functional load.

Miniplates and Load-Bearing Systems: Mono-cortical miniplates, aligned with Champy's principles, are preferred in low-stress regions for their adequate stability and minimal surgical morbidity. In contrast, bi-cortical load-bearing plates are indicated in high-stress zones or comminuted fractures, offering superior rigidity against masticatory forces.

Mandibular Angle Fractures: Three-dimensional (3D) plates are increasingly utilized for their geometric stability and resistance to torsional forces. Nonetheless, conventional dual-plate techniques remain widely accepted due to their proven efficacy and ease of adaptation.

Resorbable Systems: Resorbable fixation devices present a viable option in paediatric cases or low-load environments. Despite their advantages in avoiding secondary hardware removal, concerns persist regarding mechanical durability and potential inflammatory reactions, limiting broader clinical application [10].

Timing of Intervention

The timing of surgical intervention significantly influences outcomes in mandibular fracture management. Early repair-ideally within 72 hours-is traditionally recommended to reduce infection risk and promote optimal healing. However, short delays of up to five days may be acceptable, particularly in polytrauma cases or when soft tissue conditions contraindicate immediate surgery. Delayed

intervention can improve surgical access and facilitate soft tissue management. Still, postponement beyond five to seven days increases the likelihood of complications such as infection, fibrosis, and malunion. Therefore, timing should be individualized, balancing clinical urgency with patient stability and tissue readiness [11].

Use of Prophylactic Antibiotics

The routine use of prophylactic antibiotics in facial trauma remains controversial, particularly in closed fractures without mucosal disruption. While traditionally employed to prevent infection, emerging evidence supports a more selective approach aligned with principles of antibiotic stewardship.

- Clinical Guidelines
- *Nonoperative Fractures:* Antibiotics are generally not recommended for closed, nonoperative fractures with intact mucosa due to the low risk of infection.
- *Operative Fractures:* Perioperative: Advised for procedures involving any facial third to reduce intraoperative contamination.
- *Preoperative:* May be considered in comminuted mandibular fractures with increased susceptibility to bacterial ingress.
- *Postoperative:* Not routinely indicated; use should be based on individual risk factors and clinical judgment.

AAST Position

The American Association for the Surgery of Trauma endorses a tailored strategy, recommending antibiotic use based on fracture complexity, contamination risk, and patient comorbidities.

Arguments Against Routine Use	Arguments Supporting Prophylactic Use
Low Infection Rates: Recent multicentre studies show infection rates below 1% in nonoperatively managed facial fractures, even without antibiotics.	*Contamination Risk:* Facial fractures often involve communication with the oral cavity, sinuses, or skin, increasing the risk of infection.
Antibiotic Stewardship: Overuse contributes to antimicrobial resistance, adverse drug reactions, and increased healthcare costs.	*Historical Precedent:* Earlier studies supported antibiotic use to reduce postoperative complications, particularly in mandibular fractures.
Lack of High-Quality Evidence: Systematic reviews reveal that most studies are of low methodological quality, limiting the strength of recommendations.	*Surgical Site Infection (SSI) Prevention:* In open reduction and internal fixation (ORIF), perioperative antibiotics are believed to reduce SSIs, especially in comminuted or contaminated wounds.
No Benefit in Postoperative Use: Evidence does not support extended postoperative antibiotic use in any facial third.	-

The use of prophylactic antibiotics in facial fractures should be guided by clinical context, weighing infection risk against the principles of antibiotic stewardship. While perioperative antibiotics are standard in surgical cases, routine use in nonoperative management is increasingly discouraged. Ongoing research and adherence to evidence-based protocols are essential to improve outcomes and reduce unnecessary antimicrobial exposure [10-11].

Paediatric Mandibular Fractures

Management in children requires careful consideration of growth dynamics and developmental anatomy.

- *Rapid Healing:* Early intervention may be beneficial due to accelerated bone regeneration.
- *Growth Preservation:* Conservative treatment is often preferred to avoid interference with developing dentition and growth centers.
- *Balanced Approach:* Decisions must weigh immediate stabilization against long-term functional and aesthetic outcomes.

Adult Fractures

Timing in adults is more flexible and influenced by individual clinical factors.

- *Patient-Specific Planning:* Comorbidities, fracture severity, and compliance guide intervention timing.
- *Recovery Optimization:* Treatment aims to minimize complications while aligning with systemic health needs [12].

Orthognathic Surgery: Evolving Controversies and Clinical Considerations

Orthognathic surgery remains essential for correcting dentofacial deformities beyond the scope of orthodontics. While widely practiced, several aspects continue to spark debate, underscoring the need for individualized, evidence-based strategies.

Fixation Methods and Condylar Management

- *Evolution of Fixation:* Transition from wire to rigid internal fixation has improved skeletal stability but raised concerns about condylar displacement and potential TMJ dysfunction.
- *Positioning Techniques:* Strategies include positioning devices, intraoperative imaging, and splintless protocols.

- *Ongoing Debate:* Whether condylar seating should be actively guided or allowed to self-adjust remains unresolved.

Virtual Surgical Planning (VSP)

- *Technological Advances:* 3D imaging, CAD/CAM splints, and navigation systems have improved surgical precision.
- *Challenges:* High costs, steep learning curves, and limited predictive accuracy—especially for soft tissue and condylar outcomes-temper widespread adoption.

Segmental Osteotomies and Surgical Sequencing

- *Segmental Approaches:* Enable focused correction of arch discrepancies but increase procedural complexity and vascular risk.
- *Sequencing Controversy:* No clear consensus exists on whether maxillary or mandibular osteotomy should be performed first.

Splintless Techniques

- *Benefits:* Enhanced airway access and reduced operative time through reliance on VSP and navigation tools.
- *Limitations:* Demands high surgical precision and may not be suitable for all cases.

Orthognathic surgery continues to evolve amid ongoing debates over fixation, condylar positioning, virtual planning, and procedural sequencing. A patient-specific, outcome-driven approach remains central to achieving functional and aesthetic success [13].

Reconstructive Surgery

Microvascular Techniques

Microvascular reconstruction is a cornerstone in managing extensive maxillofacial defects, with success rates exceeding 95%. Despite its reliability, perioperative protocols-particularly flap monitoring, anticoagulation, and vasopressor use-remain subjects of ongoing debate.

Flap Monitoring: Clinical observation remains the most accessible method but is limited by subjectivity, especially in buried flaps. Technological adjuncts such as implantable Dopplers, near-infrared spectroscopy (NIRS), and laser flowmetry offer improved detection of vascular compromise but introduce concerns regarding cost, invasiveness, and operational complexity. Most vascular failures occur within the first 72 hours, yet consensus on optimal monitoring duration and frequency is lacking [14].

Anticoagulation Strategies: Protocols vary widely. Aspirin and low-molecular-weight heparin (LMWH) are commonly employed, offering similar efficacy but differing bleeding profiles. Dextran is largely avoided due to its association with adverse effects. Emerging topical and intraluminal agents show potential but require further validation.

Vasopressor Use: Once considered detrimental to flap perfusion, vasopressors-particularly norepinephrine-are now deemed safe when used judiciously during surgery. Dopamine is less favoured due to its variable hemodynamic effects [15].

Topical and intraluminal approaches show promise but require validation. Vasopressors, once controversial, are now considered safe with careful intraoperative use, particularly norepinephrine over dopamine.

Timing and Technology

Immediate reconstruction provides significant psychosocial advantages but may hinder accurate assessment of oncologic margins. Innovations such as virtual surgical planning and patient-specific implants enhance precision; however, their accessibility remains limited. In the absence of standardized guidelines and high-level evidence, a tailored, patient-centered approach is essential for achieving optimal outcomes [14].

Implantology and Pathology

Controversies in implant surgery encompass key aspects of clinical decision-making. The use of short and narrow-diameter implants offers reduced morbidity and avoids grafting but raises concerns about biomechanical stability and long-term outcomes, particularly in compromised bone. Immediate placement in infected sites remains debated; while some advocate for it with thorough debridement and antibiotics, risks of peri-implantitis and limited evidence warrant caution. Implant placement in growing patients is typically avoided due to infraocclusion, though exceptions exist, such as in anodontia. The expanded use of mini-implants for definitive prostheses is questioned due to mechanical limitations and inconsistent survival rates. Ethical concerns also emerge with early extraction of restorable teeth, emphasizing the importance of interdisciplinary planning and tooth preservation. Peri-implantitis management lacks standardized protocols, with variable success across mechanical, laser, and regenerative therapies, and frequent recurrence highlights the need for clearer clinical guidelines [16].

Oncology Sleep Apnea Surgery

Sentinel node biopsy presents a less invasive alternative to elective neck dissection but remains limited by the absence of standardized protocols.

Defining Surgical Success in Sleep Surgery

- No unified criteria exist; success is variably measured by AHI reduction, symptom improvement, or enhanced quality of life.

- Sher's definition (≥50% reduction in AHI and final AHI
- There is a growing emphasis on patient-centred metrics, including reductions in daytime sleepiness and cardiovascular risk [23].

Sleep Apnea Surgery

Multilevel surgical approaches, particularly maxillomandibular advancement (MMA), offer durable outcomes in obstructive sleep apnea (OSA) but demand careful patient selection.

Airway Evaluation

- Static assessments (e.g., imaging, cephalometry) reveal structural anatomy but fail to capture dynamic airway collapse.
- Drug-induced sleep endoscopy (DISE) enables functional evaluation, though its predictive value and standardization remain limited.

Maxillomandibular Advancement (MMA)

- MMA is among the most effective surgical options, with outcomes comparable to CPAP.
- Challenges include surgical morbidity, aesthetic considerations, and variability in long-term stability and timing across practices.

Multilevel vs. Single-Level Surgery

- UPPP alone is insufficient for moderate/severe OSA.
- Multilevel approaches improve outcomes but add complexity and lack standard sequencing.

Isolated Nasal Surgery

- Minimal impact on AHI; improves subjective symptoms and CPAP compliance.
- Primarily beneficial in nasal obstruction cases affecting mask tolerance.

Patient Selection and Predictive Tools

- Friedman staging, BMI, and anatomy are widely used but imperfect.
- Emerging models: machine learning, personalized airway simulation. Ethical concerns when the benefit is uncertain [17].

Anaesthesia Cosmetic Surgery

Office-based anaesthesia administered by OMS-trained providers continues to spark debate over safety, oversight, and scope of practice.

Controversies in Maxillofacial Anaesthesia

Office vs. Hospital-Based Anaesthesia: Office settings offer convenience but raise concerns regarding monitoring standards, emergency preparedness, and patient safety.

Autonomy vs. Collaborative Care: OMS training supports independent practice; however, team-based models may enhance safety while limiting procedural autonomy.

Local vs. General Anaesthesia: Local anaesthesia is less invasive but carries risks such as paraesthesia; general anaesthesia provides greater control with broader systemic considerations.

Complications and Reporting Gaps: Adverse events like nerve damage and tissue necrosis are underreported due to the lack of standardized documentation protocols.

Ethics and Informed Consent: Variability in consent practices and practitioner qualifications contributes to legal disputes, emphasizing the need for transparent risk disclosure.

Training and Credentialing: Ongoing debate surrounds the sufficiency of OMS anaesthesia training, with increasing support for simulation-based education and subspecialty certification [18].

Cosmetic Surgery

Cosmetic procedures such as osseous genioplasty and chin implants underscore the ongoing tension between aesthetic aspirations and anatomical integrity.

Controversies in Facial Cosmetic Surgery

Surgical vs. Non-Surgical Techniques: The popularity of injectables challenges conventional surgery, offering convenience but with temporary effects and potential complications.

Standardization vs. Individualization: Debate persists between applying neoclassical aesthetic norms and tailoring plans to respect ethnic variation and unique anatomy.

Revision Rates: High rates of revision highlight the importance of thorough patient counseling and precise surgical execution.

Lower Eyelid Surgery

- *Fat Removal:* May lead to a hollowed, aged appearance.
- *Fat Repositioning:* Maintains natural contour but requires advanced skill and precision.

Chin Augmentation

- *Implants:* Appropriate for minor deficiencies; associated with higher complication and revision rates.
- *Osseous Genioplasty:* Allows comprehensive correction but involves greater surgical complexity and neurosensory risk [19].

Controversies in Maxillofacial Infection Management

Antibiotic Stewardship vs. Empirical Therapy

- Empirical broad-spectrum antibiotics are frequently used but contribute to resistance.
- Culture-guided therapy enables targeted treatment and optimized dosing.

Imaging for Deep Space Infections

- CT is the standard for diagnosis; MRI offers superior soft tissue detail but is less accessible.
- Ultrasound is safe and cost-effective, but limited in evaluating deep anatomical spaces.

Surgical Timing and Extent

- Early intervention improves outcomes but may lead to overtreatment in select cases.
- Severity scoring systems aid in tailoring surgical decisions.

Corticosteroid Use

- Can reduce edema and improve airway patency.
- Concerns include immunosuppression; routine use remains controversial.

Biofilm-Related Hardware Infections

- Hardware removal is often required due to biofilm resistance.
- Conservative management may be viable depending on device stability and host response.

Airway Management and Tracheostomy

- Prophylactic tracheostomy secures the airway but carries procedural risks.
- Alternatives include awake intubation and selective airway strategies guided by clinical scoring [20].

Controversies in Maxillofacial Pathology

Odontogenic Keratocyst (OKC) vs. Keratocystic Odontogenic Tumor (KCOT)

- WHO reclassified KCOT back to OKC as a cyst.
- Despite molecular evidence of neoplastic behaviour, the classification affects surgical approach and use of adjunctive treatments.

Ameloblastoma Management

- Unicystic variants are often managed conservatively.
- Multicystic types typically require radical resection.
- Emerging BRAF-targeted therapies offer non-surgical alternatives.

Central Giant Cell Lesions

- Ambiguous etiology (reactive vs. neoplastic) complicates treatment decisions.
- Management ranges from curettage to pharmacologic options like corticosteroids or calcitonin.

Oral Potentially Malignant Disorders (OPMDs)

- Histopathologic grading remains inconsistent.
- Biomarker research is ongoing but lacks clinical standardization.

Molecular Profiling in Oral Squamous Cell Carcinoma (OSCC)

- Prognostic markers show potential but are not widely adopted due to cost and accessibility.
- HPV's role in non-oropharyngeal OSCC remains controversial.

Adjunctive Therapies for Benign Lesions

- Carnoy's solution lowers recurrence rates but poses toxicity risks.
- Modified formulations exist, though long-term safety remains uncertain [21].

Controversies in Maxillofacial Oncology

Management of cN0 Neck in OSCC

- Sentinel lymph node biopsy (SLNB) offers a minimally invasive option but lacks universal protocols.
- Elective neck dissection may lead to overtreatment, while imaging often misses micrometastases.

Mandibular Resection Strategies

- Marginal resection preserves function but may compromise oncologic margins.
- Segmental resection ensures clearance but increases morbidity.

Timing and Technique of Reconstruction

- Immediate microvascular flaps enhance rehabilitation but can obscure margin evaluation.
- Delayed or regional flaps are favoured in high-risk or uncertain margin cases.

HPV in Oral Cavity Cancer

- Its prognostic relevance remains debated.
- Implications for treatment de-intensification are still under investigation.

Adjuvant Therapy in Early OSCC

- Decisions depend on the depth of invasion, margin status, and perineural involvement.
- Clinical trials are ongoing to optimize patient selection.

Ethical Considerations in Advanced Disease

- Treatment planning must balance longevity with quality of life.
- Emphasis on shared decision-making is critical in palliative care [22,23].

Controversies in Metopic Suture Craniosynostosis and Its Relevance to Oral and Maxillofacial Surgery

Diagnostic Controversies

- *Metopic Ridge vs. Metopic Synostosis:* Benign ridges may mimic synostosis; misdiagnosis risks unnecessary surgery or delayed intervention.
- *Imaging Limitations:* CT variability and lack of radiologic consensus complicate diagnostic accuracy.

Management Debates

Surgical vs. Conservative Treatment

- The traditional view Favors surgery for ICP prevention and aesthetics.
- Emerging evidence supports watchful waiting in mild cases with normal development.

Role of Oral and Maxillofacial Surgery (OMFS)

- OMFS contributes to assessing midface growth, airway patency, and future orthognathic needs.
- Plays a key role in multidisciplinary planning, especially in syndromic presentations.

Timing and Technique Selection

- *Timing:* Early surgery (6-9 months) allows optimal remodelling but raises anaesthesia concerns.
- *Techniques:* Fronto-orbital advancement (FOA) is standard for severe cases; endoscopic strip craniectomy with helmet therapy suits milder forms.

Genetic and Neurodevelopmental Considerations

- Mutations in genes like SPRY3 and BMP7 are linked to developmental outcomes.
- Debate persists on whether surgical intervention can influence neurocognitive trajectories shaped by genetics.

Broader OMFS Controversies in Craniosynostosis

- *Syndromic Cases:* Midface hypoplasia often necessitates Le Fort III osteotomy or distraction techniques.
- *Orthognathic Timing:* Ongoing debate between early midface advancement and delayed adolescent surgery.
- *Multidisciplinary Coordination:* Absence of standardized protocols complicates integrated care [24].

Conclusion

Controversies in Oral and Maxillofacial Surgery Represent Catalysts for Progress

From surgical timing to the integration of emerging technologies, personalized care-anchored in sound clinical judgment and evidence-is essential. As Retana aptly noted, facial aesthetic procedures demand a careful balance between artistic goals, anatomical accuracy, and patient safety [25].

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Ethics Approval

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Author Contributions

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