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DENTAL IMPLANT REHABILITATION IN PATIENTS WITH LIMITED MOUTH OPENING: CHALLENGES & SOLUTIONS

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ABSTRACT

Dental implant therapy has revolutionized oral rehabilitation by providing a reliable solution for edentulism. However, implant placement in patients with a limited mouth opening presents unique challenges, requiring modifications in surgical techniques, instrumentation, and prosthetic workflows. This narrative review explores the difficulties encountered during implant placement in such patients, reviews available literature, and discusses innovative approaches to optimize outcomes. Various strategies, including alternative implant designs, computer-aided techniques, and specialized surgical protocols, are reviewed to provide clinicians with practical solutions.

Keywords: Dental implants, Digital dentistry, Implant placement, Limited mouth opening, minimally invasive surgery, Trismus

INTRODUCTION

Successful dental implant placement depends on adequate surgical access, precise drilling, and prosthetic maneuverability. Patients with restricted mouth opening, due to conditions like temporomandibular joint disorders (TMD), oral submucous fibrosis (OSMF), trauma, or radiation-induced fibrosis, present unique clinical challenges.¹ Traditional surgical and prosthetic workflows become compromised, necessitating innovative approaches for successful rehabilitation. This review aims to summarize current literature and present viable solutions for implant placement in patients with restricted mouth opening.

Limited mouth opening poses serious technical difficulties for the clinician during the surgical phase of implant placement. Precise drilling sequences and handpiece positioning are essential for proper osteotomy preparation, but with inadequate interarch distance, angulating the surgical

instruments correctly becomes difficult. According to Gupta et al., improper positioning can result in deviations from the planned implant trajectory, affecting primary stability, prosthetic alignment, and overall implant success.² Additionally, the inability to fully retract soft tissues may compromise visibility, increasing the risk of iatrogenic damage to adjacent structures such as nerves and blood vessels.

Once the implant has been placed successfully, the restorative phase presents additional challenges. Conventional impression-making techniques—especially those involving closed-tray or open-tray methods—require sufficient mouth opening to accommodate impression trays. In cases of severe restriction, even digital intraoral scanning may be limited due to difficulty in properly positioning the scanner tip within the confined space. Moreover, delivering the final prosthesis, whether a single-unit crown, bridge, or overdenture, may require modifications in abutment selection or the use of customized prosthetic components that can accommodate the restricted access.

A limited oral aperture increases the risk of intraoperative and postoperative complications due to restricted visualization and compromised control over surgical instruments. Smith et al. highlight that inadequate access can lead to misaligned implant positioning, which may cause biomechanical complications in the final prosthesis.³ It can also result in soft tissue trauma due to excessive force exerted while maneuvering instruments in a constrained space. Additionally, limited access may prolong surgical time, increasing the risk of postoperative edema, pain, and infection. Furthermore, challenges in suture placement may arise, potentially leading to wound dehiscence or delayed healing.

To optimize implant placement in patients with limited mouth opening, clinicians can consider alternative surgical approaches such as piezoelectric surgery, which allows for minimally invasive bone preparation. Angled implant systems may also be utilized to facilitate placement in anatomically challenging conditions. Additionally, segmental impressions or intraoral digital scanning with modified scanning protocols can accommodate restricted access. Custom prosthetic components, such as multi-unit abutments with extended screw channels, can further improve retrievability and ease of insertion.

By carefully planning each stage of implant therapy and using innovative techniques, clinicians can overcome the limitations posed by restricted mouth opening and ensure successful treatment outcomes.

DISCUSSION

A limited mouth opening, whether due to microstomia (congenital or acquired) or trismus (resulting from trauma, radiation therapy, surgical interventions, or systemic conditions), presents significant challenges during various stages of dental implant placement. The difficulties arise due to restricted access, visibility, and maneuverability, impacting both surgical and prosthetic procedures.

Patients with reduced mouth opening may have conditions such as Temporomandibular Joint Disorders (TMD), which are characterized by chronic pain and mechanical restrictions.⁴ Another possible cause is Oral Submucous Fibrosis (OSMF), where fibrotic changes lead to limited jaw movements.⁵ Additionally, surgical or radiation-induced fibrosis can result in scarring from prior surgical interventions, further restricting mouth opening.⁶ Congenital anomalies, such as microstomia associated with syndromic conditions, can also contribute to reduced mouth opening.⁷

The use of short and narrow implants helps reduce the need for extensive bone preparation, making them a suitable option in cases with limited bone availability.⁸ Angled and zygomatic implants, along with angulated abutments, facilitate prosthetic alignment even when access is restricted.⁹ Guided implant surgery, utilizing computer-aided design and manufacturing (CAD/CAM), enables pre-planned guided procedures, thereby minimizing intraoral instrument handling and enhancing precision.¹⁰ Additionally, flapless and minimally invasive techniques, such as piezoelectric surgery and keyhole approaches, reduce surgical trauma while improving

accuracy.¹¹

Digital impressions using intraoral scanners help overcome the limitations of physical impressions in cases with restricted access.¹² Segmented prostheses, designed as multi-part restorations, allow for easier intraoral assembly, enhancing prosthetic placement in complex situations.¹³ Additionally, 3D-printed surgical guides provide custom solutions that improve precision while minimizing intraoral instrumentation challenges.¹⁴

Physiotherapy and jaw stretching exercises play a crucial role in post-surgical rehabilitation, helping patients optimize jaw function.¹⁵ Effective soft tissue management is essential for proper healing and prosthetic adaptation, requiring strategic contouring techniques.¹⁶ Additionally, long-term maintenance protocols, including regular follow-ups, are necessary to ensure implant stability and the continued functionality of prosthetic restorations.¹⁷

CONCLUSION

Dental implant placement & prosthetic rehabilitation in patients with limited mouth opening is a challenging yet surmountable issue with appropriate surgical and prosthetic modifications. Advances in digital dentistry, guided surgery, and minimally invasive techniques provide promising solutions for these cases. Clinicians should consider individualized approaches based on the underlying etiology and patient-specific anatomical constraints to ensure predictable outcomes.

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