

Laser Treatment of Hemangiomas, Oral Cysts, and Mucocele: Advances in Minimally Invasive Oral and Maxillofacial Surgery

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Laser-assisted surgical techniques have emerged as a highly effective, minimally invasive approach for the management of soft-tissue lesions in oral and maxillofacial surgery, particularly hemangiomas, oral mucocles, and small odontogenic or non-odontogenic cysts. These pathologies are frequently encountered in daily clinical practice and often require precise excision with minimal bleeding, reduced tissue trauma, and rapid healing. The purpose of this extended abstract is to provide a comprehensive synthesis of current evidence regarding the application of diode and CO₂ laser systems in treating these lesions, highlighting clinical efficacy, safety, procedural advantages, and outcome predictability in comparison to conventional surgical methods.

Hemangiomas represent benign vascular tumors characterized by endothelial proliferation and increased vascularity. Traditional excision carries risks such as intraoperative hemorrhage, incomplete removal, and postoperative scarring. Laser photocoagulation has demonstrated superior control in these cases due to its ability to cause selective thermal coagulation while sparing adjacent healthy tissue. Diode lasers (810–980 nm) and CO₂ lasers (10,600 nm) have been widely studied, showing high rates of lesion regression, reduced recurrence, and excellent cosmetic outcomes. Clinical reports indicate that laser treatment significantly decreases operative bleeding, lowers the need for suturing, and shortens procedure time. In pediatric patients, laser therapy has been especially advantageous due to improved tolerance, minimal discomfort, and low complication rates.

Mucoceles, resulting from mucus extravasation or retention within minor salivary glands, are another common indication for laser intervention. Conventional scalpel excision risks damaging adjacent ducts and causes postoperative discomfort. Laser excision, however, provides a controlled removal of the lesion, simultaneous sterilization of the wound bed, and enhanced visibility due to the bloodless field. Studies show that diode and CO₂ laser excision of mucocles is associated with significantly faster epithelial healing, reduced inflammation, and lower recurrence rates compared to scalpel techniques. Additionally, many patients experience less postoperative pain and edema, contributing to improved patient satisfaction. Laser management of small oral cysts—such as mucous cysts, superficial odontogenic cysts, and epithelial-lined inclusion cysts—has also gained popularity. Laser enucleation facilitates precise removal with minimal collateral damage, preserving surrounding mucosa and bone. CO₂ lasers, in particular, are effective in vaporizing cystic linings while maintaining the structural integrity of the operative site. This approach reduces the risk of secondary infection, accelerates tissue regeneration, and minimizes the need for postoperative suturing. In cases of recurrent cysts, laser therapy serves as a valuable adjunct to reduce recurrence by destroying residual epithelial remnants.

Overall, literature strongly supports the integration of laser systems into routine treatment protocols for benign soft-tissue lesions in oral and maxillofacial surgery. Lasers offer clear advantages, including reduced operative bleeding, limited tissue trauma, antimicrobial effects, decreased postoperative morbidity, and superior esthetic and functional outcomes. Despite these benefits, standardized treatment parameters, such as optimal wavelength, power settings, and exposure duration, remain an area requiring further research. Long-term multicenter clinical trials are essential to establish evidence-based guidelines and assess recurrence rates over extended follow-up periods.

Laser therapy represents a progressive shift toward minimally invasive surgical care, offering predictable results with high patient comfort and safety. As modern maxillofacial surgery

continues to evolve, the role of lasers in managing hemangiomas, cysts, and mucocoeles is expected to expand further, supported by technological refinements and growing clinical experience.

Keywords: laser surgery, CO₂ laser, diode laser, hemangioma, mucocoele, oral cysts, soft tissue lesions, minimally invasive surgery.