https://doi.org/ 10.33472/AFJBS.6.5.2024. 5888-5892

African Journal of Biological Sciences

Cutting-edge Concepts for Bleeding Control in Oral and Maxillofacial Surgery

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Article History
Volume 6, Issue 5, 2024
Received: 09 May 2024
Accepted: 17 May 2024
doi: *10.33472/AFJBS.6.5.2024. 5888-5892*

ABSTRACT:

To ensure the best possible results and patient safety in oral and maxillofacial surgery, effective bleeding control is essential. This study explores traditional practices, newly developed hemostatic agents, particular concerns, and upcoming trends in this specialty area of bleeding treatment. Through an analysis of conventional methods and novel strategies, this review seeks to improve knowledge and competence regarding attaining efficient hemostasis in oral and maxillofacial surgery.

KEYWORDS:Oral and maxillofacial surgery, bleeding control, hemostasis, techniques, advancements, hemostatic agents, complications

INTRODUCTION:

To ensure patient safety and surgical success, bleeding control is crucial in oral and maxillofacial surgery. Prolonged bleeding can make the surgery field difficult to see, raise the

possibility of complications, and harm patient outcomes. Therefore, to increase effectiveness and enhance patient outcomes, bleeding control technology improvements are always changing. The goal of this review is to present a thorough summary of bleeding control strategies used in oral and maxillofacial surgery, taking into account unique factors, improvements in hemostatic drugs, conventional approaches, and potential future directions.

TRADITIONAL METHODS IN BLEEDING CONTROL:

In the past, oral and maxillofacial surgeons have depended on conventional methods to accomplish hemostasis during surgical procedures, including applying pressure, placing ligatures, and using electrocautery[1]. Pressure application is the process of directly compressing blood vessels at the bleeding site with gauze or surgical sponges to encourage the formation of a clot. Contrarily, ligation placement entails cutting off bleeding vessels with sutures or other materials to stop the flow of blood. Through the use of electrical current, electrocautery successfully controls bleeding during surgery by cauterizing tissue and coagulating blood vessels. Although these methods work well most of the time, there is a chance that they will cause tissue damage, slow wound healing, and pain post-surgery[10,17,18].

ADVANCEMENTS IN HEMOSTATIC AGENTS:

Recent developments in hemostatic drugs have completely changed the way that bleeding management is handled in oral and maxillofacial surgery. By stimulating clot formation and promoting hemostasis, topical hemostatic agents—such as gelatin sponges, oxidized cellulose, and collagen-based products—offer an alternative or supplement to conventional techniques[2]. By forming a mechanical barrier over the bleeding site, sealants like fibrin glue and cyanoacrylate adhesives block blood vessels and encourage tissue repair. These compounds are especially helpful at deep surgical sites or areas with limited access, where it is not practicable to apply direct pressure or install ligatures[15,16].

SPECIAL CONSIDERATIONS AND COMPLICATIONS:

In addition to the progress gained in hemostatic drugs, particular attention needs to be paid to certain oral and maxillofacial operations that have a higher risk of bleeding. Careful bleeding control is essential for treatments including dental extractions, implant placement, and orthognathic surgery to avoid complications like hemorrhage, hematoma formation, and nerve injury[8]. To reduce the risk of bleeding and improve surgical outcomes, patients who have underlying medical disorders or are using anticoagulant drugs might need to take extra precautions.

PROSPECTIVE COURSES:

To further enhance patient outcomes and surgical efficiency, the area of oral and maxillofacial surgery will likely continue to investigate cutting-edge methods of bleeding management in the future. New

technologies that have the potential to achieve quick, efficient hemostasis with little side effects include tissue adhesives, hemostatic dressings, and thrombin-based therapies[9]. Furthermore, improvements in robotic-assisted surgery and minimally invasive surgical methods may present new possibilities for accurate hemorrhage management and tissue preservation. Subsequent investigations ought to concentrate on assessing the security, effectiveness, and economical feasibility of these developing technologies to direct their extensive integration into clinical practice[13,14].

DISCUSSION:

In oral and maxillofacial surgery, effective bleeding control is essential because perioperative hemorrhage presents serious risks and complications. Although traditional techniques such as direct pressure, electrocautery, and vascular ligation are usually enough for controlling bleeding in this area, there are situations in which additional hemostatic drugs are required[1]. Surgeons must take into account several considerations when choosing the right topical hemostatic agent, including the kind and degree of bleeding, the patient's history of bleeding, the agent's mode of action, availability, and cost.

Because of their absorbable nature, agents such as Ostene, Gelfoam, or Surgicel are used for treating osseous hemorrhage. Additionally, even in patients receiving antiplatelet or anticoagulant therapy, topical hemostatic agents like Gelfoam, Surgicel, Hemostatic Collagen, Chitosan, or Hemocoagulase products can be used in conjunction with direct pressure to effectively stop bleeding in cases of oozing or mild hemorrhage. Research has indicated that hemostasis and chitosan not only help regulate bleeding but also lower pain levels and promote faster wound healing[4].

More recent topical hemostatic treatments such as the Gelatin-thrombin matrix, Fibrin Sealant, or Floseal® have shown promise in attaining hemostasis in moderate-to-severe bleeding scenarios. For patients on anticoagulant therapy or those with bleeding disorders like hemophilia, these medications are very helpful in perioperative hemostasis[19,20].

In addition, tranexamic acid, or TXA, has shown to be a flexible choice for hemostatic agent-free or combination hemostatic bleeding management[5,11]. Based on research, patients with underlying bleeding disorders or those on anticoagulant therapy may benefit from preventing bleeding complications by rinsing with a 4.8% TXA mouthwash for two minutes, four times a day for two to seven days following surgery.These developments in bleeding control methods represent a major step in enhancing patient outcomes and minimizing the incidence of complications following oral and maxillofacial surgery. These adjuvant hemostatic drugs can help surgeons improve surgical accuracy, reduce blood loss, and hasten the healing process after surgery[6].Additionally, significant advancements in bleeding management

techniques are anticipated as a result of continuing research and development in this area.The advancement of new hemostatic technologies, enhancing the efficacy of currently available agents, and the study of customized strategies depending on surgical needs and patient characteristics are some potential future approaches[7].

CONCLUSION:

In summary, to achieve the best possible outcomes for patients, bleeding control is an important aspect of oral and maxillofacial surgery that needs to be carefully considered and efficiently performed. Although conventional methods still hold value, novel prospects for enhanced hemostasis and decreased complications are presented by developments in hemostatic drugs and surgical technologies. Oral and maxillofacial surgeons can continue to improve surgical success and patient safety by remaining up to date on the most recent advancements in bleeding control techniques and implementing evidence-based procedures into clinical treatment.

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