CLINICAL REPORT

Management of pain and sublingual hematoma caused by suture irritation after implant surgery: A clinical report

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Implant surgery in the outpatient setting as in a dental office is generally considered a relatively safe procedure with minimal surgical complications. Fortunately, the rate of surgical complications in implant dentistry is lower than the overall rate of prosthodontic complications.\(^1,2\) One noteworthy surgical complication is intraoperative and postoperative hemorrhage and its consequences. Implant placement in the anterior or posterior mandible requires a careful understanding of anatomy to avoid the surrounding vasculature and the clinical skills to manage any adverse events.\(^3\)

The submental artery and sublingual artery are the 2 significant anatomic structures that are critically important for implant placement in the mandible. The submental artery is a terminal branch of the facial artery, which originates from the external carotid artery. It passes deeply into the digastric and stylohyoid muscles and loops forward on the inferior border of the mandible to travel a deep groove in the submandibular salivary gland.\(^3,5\) Thereafter, the submental artery courses anteriorly on the surface of the mylohyoid muscle and anastomoses with the mylohyoid branch of the inferior alveolar artery and the sublingual branch of the lingual artery.\(^3\) These terminal anastomosing branches may penetrate the lingual cortex of the anterior mandible by means of the lingual foramen or may enter through the accessory lingual foramina.\(^7,8\)

The sublingual artery provides the majority of the blood supply to the floor of the mouth. Branches from this artery perfuse the sublingual salivary gland, the mylohyoid and surrounding muscles, and the gingiva and mucosa of the mandibular anterior teeth.\(^5,6\) The sublingual artery is a terminal branch of the lingual artery, which arises from the external carotid artery between the facial artery and the superior thyroid artery. The sublingual artery travels deep into the posterior belly of the digastric muscle, hypoglossal nerve, and the stylohyoid muscle. The sublingual branch originates at the anterior border of the hyoglossus muscle and travels forward in the anterior floor of the mouth above the mylohyoid muscle to anastomose with the contralateral artery and with the submental

ABSTRACT

Hematoma in the sublingual region is an adverse consequence of implant surgery in the mandibular posterior region. Improved knowledge and understanding of the anatomy as well as the use of advanced radiographic imaging have all contributed to minimizing adverse surgical complications in this region. Delayed sublingual hematoma caused by suture irritation after implant surgery has not previously been reported. This article describes the management of a patient with a delayed sublingual hematoma after implant surgery in the posterior mandible had been performed. No evidence of encroachment of the vascular structures was noted at the time of implant surgery. However, at a 48-hour follow-up, the patient presented with severe pain and irritation of the sublingual mucosa, along with extravasation and a collection of blood in the sublingual region. Based on the patient’s symptoms and clinical signs, the source of the problem was determined to be the stiff tags of polypropylene suture, which had been used to attain primary closure of the surgical flaps. The situation was conservatively and successfully managed by the use of a custom soft tissue guard to protect the patient’s sublingual mucosa and the tongue from the stiff suture tags. Various suture materials and measures for preventing and managing similar situations are discussed in this article. (J Prosthet Dent 2015;113:360-365)
branch of the facial artery. These terminal branches may result in small alveolar branches that penetrate the lingual cortex of the mandible.4

Depending upon the amount of resorption of the mandible, the ridge crest may approximate closer to the vasculature. Iatrogenic perforation of the lingual cortex can result in damage to these arteries by the implant drill and result in massive hemorrhage. The hemorrhage can result in the extravasation of the blood, swelling of the tongue, elevation of the floor of the mouth, and subsequent airway compromise. Another risk with uncontrolled bleeding is the risk of syncope and hypovolemic shock. Numerous clinical reports have described adverse surgical events related to hemorrhage and subsequent hematoma in the floor of the mouth. Dubois et al9 have summarized more than 15 case reports with massive hemorrhage after implant placement in the mandible and have reported that life-threatening hemorrhage after implant surgery mostly occurred during implant placement in the mandibular canine region. Almost all these case reports reported on hemorrhage during implant placement due to perforation of the lingual cortex or within 4 to 6 hours postoperatively. In intraoperative hematomas, management of the situation mandates an immediate bimanual compression at the suspected site of perforation and immediate transportation of the patient to the nearest hospital to secure the airway.9 In postoperative hematomas, a patient’s phone call complaining of profuse hemorrhage, protruding tongue, or respiratory distress should alert the clinician to a possible hematoma, and the same measures should be taken as in the intraoperative situations.9 Recognizing that not all postoperative hematomas result in airway compromise or result in life threatening situations is important.

A variety of suture materials, needles, and techniques are available for use in implant dentistry.10 Insufficient reliable evidence is available to provide recommendations as to which are the best incision techniques, suture techniques, or suture materials.11 In general, nonresorbable sutures should be used when tension-free primary closure is necessary. The advantage of a nonresorbable suture is its persistent strength during the contracture of the wound and its resistant muscle pull during the remodeling of the soft tissues. Typically, they are used in conjunction with guided bone regeneration (GBR) procedures, with or without implant placement, as premature inadvertent opening of a flap can compromise the success of the treatment. Therefore, these sutures are not removed until a clinician has assessed early epithelial healing, which is usually 2 to 3 weeks after surgery. The commonly used nonresorbable sutures for implant dentistry are monofilament materials, including polyamide (nylon), polypropylene, and expanded polytetrafluoroethylene (e-PTFE).10 These polymer-based suture materials have the required strength to resist muscle pull and resist plaque accumulation.

Polypropylene suture is a monofilament nonresorbable suture composed of an isotactic crystalline stereoisomer of polypropylene, a synthetic linear polyolefin. It holds knots well, is biologically inert, and elicits minimal tissue reaction.12 It is not subject to degradation or weakening and maintains tensile strength for up to 2 years. However, some of the disadvantages include material memory, a kinking effect, and stiff suture tags.12 Clinicians who use polypropylene sutures value the high strength and the security of this suture to resisting muscle pull and are willing to compromise on the disadvantages of this material.

A mouthguard is defined as “a removable dental prosthesis made of resilient material, which is useful in reducing mouth injuries and protecting the teeth and surrounding structures from injury.”13 This definition is broad and does not specifically address soft guards that are meant to protect the mucosa. Such mucosal guards have been previously described in the prostodontic literature as protecting against chemical burns of the mouth.14,15 Essentially, the customized resilient material can be used to cover and protect the soft tissues against any mechanical, chemical, or thermal injuries. The purpose of this clinical report is to describe the management of a sublingual hematoma caused by polypropylene suture irritation after implant surgery with a soft mucosal guard.

**CLINICAL REPORT**

A 60-year-old, partially edentulous woman was referred to the prosthodontist by her general dentist for evaluation and implant placement in the left posterior mandible. The patient had been edentulous for over 40 years and had been previously experienced a failed bone graft procedure at the left posterior mandible. The patient’s medical history was unremarkable. Clinical examination revealed a partially edentulous mandible with missing molar and premolar teeth. Moderate to severe resorption of the residual ridge and reduced keratinized tissue at the ridge crest were noted (Fig. 1). The resorption was largely restricted in width, and minimal loss of height allowed an adequate distance from the ridge crest to the mandibular canal for implant placement. Given the nature of the resorption, a cone-beam computed tomography (CBCT) analysis was performed before the treatment plan was finalized. Careful analysis of the CBCT confirmed the clinical findings. The CBCT also confirmed the absence of any lingual undercut at the planned osteotomy sites.

Based on the clinical and radiographic findings and the patient’s finances and expectations, a treatment plan was developed to place a narrow diameter implant at the left first premolar and a regular diameter implant at the left first molar for a 3-unit partial fixed dental prosthesis.
The patient declined the alternative option of lateral ridge augmentation followed by the placement of a regular and wide diameter implant, given her experience with previous, failed bone graft surgery.

The surgery began 1 hour after the oral administration of 2 g amoxicillin prophylactic antibiotics and immediately after the patient had rinsed with 0.12% chlorhexidine gluconate for 1 minute. Local anesthesia with 0.5% bupivacaine containing 1/100 000 epinephrine was then administered by an inferior alveolar nerve block and 4% articaine containing 1/100 000 epinephrine by buccal and lingual infiltration at the left posterior mandibular region. The surgical guide was then placed in the oral cavity, and a periodontal probe was used to mark the planned implant sites and obtain tactile feedback about the depth and surface topography of the bone underneath the tissue. A mid-crestal incision was made that extended anteriorly to the left lateral incisor with a horizontal incision between the left canine and incisor avoiding the papilla and terminated posteriorly with an oblique release incision at the site of the former left second molar. Full-thickness mucoperiosteum flaps were elevated to expose the underlying bone before surgical drills were introduced for osteotomy preparation. Special care was taken to ensure that the apex of the drill was slightly tilted to the buccal (head of the handpiece tilted towards the lingual) in the surgical guide to reduce any likelihood of perforating the lingual cortical plate.

Both sites were prepared by using standard implant osteotomy procedures, and surgical guide pins were used to confirm parallelism between the implants (Fig. 2). The quality of the bone could be classified as Type II according to Lekholm and Zarb’s classification; bleeding from the osteotomies was unremarkable. As anticipated, both implant sites exhibited the need for a simultaneous guided bone regeneration procedure, with the anterior implant requiring more grafting than the posterior implant. A regular diameter implant of 10 mm in height (SLA RC 4.1 mm; Straumann) was placed at the left first molar site, and a narrow diameter implant of 12 mm in height (Roxolid NC 3.3 mm; Straumann) was placed at the left first premolar site. Both implants had adequate parallelism, and excellent primary stability was obtained. The surgical sites were irrigated with saline, and healing abutments of 0.5 mm in height (Straumann) were placed for a submerged healing protocol. Autogenous bone chips were then harvested from the surrounding cortical bone, which was then mixed with deproteinized bovine bone (Bio-Oss cancellous; Geistlich) and covered with a collagen membrane (Bio-Gide; Geistlich) for a simultaneous GBR procedure as described by Buser et al. A periosteal releasing incision was made in the buccal flap to advance over the grafted sites, and primary closure was obtained by using a horizontal mattress suture and interrupted sutures. A size 4-0 (Hyphenate: poly-glactin) resorbable suture material (Vicryl suture; Ethicon) was used for a wide horizontal mattress suture, and a size 4-0 polypropylene suture material (Prolene suture; Ethicon) was used for interrupted sutures (Fig. 3). Hemostasis was achieved before the patient was given postoperative instructions and dismissed. The patient was prescribed over-the-counter analgesics, antibiotics, and an anti-septic mouth rinse.

Twenty-four hours after surgery, the patient contacted the author complaining of severe pain, difficulty in swallowing, and extreme discomfort due to irritation from the suture tags. She stated that that she did not notice any intraoral bleeding at that time. The patient decided to wait another 24 hours before being evaluated clinically. On clinical examination after 48 hours, the patient exhibited trismus and an elevated, ecchymosed floor of the mouth with protruding tongue. No local signs of bleeding were evident, and the patient’s systemic signs were unremarkable. The surgical site revealed clinical...
signs of early wound healing that were unremarkable (Fig. 4). The patient was in severe pain and discomfort due to irritation from the stiff suture tags used to attained primary closure. Based on the clinical signs and symptoms, a diagnosis was made of sublingual hematoma due to irritation of the sublingual mucosa by the stiff suture tags from the polypropylene suture and subsequent bleeding. As the suture tags were already 3-mm long, they were not trimmed any further, and based on a risk-benefit assessment, the existing sutures were also not replaced. A decision was made to fabricate a custom mucosal guard to protect the tongue and sublingual mucosa from the suture trauma. Accordingly, a clear, vacuum-formed matrix (Clear Mouthguard Material 2 mm/125 mm; Great Lakes Orthodontics) was made on the patient’s diagnostic cast and trimmed such that it covered the entire surgical area (Fig. 5). After insertion in the mouth, the patient expressed instant relief from the suture irritation (Fig. 6). The patient was instructed to wear the guard continuously for 2 weeks until the sutures were removed. She was instructed to remove it twice daily for cleaning and given oral hygiene instructions.

At a 2-week recall, the patient reported no pain or discomfort, and the sublingual hematoma was absent. The patient’s healing had progressed well, and all sutures were removed at this stage (Fig. 7). The patient was pleased with the outcome from the mucosal guard and was advised to discontinue further use; oral hygiene instructions were reinforced. The patient was seen after 3 months of healing, and the implants were percussed with a mirror handle and a sharp sound was heard (Fig. 8). The healing abutments were removed and then hand tightened in a clockwise direction. No mobility, pain, radiographic bone loss, or clinical signs of infection were noted; therefore, the implants were considered to be osseointegrated. Subsequently, a 3-unit partial fixed dental prosthesis was completed by using standard prostodontic protocols as planned.
DISCUSSION

A hematoma is a localized extravasation or collection of blood outside the blood vessels in tissue spaces. As long as the hemorrhage itself is controlled, the presence of a small hematoma is usually not a significant concern, as the pooled blood usually breaks down in a few weeks. However, large hematomas in the sublingual region can compromise the airway and lead to life-threatening situations. Postoperative, delayed sublingual hematomas are not well documented in the literature, and, to the author’s best knowledge, this is the first report describing one of the etiologies and its successful management. While the custom mucosal guard was not responsible for the resolution of the sublingual hematoma, it significantly helped the patient with suture irritation and mucosal injury from the polypropylene sutures that may have resulted in further bleeding in the sublingual tissues.

The differential diagnoses considered in this patient’s clinical situation were perforation of the lingual cortex by the implant drill or the implant itself and trauma to the vasculature, postoperative bleeding from a large intrasosseous vessel, and postoperative bleeding from connective tissue trauma after periosteal releasing incision. These diagnoses were ruled out because special care had been taken to ensure that the buccolingual angulation of the implants clearly indicated that the apex of the implant was directed slightly buccally and the platform was directed lingually. No obvious intrasosseous vessel was encountered during osteotomy preparation, and placement of the implant itself would have resulted in a tamponade of any such vessel. Finally, hemostasis was achieved before the patient was dismissed. Additionally, the patient’s significant pain and distress due to the stiff suture tags suggested that irritation and subsequent trauma to the delicate sublingual mucosa had resulted in a delayed postoperative sublingual hematoma.

The various alternative options considered for management of the situation were removing the interrupted polypropylene sutures and resuturing with a smaller sized softer nonresorbable suture such as 5-0 e-PTFE or 5-0 polyamide (nylon), and placement of a periodontal pack over the polypropylene suture tags to prevent subsequent irritation and provide patient comfort. Neither of these options were considered because the risk to benefit ratio of removing sutures 48 hours after surgery in an implant site with GBR could significantly disrupt healing, compromise the vascularity of the grafted site, and alter the clinical outcome. Additionally, removing the sutures and resuturing, given the patient’s trismus and discomfort, could result in distress to the patient. Finally, placing a periodontal pack was not considered because of the lack of predictable retention of the dressing for 2 weeks and the risk of possible contamination and infection of the surgical site, especially with the GBR procedure. Therefore, the custom-made soft mucosal guard option was chosen, which resulted in the conservative and successful management of the situation. To prevent such situations from occurring, caution is advised in the use of 4-0 polypropylene sutures, especially in the posterior mandible. Alternative nonresorbable sutures such as 4-0 or 5-0 e-PTFE sutures or 5-0 polyamide (nylon) sutures should be considered as they are softer and provide better comfort for patients.

SUMMARY

This clinical report described the successful management of a patient with severe pain and a sublingual hematoma caused by polypropylene suture tag irritation after implant surgery in the left posterior mandible. A custom-made, soft mucosal guard was used to protect the patient’s sublingual mucosa and the tongue from the stiff suture tags and alleviated the patient’s symptoms within 2 weeks.
Prosthodontists are uniquely advantaged to manage such post-surgical complications, given their knowledge and understanding of use of a variety of biomaterials.

REFERENCES


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Noteworthy Abstracts of the Current Literature

The influence of interimplant distance in mandibular overdentures supported by two implants on patient satisfaction and quality of life

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This study evaluates the influence of interimplant distance (ID) on patient satisfaction and quality of life (QOL) of 55 patients who received mandibular overdentures supported by two implants. IDs were measured over the residual ridge crest and linearly on all of the patients’ mandibular casts. The crestal detours of all patients were determined by subtracting these two values from each other. Higher IDs were associated with better QOL scores (P < .05), whereas higher crestal detour values were associated with better general comfort, chewing, ease of hygiene maintenance, esthetics, pain, and QOL scores (P < .05).

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