

Salivary Gland Injury Subsequent to Implant Surgery

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Implant-based prosthetic restoration and oral rehabilitation is a very popular modality of treatment, with excellent success rates. Although a relatively safe procedure, implant insertion has its risks, which have been described in the literature. This article describes an as-yet unreported complication following implant insertion—salivary gland injury. The characteristics of salivary gland injury are examined, and 4 cases in which the salivary apparatus was injured or obstructed during 1 of the phases of implant therapy are presented. INT J ORAL MAXILLOFAC IMPLANTS 2008;23:556–560

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Implant-based rehabilitation is a popular method of treatment either by general practitioners or specialists, and it has been a predictable treatment modality for the last 3 decades. It is a relatively safe surgical procedure, with an excellent success rate (> 90%).^{1,2} The overall complication rate is less than 10%.³ Several complications following dental implant placement have been described in the literature. Some of the complications may be severe and even life-threatening, but most are minor.⁴ The majority of the complications involve instability and loss of the implant or failure of osseointegration (eg, excessive bone loss, local infection). Some of the more infrequent but much more serious complications include injury to adjacent teeth^{5,6}; nasal or sinus fistulas; hematoma⁷; hemor-

rhage^{7,9}; paresthesia; nerve injury, especially injury to the inferior alveolar and mental nerves^{4,6,9}; mandibular fracture^{10,11}; and infection causing Ludwig angina and descending necrotizing mediastinitis.¹²

Injury to the submandibular or sublingual salivary gland ducts has been described following surgical procedures such as biopsy specimen removal, frenectomies, or submandibular duct relocation.¹³ A search of the literature (English language only) revealed no other publications describing obstruction of a salivary duct following dental implant treatment. Thus, it was decided to present 4 cases of salivary duct disruption due to incorrect management of dental implants and to discuss the implication and treatment of this complication.

CASE PRESENTATION

Four patients with salivary gland injury were referred and treated in the outpatient clinic in the Barzilai Medical Center in Ashkelon, Israel, in 2005 and 2006. All underwent implant placement in the mandible. In 2 cases implants were inserted in the anterior portion of the mandible, while in the other 2 implants were placed in a posterior position. In all of the cases, the patient presented with symptoms of obstruction or injury to the salivary glands following implant placement.

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Fig 1 Panoramic radiograph demonstrating the position of the inserted implants in the mandibular right quadrant.



Fig 2 Panoramic radiograph obtained after extraction of implants.



Case 1

A 62-year-old woman underwent dental implant placement in the mandibular right quadrant by her dental practitioner in a private clinic. In the first stage, implants were inserted in the positions of the right first premolar, second premolar, and first molar (Fig 1). Six months later, second-stage surgery was carried out to expose the 3 implants. Following this procedure, the patient complained of a slowly growing swelling in the floor of the mouth on the right side. The patient consulted an oral surgeon, who advised her to remove the implants as an attempt to overcome the swelling. Eighteen months after their placement, all three implants were extracted (Fig 2). Three weeks following removal of the implants, the patient was referred to the authors' clinic for consultation. A clinical examination revealed a soft swelling, with a bluish appearance in the floor of the mouth (Fig 3). Milking saliva from the submandibular glands on both sides revealed adequate secretion without interference. There were no relevant radiologic findings in panoramic, occlusal, or occlusal oblique views. The swelling was diagnosed as an intraoral ranula. The patient underwent a successful marsupialization of the ranula under local anesthetics 1 month later. The diagnosis was confirmed by a histologic examination of the tissue removed from the ranula.



Fig 3 Clinical view of the swelling in the mandibular right quadrant.



Fig 4 Clinical view of the implant in the anterior region of the mandible.



Fig 5 Stent inserted into the ductal system after sialoendoscopy of the right submandibular gland.

Case 2

A 60-year-old man was referred to the authors' clinic due to an obstruction of his right Wharton duct following anterior mandibular dental implant insertion. The patient had undergone insertion of 3 dental implants in the anterior mandible by a private dental practitioner (Fig 4). Four months later, following the second-stage procedure, the patient began to suffer from recurrent swelling of his right submandibular gland during meals ("meal time syndrome"). The patient was referred to the authors' clinic, where a clinical examination revealed a total obstruction of his right Wharton duct orifice, with swelling of his right submandibular gland. No saliva came forth from the right submandibular orifice when the gland was milked. Local anesthesia was induced for endoscopic exploration of the right submandibular duct. The examination revealed a total obstruction of the anterior part of the Wharton duct and obstruction of the right sublingual duct (Bartholin duct). The obstruction was exposed and the duct was dilated. Sialo-stents were inserted into the Wharton duct to keep it open (Fig 5). Endoscopy revealed no other obstruction in the ductal system and demonstrated a healthy appearance of the submandibular gland. The stent was removed 1 month following the procedure, and a healthy salivary secretion was revealed. At a 1-year follow-up examination, the patient was asymptomatic, and the salivary gland function was excellent.

Case 3

A 65-year-old man was referred to the authors' clinic because of a constant swelling of both of his submandibular glands. The patient had undergone insertion of 2 mandibular dental implants 3 years prior to his referral. Following his rehabilitation with an overdenture, he started suffering from recurrent swelling of both of his submandibular glands. Clinical examination revealed obstruction of the orifices of both Wharton ducts by the lingual flange of the mandibular overdenture. The position of the lingual flange of the overdenture was the result of resorption of the anterior portion of the mandible and the lingual position of the whole prosthesis. It was recommended that the patient's dental practitioner remove a part of the lingual flange to facilitate secretion from the submandibular duct orifices. On the next clinical examination after correction of the denture, the patient demonstrated a good secretion of saliva from both orifices of the submandibular glands.



Fig 6 Clinical view of the swelling of the floor of the mouth.



Fig 7 Radiograph showing the location of the ranula after injection of a radiopaque dye. Note its close proximity to the implants.

Case 4

A 50-year-old woman was referred to the authors' clinic because of constant swelling of the floor of the mouth (left side; Fig 6). Six months prior to her referral, the patient had received dental implants in the area of the mandibular right first and second molars. The swelling appeared following exposure of the implants and placement of cover screws 3 months after implant insertion. The swelling occurred in the floor of the mouth in close proximity to the implants. Clinical examination revealed soft tissue swelling extending from the implant located in the position of the right second molar to the anterior part of the mouth. Radiopaque dye (Ultravist iopromide; Schering, Berlin, Germany) was injected into the lesion (Fig 7), and the proximity of the swelling to the implant was noted in the radiograph. Ranula was diagnosed, and the patient underwent a successful marsupialization of the roof of the lesion under local anesthesia.

DISCUSSION

Dental implant insertion is a popular procedure considered as having a low risk of complications. Complications involving the salivary glands due to implant insertion, although rare, create an unpleasant situation for the patient and surgeon. The salivary pathways may be endangered by implant placement in either

the insertion phase or the exposure phase. The oral surgeon must be mindful of the anatomic proximity of the Wharton and Bartholin ducts to the alveolar ridge. The course of the salivary ducts may be included in the operative field. The risk of interruption of the salivary ducts increases when implants are inserted in a lingual position and/or in an atrophic mandible where the alveolar crest and the surface of the mouth floor are in proximity. Under these conditions, the salivary ducts may be ruptured or obstructed when the lingual flap is raised, during implant insertion, or even at the end of the procedure when the flap is being sutured back into place. The danger to the salivary ducts exists in posterior portions of the mandible as well as in parasymphyseal areas, as described in the present article. Anterior mandibular implant insertion may cause obstruction of the submandibular duct and in some cases may involve the sublingual ducts. Posterior mandibular implants may cause injury to the sublingual gland. The cases presented here demonstrated that even implants inserted in the molar region can be followed by the appearance of a ranula.

Surprisingly, in 2 of the cases described, the first-stage surgery proceeded uneventfully, but interruption of the salivary pathways occurred during implant exposure (ie, second-stage surgery). The operator, while exposing the inserted implants, must raise a full periosteal flap and ensure that it is retracted subperiosteally to avoid injury to the salivary glands and

duct. This task may be challenging if one has to locate the precise position of the implants, especially when dealing with atrophic mandibles, where all the relevant anatomic structures are in proximity to one another.

Even when the surgical phase of the treatment has ended successfully, one must remember that the prosthetic phase must give rise to satisfactory results as well. Damage avoided in the surgical phase due to the position of the implant, as in case number 3, may arise after rehabilitation if the relationship between the prosthesis and the salivary ducts is not considered.

Additional consideration must be given to the fact that patients treated with dental implant-mounted prostheses are often older; all of the patients in the cases presented were around the age of 60. Around 25% of the elderly population suffers from mouth dryness, and the number of functional secretory units in the salivary glands may decrease with age.¹⁴ These facts contribute to exacerbation of symptoms within this age group upon injury to the salivary apparatus.

To avoid salivary gland injury while placing dental implants, the proximity of the salivary ducts to the desired implant site must be assessed as part of the examination before implant placement. Caution must be exercised while raising flaps either for insertion or exposure of dental implants. The operator must ensure a subperiosteal position while raising a flap to avoid injuring the salivary ducts.

The dental implant position should be as centralized in the mandibular bone as possible. Lingual insertion of a dental implant may give rise to serious complications such as hematoma formation, uncontrolled bleeding, and, as shown here, salivary duct obstruction. Rehabilitation with prostheses following implant placement must take into account the position of the salivary ducts and their orifices in order to prevent the application of pressure to and obstruction of the salivary pathways.

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