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Assessment of post operative wound healing in diabetic patients after extraction

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Abstract

Diabetes is a common metabolic disorder characterised by an inability to regulate blood glucose due to insulin deficiency or resistance. Type 1 diabetes or insulin dependent diabetes is characterised by deficient insulin production whereas type II or non-insulin dependent diabetes results from relative insulin deficiency and tissue insulin resistance.

Traditionally in dentistry, diabetics are considered to have increased healing problems related to dental extractions, periodontal surgery and wearing ill-fitting dentures. They are also considered more likely to have infections. Although this may be so for poorly controlled Type 1 diabetics, there is only unreliable support for this view for Type 2 diabetics on oral hypoglycemics.

In dentoalveolar surgery, diabetic patients could be expected to suffer various complications to those observed in other surgical procedures such as the most commonly seen is delayed wound healing. However, the oral environment with the forces of mastication, high bone turnover, high vascularity, saliva and the constant reservoir of microorganisms is active from other parts of the body, thereby making generalisations from other surgical sites limited.

Difficulties with extractions are unpredictable. Having a thorough medical history prior to surgery will allow the surgeon to better deal with complications that may arise. Be certain to always follow proper surgical techniques, and know your limitations prior to beginning any extractions. If and when difficulties develop, it is always recommended to explain the situation to the patient.

Keywords: Diabetes, wound healing.

1. Introduction

Diabetes is a common metabolic disorder characterised by an inability to regulate blood glucose due to insulin deficiency or resistance. Type 1 diabetes or insulin dependent diabetes is characterised by deficient insulin production whereas type II or non-insulin dependent diabetes results from relative insulin deficiency and tissue insulin resistance.

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develop, it is always recommended to explain the situation to the patient.

NORMAL HEALING PROCESS-

There are 5 stages of healing of the extraction socket:

Stage 1- Hematoma and clot formation

Stage 2- Granulation tissue formation

Stage 3- Replacement of granulation tissue by connective tissue

Stage 4- Replacement of connective tissue by fibrillar coarse bone

Stage 5- Replacement of immature fibrillar coarse bone by mature bone

Immediately after the extraction, bleeding occurs in the extraction socket and there is clot formation inside the socket. Clot refers to the thick, viscous, coagulated mass of blood. The clot functions by preventing debris, food and other irritants from entering the extraction site. It also protects the underlying bone from the bacteria and finally acts as a supporting system in which granulation tissue develops. There is vasodilatation of blood vessels of periodontal ligament and migration of leucocytes in and around the clot. As the clot contracts, the gum tissue which is unsupported after the extraction, cover and place the clot at its position. The hours after the tooth extraction are critical, for if the blood clot is dislodged, the tooth extraction recovery may be greatly delayed and may be extremely painful.

Within a week, granulation tissue is seen around the clot and there is proliferation of cells around the socket. There is organization of clot and alveolar socket margins are resorbed.

Healing is the body's response to injury in an attempt to restore normal structure and function.

During this time, there is an increased blood supply to the socket which is associated with the resorption of the dense lamina dura by osteoclasts. Small fragments of bone which have lost their blood supply are encapsulated by osteoclasts and eventually pushed to the surface or resorbed. Approximately one month after an extraction. Coarse woven bone is then laid down by osteoblasts. Trabecular bone then follows, until the normal pattern of the alveolus is restored. Finally compact bone forms of the surface of the alveolus, and remodeling continues as the bone shrinks.

1.1 Factors that affect healing of sockets after extraction

1) Smoking: Smoking decreases extraction socket wound recovery. It decreases the blood supply to that area and brings toxic products to the area. Due to negative pressure because of smoking, the clot may get dislodged and cause dry socket occurs. That is why it is advised to avoid smoking for few days after the tooth extraction.
2) Alcohol consumption: Alcohol causes delay in the healing process. Alcohol consumption should be avoided by the patient few days after the tooth removal.
3) Diet of the patient: Protein, vitamins and minerals deficiency slows down the healing process.
4) General health of the patient: In cases of patients with diabetes, anemia, ischemia etc, the healing of the extraction socket will take place slowly than a normal healthy person.
5) Age: Healing is faster in young but is normal in old age unless associated with diabetes or ischemia.
6) Use of birth control pills: If a woman is taking birth control pills and gets her tooth extracted, then the chances of dry socket are more due to high level of estrogens. Dry socket delays the healing process.
7) Infection: In cases of infection like that in dry socket, delayed secondary healing occurs and it takes longer time for healing than the normal extraction socket healing.
8) Oral hygiene maintenance: After the tooth extraction, the socket area should be kept clean. If there are food deposits around the socket, it will take longer time to heal. It is advised to maintain a good oral hygiene after the tooth removal, eat from the other side of the socket and keep the socket clean.
9) Medicaments: Certain medicaments like corticosteroids delay the healing process of the socket. [1-3]

1.2 Pre-op instructions under local anaesthesia

The patient has to tell the dentist before the extraction appointment if their medical history has changed i.e. if they are are currently taking blood-thinning medication, diet dependant diabetic or have developed blood clotting problems etc. To make sure the patient has eaten something light beforehand, lack of glucose in the blood could make them feel faint. It may be advisable to the patient to bring someone along with, who can accompany them home. If the patient is returning to work immediately after the extraction and their job involves heavy lifting or exertion, it may be advisable to transfer to light duties for the rest of the day. [4]

1.3 Equipments required

Tooth extraction is performed either in a dental office by a dentist or in an oral surgery suite by an oral and maxillofacial surgeon. In either case, the suite is equipped with dental chair and a good source of operating light. The chair provides stability and support and affords the surgeon maximal control of the force being delivered to the patient through the dental forceps. The chair tilts to allow appropriate positioning for maxillary and mandibular tooth extractions.

The oral surgery tray is equipped with surgical instruments for soft tissue, such as, No. 15 scalpel, Dean scissors, Needle holder, Curved hemostat, Minnesota retractor, Right-angle Austin retractor, Weider tongue retractor, Seldin retractor, Molt periosteal elevator, Suction tip, Addison tissue forceps, Allis tissue forceps, Double-ended curette, Small half-circle needle, Suture materials. Other instruments included in the tray are for hard tissue, such as, Blumenthal rongeur forceps, Bone file, Burs, Hand piece, Hall drill. In the past, a chisel and mallet were used to remove bone and teeth; currently, however, the use of these instruments is limited to removal of excess bone. Additional instrument are also included, such as rubber bite blocks and a Molt mouth prop, which are designed to hold the mouth open during extraction. The key instruments used for extraction are also included in the tray. These may include small and large straight dental elevators, left and right triangle-shaped elevators, a Crane pick elevator, a root tip pick, or an apex elevator. Other important extraction instruments are the various dental forceps designed for extracting maxillary and mandibular teeth. Maxillary instruments include the No. 150 universal forceps, which is designed for extracting premolar and molar maxillary teeth, the No. 53 right and left forceps, which are designed specifically for maxillary molars, and the No. 1 maxillary forceps, which is designed for extraction of maxillary incisors and canines.

Instruments designed for extracting mandibular teeth include the No. 151 universal mandibular forceps, the Ash forceps, and the cowhorn forceps.

1.4 Position of the chair

The surgeon and the patient should be positioned in such a way that the patient is comfortable and the surgeon can stand or sit in front of the patient without undue strain. Ideally, the surgical instruments (especially the needle) should be placed out of the patient's sight (usually behind the patient but close to the surgeon).

For mandibular extraction, the positioning is as follows:

Chair axis - The chair is positioned so that the mandibular occlusal plane is parallel to the floor

Chair height - The chair is lowered to afford the surgeon the leverage and control needed for the extraction

Operator - The operator is at the 9 o'clock position relative to the patient

Assistant - The assistant places the suction tip in one hand and the soft tissue retractor in the other (and also helps with irrigation when needed)

For maxillary extraction, the positioning is as follows:

Chair axis - The chair is tipped backward so that the maxillary occlusal plane is at an angle of about 60º to the floor

Chair height - The chair is lowered to the height of the operator's elbow

Operator - The operator is at the 9 o'clock position relative to the patient

Assistant - The second operator stands or sits at the 3 o'clock position and helps with retraction, suctioning, irrigation, and jaw stabilization. [5]

2. Technique

For proper extraction of a tooth, the operator must elevate the gingival soft tissue attachment, luxate the tooth with small and large straight elevators, and adapt the forceps to the crown of the tooth. Luxation requires apical pressure, buccal force, lingual pressure, rotational pressure, and tractional forces. The operator continues to luxate the tooth with the forceps in a buccolingual direction with slight rotation until the tooth is removed from the socket.

The extraction forceps is seated with strong apical pressure to expand the crestal bone around the root and allow root removal. A small root tip can be addressed by placing an endodontic file in the root canal and twisting it with a needle holder. The root can be removed with a No. 4 round bur in a dental handpiece or a small elevator, which displaces the root from its apex.

Extreme care is required in extracting maxillary teeth close to the maxillary sinus to avoid sinus exposure and subsequent oroantral fistula. Attention is also needed in extracting mandibular teeth close to the inferior alveolar canal and mental foramen to avoid paresthesia. [6]

2.1 Oral manifestations in diabetic patients

Several soft tissue abnormalities have been reported to be associated with diabetes mellitus in the oral cavity. These complications include periodontal diseases (periodontitis and gingivitis); salivary dysfunction leading to a reduction in salivary flow and changes in saliva composition, and taste dysfunction. Oral fungal and bacterial infections have also been reported in patients with diabetes.

There are also reports of oral mucosa lesions in the form of stomatitis, geographic tongue, benign migratory glossitis, fissured tongue, traumatic ulcer, lichen planus, lichenoid reaction and angular chelitis. In addition, delayed mucosal wound healing, mucosal neuro-sensory disorders, dental carries and tooth loss has been reported in patients with diabetes. The prevalence and the chance of developing oral mucosal lesions were found to be higher in patients with diabetes compared to healthy controls. [7]

2.2 Instructions to be followed by the patient after extraction

In most cases, the recovery period lasts only a few days. The following practices will help the patient speed recovery. Painkillers to be taken that has been prescribed by

the dentist or oral surgeon. An ice or cold pack can be applied to the outside of your mouth to help relieve pain and swelling. After 24 hours, the patient should rinse the mouth gently with warm salt water several times a day to reduce swelling and relieve pain. Change of gauze pads before they become soaked with blood. To Relax after surgery, physical activity may increase bleeding. Avoid smoking. To Eat soft foods, such as gelatin, pudding, or a thin soup. Gradually add solid foods to the diet as healing progresses. To not lie flat, this may prolong bleeding. Avoid rubbing the area with tongue.

After the tooth is removed, their may be need for stitches. Some stitches dissolve over time, and some have to be removed after a few days. The dentist will have to tell whether the stitches need to be removed.

2.3 Commonly seen complications after extraction

Postoperative complications included the following signs and symptoms: edema; erythema; alveolar bone exposure; halitosis; trismus; fever; cellulitis; Ludwig's angina; loss of appetite; malaise; itching; moderate pain and unpleasant taste.

It has been established in scientific literature that patients with diabetes have a greater predisposition to oral complications and that oral infections may compromise their metabolic control. There is scant clinical evidence of a relationship between diabetes and an increased risk of infection after dental extractions. [8]

2.4 Method

The aim of this study is to evaluate clinical healing after dental extraction and the occurrence of surgical complications in patients with type 1 and 2 diabetes and compare with non-diabetic patients.

According to the literature, the dental alveolus is filled with blood clot and fibrin at 3 days after dental extraction; on postoperative day 7, the alveolus is filled with granulation tissue; on postoperative day 21, wound epithelialization is complete; and on postoperative day 60, alveolar bone formation can be observed on a dental radiographic image. Delayed wound healing was defined as a delay in any of the aforementioned events. [9]

30 patients had been observed after taking into account of the diabetic ranges and been called for review on day 3,7,21 of their post extraction.

3. Results

30 diabetic patients had been recalled and their complications had been taken into account. On day 3 after extraction, many patients had complaints of burning sensation in the area of the extracted tooth. A few patients has also felt pain and swelling on the area of the tooth extracted. On day 7 of extraction, many patients had complaints of bony flakes. Patients had also reported with allergic reaction towards antibiotics dosage. On day 21 after extraction, patients had complaint of dry socket.

4. Discussion

Patient with blood sugar level ranging from 170 mgdl to 220 mgdl have major complications of pain and swelling around the extracted tooth area. These patients are considered to be at the mild level of hypoglycaemia and hyperglycaemia. The major complication evaluated in patients with their post prandial blood sugar level around 220 to 250 mgdl have burning sensation in the surrounding alveolus and the respective arch. Such complication postpones the wound healing in diabetic patients. This condition also involves a concurrent methodology for isolating the adverse reaction of antibiotics that complexes the burning susceptibility.

The major hindrance of wound healing in patients with their random blood sugar level around 250 mgdl and above have predilection towards dry socket. In these cases the patients may also complaint of unhealed wound for more than two weeks. Restricted mouth opening (trismus) is rarely seen in patients with chronic diabetes.

5. Conclusions

The traditional view that diabetics have increased delayed healing is not truly supported. Diabetics on oral hypoglycaemics should be treated the same as non-diabetic patients for extractions. These observations suggest that in uncontrolled, insulin-dependent diabetes; the formation of the collagenous framework in the tooth extraction socket is inhibited, resulting in delayed healing and increased alveolar destruction. Patients should be advised to have proper diet and make sure to have a controlled level of glucose and prevent oral complications.

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