POST-OPERATIVE COMPLICATIONS AFTER PERIODONTAL SURGERY

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Abstract: *Complication is a disease or disorder arising as a consequence of another disease. Ideally, there should be no complications after any surgery. But still some complications are avoidable whereas some are inevitable under certain circumstances. From the very basics of scaling and root planning to extensive periodontal procedures like flap surgeries and periodontal plastic procedures, periodontal therapy plays a crucial role in the maintenance of entire dentition. Complications after periodontal surgery mostly includes postoperative pain, bleeding, swelling, root hypersensitivity, delayed healing, trismus, bruising, taste changes. As clinicians, we should be able to diagnose the aetiology and provide the proper management of these complications without causing much of discomfort to the patients. This article aims to provide an overview of probable aetiology and management of these complications.*

Keywords: *complications, periodontal surgery, management*

INTRODUCTION

Periodontal diseases are heterogeneous group of diseases brought about by the interaction between supragingival and subgingival biofilms and the host inflammatory response. Their treatment comprises of non-surgical and surgical approach provided depending on the severity of the disease. Mostly these non-surgical and surgical approaches result in favourable outcome without any untoward events but in few cases, they might lead to certain complications that could alter these predictable outcomes [1].

A complication can be defined as a secondary disease or condition developing in the course of a primary disease or condition. Complications occurring after periodontal surgery include postoperative pain, bleeding, swelling, root hypersensitivity, delayed healing, trismus, bruising, taste changes. These complications can alter the outcome of periodontal therapy. Therefore, for a clinician it becomes mandatory to acknowledge their etiology and management in order to achieve successful periodontal therapy [2].

Prevalence

According to a retrospective study postoperative complications were reported as moderate or severe in only 5.5% of the cases. On analysis few regression studies revealed osseous surgery to be three times more likely than pure mucogingival surgery to cause complications of bleeding, infection, swelling or adverse tissue changes. Also, pure mucogingival surgery was significantly found to be related with pain and was 3.5 times more likely to cause pain than osseous surgery and 6 times more likely to cause pain than plastic soft tissue surgery. Along with pain, duration of surgery was also found to be statistically significant in occurrence of

postoperative complications [3].

Postoperative complications occurring after periodontal surgery can be categorized as following

A. General Complications arising after periodontal surgery:

• Bleeding
• Swelling
• Postoperative pain
• Root hypersensitivity
• Increased tooth mobility
• Delayed wound healing
• Trismus
• Postoperative bacteremia
• Taste changes
• Bruising

B. Complications arising due to the surgical procedure employed

• Local anaesthesia related
• Flap related
• Graft related
• GTR related
• Suture related

A. General Complications arising after periodontal surgery

Bleeding

Following periodontal surgery, haemorrhage occurs which ranges from a minor leakage or oozing at the site, to extensive bleeding at the surgical site. Though some amount of bleeding is considered normal post operatively within 24 hours [4]. In these cases patient should be examined for the causative factors such as infection; intrinsic trauma which can occur easily because tissues of mouth and jaw are highly vascular; presence of foreign bodies; dislodgement of clot which occurs when patient tends to manipulate the surgical site with their tongue resulting in secondary bleeding; displacement of periodontal pack which could destabilize the clot; small negative pressure created by tongue that could result in secondary bleeding [5].

Bleeding in a surgical patient can be classified as following: Primary bleeding –in this the bleeding occurs during the intraoperative period. This is mostly resolved during the surgery, but if any major haemorrhages are recorded, then the patient is monitored closely post-operatively.

Reactive bleeding – occurs within 24 hours of surgery. Mostly it occurs when a ligature slips. Secondary bleeding – occurs 7-10 days post-surgery. Secondary bleeding is often due to erosion of a vessel from a spreading infection due to contaminated wound [6]. For the management of bleeding it is very important to find the source of bleeding and then the approach for its management should be planned. In case of mild bleeding a pressure pack can

be applied for 15- 20 minutes. Still if bleeding is persistent then haemostatic agents like surgicel, gelfoam, microfibrillar collagen (Avitene) etc. can be used. If the bleeding is arterial, then ligating the vessel is considered as the best option (Hofschneider et al. also noted that the sublingual and submental arteries may traverse anteriorly very close to the lingual cortical plate, and branches of these arteries may enter accessory foramina along the lingual cortex) [8].

Swelling

Swelling is considered as the body's normal reaction to surgery and repair process. The swelling becomes apparent after the day following surgery and will reach its maximum within 2-3 days post-operatively [9].

Expected swelling is usually proportional to extent and duration of surgery involved. According to Akadiri et al. gender, weight and body surface affect postoperative swelling. Swelling after an injury or surgery occurs as a result of increased blood supply to the affected body part, thus bringing extra nutrients to promote healing. Although swelling is considered normal until it interferes with healing [10].

Though the swelling subsides within 4-5 days in case if it doesn't then use of antibiotics, corticosteroids, surgical approach to manipulate soft and hard tissues should be considered and lastly considering alternative surgical approaches like piezo surgery, cryosurgery that are less traumatic to tissues should be done [11].

Elha et al. reported that administration of 10 mg dexamethasone IM, 1 h before surgery and 10-18 h later together with antibiotic therapy (400 mg oral metronidazole, administered pre-and post-surgically), significantly reduces swelling when compared to only postoperative treatment, without corticosteroids [12] Various studies postulated that good results were also obtained with 32 mg methylprednisolone and 400 mg ibuprofen administered 12 h before and 12 h after surgery respectively [7].

A research finding by Chappi et al. has concluded that methylprednisolone affords better pain relief while serratiopeptidase exerts better anti-inflammatory and anti-swelling effects in the postoperative period. Serratiopeptidase (Serratia E-15 protease also known as serral-ysin/serratia-protease/serrapeptase) is a proteolyticenzyme that has been used for reducing inflammation. It is available as enteric coated tablets given in the dosage of 2.5mg -10mg [13].

Post-operative pain

Eighty percent of patients experience acute pain after surgery of these patients, 86% experience moderate, severe, or extreme pain. It has also been shown that 77% of patients believe pain is a necessary part of surgery, and 8% of patients

postpone their procedure because of concerns associated with pain. Postoperative pain experienced within the first 3 days after surgery is considered normal and should progressively diminish throughout the healing phase [14].

Postoperative pain can occur as a result of extensive and long surgical procedures; poor tissue handling (including incising with a dull instrument, tissue trauma, and poor local anaesthesia); poor infection control (which increases the risk of postoperative infection); poor

knowledge of surgical anatomy (which increases the risk of complications, such as nerve injury and edema) ;patients who underwent the procedures that involved mucogingival/ bone or surgeries with large wounds;

For relieving pain initially certain medications like nonsteroidal anti-inflammatory drugs (NSAIDs), such as diclofenac (1 mg/kg) and ibuprofen, paracetamol (15 mg/kg) can be prescribed [17].

Root hypersensitivity

A minimal root hypersensitivity is considered normal post periodontal surgery, as it gradually reduces in about 2 weeks During periodontal therapy, scaling and root planing removes the outer layer of hyper mineralized dentine and thus leaves

the surface expose to the effect of hydrodynamic phenomenon. Surgical periodontal treatment, usually involves complete debridement of root surface. Post-operative recession of soft tissue further exposes the dentinal tubules. Patient inability to maintain plaque control in the healing phase further complicates the problem [18].

Though the sensitivity decreases around 2 weeks but if it doesn't then it is recommended to use desensitizing agents like sodium fluoride, stannous fluoride, calcium sodium phosphosilicate bioactive glass (NovaMin®); resins, varnishes, toothpastes (occlusion of dentinal tubules); iontophoresis, lasers and gingival grafts [19].

Increased tooth mobility

Excisional procedures, particularly with flap retraction and the accompanying removal of interdental tissues, actually devoid a tooth of gingival and periosteal support on a temporary basis. Initial reattachment may be evident in the first 10-14 days after surgery which may be the cause of transient mobility following which more advanced collage nation and renewal of the gingival attachment to tooth and

bone occurs which may require 30-45 days or more days.

After 30- 45 days if mobility persists then the etiological factor for mobility should be identified and corrected through occlusal adjustment and finally splinting should be done to stabilize the teeth. Although if the mobility is still progressive

then extraction can be considered as an option [20].

Postoperative bacteremia

There is huge microbial challenge to the patient during periodontal surgery. The occurrence of post-surgical bacteraemia depends on amount of trauma imposed during surgery. It is documented that 88% of all blood cultures are positive after periodontal therapy. Okel and Elliot in their study found Staphylococcus albus

coagulase negative as most common pathogens involved in postoperative bacteremia. Similarly, Mc Entegart and Porterfield in their study concluded Staphylococcus albus as the most frequently isolated micro-organism occurring six

times whereas Psedomonas aerugenosa, Streptococcus viridans, Alpha hemolytic streptococcus occurring more than once and Neisseria catarrhalis, the least isolated, occurring only once in postoperative infection after periodontal surgery [21].

Transient bacteremia can be effectively treated by giving antibiotic prophylaxis before surgery. Amoxicillin is considered to be highly effective in reducing post-operative bacteremia in periodontal flap surgery as well as in preventing the possible sequelae (infective endocarditis and other systemic maladies) insusceptible patient. Amoxicillin and clindamycin were prescribed most frequently for infection

prophylaxis (71.3% and 23.8% of antibiotic prescriptions, respectively). The other antibiotics prescribed post surgically included amoxicillin-clavulanate (3.1%), azithromycin, ciprofloxacin, metronidazole, and trimethoprim-sulfamethoxazole (each <1%) [22].

Delayed wound healing

Wound healing, as a normal biological process in the human body, is achieved through four precisely and highly programmed phases: haemostasis, inflammation,

proliferation, and remodelling. By 7 days surface epithelisation gets completed following periodontal surgery. The most probable cause of delayed wound healing is infection which results in dead necrotic tissue which promotes bacterial growth.

Other causes include wound dehiscence (unapproximated flap margins), hematoma, Stitch abscess (infection of suture track), foreign substances (like calculus, tooth fragments, periodontal pack), allergic reactions to graft material, suture material, periodontal pack, tight closure via suturing [23].

Thorough debridement and irrigation followed by prescription of antibiotics and analgesics usually lowers down the symptoms and accentuates wound healing.

Trismus

Trismus is an inability to open the mouth. Trismus after periodontal surgery can occur due to trauma, infection, infection of masticatory space, inaccurate positioning of needle. For reducing it heat therapy, soft diet and muscle relaxants can be used. If the pain is intense then analgesics can be given. If required, diazepam (2.5–5 mg three times daily) and other benzodiazepines may be given for muscle relaxation [24].

Taste change

It can be due to any infection, trauma to any nerve, invasive procedures, idiopathic or due to any surgery requiring insertion of a periosteal elevator, sectioning of tooth, lingual flaps etc. Taste change could be described in the terms of dysgeusia: disgusting oral taste or altered taste sensation; Hypogeusia: reduction in all 4 taste modalities i.e. sweet, salty, sour and bitter; Ageusia: no taste sensation is perceived;

Phantogeusia: spontaneous, continuously altered, often metallic taste which is usually drug related. Management includes administration of zinc (gluconate or sulfate) as it plays an important role in the regeneration of taste bud cells. Taste function is also affected by amount of saliva. Matsuo and Yamamoto in their study showed a significant association between saliva and taste. Thus, low salivary flow may also alter taste, which require the use of a sialogogue. (pilocarpine -30mg/day) [25].

Bruising:

Bruising is defined as an injury to underlying tissues or bone in which the skin is not broken, often characterized by ruptured blood vessels and discolorations. Also corners of mouth may become dry and cracked [2].

To prevent further injury or irritation there should be application of petroleum jelly (Vaseline) or ointment.

B. Complications arising during each step of the procedure employed

Local anaesthesia related

The most common complications arising from local anaesthesia via needle insertion or is attributed to solution include toxicity, syncope, allergy, trismus, paraesthesia etc.26

Local anaesthetic toxicity is due to systemic absorption of an excessive amount of the drug. Because local anaesthetics block conduction in many tissues in addition to the peripheral nerve, toxicity could result if sufficient amounts of the anaesthetic reach these other tissues, such as the heart or brain. Signs and symptoms include loss of consciousness, talkativeness, and agitation, along with increased heart rate,

blood pressure, and respiratory rate. In patients suffering from local anesthesia toxicity adequate oxygen supply should be ensured, cardiovascular status should be assessed throughout and medical assistance should be provided [27].

Syncope most often occurs when the blood pressure is too low (hypotension) and the heart doesn't pump a normal supply of oxygen to the brain. It is characterized by pallor, cold, sweaty, dizzy, nausea, loss of consciousness, dilated pupils.

Management includes placing the patient in supine position with slight head down or elevate the legs (to increase cerebral circulation). Recovery is almost instantaneous if the patient has simply fainted. Then maintain airway, check pulse (if absent, indicates cardiac arrest), and start CPR immediately.

To regain consciousness aromatic ammonia ampoules can be administered. For this the ampule is crushed between the fingers and positioned under the patient's nose. Once the irritating fumes released begin to stimulate movement of the extremities and aids in blood return from the peripheral areas to the heart and brain. If pulse is palpable and the patient has not completely lost consciousness, four sugar lumps may be given orally or intravenous 20 ml of 20-50% sterile glucose in case of hypoglycaemia [28].

Allergy is a hypersensitive reaction that occurs through exposure to an antigen (Ag) such as a drug (as L.A. agent) which the patient has been previously exposed to it, resulting in an Ag - Ab reaction. Allergic reactions can be effectively managed by the administration of anti-histaminic (benadryl 20 - 40 mg IV or IM.), epinephrine 1:1000 concentration 0.3 mg SC. or IM. Bronchodilator via inhaler, corticosteroid

100mg IV. Hydrocortisone hemisuccinate [29].

Paraesthesia occurs when patient reports feeling numb ("frozen") many hours or days after a local anaesthetic injection. Trauma to the nerve is the most common cause of this. In an audit of 741 mandibular third molar extractions, Bataineh found postoperative lingual nerve anaesthesia in 2.6%; inferior alveolar nerve paraesthesia was 3.9%, developing in 9.8% of

patients younger than 20 years of age. Also, a significant correlation was noted between the incidence of paraesthesia and the experience of the operator. It could be transient occurring for hours, days, or months. Discomfort to patient can be minimised by the use of medications which include the immunosuppressant prednisone, intravenous gamma globulin (IVIG),

anticonvulsants such as gabapentin or Gabitril and antiviral medication, depending on the underlying cause [30].

Hematoma can occur due to injury of the blood vessel by penetration of needle to far distally during Posterior superior alveolar nerve block. Hematoma may or may not result in the formation of puncture of vein by needle but perforation of

artery subsequently result in hematoma which rapidly increases in size until the treatment is instituted, due to significantly greater blood pressure within the artery. Emergency management begins by gently cleaning the mouth and locating the source of bleeding and the application of cold compress, pressure packs, or styptics. Tranexamic acid - 500 mg in 5 ml by slow IV injection is the drug of choice [27].

Flap related

Flap related complications occur most commonly due to improper incisions which if it is not made up to the bone/root surface could result in inappropriate visibility and access of operative area or could cause overexposure of bone leading to bone resorption; improper debridement which may be considered as crucial factor in the success of periodontal therapy; also, improper suturing which affects the flap approximation and can lead to reoccurrence of disease [31].

Graft related

Loosened sutures could lead to displacement of grafts or contamination of graft. Inadequate size of the graft or improper root preparation for graft may lead to failure of graft. Also, allergic reaction to the grafts are rare but can occur in a hypersensitive patient. Commonest failure associated with root coverage procedures is recipient bed is too small to provide adequate blood supply [32].

Guided tissue regeneration (GTR) related

Failures in GTR procedures can result in swelling which is most commonly associated with pain, sloughing which can be attributed to a decrease in the vascular supply to the flap in the early stages of healing, membrane exposure. Out of these membrane exposures is the major complication associated with GTR technique with a prevalence in the range of 50 to 100%. Cortellini et al., 1990; Selvig et al., 1992 reported that the prevalence of membrane exposure can be highly reduced with the use of access flaps, specifically designed to preserve the interdental tissues (modified papilla preservation technique) [32, 33].

Suture related

Is known to arise commonly from suture breakage which results in inappropriate flap approximation. If sutures are too loose it could lead to exposure of GTR membrane or graft displacement or if they are too tight then it leads to devitalisation of tissue. Also, type of suture should be chosen carefully as monofilament sutures are considered more sterile than the

braided suture because of the "wicking effect" of braided sutures that pulls the bacteria & fluid into the wound site. All of these problems could be avoided by choosing the correct type of suture material placed through proper technique [34].

Conclusion. Successful Periodontal therapy is necessary for providing better dental care. For which the selection of the most suitable technique for treatment, evaluation of the complications associated with it is considered crucial for paving way towards favourable outcomes. As any periodontal surgery can be followed by occurrence of

these complications, a thorough knowledge of their etiology and management is required to achieve maximum results with reduced patient discomfort.

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