Unveiling the pandora's box of periodontal surgery- a lucid overview on post-operative complications

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Introduction

Anatomical, traumatic, developmental, or plaque-induced abnormalities in the bone,gingiva, or alveolar mucosa can be prevented or corrected with periodontal surgery.The surgery aims to achieve the following: maintaining proper embrasure space, treating gingiva-alveolar mucosa issues, reducing inflammation, controlling periodontal diseases, controlling plaque, improving oral hygiene, and improving aesthetics.

Complication

A complication is an illness or condition that develops as a result of another illness.However,in certain situations, certain issues cannot be avoided,while others are unavoidable. Following periodontal surgery, the most common complications are postoperative discomfort, bleeding, edema, hypersensitivity of the roots, delayed healing, bruising, trismus, and taste abnormalities.The implications of these issues may change how periodontal therapy works out. Therefore, in order to obtain successful periodontal care, a practitioner must acknowledge their etiology and management.

Postoperative complications occurring after periodontal surgery can be categorized as following

A. General Complications arising after periodontal surgery.
B. Complications arising due to the surgical procedure employed.

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
- Periodontal pack related
- Implant related.

A. General Complications arising after periodontal surgery

BLEEDING:

Haemorrhage can range from a small amount of leaking or oozing at the site to significant bleeding at the surgical site following periodontal surgery.Nevertheless, considerable bleeding is accepted as usual 24 hours after surgery.A surgical patient's bleeding can be categorized as follows:

Primary bleeding: in the present situation, the bleeding occurs during the surgical procedure.The majority of this is fixed during surgery, but the patient is closely watched after if there are any significant hemorrhages noted.

Reactive bleeding: After surgery, reactive bleeding occurs 24 hours later.It usually happens when a ligature slips.

Secondary bleeding:7 to 10 days following surgery, further bleeding takes place. Secondary bleeding frequently results from a vessel being eroded by an infection that is spreading because of a contaminated wound.

Causative factors

- 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.

Management of bleeding

Finding the source of the bleeding is important for managing it, and once that is done, a plan for treatment should be made.For 15 to 20 minutes, a pressure pack can be used to treat minor bleeding.Haemostatic medications such as Surgicel, Gelfoam, Microfibrillar Collagen (Avitene), etc. can be utilized if the bleeding persists.The best course of action for managing bleeding is seen to be ligating the vessel if the bleeding is arterial.

Swelling

Swelling is thought to be the body's typical response to surgery and the healing process.The day after surgery is when the swelling first appears, and it will peak two to three days later.Expected swelling is typically correlated with the degree and length of the surgery.Postoperative edema is influenced by body surface,weight, and gender,according to Akadiri et al.Increased blood flow to the injured or surgically repaired bodily part brings more nutrients to aid in healing,which is why swelling happens after surgery or injury.Despite this, swelling is accepted as natural until it impedes healing.

Management of swelling

Although the swelling usually goes down in four to five days, if it doesn't,treatment with antibiotics,corticosteroids and surgical techniques to manipulate soft and hard tissues should be considered.Lastly,less traumatic surgical techniques like piezosurgery and cryosurgery should be explored.According to Elha et al.,administering 400 mg of oral metronidazole both before and after surgery, along with 10 mg of intramuscular dexamethasone, reduces swelling significantly when compared to only postoperative treatment without corticosteroids.It has been suggested by several studies that administering 32 mg of methylprednisolone and 400 mg of ibuprofen 12 hours prior to and 12 hours following surgery,respectively,also produced positive results.

According to the findings of Chappi et al., serratiopeptidase has superior anti-inflammatory and anti-swelling properties during the postoperative phase, while methylprednisolone provides superior pain relief.Serratiopeptidase, also referred to as serral-ysin,serratia-protease,or serrapeptase,is a proteolytic enzyme that has been employed in the management of inflammation.Enteric-coated tablets containing 2.5 mg to 10 mg of the medication are available.

PAIN

During the first three days following surgery, postoperative pain is typical and should gradually go away as the body heals.Extended and drawn-out surgical procedures, ineffective local anesthetic,tissue damage,and improper tissue handling—including dull instrument incisions can all lead to postoperative pain.improper infection control, which increases the risk of infection after surgery.Inadequate understanding of the anatomy of surgery (which raises the risk of complications, such as nerve injury and edema).Those who had big wounds surgically repaired or undergoing mucogingival/bone treatments.Patients whose healing could be slowed down, such as those with immunosuppression, diabetes that is not under control, smokers, bisphosphonate users, and radiation therapy veterans.Individuals suffering anxiety prior to surgery, as well as those who have previously used large amounts of analgesics following periodontal surgery.

MANAGEMENT:

For early pain, practitioners may prescribe nonsteroidal antiinflammatory drugs (NSAIDs) including ibuprofen and diclofenac (1 mg/kg) as well as paracetamol (15 mg/kg).

Root hypersensitivity

After periodontal surgery, a small root hypersensitivity can be considered normal as it generally diminishes after around two weeks.Scaling and root planing during periodontal therapy remove the hypermineralized dentine's outer layer, exposing the surface to the effects of hydrodynamic phenomena.Surgical periodontal treatment typically entails total root surface debridement.The dentinal tubules become more visible during surgery due to soft tissue recession.

MANAGEMENT

It is advised to use desensitizing agents such as sodium fluoride, stannous fluoride, calcium sodium phosphosilicate bioactive glass (NovaMin®); resins,varnishes, toothpastes (occlusion of dentinal tubules); iontophoresis, lasers, and gingival grafts if the sensitivity doesn't go decreased after about two weeks.

Increased tooth mobility

Temporarily, a tooth loses its gingival and periosteal support due to excisional treatments,especially when flap retraction and the corresponding removal of interdental tissues are performed.In the first 10 to 14 days following surgery, initial reattachment may be visible,which could be the reason for temporary movement before more extensive collage nation takes place.And it may take up to thirty to forty-five days for the gingival attachment to the tooth and bone to rebuild.

MANAGEMENT

If movement still exists after 30 to 45 days, the cause should be found, adjusted by occlusal adjustment, and splinting should be done to stabilize the teeth. However, extraction may be a possibility if the mobility continues to increase.

Postoperative bacteremia

The severity of trauma caused during surgery determines the likelihood of post-surgical bacteremia.After receiving periodontal therapy,88% of all blood cultures yield favorable results.In their research,Okel and Elliot discovered that the most prevalent bacteria implicated in postoperative bacteremia were Staphylococcus albus coagulase negative.In their study, Mc Entegart and Porterfield found that Staphylococcus albus was the most often isolated microorganism, occurring six times, while Psedomonas aerugenosa,Streptococcus viridans,Alpha hemolytic streptococcus and Neisseria catarrhalis were the least frequently isolated, occurring only once in postoperative infection following periodontal surgery.

MANAGEMENT

Antibiotic prophylaxis prior to surgery is an effective treatment for transient bacteremia.When it comes to minimizing post-operative bacteremia following periodontal flap surgery and shielding susceptible patients from potential side effects including infectious endocarditis and other systemic illnesses, amoxicillin is thought to be quite helpful.For the purpose of preventing infections, amoxicillin and clindamycin were administered the most frequently (71.3% and 23.8% of antibiotic prescriptions, respectively). Following surgery,additional antibiotics recommended were amoxicillin-clavulanate (3.1%), azithromycin, ciprofloxacin, metronidazole, and trimethoprim-sulfamethoxazole (each less than 1%).

Delayed wound healing

Four steps are involved in the normal biological process of wound healing in the human body. **Phases**: haemostasis, inflammation, proliferation, and remodeling are highly planned.Seven days after periodontal surgery, surface epithelization is finished. Infection is most likely the reason for delayed wound healing since it causes necrotic tissue to breakdown and encourages the growth of pathogens.Additional reasons include calculus,fractured teeth,periodontal pack,wound dehiscence (unapproximated flap margins),hematomas,stitch abscesses (infection of the suture track)and allergic reactions to suture, graft, and periodontal pack materials.

MANAGEMENT:

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

Trismus

The inability to open one's mouth is called trismus. After periodontal surgery, trismus may result from trauma, infection, masticatory area infection, or improper needle positioning.

MANAGEMENT

Patients can employ muscle relaxants, soft diets, and heat therapy to reduce it. Analgesics may be administered if the pain is really severe.Diazepam (2.5–5 mg three times a day) and other benzodiazepines might be administered if necessary to relax muscles.In addition, medications for muscular relaxation include cyclobenzaprine, methocarbamol, metaxalone, ophendrine, chlorzoxazone and carisoprodol.

Taste change

It may be brought on by an infection, nerve damage, intrusive treatments, idiopathic conditions, or surgical procedures including the insertion of a periosteal elevator, tooth sectioning, lingual flaps, etc.An alteration in taste could be explained by

- **Dysgeusia:** A unpleasant taste in the mouth or a changed sense of taste.
- **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.Low salivary flow can therefore also affect taste, requiring the use of a sialogogue. (pilocarpine -30mg/day).

Bruising:

Bruising is characterized by ruptured blood vessels and discolorations, and it is an injury to the underlying tissues or bone without a break in the skin. Additionally, mouth corners could get cracked and dry.

Management

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

- The most common complications arising from local anaesthesia via needle insertion, syncope,allergy,trismus,paraesthesia,anaesthetic toxicity.

Local anesthetic Toxicity

The cause of local anesthetic toxicity is an excessive amount of the substance absorbed into the system.Because local anesthetics inhibit conduction in a variety of tissues in addition to the peripheral nerve, poisoning may arise if the anesthetic is administered in large levels to the heart or brain, among other organs. Signs and symptoms include elevated heart rate, blood pressure, and breathing rate, as well as excitement, talkativeness, and loss of consciousness.Adequate oxygen supply should be guaranteed, cardiovascular condition should be monitored continuously, and medical help should be given to patients suffering from local anesthetic toxicity.

Syncope

The most common cause of syncope is hypotension, or low blood pressure, which happens when the heart is unable to pump enough oxygen-rich blood to the brain. Pallor, cold, sweating, lightheaded, nausea, loss of consciousness, and dilated pupils are some of its symptoms.

Management

Involves either elevating the legs or positioning the patient in a supine position with their head slightly down to enhance blood flow to the brain.If the patient has just passed out, recovery happens relatively immediately.Next, keep the airway open, check for a pulse (absence implies cardiac arrest), and start CPR right away.

Aromatic ammonia ampoules can be used to enable patients regain consciousness.The ampule is crushed between the fingers and placed beneath the patient's nose for this purpose.The irritant gases that are emitted promote movement of the extremities and help blood flow to the heart and brain from peripheral locations.If the patient's pulse can be felt and they haven't fully passed out, four sugar lumps can be administered intravenously or orally. For hypoglycemia, 20 milliliters of sterile glucose ranging from 20 to 50%.

Allergy

Allergy is a hypersensitivity reaction that happens when a patient is exposed to an antigen (Ag), such as a medication (as an L.A. agent), to which they have already been exposed. This exposure causes an Ag-Ab reaction.Anti-histaminic medications (benadryl 20–40 mg IV or IM) and 0.3 mg SC or IM of epinephrine (1:1000) can be used to effectively treat allergic responses. Inhaler bronchodilator and intravenous corticosteroid (100 mg). Hemisuccinate hydrocortisone.

Paraesthesia

When a patient has paraesthesia, it is when they report feeling numb or "frozen" several hours or days following a local anesthetic injection. The most frequent cause of this is nerve trauma.Depending on the underlying reason, the immunosuppressant prednisone, intravenous gamma globulin (IVIG), anticonvulsants such gabapentin or Gabitril, and antiviral medicine can all be used to minimize patient discomfort.

Hematoma

Hematomas can result from blood vessel damage caused by a needle piercing too far distally during a posterior superior alveolar nerve block.A hematoma may or may not cause a vein to be punctured with a needle, but an arterial perforation will cause a hematoma that will quickly enlarge until treatment is started since the artery will be under much higher blood pressure.Finding the cause of the bleeding, cleansing the mouth gently, and applying cold compresses, pressure packs, or styptics are the first steps in emergency management.The recommended medication is tranexamic acid (500 mg in 5 ml via gradual IV infusion).

Flap related

The most prevalent cause of flap-related complications is incorrect incisions, which, if they are not made all the way to the bone or root surface,may result in inadequate vision and access to the operating area or excessive bone exposure that might induce bone resorption.One important element in the efficacy of periodontal therapy may be improper debridement.Inadequate suturing can cause the illness to recur and can also damage the flap approximation.

Postoperative Wound Dehiscence

Increased tissue pressure causes the wound borders to separate and secretions to leak out of the wound, which is known as postoperative wound dehiscence subsequent to infection.As a result,the surgery site may experience more discomfort and edema.It has an impact on periodontal plastic surgery's intended cosmetic result. Irrespective of wound infection, wound dehiscence can also happen as a main event. Clinical outcomes are the same for both infected and non-infectious wound dehisence.

Flap perforation

During partial-thickness flap elevation, flap perforation is a potentially serious complication that happens regularly.The facial tissue thinning makes flap elevation more challenging.At the mucogingival junction, where the tissue is rather thin, there is an increased risk of perforation while elevating a partial thickness flap. As the flap adheres to the periosteum beneath, the existence of scar tissue from prior surgeries (such as apicoectomy) makes the process even more difficult.By reducing local blood supply, flap perforation raises the possibility of flap necrosis.Owing to a limited vascular supply, covering a connective tissue graft with a perforated flap may have detrimental effects on graft integration.

MANAGEMENT

It is necessary to elevate the flap slowly and carefully in order to finish the flap dissection without extending the puncture. When dealing with a full-thickness flap, it is recommended to do additional dissection in the perforation area by applying a moderately firm pressure with the blade to the underlying bone.Depending on how large the perforation is, the tear can either be sutured closed or left open after flap elevation is finished.In the case that sutures are necessary, utilize fine suture material (6-0, 7-0) to avoid the suture ripping the flap and widening the perforation.

Scar formation

It is impossible to predictably prevent scar formation from horizontal incisions, notwithstanding the rarity of scar formation.Horizontal scar correction is not as successful as vertical scar correction. Thus, it is best to avoid making horizontal incisions in the esthetic zone.Using a rough diamond or scalpel, an attempt might be made to lessen the scars from vertical incisions or dense grafted tissue.

Flap necrosis

Flap necrosis is an uncommon issue that impairs healing when it occurs.The necrotic tissue must be quickly and precisely dissected with a scalpel or surgical scissors in cases of whole or partial flap necrosis. Chlortetracycline-soaked strips and a periodontal dressing should be applied to any exposed bone.In the event that more surgery is required, it must be delayed until full recovery.

Day1: Nutrients diffuse from the recipient bed.

Day 3: Revascularization and subsequent capillary anastomosis.

Day 21: Establishing the graft In the event that only a portion of the graft is necrotic, a scalpel or surgical scissors can be used to remove just the necrotic portions.

It is recommended to remove the entire transplant if it is fully necrotic.The intended surgical result cannot be anticipated if an autologous connective tissue graft has complete or partial necrosis. It is usually necessary to postpone secondary surgery for a minimum of three months until full healing has occurred.Bacterial contamination and subsequent resorption of augmented bone are inevitable outcomes of exposure to barrier membranes, bone particles, bone graft materials, bone blocks, bone plates, or fixation personnel. This finally results in the failure of the entire augmentation technique.

Graft related

Graft dislocation or contamination may result from loosened sutures. Graft failure may result from an inadequate graft size or from insufficient root preparation. Additionally, hypersensitive patients may experience a rare adverse reaction to the grafts.The recipient bed's inability to provide a sufficient blood supply is the most frequent cause of failure in root coverage treatments.

Guided tissue regeneration (GTR)

Failures in GTR treatments can lead to membrane exposure, sloughing, which is caused by a reduction in the vascular supply to the flap during the early phases of healing, and swelling, which is typically accompanied by pain.The primary side effect of the GTR procedure among these membrane exposures is an incidence of between 50% and 100%.According to studies by Cortellini et al. (1990); Selvig et al. (1992), the use of access flaps—which are made especially to safeguard the interdental tissues can significantly lower the occurrence of membrane exposure.

Suture related

Is commonly caused by suture breakage, leading to an incorrect flap approximation.Sutures that are too tight cause tissue devitalization, whereas those that are too loose may expose the GTR membrane or cause graft displacement. Additionally, the type of suture should be carefully chosen because braided sutures have a "wicking effect" that draws fluid and bacteria into the wound site, making monofilament sutures thought to be more sterile than braided sutures.By selecting the appropriate suture material and using the right technique, all of these issues might be prevented.

Periodontal pack related

The most frequent consequences of periodontal packs are allergies related to packs containing eugenol.Research conducted by Baer and Wertheimer (1961) revealed that periodontal dressings have the potential to increase bone inflammatory infiltration. Additionally, the inflammatory response is higher when the dressing is applied directly to the bone as opposed to first coating the periosteum.

Implant

The Pathophysiology of Periapical Implants and Endodontic Considerations According to Quirynen et al. (2003), periapical pathosis occurred in 1% of implants inserted over a 5-year period. Another name for the illness is retrograde peri-implantitis.

Causes:

•Incorrect positioning of an implant.
•Striking an adjacent tooth
•Impinging on the tooth's blood supply
• bone overheating during the osteotomy In these situations, endodontic therapy, an apicoectomy, or an extraction will be required to restore the affected tooth.

Preventive Measures:

Before implant implantation, radiographic evaluation of the angulation of neighboring teeth and root dilatation is required. An implant and the neighboring tooth should have 1.5 to 2 mm of bone between them. Making adjustments to the angulation of an osteotomy is made easier by inspecting a radiograph with a guide pin inserted five millimeters deep.D. Flanagan. (2002) Reversible peri-implantitis treatment options:Inactive lesions do not produce any symptoms and do not need therapy as long as the radiolucency size stays stable, according to Quirynen et al. (2003).Alternatively, Flanagan (2002) proposed that any radiolucency around a periapical implant should be surgically removed to avoid aggravating the lesion and losing the implant.Patient symptoms may include discomfort, tenderness, swelling, and fistulous tract if an infection is present at a place.Periapical lesions around implants that are symptomatic need to undergo surgical debridement and antibiotic therapy.

Fractures

Fracture of an atrophic mandible is a possible though rare complication of implant insertion.Tolman and Keller (1991) came to the conclusion that stress fractures at the weaker areas where implants were inserted were the cause of fractured mandibles that were discovered soon after the implants were placed.

Treatment consideration:

The ideal ratio between implant size selection and bone volume consideration. When the resorbed mandible has less than 7 mm of bone height and less than 6 mm of width, Park and Wang(2005) indicated that there is a higher risk of fracture.According to Laskin (2003), when a fracture happens, the degree of displacement is a crucial factor in determining the best course of action.The implant should be kept in place if the fracture shows only slight movement or displacement.Closed or open fracture reduction, with or without implant retention along the fracture line, is necessary if there is significant displacement.

Predisposing factors:

- Osteoporosis
- Stress at the implant location and trauma.
- Insertion of long and wide implants in an atrophic mandible

Penetration Into Maxillary Sinus or Nasal Fossa

One of the difficulties related to maxillary implant insertion is unintentional drill or fixture penetration into the maxillary sinus or nasal cavity.It is often well tolerated to insert an implant a few millimeters into the sinus or nasal cavity. In 1984, Branemark PI et al.Nonetheless, it is wise to recommend a decongestant and an antibiotic in these circumstances.One of the problems of placing maxillary implants is unintentional drill or fixture penetration into the maxillary sinus or nasal cavity.It is often well tolerated to insert an implant a few millimeters into the sinus or nasal cavity. In 1984, Branemark PI et al.However, it is wise to recommend a decongestant and an antibiotic in these circumstances.

Lateral window approach

Issues related to the Lateral Window Method According to a 2005 study by Elian et al., 20% of intraosseous arteries are less than 16 mm from the crest of the ridge and can cause problems when preparing a lateral window.The maxillary sinus may have septa, which can make membrane elevation more difficult.The majority were discovered between the second premolar and the first molar, and they have been identified in 31.7% of individuals.Boyne and James (1980) suggested using a hemostat to remove septa and a narrow chisel to cut through them when they are found on the antral floor.If an implant is unintentionally moved into the sinus cavity after implant placement, it needs to be removed by opening a lateral window.

Antibiotics are prescribed if an infection (pain, redness, and soreness) persists after a sinus lift procedure. After closure, systemic antibiotics are prescribed along with incision and drainage procedures.If the infection is ongoing, the graft material may be contaminated and should be removed, along with the sinus fluid.

Symptoms of sinusitis:

- Fever
- Facial pain (that increases on leaning forward)
- A purulent discharge from the nose that has a yellow-green color and can discharge posteriorly, resulting to a cough and fatigue.
- Popping of the ears and muffled hearing
- Swelling of the periorbital tissues
- Referred pain to the maxillary teeth. Serious effects can result from sinus infections.It is uncommon for them to advance to cavernous sinus involvement or unilateral or bilateral pansinusitis.
- CT scans are a crucial diagnostic tool for estimating the size of the maxillary sinus and identifying any unexpected discoveries (such as intraosseous arteries and malignancies).
- It is caused by inadvertent introduction of air into tissues under the skin or mucous membranes.
- A sulcus, surgical wound, or oral laceration may be forced to open by air using a high-speed handpiece, air/water syringe, air polishing device, or air abrasive device.
- The air may expand the face and/or submandibular regions unilaterally by following the fascial planes.
- The typical clinical manifestation is a swelling of the face or cervico-facial area that occurs concurrently with dental treatment.
- Swelling can close the eye, and it can appear several hours after therapy.It is also possible to have tissue emphysema and no crepitus.

Treatment:

Treatment with antibiotics and mild analgesics, Since the compressed air may have brought bacteria into the tissue, antibiotics are administered,close monitoring and consolation.When a significant volume of air is forced into the tissues, it may travel through the pleural space and mediastinum.It is important to acknowledge the potential for mediastinal involvement and to monitor the patient accordingly.A patient must be transported to a hospital if they report any airway trouble.Symptoms usually subside in 3 to 10 days.

A potentially fatal consequence may arise from the intraoperative swallowing or aspiration of an implant or dental screwdriver.Referring a patient to an otolaryngologist for assessment and treatment is imperative in cases where a device is aspirated.Maintaining tidy and unbroken wounds helps lessen postoperative discomfort following the implantation of dental and periodontal implants. Healing happens by primary purpose because the periosteum is reflected and tissues are handled gently when sutures are used.It is known that delicately working with hard tissue, like bone, might lessen postoperative pain.Because the thermal insult is happening in the deeper parts of the osteotomy, color changes can occasionally be invisible.It's crucial to pay close attention to irrigation procedures and sporadically apply drilling pressure.

Conclusion:

To provide superior dental care, periodontal therapy must be successful. For which choosing the best appropriate method for treatment, assessment of the related issues is thought to be essential for providing the basis for effective outcomes. Any periodontal surgery procedure carries the risk of these problems developing, thus understanding the causes and treatment is essential to achieving the best outcomes while minimizing patient discomfort.

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