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Complications of Tooth Extraction

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Abstract

Tooth extraction or exodontia, despite the massive advances in restorative dentistry, is still one of the most common procedures in dental practice. The aim of exodontia is to remove the cause of a patient's pain as painlessly and as traumatically as possible. Unfortunately, there are numerous complications that can arise before, during and after an extraction that can result in a negative treatment outcome. Patient factors, local and systemic and operator factors have a role in the success of an extraction. The aim of this paper is to discuss and identify some of the relevant factors with a focus on prevention of complications.

Keywords

Tooth extraction; Exodontia; Haemorrhage; Extraction of wrong tooth

Introduction

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1. Pre-operative
2. Peri-operative
3. Post-operative

Pre-Operative Complications

Patient factors that can lead to complications can often be identified and addressed before the surgery, if a robust and full dental, medical and social history is taken with a good history of pain [1]. The patient's chief dental complaint along with location, intensity, duration, precipitating factors, relieving factors, radiating pain pathway to confirm that the pain is odontogenic in origin prior to tooth extraction [2]. recently discussed the new classification of orofacial pain produced in 2020 by the Orofacial pain Classification Committee which has divided facial pain into six main categories and detailed a diagnosis pathway to aid a clinician in the identification of non-odontogenic origin. As a guide to the prevalence of non- odontogenic facial pain [3]. reported the incidence within the UK to be between eight and 12.6/100000 population per annum. On average it takes a patient four years and three clinicians to be diagnosed during which 44% have irreversible dental treatment, either root canal therapy or extraction to alleviate their pain [4]. Treatment based on a patient's history alone without supporting radiographic or clinical findings may be maltreatment. Taking a full medical history and extending into the extended family medical history may discover medical conditions such as diabetes or bleeding disorders which will have impact on treatment during and after, along with allergies and any medications. Overall systemic health will have an effect on the healing capacity of the oral cavity [5]. Between 2009 and 2018, the incidence rate of new clinical diagnoses of type 2 diabetes recorded in a UK primary care database decreased by a third from its peak in 2013–2014, while the incidence of pre-diabetes has tripled [6], after studying a large cohort group of over 400,000 people. Diabetes delays wound healing by reducing oxidation and perfusion of the peripheral blood supply and impairs the function of polymorphonuclear cells and delaying the release of cytokines essential in wound healing [7,8]. However, the research [9]. supports the notion that controlled diabetics have a similar healing capacity to non-diabetics when taking insulin, metformin, specific sulfonylureas, thiazolidinediones, and dipeptidyl peptidase-4 inhibitors but makes a recommendation to research further into what treatment medication would be best to promote wound healing. Additionally, there is little research into the effect of the prediabetic status on healing. This may be worth exploring. Diabetes mellites and hypertension have been shown to increase the chance of developing dry socket after extraction [10]. It is recommended to treat diabetic patients in the morning just after their breakfast to avoid hypoglycaemic crisis. Other medications such as bisphosphonates, warfarin, and factor Xa inhibitors (NOAC's) will be discussed later. A very important consideration is the

ability to achieve good anaesthesia under local anaesthesia typically more so in the mandible as the inferior dental nerve enters the body of the mandible at the lingual. Inferior dental nerve blocks (IDNB) has a varying success rate between 65% and 92%, Bartlett and Mansoor, 2016, so alternative techniques have been suggested such as Gow-Gates, intraligamentary, intraosseous, buccal and closed mouth block to help achieve adequate numbness [11]. There would appear to be no difference in lidocaine as an IDNB compared to articaine infiltrations [12]. Anaesthesia is paramount to achieving a satisfactory treatment outcome.

Peri-Operative Complications

Soft tissue injuries to the gingiva, lips, cheeks, palate, and floor of mouth due to movement or slippage of instruments. Inadequate support of the instruments and retraction of the gingiva using the thumb and forefinger of your free hand. Local anatomy, especially in the floor of the mouth (lingual artery) and the palate (incisive and palatal arteries), makes these areas very vascular. Small wounds can be left to heal without intervention. Large wounds may require suturing, ligating an artery or cauterisation.

1. Tooth root fracture commonly occurs in extraction - The incidence of retained root fragments found on radiographic examination is in the incidence of 11-37% [13]. If there is enough root structure left, elevation of the remaining fragment or surgical removal by raising a flap and bone removal may be sufficient. If the root fractures at the apex, it may be best to leave the root in situ and a risk-benefit analysis should be undertaken to see if it is worth removing. Risks involved in removing a retained root include nerve damage, displacement into the maxillary antrum and lingual pouch, damage to the inferior dental nerve and damage to the adjacent teeth. Benefits include maintaining bone as in the socket shield technique. This technique uses a partial shell of buccal root divided from a root and used to maintain the buccal wall bundle bone prior to immediate implant placement [14].
2. Extraction of wrong tooth - No longer classed as a never event by [15]. Prior to this [16]. it accounted for 20- 25% of all wrong site surgery and 9% of all never events. The total incidence is unclear as only hospital-based and community services seem to have reported in this particular study so the figures from general practice are not included. Reasons stated for wrong removal include unclear notation, previous extraction and mesial drift of the adjacent teeth, previous restorations making tooth identification difficult and wrong referral. It may be prudent to ask for the tooth to be extracted to be expressed in both figure and written notation and if unclear, the procedure to be postponed until clarification obtained.
3. Root extruded into the maxillary sinus - Due to the upper molars root apices and their anatomical proximity to the maxillary sinus, it is not uncommon for the apices to displace apically into the maxillary sinus particularly if upward forces are applied to attempt to remove the root. This risk increases with age due to pneumatization of the sinus and increased alveolar density [13]. The risk of thrombosis sepsis of cavernous sinus sepsis which carries a mortality of 20-30% although small is present (Beech and Farrier 2016). When apices fracture

- high up in the alveolar bone, it may be more prudent to leave in situ and allow to erupt with time to a more favourable position than risk referral to ENT for a Functional endoscopic sinus surgery (FESS) procedure.
4. Restoration/crown fracture of the adjacent tooth – inappropriate use of the adjacent tooth as a fulcrum can lead to luxation and fracture of the adjacent tooth.
 5. Luxation of the adjacent tooth.
 6. Fracture of the maxillary tuberosity – occurs when awkward and heavy movements are used to extract an upper second or third molar, the risk is increased if the bone is D4 quality (very soft bone) but also conversely very dense bone(D1). There is no firm consensus on how to treat a fracture tuberosity [17]. recommend removal of the teeth and tuberosity simultaneously and closure of the wound with sutures whereas [18]. described a technique to dissection the tooth to be extracted from the tuberosity and suture [19]. discussed several methods to treat including stabilising the tuberosity for four to six weeks with a view to then surgically extracting the tooth. There appears to be no robust literature to support any mode of dealing with tuberosity fracture and would seem to be associated with operator experience and personal preference.
 7. Haemorrhage – frequent occurrence enhanced by factor Xa inhibitors (apixaban, rivaroxaban, dabigatran), warfarin and aspirin. Consideration must be taken as to the timing of the extraction for those on anti-coagulants preferably early in the morning to allow for the wound clot to stabilize and to allow for continuation of the medication at a delayed time (for apixaban, the oral dose of medication can continue four hours after clot stabilization) (Curto and Albaladejo 2016). A comparison cohort study of 86 patients taking either warfarin (INR between 2 and 4) or NOAC's showed no noticeable difference in bleeding events within a flow up of seven-day period [20]. There seems to be no firm evidence to support the use of collagen sponges, haemostatic agents to prevent post- operative bleeding. The use of tranexamic acid mouthwash to arrest bleeding has been advocated by some [21]. However, a systemic review by [22]. state that its superiority over other haemostatics was not proven. Additionally, it stated that histoacryl glue was proven better than gelatine sponges.
 8. Creation of an oroantral fistula – [23] found that out of 147 cases repair of an oroantral fistula (OAF) with a buccal fat pad was the most reliable way to close the communication but did not consider the use of alloplast or collagen membrane simultaneous placement with buccal or palatal pedicle flap advancement as an alternative method of OAF closure. The buccal fat pad was seconded as the gold standard to repair an OAF [24]. This may change as developments with evidence to support the use of platelet rich fibrin (PRF) and collagen membrane becomes more substantial. It is widely thought that PRF improves soft tissue healing [25].
 9. Fracture of the mandible – [26]. listed age, sex, relative tooth to bone volume, surgical technique, and degree of tooth impaction to be important in the risk of mandible fracture.
 10. Displacement of a lower root into the lingual fascial space.

11. Dislocation of the temporomandibular joint (TMJ) – more common in extraction of lower molars due to excessive force. The repositioning of the TMJ should occur as soon as possible to prevent muscle spasm.
12. Fractured instrument – check for wear and tear of instruments prior to usage.
13. Inhalational or ingestion of root or root fragment.
14. Systemic complications – asthma attack, anaphylaxis, angina, seizure, syncope and hypoglycaemia during the procedure managed by basic life support training.

Post-Operative Complications

1. Immediate or delayed haemorrhage – treated as above.
2. Swelling and pain.
3. Alveolar osteitis – most common complication after the removal of lower wisdom teeth, more prevalent in women than in men, mandibular extractions versus maxillary extractions, difficulty of extraction and smoking have been cited as causes [27].
4. Nerve injury – more common in the lower jaw where the inferior dental nerve and lingual nerves may be damaged affecting sensation along the dermatomes supplied by those branches [28]. found the incidence of inferior nerve damage is one to five percent seven days after third molar surgery which falls to less than one percent after six months. It may be a total or partial paraesthesia which if it does resolve will do so within six months in 85% of cases.
5. Trismus.
6. Osteonecrosis (BRONJ/MRONJ) - described as an area of uncovered bone that does not heal after eight weeks. More prevalent in the mandible than the maxilla, with diabetes mellitus being the most frequent relative disease [29]. IV Bisphosphonates tend to have a higher risk of BRONJ than oral bisphosphonates and it has been suggested that extractions prior to three years of oral medication is safe. It may be better to keep in mind that the risk is lower under three years but is not negligible [30]. Other drugs implicated in its pathogenesis include Denosumab and other cancer drugs. Hyperbaric oxygen, ozone therapy and low-level laser therapy to increase blood flow are treatment options but there is no definite treatment.

Summary

Complications will arise in exodontia ranging from the simpler alveolar osteitis to nerve damage from time to time. It is the best place of the surgeon to assess thoroughly through clinical and radiographic examination, within a robust dental and medical history framework, to present the best treatment plan. The ideal is to execute this plan with an intention of having minimal complications. The surgeon must choose the most appropriate surgical technique available to minimize the risk of complications while acting within their scope of practice.

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