Complications of Forceps Extraction: A Clinical Review

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Abstract

Introduction: Tooth extraction using dental forceps is one of the most frequently performed procedures in dental practice. Despite its routine nature, forceps extraction carries a well-documented risk of intraoperative and post-operative complications that every dental practitioner must be able to recognise, prevent, and manage. These range from minor soft tissue lacerations to serious events including jaw fracture, oro-antral communication, and nerve injury. This review provides a comprehensive yet accessible clinical overview of these complications, written specifically for dental interns entering independent clinical practice.

Discussion: Complications are classified as intraoperative — including crown and root fracture, alveolar bone fracture, soft tissue injury, and oro-antral communication — and post-operative, which include alveolar osteitis (dry socket), secondary haemorrhage, infection, trismus, and nerve disturbance. Alveolar osteitis is the most common delayed complication, affecting 1–5% of routine extractions and up to 30% of mandibular third molar cases. Oro-antral communication is a significant risk during maxillary posterior tooth removal. Nerve injury to the inferior alveolar or lingual nerve, while more common with surgical third molar removal, may also follow forceps extraction in the posterior mandible. Each complication has clearly defined risk factors, clinical features, and evidence-based management protocols.

Conclusions: The majority of complications associated with forceps extraction are preventable through thorough pre-operative assessment, correct case selection, sound surgical technique, and clear patient counselling. When complications occur, early recognition and prompt management are essential for favourable outcomes. A calm, systematic, and anatomy-informed approach to every extraction remains the most effective strategy for minimising patient morbidity.

Keywords: tooth extraction; forceps extraction; post-extraction complications; alveolar osteitis; oral surgery

Introduction

Tooth extraction is the most commonly performed surgical procedure in dentistry. For dental interns and junior dental officers entering clinical practice, forceps extraction forms the cornerstone of daily surgical work. The procedure, although often appearing straightforward, requires a thorough understanding of dental and regional anatomy, patient risk factors, correct instrument selection, and the biomechanical principles governing safe tooth delivery. Without this foundation, even routine extractions carry the potential for preventable complications (Hupp et al., 2019).

A complication is defined as any undesirable event that departs from the expected clinical course, occurring either during or after the procedure. Complications of forceps extraction are broadly grouped by when they happen — intraoperative complications occur during the procedure itself, while post-operative complications develop in the hours to weeks that follow. They may involve the tooth being extracted, the surrounding bone, adjacent soft tissues, neighbouring teeth, or more distant neurovascular structures (Fragiskos, 2007; Peterson et al., 2003).

Gintaras et al. reported an overall complication rate of approximately 8.6% across all dental extractions in a retrospective study, with root fracture and soft tissue injury being the most commonly recorded intraoperative events. Dry socket and haemorrhage accounted for the majority of post-operative return visits (Gintaras et al., 2010). Understanding these complications — their causes, warning signs, and management — is not merely an academic exercise; it is a fundamental clinical responsibility.

This review is written in a simple and clinically practical style, intended specifically for dental interns. Each major complication is explained with its causes, how to recognise it, and what to do about it. Summary boxes are included throughout to highlight the most important clinical points for quick reference.

Discussion

Fracture of the Tooth Crown or Root

Root or crown fracture during extraction is the most common intraoperative complication. It happens when the tooth cannot withstand the forces applied by the forceps — usually

because the tooth is weakened by decay, previous root canal treatment, heavy restorations, or because the roots are curved, long, or fused to the surrounding bone (a condition called hypercementosis). Dense bone in elderly patients and improper forceps application are also important contributing factors (Bouloux et al., 2007; Hupp et al., 2019).

When a root fractures during extraction, the first step is to stay calm and take a periapical radiograph to assess the size and position of the remaining fragment. Small root tips of less than 3 mm in healthy, uninfected bone - especially those near the inferior alveolar canal - can often be safely left in place, provided the patient is fully informed and the decision is documented in the case notes. Larger fragments, or those associated with infection, should be retrieved surgically through a flap approach with bone removal and root elevator delivery. Attempting to retrieve a retained root tip by vigorous blind probing is counterproductive and may cause more damage (Chiapasco et al., 1993; Fragiskos, 2007).

Summary Box 1: Root Fracture — Key Points for Interns

- Always take a pre-operative periapical radiograph — it tells you what to expect before you even pick up forceps.
- High-risk teeth: heavily restored, root-canal treated, hypercementosed, or with curved/divergent roots.
- Root tip <3 mm + no infection = can leave in situ with radiographic documentation and patient consent.
- Root tip >3 mm or infection present = surgical retrieval needed; refer if you are not confident.
- Never probe blindly — take a post-op radiograph and document everything.

Fracture of the Alveolar Bone and Maxillary Tuberosity

Fracture of the alveolar bone — the bone that directly surrounds the tooth socket — is a common intraoperative occurrence and in most cases involves a small piece of buccal or labial cortical plate that comes away with the tooth. This is usually not serious and can be smoothed with a bone file if sharp edges remain. The wound is sutured and the patient reassured (Hupp et al., 2019).

Maxillary tuberosity fracture is a more significant complication that can occur during upper molar extraction, particularly in elderly patients where the tuberosity may be hollow (pneumatised by the maxillary sinus). If during an upper molar extraction you notice that a large block of bone is moving with the tooth, stop immediately. Do not continue delivering the tooth if this means pulling away a large tuberosity fragment — this can result in a sizeable oro-antral communication that is very difficult to close. The correct action is to splint the fragment back in place, suture the wound, and refer urgently to an oral and maxillofacial surgery unit (Fragiskos, 2007; Peterson et al., 2003).

Soft Tissue Injuries

Lacerations of the gingiva, lip, cheek, or tongue most often result from a sudden, uncontrolled slip of the forceps when the tooth delivers unexpectedly, or from the patient moving during the procedure. They can also occur from imprecise forceps placement or failure to adequately retract soft tissues before beginning extraction. Minor gingival lacerations heal well by themselves and usually do not need suturing. More significant lacerations involving the alveolar mucosa or buccal sulcus should be approximated with resorbable sutures (Meechan, 2006).

A more serious soft tissue complication is the accidental displacement of a tooth or root fragment into an adjacent anatomical space — most commonly the maxillary sinus, infratemporal fossa, or submandibular space. If a root tip disappears and cannot be located, do not probe blindly. Take a radiograph or CBCT to locate it, and refer to a specialist for retrieval under controlled conditions. Document the incident fully and inform the patient (Bouloux et al., 2007).

Summary Box 2: Soft Tissue Injuries — What to Watch For

- Use a finger guard technique during delivery to control sudden movement of the forceps.
- Always retract soft tissues adequately before applying forceps beaks.
- Minor gingival tears — reassure, no suture needed; deeper lacerations — suture with resorbable material.
- Missing root tip — take a radiograph immediately; never probe blindly.
- Document all soft tissue injuries in the case notes, regardless of severity.

Oro-Antral Communication

Oro-antral communication (OAC) is an opening between the mouth and the maxillary sinus that can occur during extraction of upper back teeth — most commonly the upper first and second molars — when the sinus floor lies close to or between the tooth roots. It is one of the most important complications to know how to identify and manage (Fragiskos, 2007; Hupp et al., 2019).

To test for OAC, use the Valsalva test: ask the patient to pinch their nose and gently blow. If air or fluid bubbles through the empty socket, you have an OAC. Small communications under 2 mm may close on their own if the blood clot is left undisturbed. Medium-sized openings between 2 and 6 mm require a buccal advancement flap or palatal rotation flap for closure. Large openings over 6 mm must be referred urgently for specialist surgical repair (Peterson et al., 2003).

All patients with an OAC must be given antral precautions: no nose blowing for two weeks, sneeze with the mouth open, no drinking through a straw, and avoid blowing up balloons or musical instruments. A one-week course of antibiotics with antral coverage (amoxicillin or co-amoxiclav) and a nasal decongestant are also prescribed. If left untreated, an OAC can become a chronic oro-antral fistula requiring significantly more complex surgical management (Fragiskos, 2007).

Summary Box 3: Oro-Antral Communication - Immediate Action Steps

- Suspect OAC after any upper molar or premolar extraction — do the Valsalva test routinely.
- Confirm with: air/fluid in socket on Valsalva, patient reports nasal sensation of fluid.
- <2 mm: preserve clot, suture, give antral precautions, review in one week.
- 2–6 mm: buccal advancement flap closure + antibiotics + decongestants.
- >6 mm or any doubt: refer urgently to oral and maxillofacial surgery today.
- Never discharge a patient with a confirmed or suspected OAC without follow-up arranged.

Post-Extraction Haemorrhage

Some bleeding after extraction is completely normal and should stop within 20–30 minutes with gentle biting on a gauze pack. Haemorrhage becomes a complication when bleeding is excessive, prolonged, or restarts after an initial period of control. It is classified as primary (at the time of extraction), reactionary (within the first few hours as the vasoconstrictive effect of local anaesthetic wears off), or secondary (5–7 days later, usually due to infection at the wound site) (Hupp et al., 2019).

The most important step in managing post-extraction haemorrhage is to stay calm, remove the clot from the socket, identify the source of bleeding, and apply targeted local pressure. Pack the socket with a haemostatic agent such as oxidised cellulose (Surgicel) or a resorbable gelatin sponge, and ask the patient to bite firmly on a fresh gauze for 20–30 minutes. If bleeding persists despite these measures, investigate for a systemic cause — particularly anticoagulant or antiplatelet medication, undiagnosed bleeding disorder, or active infection at the wound site (Hupp et al., 2019; Peterson et al., 2003).

Before any extraction, always ask about medications — particularly warfarin, aspirin, clopidogrel, rivaroxaban, and apixaban. For patients on warfarin, check the INR within 72 hours pre-operatively. Current guidelines support continuing anticoagulation for routine extractions provided the INR is within the therapeutic range and local haemostatic measures are employed post-operatively.

Summary Box 4: Managing Post-Extraction Bleeding — Step by Step

- Step 1: Stay calm. Reassure the patient. Sit them upright.
- Step 2: Remove the old clot from the socket and identify the bleeding point.
- Step 3: Place haemostatic agent (Surgicel / gelatin sponge) in the socket.
- Step 4: Ask patient to bite firmly on gauze for 20–30 minutes — no peeking.
- Step 5: If still bleeding - suture the socket edges together and re-apply pressure.
- Step 6: If bleeding does not stop - refer to hospital; suspect systemic cause.
- Always ask about anticoagulants BEFORE you extract.

Alveolar Osteitis (Dry Socket)

Alveolar osteitis — commonly known as dry socket — is the most frequently encountered delayed complication of tooth extraction. It occurs when the blood clot that forms in the socket after extraction breaks down prematurely, leaving bare bone exposed to the oral environment. The result is intense, unrelenting throbbing pain that starts on the second to fourth post-operative day and radiates up to the ear or temple. The pain is characteristically not relieved by standard analgesics, and the socket on inspection appears empty, grey, or with exposed bone rather than the expected dark blood clot (Chuang et al., 2007; Oginni, 2008).

The incidence of dry socket ranges from 1 to 5% for routine extractions but rises dramatically to up to 30% for mandibular third molar removal. Established risk factors include cigarette smoking — the single most modifiable risk factor — oral contraceptive use, traumatic extraction, pre-existing periapical infection, poor oral hygiene, and a previous history of dry socket. Advising patients to stop smoking for at least 48 hours before and after extraction is one of the most effective preventive measures available (Chuang et al., 2007; Oginni, 2008).

Management is symptomatic: gently irrigate the socket with warm saline to clear food debris, then pack the socket with an obtundent dressing — Alvogyl is the most widely used, containing butamben, iodoform, and eugenol. The dressing is replaced every 2–5 days as needed. Systemic antibiotics are not indicated unless there are signs of secondary infection. Reassure the patient that the condition resolves by itself within 10–14 days as healing occurs by secondary intention (Oginni, 2008).

Nerve Injury

Injury to the inferior alveolar nerve (IAN) or lingual nerve during forceps extraction is an uncommon but potentially distressing complication. IAN damage results in altered sensation — numbness, tingling, or a pins-and-needles feeling — affecting the lower lip, chin, and front teeth on the affected side. Lingual nerve damage affects the tongue, the floor of the mouth, and the lingual gingiva on that side. While nerve injury is far more common with surgical removal of impacted lower wisdom teeth, it can also follow forceps extraction of lower posterior teeth, especially when roots curve around or lie very close to the inferior alveolar canal (Renton & Yilmaz, 2011; Ziccardi & Zuniga, 2007).

Most nerve injuries following routine extraction are mild (neuropraxia) and recover completely within 6–8 weeks without any specific treatment beyond patient reassurance and monitoring. More significant injuries (axonotmesis) may take several months to resolve. If altered sensation has not improved at all by 8–12 weeks, the patient should be referred to an oral and maxillofacial surgery specialist for further assessment and management. Document the presence and distribution of any sensory change at the post-operative review visit and at every subsequent follow-up (Renton & Yilmaz, 2011).

Summary Box 5: Nerve Injury — What Every Intern Must Know

- Ask about sensation at every post-op review — patients may not volunteer numbness.
- IAN injury: numbness/tingling of lower lip, chin, and anterior teeth on the same side.
- Lingual nerve injury: altered taste or sensation of tongue and floor of mouth.
- Most mild injuries resolve on their own within 6–8 weeks — reassure the patient.
- No improvement by 8–12 weeks: refer to oral and maxillofacial surgery specialist.
- Document any sensory change in the patient's notes at every visit.

Conclusion

Forceps extraction, despite being a routine dental procedure, carries a real and well-documented risk of complications. For the dental intern, understanding these complications is not a theoretical exercise — it is an essential practical skill that directly impacts patient safety and clinical outcomes. The complications discussed in this review range from minor and self-limiting to serious and potentially life-altering, but the great majority are either preventable with proper technique or manageable with prompt, informed action.

The most important habits to develop as an early-stage clinician are: always taking a pre-operative radiograph and reading it carefully; identifying and documenting risk factors before you begin; using the correct forceps with controlled, anatomy-guided force; and staying calm when something unexpected happens. If you encounter a complication that is beyond your current level of training, seeking help promptly is not a sign of weakness — it is the mark of a responsible clinician.

Most importantly, talk to your patients. Explain what happened, what you are doing about it, and what to expect. A

well-informed patient who understands their situation is far less anxious, more compliant with post-operative care, and more trusting of their dentist — even when things do not go exactly to plan.

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