Avoiding common problems in tooth extractions

By Dr Kamis Gaballah, UAE

The last two decades have seen significant advances in restorative techniques and materials for dentistry. The latter, along with community-based preventive measures that aim to reduce the incidence of caries, have resulted in many patients living with functional teeth for a longer period. Yet, extraction of teeth forms the considerable bulk of the workload in oral surgeries owing to several factors, including the late presentation of patients with advanced dental disease, the presence of symptomatic impacted teeth, such as third molars, and the need to extract teeth for orthodontic or orthognathic treatment.

The extraction of teeth varies greatly based on the type of patient who is undergoing the procedure. For example, elderly patients with significant co-morbidities and on a complex combination of medications as compared with young healthy individuals render the procedure complicated and require much more preparation with modifications during and after patient management. Additionally, extractions can range from a single, fully erupted tooth with favourable morphology to multiple misaligned, impacted teeth or teeth with challenging morphology. Local anatomy, such as tooth proximity to the nerve, maxillary sinus and tuberosity, also plays a significant role. These variations usually dictate who is to perform the extraction, as many general practitioners deal with less complicated cases of dental extraction in individuals regarded as healthy patients and may not feel comfortable operating on medically complex patients.

Complex extraction cases have been linked to a higher rate of post-operative complications, therefore, a cautious and systematic approach should be adopted that includes a detailed preoperative assessment to predict the potential difficulties that might arise during extraction. The documentation of all complicating risk factors along with their potential postoperative morbidities is crucial and should be included in the informed consent. In the following article, other useful tips will be provided that are not usually included in traditional textbooks or lecture notes to help general practitioners to perform safer extractions.

During clinical examination, it has been proven useful to observe the patient’s build. Tall and muscular individuals tend to have a long ramus with a higher mandibular foramen, and thus increases the possibility of failure of the inferior dental nerve block procedure if the former is not taken into account when determining the height of the injection site. This can be aided by tracing the inferior dental canal (IDC) to the mandibular foramen in the preoperative panoramic radiograph. The teeth of such individuals may also have longer and more curved roots and be embedded in highly dense, compact alveolar bone, and thus sectioning of the teeth may be required to ease the resistance. Racial differences should also be taken into account as extractions of teeth from individuals of Afro-Caribbean descent tend to be more challenging owing to the hardness of their bone and divergence of roots in their molars.

The resistance of hard tissue should be expected, particularly if maxillary second and third molars are being extracted, as the potential for fracture of both the buccal plate and the tuberosity is relatively common when excessive force is applied with dental forceps. Fracture of the tuberosity may produce irregular sharp bony boundaries, significant soft tissue laceration and potentially an orofacial fissure. If such risk factors are identified, dental nerve (IDN) is a well-known complication of surgical extraction of deeply impacted LM3. It should be acknowledged that this is not simply a loss of sensation; the damaged nerve can be responsible for a number of abnormal sensations, such as pain and abnormal response to stimuli, such as the perception of a light touch as a sharp stab. This can have a significant impact on quality of life for many patients.

Injury to the IDN may occur from compression of the nerve, either indirectly by forces transmitted by the root and surrounding bone during elevation or directly by surgical instruments, such as elevators. The nerve may also become transected by rotary instruments or during extraction of a tooth whose roots are notched or perforated by the IDN. The risk factors for IDN injury during extraction of LM3 are shown in Table 1.

Preoperative radiographic investigations may include intraoral images, such as occlusal radiographs, panoramic views of the jaws, and conventional CT or CBCT scans. It should be noted that risk-predicting signs in radiographs only indicate that there is an increased risk of nerve damage associated with the extraction of the corresponding third molar. However, they cannot actually prevent the nerve injury if the tooth is to be extracted. The effective strategies that may avoid or minimise the overall risk factors for IDN injury Radiographic signs of increased risk of IDN injury

<table>
<thead>
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<th>Full bony impactions</th>
<th>Apices of the LM3 located inferior to the lower border of the IDC</th>
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<td>Horizontal impactions</td>
<td>Darkening of the root</td>
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<td>Use of burrs for extraction</td>
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<td>Radiographic risk markers</td>
<td>Interruption and loss of the white line representing the IDC</td>
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<td>Excessive bleeding into the socket during surgery</td>
<td>Abrupt narrowing of one or both of the white lines</td>
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Table 1: Risk factors for IDN injury during LM3 extraction.

The indications for the extraction of impacted lower third molars (LM3) have been the subject of long-standing debate. Surgical procedures for the extraction of unerupted LM3 are associated with significant morbidity. This includes pain, swelling and the possibility of temporary or permanent nerve damage, resulting in altered sensation of the lip, chin, gingiva or tongue. Damage to the inferior dental nerve owing to the nerve block procedure. This injury may be related to the pharmacological properties of the agent itself or the injection technique. Studies have shown that the lingual nerve is affected approximately twice as often as the IDN, and one reason for this may be the fleshy pattern in the region where the injection is given. It also appears that about half of patients feel an electric shock sensation during injection.

There is a higher incidence of reports of nerve injury after the use of articaine and prilocaine. Although the reason for this remains unknown, it has been suggested that this may be because they are 4 % solutions, whereas the other commonly used local anesthetics have lower concentrations. Others associate the damage with the neurotoxicity potential of 4 % articaine and 3–4 % prilocaine. Hence, it is recommended that the use of such anesthetics be limited to local infiltration. It has been claimed that needle contact with a nerve felt by the patient as an electric shock is related to injection injury. An obvious explanation is that the possibility of mechanical injury to the nerve is more likely in the case of multiple repeated attempts at the inferior dental nerve block procedure. Therefore, it is crucial that the operator achieve optimal control with minimal episodes of injection with minimal doses of anesthetic agent.

The surgery should be planned according to the information obtained from the preoperative assessment process. The procedure itself should aim to minimise the manipulation around the IDC. Both should include the carefully planned, properly constructed and elevation techniques. In many scenarios, the extraction of the
as the amount of bone removal re-
quired is minimal, thus minimis-
ing the postoperative morbidity.
However, it cannot be performed in all cases in which the LMs is close

to the IDC and is certainly contra-
indicated when the LMs is decayed or its roots are associated with a pathology and should be con-
bidered with caution in severely inclined mesio-angular and hori-
zontal impaction cases. The author
does not recommend distal bone
removal or retraction of the lingual
flap with the intention of protect-
ing the lingual nerve, as these may
increase the risk of damaging the
lingual nerve. It should be empha-
sised that incision may not extend
beyond the distobuccal aspect of the
tooth.

The other important aspect of
the dental extraction procedure is
the future replacement of the
tooth to be extracted. The current
trend of tooth replacement for
both functional and aesthetic rea-
sons is the placement of dental
implants. The success of this treat-
ment largely depends on the avail-
ability of healthy bone in sufficient
volume. Therefore, it is crucial for
the dental practitioner not to com-
promise the alveolar bone during
extraction of the teeth. Changes in
the alveolar bone ridge after an
extraction are inevitable. After all
dental extractions, bone height
and width always undergo dimen-
sional changes. Bone does not
regenerate above the level of the
alveolar crest, that is, its height
will not increase during healing.
The buccal plate tends to shrink,
shifting the crest of the alveolar
bone lingually, and often forms
a concavity. Such changes are pro-
portional to the amount of trauma
to the soft and hard tissue during
the extraction.

An additional unfavourable
change that may take place is the
slow remodelling of the bone
formed to fill up the extraction
socket owing to lack of functional
stimulation. The presence of poorly
remodelled alveolar bone may com-
promise the stability and function of the future implant.
Furthermore, studies show that
the stripping and elevation of
mucoperiosteal tissue produce a
higher number of osteoclasts with-
in the alveolar ridge and hence
greater resorption and shrink-
age are seen after the classical surgical
or traumatic extraction of teeth.

The preservation of alveolar
bone for future implant placement may be achieved by avoiding
unnecessary bone removal and
stripping of the periodontium
during surgery, as well as perform-
ing a surgical alveolar bone preser-
vation procedure. Bone removal can
be largely avoided through modific-
ations of the tradi-
tional extraction technique.
The first such modification is
the use of dental periosteums and
luxatomes to gently strip the peri-
odental ligament fibres and widen
the socket without causing cracks
or fracture of the cortical plates,
as commonly encountered when
using dental forceps or the bulky
elevators. The use of such gentle
instruments also eliminates the
need for elevation of mucoperi-
osteal tissue. However, it should be
noted that the safe use of these in-
struments requires adequate train-
ing and should be encouraged during
undergraduate clinics. Clot stabil-
ization through light packing of the
socket with collagen sponges may
help to minimise clot dislodgement,
as well as accelerate the healing
process and bone regeneration.

The second strategy is the alveo-
lar bone preservation procedure.
This includes packing the extrac-
tion socket with different fillers,
such as osteoinductive or osteo-
conductive materials, like auto-
genous, natural or synthetic bone
grafting materials that support
the alveolar socket walls, thus pre-
venting their collapse and shrink-
age. It should be noted that this
intervention can only slow down
the post-extraction changes to
improve the success of the dental
implant, but cannot stop them
altogether.

Finally, post-extraction care
should include an explanation
of the healing process and po-
tential symptoms encountered
after such procedures. The pre-
scription of medications should
be limited to non-steroidal anti-
flammatory drugs in most cases
and imprudent use of antibiotics
or socket dressing should be
avoided.

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