Maxillary Molar Surgery: A Buccal Approach To The Palatal Root

A review of 96 clinical cases

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While retreatment of endodontic therapy has received much attention in recent literature, and new instrument technology and improved optics have made way for greater success in retreating canals, there are still clinical situations that require another approach. It is not always possible for a patient to have his tooth disassembled, then re-assembled, not to mention the stress on the tooth structure itself of crown, core and post removal. When a clinician spends several hours over
Figures 2a-g

Figures 2a, 2b, 2c. Large lesion at palatal root apex. Incomplete obturation of canals on 2.6. Tooth 2.7 involved from the M.B. root apex. Instrumentation for retreatment of 2.6, conventional treatment of 2.7. Post-op after obturation and retrograde surgery, all completed at same appointment. Biopsy of lesion at palatal root reported “radicular cyst in acute exacerbation.”

Figures 2d, 2e. Overfill of all roots, post-core crown assembly in place. Surgical retroseal of all roots.

Figures 2f, 2g. Previous surgery with incorrect retrograde filling placement. Re-surgerization, incorporating all roots.


several appointments to treat the root canal system, it may be difficult for a patient to accept that it has to be done all over again. That is not to say that inadequately cleaned canals can be surgerized successfully - the basic endodontic principles must be adhered to. But when root canals are thoroughly cleaned and densely obturated, and an anatomic irregularity occurs in the apical few millimetres, the avenue of root-end surgery becomes clear (Figure 1). Studies have shown variations in the canal system of the palatal root, with the main canal exiting to a lateral surface 88.5 per cent of the time.¹

The roots of maxillary first molars (and many second molars) are often found in close approximation to the floor of the maxillary sinus or antrum. The divergence of the roots of these teeth sometimes allows the sinus cavity to extend downward toward the furcation. The consideration of this anatomic variation can often impact on the attempt, approach and successful completion of apical surgery on all roots.

While basic dental school training teaches to avoid the maxillary sinus as much as possible, many oral surgeons prefer the buccal approach to resecting the palatal root. This may require entering and performing root-end procedures through, under or at the floor of the maxillary antrum. The following is a discussion of this surgical approach and a review of 96 clinical cases.

**Preoperative Assessment**

When the factors of the patient’s health, the periodontal status, the obturation of the canals (conventionally) and extent of prosthetic restoration of the particular molar in question have been assessed, and
the decision has been made to surg-
erize this tooth, the clinician should
determine if the palatal root is part
of the problem (apical lesion), if it
can be reached, and then if it
should be included in the root-end
procedures (Figure 2).

Preoperative clinical and radi-
ographic evaluation can be helpful
in determining the depth of the
palatal root from the buccal cortical
plate, and the degree of divergence
between buccal and palatal roots.

Two, and even three periapical films — parallel, mesial-
angled, and distal-angled — can display, by the buccal
object rule, the amount of “displacement” of the palatal
root by comparison of films. It has been suggested that
a parallel, mesial-angled, and more-mesial-angled series
of films should be employed. In many cases, where
there is an edentulous span mesial to the molar, the
clinician can utilize a mesial-buccal approach for root
access.

Utilizing periapical radiographs to assess the floor of
the maxillary sinus can be misleading. Unless all roots
are well beneath the sinus floor, with three to four mil-
limetres of maxillary bone to spare, then it should be
assumed that the sinus will be encountered during the
surgical procedure. More discussion of this will follow
in the approach to the roots.

Clinically, by placing the forefinger on the buccal
plate, and the thumb on the palatal plate of bone at the
level of the apices, an estimate of divergence (thickness
between the cortical plates) can be made. Generally, a
high palatal vault correlates to more vertical and less
divergent roots. Likewise, a shallow, broadened palatal
vault may indicate a wide divergence between buccal
and palatal roots. If a flat palatal vault exists, and the
clinical situation reveals a fistula on the palate tracing to
the palatal root, then a conventional palatal flap
approach may be more prudent as the pathology has
already displayed the location of that root.

THE “APPROACH”
All basic endodontic surgical principles apply, but a few
modifications can be made to allow easier access to the
deeper palatal root. First, full sulcular flap design can
be altered to have a releasing vertical incision two teeth
mesial to the operative tooth, or to have an exaggerated
diagonal releasing incision one tooth mesial — both
will allow for easier retraction and less muscle pull.
Second, the identification of the buccal root apices by
cutting of bone should be started more superior, to
assess the full length of the roots, and to leave as much
crestal bone intact as possible over the buccal roots.
The bony access or window over the mesio-buccal and
disto-buccal should be one confluent opening, as all
procedures for the palatal root preparation and ret-
roseal will be completed through this opening.
The terms "trans-antral" and "trans-sinus" have been labelled to this approach, but it can really be subdivided into three categories:

**i. Sub-sinus approach:** All roots of the molar are inferior to the floor of the maxillary sinus. Even after bone crypts are prepared, and roots are bevelled, there is no communication with the sinus. In effect, this becomes just a very deep root-end preparation.

**ii. Sub-membrane approach:** All roots of the molar are inferior to the bony floor of the maxillary sinus, but the Schneiderian membrane (sinus cavity lining) is revealed and not violated in crossing from the buccal root to the palatal root. If the lining can be kept intact, it will help to control and stop sinus fluid from entering the bony crypt of the palatal root preparation (Figure 3).

**iii. Trans-sinus approach:** As the buccal roots are bevelled, the sinus membrane is immediately and unintentionally cut, revealing the large space of the maxillary sinus (Figure 4).

The third category is the most technically challenging. Once the sinus cavity is entered, the question of what to do next arises. If the buccal window of the entry is of sufficient size, and magnification, lighting and surgical suction are optimum, the sinus membrane can be slightly lifted off the floor so that the root prominence
of the palatal root can be identified as a rise in the bony floor of the sinus in that location (Figure 5). With an endodontic explorer, the sinus floor can be probed to identify this prominence. If there is pathology associated with the palatal apex, it will be readily identified by the explorer. As with any buccal root prominence, the superior extent of this “rise” will usually identify the apical portion of the root. The bevel procedure can start at that location.

All root-end procedures would follow as in any other root. Of the 96 cases reviewed over a five-year period, approximately half were carried out before ultrasonic retroreparation was utilized. Incorporating ultrasonics has made access and root-end preparation easier (Figure 6). Fluid control in the bony crypt can be handled in different ways. An E.N.T. iodoform gauze, that packs almost the entire sinus cavity, could be used. A 2” by 2” gauze square soaked in lidocaine 1/50 epi- nephrine could be custom cut and fit with a tail brought out to the buccal and held under the retractor (for retrieval). In most of the 96 cases reviewed here, no packing was utilized - just optimum surgical suction and careful material placement. As with most surgical procedures, the more often the procedure is carried out, the more comfortable the operator feels in the sinus cavity, thus the more efficient the surgery becomes.

**CLOSURE**

After retrofilling, all extraneous material is removed, any packing is retrieved, and a radiographic check is taken. The flap is then re-approximated and sutured closed.

When the sinus membrane and sinus cavity are exposed or perforated in the course of identifying and handling the palatal root, this does not appear to create post-surgical problems because the defect is sealed from the oral environment by proper closure of the flap. There is no evidence to suggest the need for antibiotic or antihista-mine therapy for the sinus exposure itself (antibiotics may be prescribed for periapical pathology) as the tooth is not being extracted and therefore no oral-antral fistula is created.

**POSTOPERATIVE EVENTS**

All aspects of the endodontic surgery are explained to the patient preoperatively. Special attention to the maxillary sinus is included to prepare the patient for what can be expected. During the procedure, in an open exposure of the sinus, the patient may experience a “post-nasal drip” sensation, where fluid and water spray may drain from the sinus, through the nose, and down the back of the throat. If this happens, and the patient is prepared, there is no panic, and the event may or may not be acknowledged afterwards. However, latent drainage may become apparent in the form of a nosebleed. This was noted in two out of 96 cases reviewed. This occurred in the form of some small amounts of dried blood on the pillow the next morning. Again, the patients were advised, prepared, and this proved to be a minor concern.

All other postsurgical events were explained and occurred within the normal range from a standpoint of swelling and discomfort. In three notable cases, the patients reported an immediate clearing of a chronically congested sinus on the operative side, and a sensation of deeper breathing and improved sense of smell.

**SUCCESS...AND FAILURE**

In reviewing the literature, success with periapical surgery has been reported to range from 25 per cent to 90 per cent encompassing many parameters, from the tooth, the materials, the patient pool and the operator pool. As stated by Selzer, “The use of the term adequate clinical function is more realistic and satisfies the need of the clinician, in as much as the retention of the tooth in function is the ultimate goal of endodontic therapy.”

Of the 96 cases reviewed, 85 teeth are still present and in function, giving an evaluation of 88.5 per cent for this small data pool with limited time frame. Some specific recall films are shown to illustrate apical bone growth over all roots (Figure 7).

The failures that could be retrieved were interesting...
from the standpoint of what was found at the time of extraction. The oral surgeons involved were asked to report back on the condition of the tooth and the socket. Even in cases where the operative tooth came out in many fragments, the sinus membrane was reported to have regenerated. Two clinical specimens are shown, illustrating vertical root cracks not detected at the time of surgery (Figure 8).

**DISCUSSION**

With recent clinical advancement in materials, ultrasonic instrumentation, magnification and illumination, endodontic root end surgery can encompass previously unattainable locations of roots, and unseen canal anatomy (such as the second mesio-buccal canal with the adjoining isthmus).

Surgery is not a panacea for failing endodontics due to missed canals, or poorly cleaned and obturated canals. Assessment for retreatment is still primary to surgical consideration, even if elaborate prosthetics must be removed. However, in situations where the conventional endodontics meets or surpasses the standard of care, and complex prosthetics is in place, surgical treatment of all roots of the concerned tooth can be incorporated.

As surgical endodontics moves towards routine use of the operating microscope, attaining these goals should become easier.

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**REFERENCES**


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**Editor’s Note:** This article was reprinted from the December, 1995 issue of Ontario Dentist due to the poor reproduction of radiographs. We apologize to Dr. Cohen for this incident.