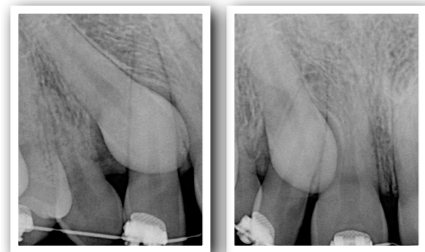


RADIOGRAPHIC INTERPRETATION

Determining the location of an impacted tooth is very important in achieving the least invasive and most predictable means of tooth exposure. Two main types of radiographs are available: CT Scan or Periapical film.

A CT scan can provide precise information on the three-dimensional location of a tooth. This is particularly useful in more complicated impactions where adjacent tooth roots are in jeopardy of damage.

For the majority of cases, a pair of periapical films taken at slightly different angles will suffice. In this case, the SLOB rule applies: Same Lingual Opposite Buccal. This means that when comparing two films side by side, one being taken more anterior than the first, if the tooth appears to move in the same direction as the film (ie. the tooth moves anteriorly in relation to the adjacent teeth in the more anteriorly positioned film), then the tooth is located lingually. Conversely, if the tooth moves in the opposite direction from the film (ie. the tooth moves distally in relation to the adjacent teeth in the more anteriorly positioned film), then the tooth is located buccally. The radiographs below demonstrate the canine is positioned lingually: the mesial contact of the canine in



the first image moves mesially relative to the root of the central incisor in the more mesially taken second image. The tooth moves in the same direction as the film, it is lingual.

TOOTH IMPACTION: CAUSES AND TYPES

Teeth may remain impacted in the mouth for reasons primarily dictated by genetics. The teeth most likely to be impacted in order of predilection are mandibular third molars, followed by maxillary canines. Besides the esthetic problem when a tooth is not present, there are form and functional issues as well. The lack of normal eruption of teeth leads to deformities in the alveolus, and poor eruption position of the adjacent teeth. This can lead to significant malocclusion or TMJ problems.

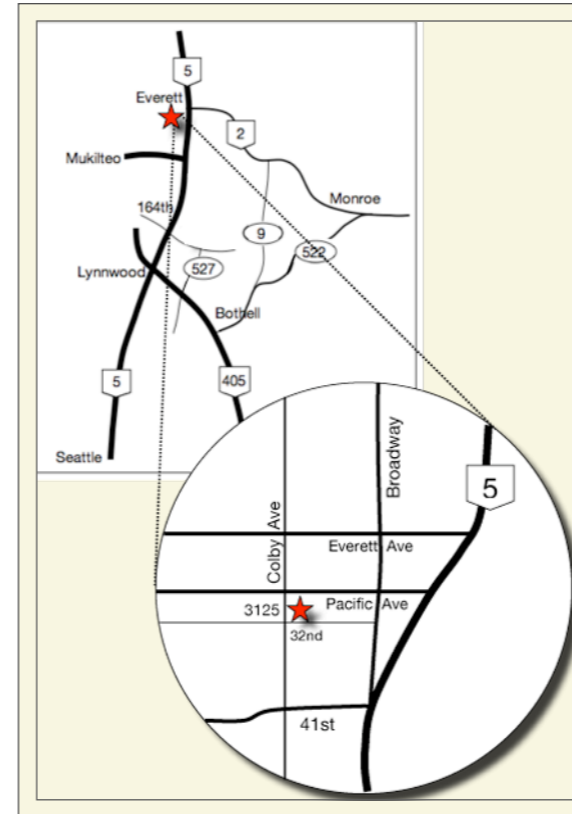
When a tooth is not erupting in the expected time frame, a decision needs to be made if the tooth can be utilized or not. Sometimes it is apparent quite early in development that the position of the developing tooth is so far from its normal eruption path, that it is not worth the time or the effort, particularly due to significant risk to adjacent teeth, to attempt to uncover and move the tooth into an appropriate site in the arch. If a tooth can be uncovered and orthodontically moved into the correct position, the way in which the tooth is uncovered becomes important in attempting to achieve the best long term esthetic and hygienic outcomes. In addition, the technique for moving the tooth into the arch will ensure a healthy tooth root and healthy adjacent teeth.

This issue of **ProbeTips** will review an orthodontic case requiring the uncovering of a mandibular impacted canine, and the precautions taken periodontally and orthodontically that made this case successful. It is the first in a series of cases highlighted as a 'Case of the Quarter'. This patient was treated by Dr. Pamela Nicoara and Dr. Graham Jones (orthodontist in Monroe/Redmond).

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PROBE TIPS

A QUARTERLY PERIODONTAL
NEWSLETTER

BY PAMELA NICOARA DDS MSD

Case of the Quarter:



No 1. Canine Uncovering

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Case of the Quarter: Facially Impacted Mandibular Canine

FACIALLY IMPACTED CANINES

There are three methods for uncovering facially impacted canines, depending on the location of the tooth relative to the mucogingival junction (MGJ), the anticipated amount of bone that needs to be removed, and the amount of keratinized tissue that is present. Although these techniques are not fool-proof, choosing the correct method of exposure hopefully reduces the need for gingival grafting post-orthodontic treatment.

If the tooth is near the crest of the ridge, and there is sufficient keratinized tissue to leave 3mm after surgery, a *punch technique* may be used to allow bonding of a chain to the tooth. This technique is rarely used because of the general lack of keratinized tissue in areas where teeth are un-erupted, and the need to lay a flap to visualize and remove bone to allow the entire crown of the tooth up to the CEJ to be free of bone as an impediment.

If the tooth is moderately deep and there is enough keratinized tissue present, a portion of the gingiva can be moved apical to the tooth with an *apically positioned flap*. The hope is that the newly located keratinized tissue will remain after the tooth has been pulled into the arch. This technique, however, does carry increased risk of recession and re-intrusion of teeth, as well as scar formation and unusual appearing tissue depending on patient healing.

Finally, if there would be less than 3mm of keratinized tissue remaining with a punch technique, or the tooth is positioned very far apically (>5mm) to the MGJ, then a *closed flap procedure* is recommended. This allows temporary exposure of the tooth in order to remove bone to the CEJ and bond a chain to the tooth, then the flap is closed back over the tooth. It is believed that this technique carries the least risk esthetically with regard to scar

Closed Eruption Technique



tissue formation, leaving a lack of keratinized tissue, and re-intrusion. This technique was used to treat our 'Case of the Quarter.'

ORTHODONTIC EXTRUSION

Orthodontic extrusion is the controlled occlusal movement of a tooth, usually 1mm per month. It results not only in displacement of the tooth, but of the supporting periodontal structures as well. The free gingiva follows the tooth by 90%, and the attached gingiva by 80%. To prevent this, extrusion can be done rapidly (1mm per week), but would also require circumferential fiberotomy every two weeks during extrusion and a longer retention period (3 months or more). Faster or greater force than this may cause root resorption and/or rarely ankylosis. Extrusion can produce interproximal papilla more predictably than periodontal regeneration, and it may also correct periodontal pockets. Occasionally, however, clinical crown lengthening may be necessary at the end of extrusion to idealize gingival margins and underlying bone, or add keratinized tissue if there is too little of it.

ORTHODONTIC CONSIDERATIONS

For this particular case, special precautions were taken to ensure the health of the lateral incisor as well as the canine as they were moved into the correct position. Such precautions included:

1. Avoid engaging the most at-risk tooth on the arch wire until after the impacted tooth has been moved a safe distance away from the neighboring roots. This helps to prevent unnecessary contact of the impacted tooth and adjacent roots during traction. You may notice that the disengaged teeth drift and tip as the impacted tooth moves past it, but this can be recovered at a later time. To prevent excessive drift, the disengaged tooth can be lightly ligated to adjacent, engaged teeth with a steel tie. In this case we used a lingual arch to provide distal movement of the impacted canine prior to bonding the remaining teeth.

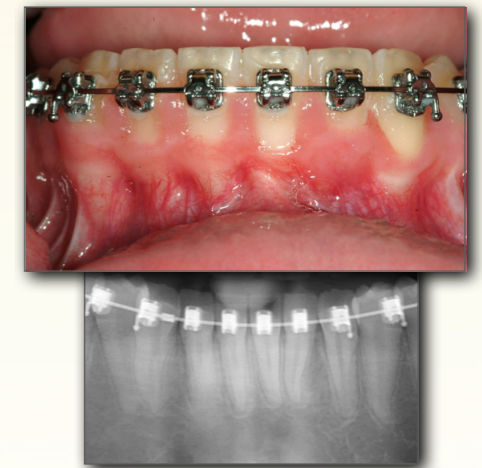
When the impacted canine had been erupted and moved distal to the adjacent lateral, appliances were placed on all lower teeth.

2. Create sufficient space for the impacted tooth prior to engaging it on the arch wire. This is particularly true here as the crown of #22 has been tipped and is buccally displaced. Prematurely



engaging such a tooth on a light, round arch wire can result in the crown tipping into alignment, but can also cause uncontrolled tipping of the root out of the buccal cortical plate. This situation can lead to recession and bone loss.

Finally, it should be expected that the roots of the impacted tooth and adjacent teeth will be malpositioned, even after their crowns are aligned. Additional time should be budgeted and orthodontic mechanics designed to provide appropriate root uprighting, both mesial-distally and buccal-lingually in order to maximize esthetics, stability, and periodontal attachment.



In this case, because of a thin gingival biotype, gingival grafting is likely necessary on tooth #24, and may still be necessary on tooth #22 in the future despite the ideal outcome.

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complete references available upon request