Lower third molar rotations: influence on surgery and a radiographic audit to assess incidence

By Stephanie Sammut

Plain and tomographic radiographs are often used to classify ectopic third molars, usually focusing on the depth and angulation of the teeth in the para-sagittal plane. Assessment of rotations of the third molar in its long axis and degree of tilting in the coronal plane tend to receive less attention.

The use of 3-D CT imaging may be justifiable in some cases where plain films may not significantly add to the information available from plain films. It is suggested that an appreciation of torsion rotations of third molars can influence the surgical technique to minimise surgical trauma and postoperative sequelae and that this information can be gleaned from routine preoperative films.

Clinical relevance statement
Concerning lower third molars with a rotation, care must be taken when determining line of section during surgical removal to minimise surgical trauma.

Objectives statement
The reader should understand the radiographic features which suggest rotation of the lower third molar in the long axis and the implications such rotations may have on the surgical management/removal.

Introduction
The most commonly performed procedure in oral and maxillofacial surgery is the surgical extraction of impacted wisdom teeth. It is customary to classify teeth according to radiographic and clinical findings to predict the difficulty of surgical removal.

During the pre-operative radiographic assessment of lower third molars, contemporary textbooks have generally placed only little significance on the rotation of the tooth around its long axis. Geoffrey Howe does consider the rotation of third molars in his book1 but generally it is the angulation of the tooth in the sagittal plane, i.e. whether it is distoangular, mesioangular, vertical or horizontal and its depth within the jaw which are given pre-eminence.

The OPG is the most frequently used image in the diagnosis and treatment planning of impacted mandibular third molars. Three-dimensional CT images are not routinely available or required, but can be particularly useful in demonstrating the nature of an intimate relationship between the tooth and the inferior dental canal. In considering the buccolingual inclinations, the use of a further plain radiograph has also been described, for example, the occlusal view.2

Two radiographic features were considered to give an indication of the rotation of a tooth around its long axis. These features were 1) the image of the outline of the cusps and 2) the image of the root anatomy. Both of these may be demonstrated in

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References
2. Gallagher A, Sowinski J et al. The effect of brushing time and dentifrice on dental plaque removal in vivo. [Accepted for publication in J Mel].

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Fig. 1. Radiographic images of an extracted lower third molar as it is rotated from a) a normal buccolingual alignment, b) 45 degrees, and c) 90 degrees.

panoramic as well as intra-oral plain radiography and when considered together can give a strong indication of the presence and degree of a tooth rotation.

Figure 1 demonstrates the differing radiographic images of an extracted lower third molar as it is rotated through 45 degrees and 90 degrees.

Cuspal image:
The superimposition of the cusps, into two well defined peaks, implies that there is no rotation along the long axis of the tooth (Fig. 1a) or that there is a 90-degree rotation (Fig. 1c). The latter is suspected by the differ- ing convexity of the buccal and lingual surfaces of the crown. A cuspal image with three or more poorly defined cusps indicates a rotation of nearer 45 degrees (Fig. 1b).

Root image:
The image of two clearly defined roots with separate canals implies that there is no rotation (Fig. 1a). An octopus-like image caused by superimposition of the root and pulp chambers (Fig. 2) indicates a degree of rotation along the long axis of the tooth of nearer 45 degrees (see also Fig. 1b). The root form image of a 90-degree rotated tooth (see Fig. 1c), may give the impression that the tooth will be easily elevated but this may not necessarily be the case.

Once any or both of these features are identified on a pre-operative radiograph, a modification to the surgical approach should be considered, with regard to which plane the tooth may optimally be sectioned if root division is indicated.

Incidence of third molar rotations
A consecutive prospective study of radiographs of patients awaiting surgical removal of lower third molars was carried out at the Edinburgh Dental Institute. One hundred orthopan- to-grams were assessed paying particular attention to the two radiographic fea- tures suggestive of rotation of the lower third molars around the long axis. Five per cent of these patients were seen to have radiographic features indicating a degree of torsion rotation of the tooth in the long axis.

Case 1
The radiograph shown in Figure 5 is of a 37-year-old fe- male who was referred for the extraction of her lower right wisdom tooth following recurrent episodes of pericoronitis. The cuspal image had three peaks and the root image was ill-de- fined and therefore a 45-degree rotation was suspected. This diag- nosis only really has signifi- cance if a longitudinal section to divide roots is indicated.

At operation the tooth was found to be rotated and there- fore prior to sectioning it would be necessary to assess the de- gree and direction (clockwise or anticlockwise) of rotation of the tooth around the long axis to establish the correct line of sec- tioning (see Fig. 4). If the tooth were not rotated, sectioning in a conventional buccolingual di- rection would separate the mesial and distal roots and fa- cilitate extraction. Such root di- vision would not occur if the same plane of section were used in a rotated tooth.

Fig. 3: The tooth in Fig. 5 as seen at operation. A 45-degree rotated tooth will need to be assessed for clockwise or anti-clockwise rotation. This tooth having a rotated cusp or root will most effectively be sectioned along the Green line which represents a buccolingual section of the tooth.

Conclusion
The incidence of rotations around the long axis of lower third molars requiring removal may be as high as five per cent. The diag- nosis of such rotations can be pre- dicted from observations of the preoperative radiograph and may influence the surgical technique. This can save time and minimise surgical trauma and post-opera- tive sequelae.

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References

Fig. 4: The tooth in Fig. 3 as seen at operation. A 45-degree rotated tooth will need to be assessed for clockwise or anti-clockwise rotation. This tooth having a rotated cusp or root will most effectively be sectioned along the Green line which represents a buccolingual section of the tooth.

Fig. 5: Radiographic image of 48 suggests a 90-degree rotation. The smaller cuspal image is nearly in association with what appears to be a conical root suggesting the buccal aspect of the tooth is distally positioned. A para- sagittal section is indicated in the event of a failure to easily elevate. Note the ID canal.

Fig. 1. Preoperative OPG of a 35-year-old female. Indistinct crown and root image suggestive of a 45-degree rotation.

Fig. 2. The radiograph of the lower third molar demonstrates an indistinct multiple cuspal image of the crown with almost an octopus like root structure. A 45-degree rota- tion is suspected.