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Plain radiographs for the assessment of coronectomy: not always a case of black or white

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Abstract

In recent years, coronectomy of impacted lower third molar teeth has become an increasingly popular alternative to removal. Traditionally, orthopantomograms of mandibular third molars have been used to indicate features that show that the tooth is in close proximity to, or in an intimate relation with, the inferior dental nerve. Some authors advocate coronectomy as opposed to surgical removal to reduce the risk of damage to the nerve. In our Trust during the last two years, there has been a noticeable increase in the prescription of coronectomy for the management of pericoronitis associated with mandibular third molars. The purpose of this study therefore was to examine the differences among clinicians in their assessment of the need for coronectomy using plain-view radiographs. An online survey was completed by 25 clinicians with different levels of experience from six units across the UK and Republic of Ireland. We found a wide variation in the number of coronectomies prescribed (intraclass correlation 2.67), and when prescribed, a lack of agreement about the radiographic feature that had influenced the decision. These judgments are not straightforward. They are, to some extent, subjective, and in certain cases may benefit from a team-led approach.

Keywords: Third molar; third molar surgery; coronectomy

Introduction

To reduce the risk of paraesthesia of the inferior dental (ID) nerve, coronectomy is an alternative to surgical removal of mandibular third molars in cases with a clear radiographic indication.[1–3] However, coronectomy itself is also associated with risks such as recurrent pain and infection, and can result in the need for early or late retrieval of the remaining portion of tooth.[4]

Since the Montgomery case in 2015, clinicians have a legal responsibility to take reasonable care to ensure that patients are aware of the material risks involved in any proposed treatment, and also of any reasonable alternative.[5] Coronectomy should therefore be discussed with patients during preoperative counselling in appropriately selected cases.[6]

An increase in the prescription of coronectomies in our Trust during the last two years has coincided with the appointment of some new junior members of the team. In a pilot study, 5 senior clinicians (all with over 10 years' experience in the regular assessment of third molars) each reviewed 77 plain radiographs of mandibular third molars for which coronectomies had been prescribed. A mean (range) of 15 (10–20) individual responses agreed with the prescription,

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Table 1
Results of online survey.

Group (years of experience)	No. of clinicians	No. of coronectomies prescribed by each participant	Mean (range)	Median	Intraclass correlation
0–3	5	18, 20, 23, 24, 31	23.2 (18–31)	23	0.295
4–6	6	20, 20, 26, 27, 38, 50	30.2 (20–50)	26.5	0.380
7–9	2	12, 14	13 (12–14)	13	0.510
10+	12	1, 2, 10, 12, 15, 15, 17, 17, 18, 18, 19, 22	13.8 (1–22)	16	0.242

with an intraclass correlation coefficient of 0.679 between clinicians.[7] We designed the current study to find out if the opinions of clinicians in other units in the UK and Ireland varied to a similar extent when asked to review the same 77 radiographs. We also investigated the effect of experience on the number of coronectomies prescribed.

Methods

The preoperative plain view digital radiographs of 77 patients listed for coronectomy of mandibular third molars in our Trust over a 5-year period were uploaded to an online survey. The orthopantomograms were sectioned to show the full tooth and its relation to the ID canal. Colleagues from oral surgery and oral and maxillofacial surgery in 6 units in the UK and the Republic of Ireland were invited to complete the survey.

They were asked to review each radiograph and to indicate whether they would or would not prescribe a coronectomy ("yes" or "no"). If they answered "yes" they had to choose from a drop-down list which radiographic indication had influenced their decision (diversion of the ID canal; darkening of the molar root; deflection of the root; narrowing of the ID canal; juxta-apical area; and interruption of the lamina dura of the ID canal).

Respondents were asked to record their clinical grade and their own experience (in years) in the regular assessment of mandibular third molars for surgical treatment. Results were collated in ranges of experience (0–3 years, 4–6 years, 7–9 years, and over 10 years), and the mean, median, and range for each group calculated. An intraclass correlation coefficient for each group was calculated by scoring a response of "yes" as one and a response of "no" as zero. Each variable was then compared among groups. Intraclass correlation was used because of the number of participants, but consideration was given to other statistical methods, for example, Cohen's kappa. All statistical analyses were done with the help of IBM SPSS Statistics for Windows version 25 (IBM Corp).

Results

A total of 25 clinicians completed the survey in full. Table 1 shows the number of coronectomies each respondent prescribed by years of experience.

The highest number of coronectomies prescribed overall was 50, and the lowest was one. None of the 77 radiographs was chosen by all the participants to indicate the need for coronectomy, but seven of the radiographs were chosen by none. When there was agreement about the need for coronectomy there was no agreement about the radiographic indication that had influenced the decision.

Discussion

The use of coronectomy, or intentional partial odontectomy, has been reported to reduce the risk of paraesthesia of the ID nerve after full removal of a mandibular third molar.[2,3] It is an excellent option in appropriately selected cases that have a clear radiographic indication,[1] and a systematic review in 2017 quoted an overall success rate of 93%.[8]

It is important to discuss the option of coronectomy with patients when a radiograph indicates a close relation to the ID canal and there are no contraindications. The material risks of all of the options should also be discussed.[6,9–12]

Our preliminary survey of senior clinicians in our department showed a marked variation, both in the number of coronectomies prescribed and which patients were thought to be suitable. The results of our current study show that this issue is not confined to our Trust. There was little agreement between the 25 clinicians who took part about the suitability of a case for coronectomy, and even a marked variation in the opinions of those with most experience. We found that those with less experience tended to prescribe coronectomy more often. In our view, such variations could lead to a number of problems.

First, a patient may not be offered a coronectomy if there is no clear indication, which means that their consent may be invalidated, as it does not comply with the judgment on Montgomery.[5] Secondly, a coronectomy may be inappropriately prescribed when a radiograph has suggested that the procedure is contraindicated, which could lead to postoperative problems and the need for a second procedure.

In units in which patients are pooled and the surgeon who has assessed and listed the patient is not the person who does the procedure, there can be disagreement regarding the treatment plan. This may lead to it being changed on the day of operation, which again invalidates the consent, as the patient has had no time to weigh up their options, and no "cooling off period". The potential alternative is that the procedure is cancelled, which is a poor experience for the patient, and a waste of resources.

We think that there are several reasons for the variations we observed. Clinicians with more experience are potentially more confident, having seen many more radiographs and removed more teeth. They may also have had more experience with complications after coronectomy, which may have made them less likely to consider it as a safe alternative to full extraction.

When the results of the two less experienced groups (those with 0–3 and 4–6 years' experience) were compared with those of the two most experienced groups (those with 7–9, and 10 or more years' experience), the ranges varied widely (18–50 and 1–22, respectively), showing that the clinicians in the latter group listed fewer coronectomies overall. However, inter-clinician agreement was not regarded as significant within all the groups. Both the two less experienced, and the two more experienced groups showed poor correlation between clinicians, which was exclusive of experience.

Another explanation could be the increase in the amount of teaching about coronectomy to both undergraduates and postgraduates and, over the last two decades, a greater emphasis on conservative approaches in the dental undergraduate curriculum.[12] Training for the start of clinical practice in a more litigious society[13] may mean that new graduates are more cautious in their assessment and, because they lack confidence, more easily influenced by patients who have researched the possible treatments.

There are drawbacks to our survey. Despite its aim being to look only at plain view radiographs, one could argue that cone-beam computed tomograms (CT) should be done of all third molars that are assessed for extraction or coronectomy. The same point, however, could be made about the indication for such a scan: it should be prescribed only when plain view films clearly indicate a need for this additional exposure to radiation.

A further drawback of the online survey was the inability to alter the contrast or lightness of the snapshot of the radiograph, which would be possible on most digital radiographic systems. This could have distorted the assessment of the tooth, and features that would have been obvious had it been possible to alter the picture, could have been missed. We do not consider this to be a major drawback, however, as all the clinicians saw the same images.

Our solution to the variation we have encountered has been to introduce a panel of five senior clinicians, the Coronectomy Discussion Group, which meets once a month to discuss all potential cases, and gives advice about full extraction, coronectomy, or cone-beam CT and further review. We decided that a panel of five would give a robust opinion from a medicolegal point of view and, in the case of absence, allow for a minimum of three to be present.

Over 6 months, 24 third molars have been discussed and only one coronectomy recommended, whereas in the 6 months before initiation of the group, 19 were listed. Two patients who were advised for cone-beam CT were subsequently listed for full extraction. Postoperatively, none of the 24 patients has had paraesthesia of the ID nerve.

In view of the marked variation in the prescription of coronectomy highlighted by our study, we encourage colleagues in other units to follow our model of a coronectomy discussion group. This team approach to treatment planning has vastly reduced the amount of variation. It has also improved the training of junior colleagues, and will possibly reduce the number of medicolegal cases.

Conflict of interest

We have no conflicts of interest.

Ethics statement/confirmation of patients' permission

Not required.

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