Orthodontic considerations in predicting and preventing third molar impactions: a review

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The prevalence of lower third molar impaction is 45% (Bjork 1956), and the possibility of predicting impaction of third molars has stimulated investigations from Henry & Morant (1936) to Tait & Williams (1978). The basis for such investigations is the measurement of the space available between the ascending ramus and the second permanent molar compared to the mesiodistal width of the third molar crown, called the space-width ratio. The measurements have been made on a variety of radiographs. As a result of their comparisons, Oliver & Basford (1981) concluded that the rotated tomograph (OPG) yielded the most accurate estimate of space-width ratio followed by the 60 degree rotated cephalogram.

Prediction of third molar impaction
From his concept of arcial growth of the mandible, Ricketts (1972) used serial longitudinal records to predict the amount of mandibular growth. This led to estimation of the amount of space for forward and upward development of the molars. For the third molar to have a 50% chance of erupting, 50% of the crown must lie ahead of the external ridge.

The measurement from the centre of the ascending ramus, Xi point as described by Ricketts (1972), to the distal of the second permanent molar, was used by Schulhof (1976) in computerized prediction of third molar impaction. As this length decreased below 25 mm impaction became more likely and, conversely, less likely as the length increased towards 30 mm. The standard error of 2.8 mm should ensure that any difference in severity of impaction between prediction and actuality is marginal. This prediction presupposes impaction being solely related to available space. All investigators list additional factors, notably the developmental angulation of the third molar crown. Tait & Williams (1978) relate this angulation to the overlying bony surface, Richardson (1975) to the available space. The latter demonstrated that an increase in angulation (40%) was almost as likely to occur as a reduction (46%), thereby reducing the possibility of predicting eruption.

Prevention of third molar impaction
The beneficial influence of previous extractions on third molar eruption has been noted by Richardson (1970). Williams (1976) compared the prevalence of third molar eruption in non-extraction cases with different lower arch extraction patterns. The percentage of successful third molar eruption was non-extraction 52.5%, lower first premolars 57.4%, lower second premolars 54.2% and lower first molars 90%. The 15% incidence of missing third molars (Bjork 1956) and the variability of their developmental time (Moorrees et al. 1963) complicate the planning of first molar extractions early enough to achieve satisfactory spontaneous tooth movements.

The removal of second permanent molars facilitates distal movement of the buccal segments and disimpacts third molars (Rix 1966). Investigators of the resulting occlusal

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changes following lower second molar extractions (Smith 1958, Cryer 1967) have shown good position of the third molars in approximately half of the cases. Careful case selection at crown formation stage of the third molars is required for a successful outcome. It is not appropriate in the late teens as an alternative to immediate extraction of third molars.

References

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