Extreme Distal Migration of the Mandibular Second Bicuspid

A variant of eruption

STEPHEN R. MATTESON, MEL L. KANTOR, AND WILLIAM R. PROFFIT

Dr. Matteson is Associate Professor and Head of the Section of Oral Radiology at the University of North Carolina School of Dentistry. He is a dental graduate (D.D.S.) of the University of Pennsylvania School of Dental Medicine.

Dr. Kantor is a general practice resident at the Hennepin County Medical Center, Minneapolis, Minnesota. He is a dental graduate (D.D.S.) of the University of North Carolina.

Dr. Proffit is Professor and Chairman of the Department of Orthodontics at the University of North Carolina. He is a dental graduate (D.D.S.) of the University of North Carolina and holds a Ph.D. degree from the Medical College of Virginia.

Address:
Dr. Stephen R. Matteson
Section of Oral Radiology
School of Dentistry
University of North Carolina
Chapel Hill, N.C. 27514

Evaluation of more than 25,000 panoramic radiographs shows that distal migration of an unerupted lower second bicuspid into a first molar extraction site occurs with sufficient frequency to require consideration of this possibility in cases of early molar loss.

The concept of mesial drift of posterior teeth is familiar to all dentists. Molars will usually drift mesially whenever the adjoining mesial tooth is lost. Since prevention of such drift is a major reason for space maintenance in children, mesial drift as a concept is especially emphasized in children's dentistry.

Where permanent molars are concerned, the concept is valid. Cuspids and bicuspids, however, tend to remain in the same location or drift distally when excess space is available. Despite this, it is still widely believed that mesial drift will occur wherever spaces are present in the arch. The concept of attritional occlusion,[1] with its emphasis on decrease in arch length as proximal wear occurs, has also contributed to this expectation.

Migration of teeth, especially distal migration, is not so widely known. *Migration* describes the movement of an unerupted tooth within the bone, while *drift* applies to tooth movement

following eruption. Extreme distal migration of mandibular second bicuspids is one example of that phenomenon. Such migration is particularly likely when a mandibular first molar is lost.

In some cases the second bicuspid migrates through the first molar extraction site to the mesial of the second molar and then rotates superiorly to erupt into occlusion. This was reported under the term "prämolarwanderung" by Abo[2] in 1942 and subsequently in a number of case reports,[2-16] primarily in the Japanese and English literature.

In 1968 Sutton[16] presented a summary of 62 previously published cases in which unerupted mandibular bicuspids had migrated from their normal developmental positions. In 58 of those 62 cases the tooth migrated in a distal direction. Sutton suggested that this might be due to the initial distal angulation of the bicuspid coupled with early loss of the first molar.

This is in agreement with Rose,[12] who found that the developing lower bicuspids are inclined distally much more frequently than mesially, and with Stafne[14] who indicated that a developing tooth is likely to migrate into an adjacent edentulous area. No data has been presented on the incidence of such migration.

Our interest was aroused by repeated observations of extreme distal positioning of the lower second bicuspid as one of us (SRM) reviewed panoramic radiographs of patients presenting for treatment at the University of North Carolina School of Dentistry. In a number of adults, the first molar was missing and the second bicuspid was found in occlusion adjacent to the second molar, with its long axis approximately parallel to that of the second molar. Mesial drift of the second molars was negligible. There was a space between the first and second bicuspids (Fig. 1).

The purpose of this study was to determine the prevalence, risk and sex distribution of this distal positioning following extraction of the first molar.

Method

Records of 26,264 panoramic radiographs exposed during the five-year period 1975-1980 were evaluated for the presence of distally positioned second bicuspids. For some representative cases, old records and/or follow-up examination were also obtained.

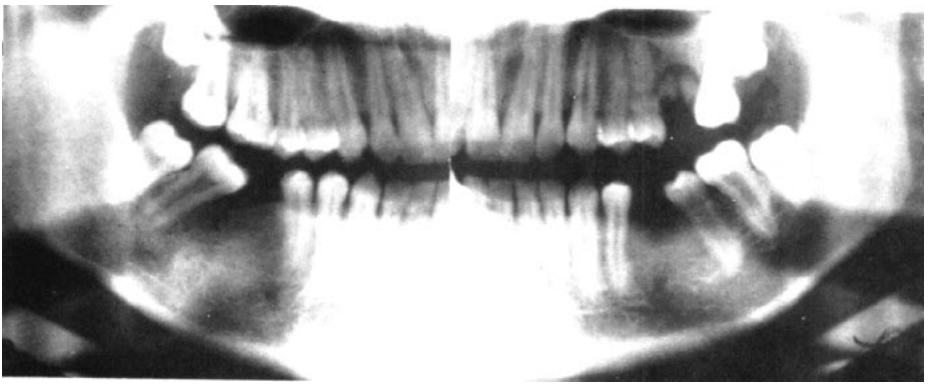

Fig. 1 Panoramic radiograph of adult, showing distally positioned lower left second bicuspid.

To establish a risk factor for distal migration of the second bicuspid following first molar extraction, it was necessary to establish the prevalence of missing first molars in this patient population. A random sample of 638 cases was reviewed. This sample excluded all edentulous patients, patients in the deciduous dentition, and patients missing their mandibular second bicuspid as well as the first molar.

Results

Fifty-two patients demonstrating this abnormality were identified, an incidence of one case for each 505 patients. Of the 52 cases, 36 were female and 16 were male, a ratio of 2.2:1. Adjusting for the female bias of this patient population, the female-to-male ratio is 1.7:1.

Ten percent of the 638 randomly selected patients had at least one lower first molar missing. The age at the time of extraction is an obviously critical variable for bicuspid migration, but this information was not available.

For purposes of estimation, we have assumed that one-fourth of the 10% with missing molars had them removed sufficiently early to initiate bicuspid migration. Extrapolation leads to an estimate of 656 individuals in the total sample of 26,264 patients who could have been at risk. Since only 52 actually experienced distal migration, it seems reasonable to conclude that there is about a 5% to 10% chance of distal bicuspid migration if the lower first molar is extracted prior to second bicuspid eruption.

Sequential films of distal migration are not available. Evaluation of cross-sectional films showing different ages suggests that the second bicuspid migrates distally through the site formerly occupied by an extracted first molar, with the crown leading the way.

In an unmutilated dentition, distally inclined lower second bicuspids usually rotate upward into occlusion as they contact the first molar in the course of eruption. When the first molar is extracted at an early age, a distally inclined bicuspid may erupt along its long axis, or actually tip toward the extraction site. This may occur unilaterally or bilaterally (Fig.

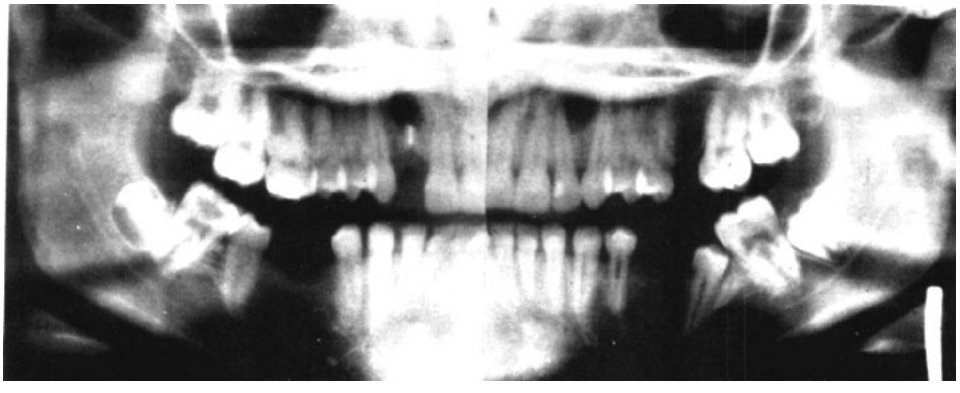

Fig. 2 Panoramic radiograph showing bilateral distally positioned mandibular second bicuspids.

2). The migration continues until the bicuspid contacts the second molar, when it typically rotates upward into occlusion and assumes a position with its long axis approximately parallel to that of the second molar (Fig. 3).

The apical third of the root of many of these teeth is curved in an anterior direction (Fig. 4). This suggests that the apical portion of the root formed as the erupting tooth was turning up into occlusion.

If both the first and second molars are missing, the migrating bicuspid may continue distally within the bone until it contacts the third molar, at which point it may still rotate upward into occlusion adjacent to the third molar (Fig. 5). Should no molars be present, it can continue to migrate distally toward the mandibular ramus without ever erupting into the mouth. In the case illustrated in figure 6, the bicuspid has reached the ramus. A similar case was reported by Sutton,[16] in which the second bicuspid ultimately migrated into the coronoid process.

Two cases were seen in which the first molar had not been removed, but the mandibular second bicuspid had migrated distally below the perma-

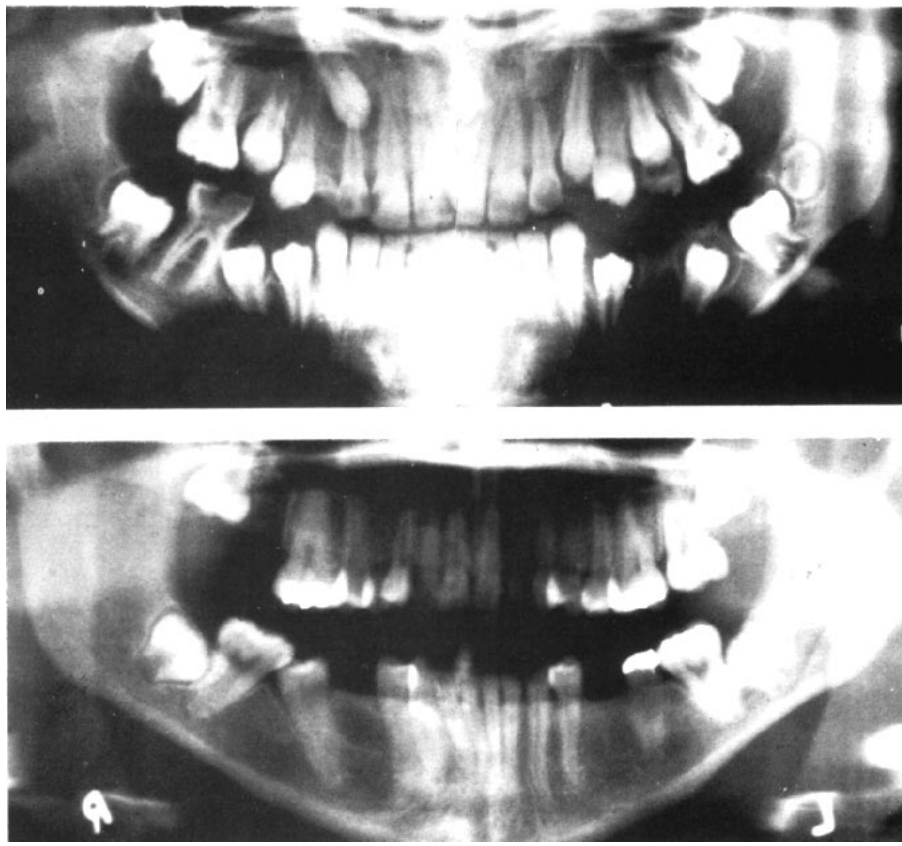

Fig. 3 (a) Panoramic radiograph of patient showing migration of lower left second bicuspid into first molar space. (b) Panoramic radiograph of patient with migration of erupting lower second bicuspids into first molar spaces.

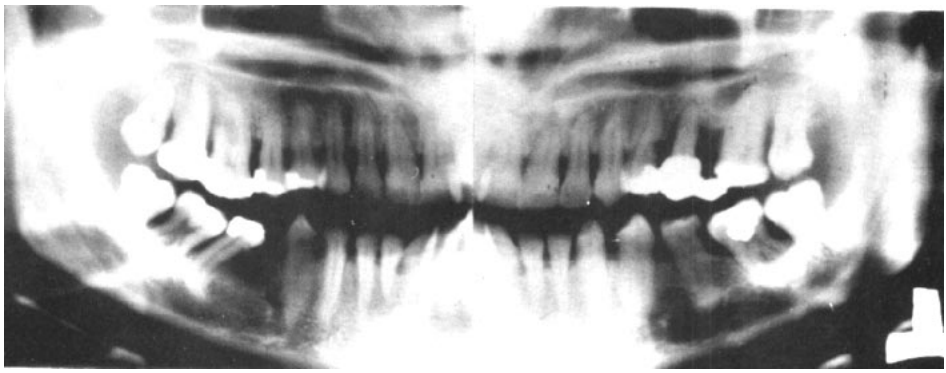

Fig. 4 Panoramic radiograph of distally positioned bicuspid with curved roots.

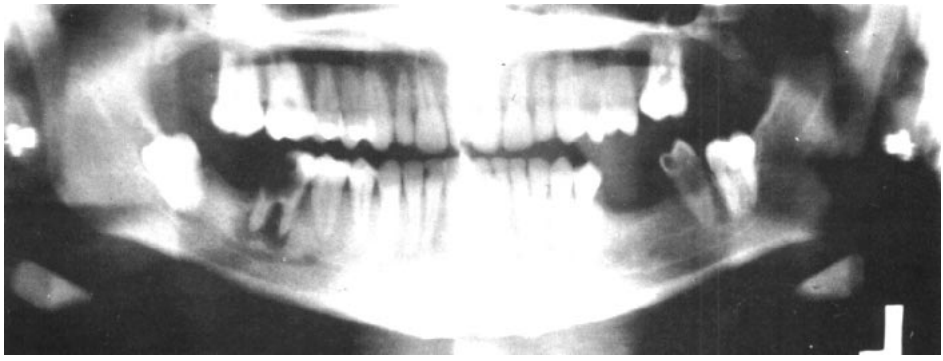

Fig. 5 Panoramic radiograph showing distally positioned lower left second bicuspid adjacent to the third molar. First and second molars are missing.

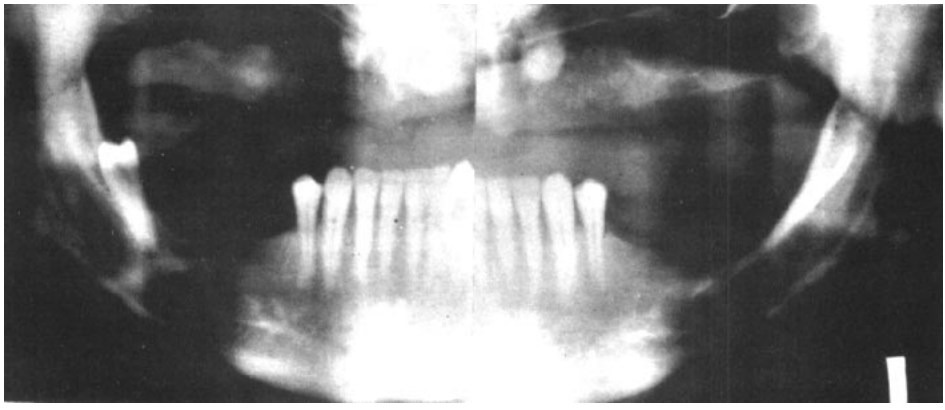

Fig. 6 Panoramic radiograph showing extreme distal migration of lower right second bicuspid. All three molars are missing.

nent molars. Apparently the erupting molar had moved above the level of the bicuspid before eruption and uprighting rotation could take place, possibly because the bicuspid was too severely tipped initially for the necessary vertical eruptive vector. Lack of molar guidance, together with the distal inclination, allowed distal migration below the first permanent molars until contacting other tooth structure (Fig. 7). Resorption of the associated roots was probably related to expansion of the follicle around the bicuspid crown after further migration was blocked.

In our sample of 26,264 patients, not a single case of extreme distal positioning of a maxillary second bicuspid was observed. Anatomic considerations such as three-rooted deciduous molars, trabecular pattern, adjacent cortex of the maxillary sinus and initial orientation of developing bicuspids may be factors.

Discussion and Clinical Implications

The distally positioned mandibular second bicuspid is found fairly frequently, and usually appears to be associated with early loss of the permanent molar. The bicuspid moves in the direction that its crown faces, with the crown leading the way.

The reason for this abnormality showing a female sex bias is not clear. Perhaps the fact that females are often taken for dental care earlier than males may lead to earlier removal of diseased molars.

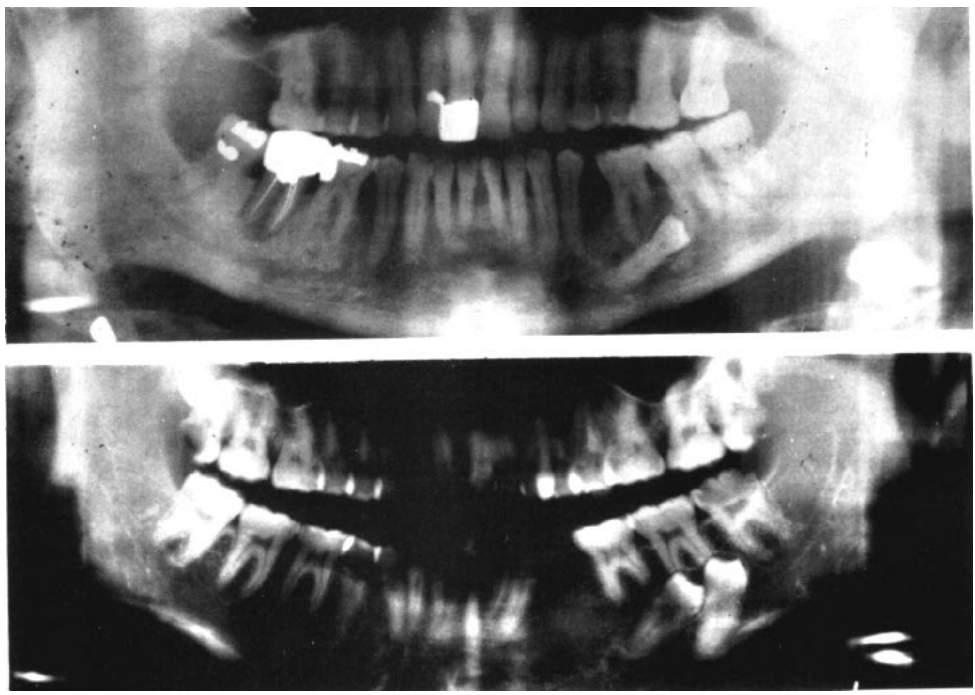

Fig. 7 (a) Panoramic radiograph showing distal migration of second bicuspid below the first molar, with resorption on the distal root of the molar. (b) Panoramic radiograph showing distal migration of both left bicuspids below first and second molars, with molar root resorption.

We have estimated a 5% to 10% risk of distal bicuspid migration when mandibular first molars are extracted at an early age. It seems reasonable to expect this risk to be highest for very early molar extraction, but no relevant information is available.

The possibility of bicuspid migration should be taken into account whenever early removal of the mandibular first molar is contemplated or found on later examination. Therapeutic management can begin with observation to determine whether the tooth is progressing along an eruptive path that could lead naturally into occlusion or to distal migration.

If the bicuspid is tipped so far distally thatit fails to rotate up into occlusion, orthodontic intervention is indicated. Surgical exposure of the crown, direct bonding of an orthodontic attachment, and application of light forces to the crown of the unerupted tooth offer an excellent chance of success. Since the periodontal membrane of these bicuspids is usually normal, they can be expected to respond normally to orthodontic force and often to erupt spontaneously once they are reasonably upright (Fig. 8).

While it may be technically feasible to surgically upright and elevate the bicuspid at the same time that it is exposed, this often leads to devitalization of the pulp, cessation of further root development, ankylosis and other periodontal defects. Conservative or-

Fig. 8 (a) Pretreatment radiograph showing distally inclined impacted second bicuspids. (b) Radiograph showing the same teeth in alignment. (Courtesy of Dr. K. Vig, Chapel Hill, North Carolina.)

thodontic management is the preferred approach.

Summary

A five-year study of 26,264 panoramic radiographs found distal positioning of the mandibular second bicuspid associated with a missing adjoining first molar in one of every 505 patients. Following early removal of the first molar, there is a 5% to 10% chance that the second bicuspid will migrate distally. It usually continues until it contacts the root of the second molar, and then rotates up into occlusion adjacent to and parallel with that tooth.

Mesial drift seldom occurs in this circumstance; the resulting space between lower first and second bicuspids remains.

Early conservative management can be very important in these cases, making periodic x-ray examination advisable whenever a molar has been lost and the adjoining bicuspid has not yet erupted.

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