

# Alveolar plate fenestrations and dehiscences of the human skull

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**M**ucogingival surgical procedures require the dentist to have a precise knowledge of both normal and unusual anatomic features of the alveolar process. Fenestrations (Fig. 1) and dehiscences (Fig. 2) of the alveolar plate of bone are often detected only when mucogingival surgical procedures are performed. Such bony defects are probably the result of a slow, progressive absorption of an already existing thin plate of bone covering a prominent tooth root.<sup>1</sup> Bone of this type usually lacks a supporting layer of bone marrow between the outer labial plate of compact bone and the alveolar bone proper and depends on periosteum and periodontal connective tissue for adequate nourishment and blood supply. Therefore, stripping of the periosteum during mucogingival surgery will encourage even further resorption of the thin overlying plate of bone, since bone absorption is greater than bone deposition after surgical intervention.<sup>2</sup>

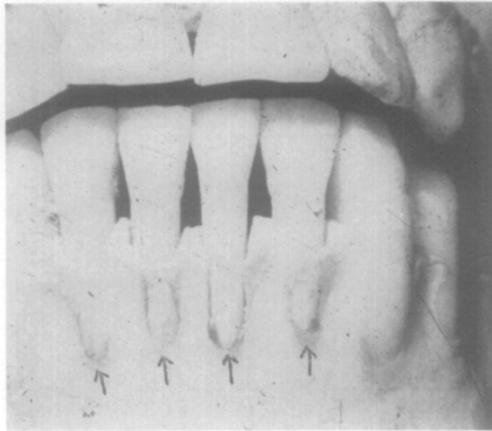
Since it is difficult to predict with certainty when fenestrations or dehiscences may be encountered during mucogingival surgery, it would be helpful to the dentist who performs periodontal surgery to know which teeth are most often associated with such bony defects. By inspecting dry human skull specimens, we can derive some knowledge of the incidence and distribution of fenestrations and dehiscences in the human skull.

## **MATERIALS AND METHODS**

The skull material used for this study consisted of 108 adult skulls of Mexican Indian origin from the skull collection of the Atkinson Library of Applied Anatomy at the School of Dentistry, University of the Pacific, San Francisco, California. Definitive information concerning the age and sex of the specimens was not available; therefore, the age of the skulls could only be estimated according to the degree of suture closure. The skulls varied in age from approximately the early 20's to past 70 years. The number and location

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*Fig. 1.* Fenestrations of labial alveolar plate of bone.



*Fig. 2.* Dehiscence of prominent tooth root.

of fenestrations and dehiscences were recorded for each tooth area in each of 108 skulls. The occlusal wear pattern of each tooth was also recorded in order to determine whether any relationship exists between occlusal wear (that is, facets) and fenestrations.<sup>3</sup> The prominence of each tooth root was also recorded to see if root prominence relative to general arch configuration was related to the number of fenestrations and dehiscences.

## RESULTS

Of 3,416 teeth present and examined in 108 skulls, 149 (4.3 per cent) exhibited fenestrations of the labial alveolar plate of bone and 109 (3.2 per cent) had dehiscences (Table I). Therefore, 7.5 per cent of all teeth examined exhibited fenestrations or dehiscences. Anterior teeth, however, exhibited a greater over-all percentage of fenestrations and dehiscences than posterior teeth. A

**Table I.** Distribution of fenestrations and dehiscences in 108 skulls

<i>Total teeth examined</i>	<i>Teeth with fenestrations</i>	<i>Teeth with dehiscences</i>
3,416 (100%)	149 (4.3%)	109 (3.2%)

**Table II.** Distribution of fenestrations and dehiscences in anterior teeth of 108 skulls

	<i>Total maxillary and mandibular anterior teeth examined</i>	<i>Teeth with fenestrations</i>	<i>Teeth with dehiscences</i>
Maxillary teeth	649	54 (8.3%)	27 (4.2%)
Mandibular teeth	640	37 (5.7%)	55 (8.6%)
Total	1,289	91	82

**Table III.** Number and distribution of fenestrations and dehiscences for each tooth in 108 skulls

	<i>Right teeth</i>								<i>Left teeth</i>							
	8	7	6	5	4	3	2	1	1	2	3	4	5	6	7	8
<i>Maxillary</i>																
Number of dehiscences	0	0	1D	1	2	9	0	5	3	3	7	0	0	0	0	1D
Number of fenestrations	0	4D	8D	0	8	23	12	0	1	8	10	6	1	8D	10	0
		1M	15M											11M		
<i>Mandibular</i>																
Number of dehiscences	0	0	0	0	11	23	5	1	5	4	17	8	2	1M	0	0
Number of fenestrations	0	0	6M	3	3	8	6	2	2	9	10	2	1	0	0	0

M = Mesiobuccal root of molar.  
D = Distobuccal root of molar.

total of 1,289 anterior teeth were examined, and 13.4 per cent of these exhibited either fenestrations or dehiscences of the alveolar plate. A total of 12.5 per cent of all maxillary anterior teeth had either fenestrations or dehiscences, while 14.3 per cent of the mandibular anterior teeth had the same types of bony defects (Table II).

Table III shows the total number and distribution of fenestrations and dehiscences for each individual tooth in 108 skulls. Of the maxillary teeth, cuspids and first molars most frequently exhibited alveolar plate fenestrations and dehiscences. In the mandible, cuspids were most commonly associated with fenestrations and dehiscences. Fenestrations and dehiscences were not observed in either the maxillary or the mandibular lingual alveolar plates of bone.

## DISCUSSION

Kakehashi, Baer, and White<sup>2</sup> and Stahl, Cantor, and Zwig<sup>3</sup> have suggested that fenestrations of the alveolar plate may be associated with teeth in excessive trauma which have only a thin labial plate of bone covering the tooth root. From the skulls examined in this study, no definite relationship could be shown between fenestrations and teeth in excessive trauma, since marked occlusal wear was present in almost all the skulls. The presence of extreme tooth wear in the skulls of all age groups may have been due to the highly abrasive diet of the Mexican Indian. However, in more than 90 per cent of the teeth that exhibited either alveolar plate fenestrations or dehiscences, the teeth had prominent roots in relation to the rest of the arch. In addition, no correlation could be made between the number of fenestrations and dehiscences present and the estimated age of the skull, since many of the skulls in the younger adult groups (20 to 40 years old) exhibited these same bony defects.

## SUMMARY

A total of 108 adult Mexican Indian skulls were examined for the presence of alveolar plate fenestrations and dehiscences. The results of this study indicate the following:

1. Maxillary and mandibular anterior teeth exhibit more fenestrations and dehiscences than posterior teeth.
2. Maxillary first molars and cuspids and mandibular cuspids are most often associated with fenestrations and dehiscences.
3. Fenestrations and dehiscences are commonly associated with prominent tooth roots.
4. Fenestrations and dehiscences are also found in young adult skulls.
5. No relationship could be found between the number of fenestrations and dehiscences present and the age of the skull.

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