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A Study of Periodontal Hazards of Third Molars*

by MAJOR M. ASH, JR., D.D.S., M.S.,** EMMETT R. COSTICH, D.D.S., PH.D.,***
AND JAMES R. HAYWARD, D.D.S., M.S.,**** *Ann Arbor, Michigan*

THE diagnosis and treatment of third molars often have been cited as being special problems to the oral surgeon and orthodontist, but the relationship of the third molars and their extraction to gingival changes, loss of bone, development of periodontal pockets, and exposure of the cementum on the distal of the second molars has received very little attention. Most of the studies of the status of the third molar have been directed towards classification of impactions, surgical procedures for their removal, their effect upon the development and treatment of malocclusion, their relationship to resorption and repair of the roots of the second molars, and their relation to cysts, pericornal infection, Vincent's infection, cellulitis, and caries.^{1,2,3,4} Indications for the prophylactic removal of third molars are usually related to possible spread of infection, fractures, cystic degeneration, possibility of poor healing in older individuals, and treatment of malocclusion.^{5,6,7} Although Robb⁸ pointed out some of the problems related to the presence of impacted third molars and the periodontal complications following their removal, no intensive investigation of periodontal problems has been reported.

Thus the importance of third molars to the investing and supporting structures of the second molar and the periodontal indications and contraindications for the removal of third molars has been largely overlooked. The objectives of this study were to determine the effect of the extraction of third molars on the periodontal structures distal to the second molars; the indications and contraindications for extraction of third molars relative to possible periodontal complications; and possible means of minimizing periodontal complications following the removal of third molars.

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**Associate Professor, Department of Oral Pathology & Periodontia, University of Michigan School of Dentistry, Ann Arbor, Michigan.

***Associate Professor, Department of Oral Surgery, University of Michigan, School of Dentistry, Ann Arbor, Michigan.

****Professor and Head, Department of Oral Surgery, University of Michigan, School of Dentistry, Ann Arbor, Michigan.

METHODS

Two hundred and twenty-five mandibular and maxillary third molars adjacent to second molars were selected for extraction from patients in the clinics of the School of Dentistry of The University of Michigan. The third molars were classified as completely covered, partially erupted, or fully erupted. *Completely covered* indicated that the third molars were completely covered by soft tissue and/or bone and could not be felt by probing in the distal crevice of the second molar. *Partially erupted* indicated that the third molars could be probed in the distal crevice of the second molar, were clinically visible, were partially covered by a gingival flap, and/or were covered by a thin layer of gingiva. *Completely erupted* indicated that the third molars were vertically placed and in occlusion. Included were third molars displaced buccally or lingually but whose occlusal surfaces were completely exposed. This category also contained third molars which had not erupted to the plane of occlusion of the second molars but for the most part were in contact with opposing teeth. There were 75 third molars in each classification.

The status of the periodontal structures of the second molar was evaluated prior to, just after, two weeks, six months, and one year after extraction of adjacent third molars. The criteria for the evaluation of the periodontal structures were based on the following: (1) The presence or absence of gingivitis based on the scores: 0—normal gingiva, 1—mild inflammation, 2—moderate, and 3—severe inflammation; (2) The depth of the gingival crevice on the distal, distobuccal and distolingual of the second molar as measured from the free gingival margin to the epithelial attachment, and from free gingival margin to the cemento-enamel junction. (In effect the position of the free gingival margin and the base of the crevice of pocket were related to the cemento-enamel junction.); and (3) The height of the alveolar crest in relation to the cemento-enamel junction of the distal of the second molar was indicated on radiographs as cervical one-fourth, cervical-

middle one-fourth, and apical one-half. The height of the crest was considered to be normal if approximating the cervical one-fourth of the second molar.

The position of the free gingival margin relative to the cemento-enamel junction and the depth of the gingival crevice was measured with a thin periodontal pocket marking probe (University of Michigan #0—Premierlite). The gingival crevice was considered to be pathologically deepened when in excess of 3 mm. in depth. Periodontal pockets and/or root exposure were considered to be present when the base of the crevice was 1 millimeter or greater apical to the cemento-enamel junction. The height of the alveolar crest was evaluated by standard periapical and posterior bite-wing radiographs; angulation of x-ray head at 30 degrees down on maxillary teeth and 0 degrees on mandibular teeth with periapical radiographs. Posterior bite-wings were taken at 8 degrees down. The presence or absence of bone and the height of the bone on the distal aspect of the third molar was noted clinically and radiographically after extractions of the third molars. The height of the alveolar crest on the distal of the second molar was considered to be normal when within 2 mm. of the cemento-enamel junction irrespective of the malposition of the third molar. The position of buccally and lingually displaced third molars was evaluated clinically by using standard periapical film in an occlusal position.

In addition to the clinical examination of the periodontal structures distal to the second molars the patient was asked about symptoms referable to the third molars. The presence of carious lesions were noted. No cases with cystic lesions, or other intraosseous lesions involving the second and third molars were included in this study. All calculus and plaque was removed from the second molars in so far as possible after the initial examination.

Twenty-one additional cases of partially covered mandibular third molars were selected with periodontal pockets and given

TABLE I
Periodontal Pockets and/or Root Exposure
Before and After Extraction of Third Molars

	<i>Before Extraction</i>	<i>Immediately After Extraction</i>
Completely Covered (75)	21	55
Partially Covered (75)	28	68
Completely Erupted (75)	18	25

periodontal treatment consisting of scaling, root planing, and filing of the root surfaces of the second molar after extraction of the third molar. These cases were selected so as to compare with median age of the group of 21 cases of partially covered third molars with untreated second molars.

EXTRACTION PROCEDURE

The removal of the completely covered third molars was accomplished in the following manner. An incision was made in the gingival crevice from the mesio-buccal corner of the first molar to the distal of the second molar from which point the incision extended distally and laterally staying over the bone of the ramus. The incision was made through periosteum as well as soft tissue. The mucoperiosteal flap was carefully reflected to prevent separation of the periosteum from the overlying tissue and to minimize traumatization of the flap. A circular series of holes were made in the bone over the crown of the third molar. The central area of bone was removed to create an opening slightly larger than the greatest diameter of the crown. The tooth was then elevated. In those cases where the tooth could not be elevated it was sectioned and removed in segments. The objective was to minimize bone loss. Bone was not removed adjacent to the second molar. The socket was inspected for debris, bone margins that were used as a fulcrum for instruments were shaved (freshened) with an antrum bur, the area flushed, and the flaps returned to position and sutured.

The partially erupted teeth were treated in the manner described for completely

covered impaction. An adequate soft tissue flap was reflected and if necessary bone was removed from the distal and buccal surfaces of the crown to allow elevation of the tooth. In many cases there was little or no bone removal because the tooth could be sectioned and removed without loss of bone. The toilet of the socket and closure was the same as for completely covered teeth.

The fully erupted third molars required almost no bone removal. In all cases the interdental papilla between the second and third molar was reflected out of position to prevent crushing when the tooth was luxated by placing an elevator between the tooth and alveolar bone. If it were necessary to use a forcep, the marginal gingiva was also reflected as a flap with the interdental papilla to prevent crushing of the tissue by the forceps and elevators. The socket was inspected and the interdental papilla sutured in place. No attempt was made to close the socket by moving soft tissue.

RESULTS

In the group of completely covered third molars there were 21 cases of periodontal pockets and/or root exposure prior to extraction and 55 cases after extraction. In the partially covered group there were 28 cases prior to extraction and 68 cases after extraction. Of the completely erupted group of third molars there were 18 cases of periodontal pockets and/or root exposures on the distal of the second molar and 25 cases immediately after extraction of the third molars (see Table I).

Completely Covered Third Molars. Of the completely covered third molars 71 cases were apparently asymptomatic before extraction (see Table II). Four cases gave a history of vague complaints of pressure in the region of the third molars. Gingivitis involving the distal of the second molars was present in 73 of the cases and values ranged from 1 to 3 with an average of 1.30. Acute Vincent's infection involving other areas of the mouth was present in 6

TABLE II
Before and After Extraction of
Completely Covered Third Molars

	Before	After Extraction		
		2 wks.	6 mo.	1 yr.
Asymptomatic	71	19	60	66
Gingival Crevice > 3 mm.	38	75	60	63
Periodontal Pockets and/or Root Exposure	21	53	42	38
Alveolar Crest Normal	39	22	33	37

cases. The gingival crevice on the distal of the second molar exceeded 3 mm. in depth in 38 cases prior to extraction, but the base of the crevice was no greater than 1 mm. apical to the cemento-enamel junction. In 21 cases prior to extraction of third molars periodontal pockets ranging from 2 to 6 mm. were present on the distal of the second molar. The height of the alveolar crest distal to the second molar was considered to be normal in 39 cases.

Immediately after extraction there were pockets and root exposure in the distal of the second molar in 55 cases. Two weeks after extraction of the completely covered third molars, there were complaints in 56 of the cases referable to vague pains, tenderness, swelling, food impaction, and hypersensitivity of the second molars. Hypersensitivity of the second molar was the chief complaint. Gingivitis was present in all cases and the average score was 2.4. The gingival crevice exceeded 3 millimeters in all the cases. Fifty-three of the cases had periodontal pockets and/or exposure of the cemental surfaces on the distal, distolingual, or distobuccal of the second molar up to two weeks following extraction of the third molars. The height of the alveolar crest distal to the second molar was considered to be normal in 22 cases two weeks following extraction of completely covered third molars.

Six months following the extraction of the third molars complaints consisting of

vague discomfort, cheek biting, food impaction, and hypersensitivity of the second molars were present in 15 cases. The chief complaint in six cases was hypersensitivity of root surfaces. Gingivitis was present on the distal of the second molars in 72 of the cases and the average score was 1.24. The gingival crevice exceeded 3 mm. in 60 of the cases and periodontal pockets and/or cemental exposure were present on the second molar in 46 of the cases. The height of the alveolar crest was normal in 33 cases.

Sixty-six of the cases were asymptomatic after one year. Six complaints of hypersensitivity and 3 complaints of food impaction were made. The distal root surface was exposed from 2 to 6 mm. in all of the cases of hypersensitivity. Gingivitis was present in 70 cases and the average score was 1.28. The gingival crevice at the end of six months exceeded 3 mm. in 63 cases, and periodontal pockets were present in 38 cases. The alveolar crest was normal in 37 instances.

The distribution of loss of periodontal support between the maxilla and mandible as indicated by the number and severity of pockets and/or root exposures is given in Table III. The ages for the patients in the total group and for each group with

TABLE III
Completely Covered Third Molars
(Total Number—75)

	Before		1 Year After	
	Extraction	Extraction	Extraction	Extraction
Average Age	26.6 Years			
Median Age	23			
Range	14-62			
No. of pockets (total)	21	38		
Mandible (maxilla)	16 (5)	30 (8)		
Above age 23	17	27		
No. of mm. from CEJ to base of pocket				
Average	2.4	4.7		
Median	2	4		
Range	2-6	2-10		
Age of patients				
Average	35	28.8		
Median	32	26		
Range	20-62	17-62		

pockets is given before and after extraction of third molars.

Partially Covered Third Molars. In 56 cases of the partially covered third molars prior to extraction patients complained of food impaction, soreness, tenderness, pressure, and sensitivity to toothbrushing (see Table IV). There were 36 third molars in this classification that were buccally or lingually placed. Gingivitis was present in all the cases and the average score was 2.46. Eight of the patients had Vincent's infection at the time of the examination, and 14 gave a history of recurrent Vincent's infection. The gingival crevice was in excess of 3 mm. at the distal of the second molar in 54 cases prior to the extraction of the partially covered third molars. Periodontal pockets were present on the distal, distobuccal, and/or distolingual of the adjacent second molars in 28 cases. The height of the alveolar crest was normal in 47 cases.

Immediately after extraction, periodontal pockets and/or root exposure was present in 68 cases. Two weeks after the extraction of the partially covered third molars there were 64 complaints of vague pains, tenderness, swelling, food impaction, and hypersensitivity of the second molars. Gingivitis was present in all cases and the average score was 2.76. The gingival crevice exceeded 3 mm. in 70 of the cases. Fifty of the cases had periodontal pockets and/or root exposure on the distal, distolingual, or distobuccal of the second molar

TABLE IV
Before and After Extraction of
Partially Covered Third Molars

	Before Extraction	After Extraction		
		2 wks.	6 mo.	1 yr.
Asymptomatic	19	15	42	55
Gingival Crevice >3 mm.	54	70	57	52
Periodontal Pockets and /or Root Exposure	28	50	52	56
Alveolar Crest Normal	47	23	23	19

TABLE V
Partially Covered Third Molars
(Total Number—75)

	Average Age	23.7 Years
	Median Age	22
	Range	17-45
		<i>Before</i> <i>1 Year After</i>
		<i>Extraction</i> <i>Extraction</i>
No. of pockets (total)	28	56
Mandible (maxilla)	21 (7)	41 (15)
Above age 22	18	27
No. of mm. from CEJ to base of pocket		
Average	3.6	3.6
Median	3	4
Range	2-7	2-8
Age of patients		
Average	25.5	24
Median	25	22
Range	19-45	17-45

following extraction of the third molar. The height of the alveolar crest distal to the second molar was considered to be normal in 23 cases.

Six months following the extraction of the partially covered third molars, there were complaints in 33 of the cases referable to vague discomfort, cheek biting, food impaction, and hypersensitivity of the second molars. The chief complaint of 4 of these cases was hypersensitivity of the root surfaces. Gingivitis was present in 73 of the cases and the average score was 2.10. The gingival crevice exceeded 3 mm. in 57 cases, and periodontal pockets and/or cemental exposure were present on the distal of the second molar in 52 of the cases. The height of the alveolar crest was normal in 23 cases.

After one year 55 cases were asymptomatic. Complaints of sensitivity and food impaction were made in the other cases. Gingivitis was present in 70 of the cases and the average score was 2.25. There were periodontal pockets and/or root exposure in 56 cases. The alveolar crest was normal in 19 cases.

The distribution and severity of pockets and/or root exposures in the maxilla and

TABLE VI
Before and After Extraction of
Completely Erupted Third Molars

	Before Extraction	After Extraction		
		2 wks.	6 mo.	1 yr.
Asymptomatic	58	28	68	73
Gingival Crevice > 3 mm.	31	68	29	25
Periodontal Pockets and/or Root Exposure	18	23	20	20
Alveolar Crest Normal	57	55	55	52

mandible and the ages of the patients in each group are given in Table V.

Completely Erupted Third Molars. Except for the presence of carious lesions and related complaints, 58 of the cases of completely erupted third molars were asymptomatic (see Table VI). Of the remaining cases complaints consisted of food impaction, inability to clean the area adequately, cheek biting, and vague complaints of pain and pressure. Gingivitis involving the second and third molar was present in 63 of the cases prior to extraction of the third molars and the average score was 1.87. The gingival crevice was in excess of 3 mm. in 31 of the cases prior to extraction but the base of the gingival crevice was no more than 1 mm. apical to the cemento-enamel junction. Periodontal pockets were present on the distal, distolingual, or distobuccal of the mandibular second molar in 18 cases. The height of the alveolar crest on the distal of the second molar was considered to be normal in 57 cases.

Immediately after extraction periodontal pockets or root exposure was present in 25 cases. Two weeks after extraction of the completely erupted third molars complaints relative to food impaction, pain, tenderness, and hypersensitivity of the second molar occurred in 47 cases. Hypersensitivity was the chief complaint of 8 cases. Gingivitis was present in all cases and the average score was 2.19. The gingival crevice was in excess of 3 mm. in 68 cases but the base of the gingival crevice was no more

TABLE VII
Completely Erupted Third Molars
(Total Number—75)

	Average Age	29.7 Years
	Median Age	28
	Range	19-54
	Before Extraction	1 Year After Extraction
No. of pockets (total)	18	20
Mandible (maxilla)	7 (11)	10 (10)
Above age 28	17	16
No. of mm. from CEJ to base of pocket		
Average	3	3.4
Median	3	3
Range	2-6	2-7
Age of patients		
Average	36.8	35
Median	36	34
Range	25-54	23-54

than 1 mm. apical to the cemento-enamel junction. Periodontal pockets and/or cemental exposure were present on the distal aspects of the second molar in 23 cases. The height of the alveolar crest was normal in 55 cases.

Six months after the extraction of the completely erupted third molars complaints relative to food impaction, hypersensitivity of second molars, and vague complaints of tenderness were present in 7 cases. Gingivitis was present in 72 of the cases and the average score was 1.22. The gingival crevice was greater than 3 mm. in depth in 29 of the cases. Periodontal pockets and/or cemental exposure were present on the distal aspect of the second molar in 20 cases. The height of the alveolar crest was normal in 52 cases.

The number and severity of periodontal pockets and root exposures and the ages of the patients for the group of completely erupted third molars is given in Table VII.

The results of the treatment of twenty-one cases of second molars with pockets following the extraction of partially covered third molars did not significantly differ from untreated cases (see Table VIII). There were twenty-one pockets pres-

TABLE VIII
Results of Scaling and Filing of
Mandibular Second Molars

	<i>Before</i>		<i>After Extraction</i>	
	<i>Extraction 4 wks.</i>		<i>6 mo.</i>	<i>1 yr.</i>
Treated (21)				
Periodontal pockets	21	18	18	18
Normal crest	0	0	0	0
Untreated (21)				
Periodontal pockets	21	—	19	19
Normal crest	0	—	0	0

ent prior to extraction and eighteen after extraction. This result is comparable with the values for untreated cases.

DISCUSSION

Several factors appear to be of importance in judging the periodontal hazards of extracting third molars: (1) The position of the third molar relative to the distal root of the second molar; (2) The periodontal status of the distal of the second molar prior to extraction of the third molar; (3) Chronological and dental age of the patient; and (4) Indirectly the position of the ascending ramus of the mandible.

Periodontal pocket formation and/or exposure of the root of the second molar occurred most frequently and most severely when the crown of the completely or partially covered third molar was in close approximation or apparent contact with the surface of the second molar. This finding is to be expected on the basis of greater difficulty in removing third molars in close proximity with second molars without damaging the periodontal structures on the distal of the second molar. In addition quite often the supporting structure and root surfaces of the second molar were already damaged by the position of the third molar. A sorting of the radiographs into three groups was made on the basis of approximation of the third molar to the second: broad separation, thin separation, and no apparent separation of third molar and adjacent second molar (see Table IX).

TABLE IX
Pocket Formation and/or Root Exposure
According to Proximity of Third
Molars to Second Molars

	<i>No. of Pockets</i>	
	<i>No. in Each Group</i>	<i>1 Yr. After Extraction</i>
Broad Separation	68	15
Thin Separation	69	34
No Separation	88	65

On this basis, of the 58 broadly separated molars, 15 pockets and/or root exposures were found one year after extraction; of 79 thinly separated, 34 pockets and/or root exposures occurred; and of 88 without apparent separation, 65 pockets and/or root exposures were found one year after extraction of third molars. It is apparent that the possibility for loss of periodontal structures is considerable when the third molar is in close proximation or contact with the second molar.

A loss of periodontal support occurred slightly more frequently and with much greater severity when the completely covered third molar approximated the apical one-half than when approximating the cervical one-half of the root of the second molar (see Table X). It was found in the extraction of completely covered third molars that a decrease in the number of pockets and/or root exposures occurred from the first to last examination. This decrease was noted to have occurred in the apically

TABLE X
Comparison of Cervically and Apically Placed
Completely Covered Third Molars

	<i>Before</i>		<i>1 Year After</i>	
	<i>Extraction</i>		<i>Extraction</i>	
Completely Covered (75)				
Cervically placed (40)				
No. of pockets	12		20	
CEJ to base (av. mm.)	2.6		3.2	
Apically placed (35)				
No. of pockets	9		18	
CEJ to base (av. mm.)	2.2		5.7	

TABLE XI
Comparison of Cervically Placed and Apically Placed Completely Covered Third Molars

<i>Without Pockets</i>	<i>Before</i>	<i>After Extraction</i>	
	<i>Extraction</i>	<i>2 wks.</i>	<i>1 yr.</i>
Cervically Placed	28	18	20
No separation	24		
Apically Placed	26	4	17
No separation	21		

placed group of completely covered third molars which were centrally placed distal to the second molar. Of the 14 patients in this category 10 cases had a thin separation and 4 cases no separation between the third molar and the root of the second molar (see Table XI). A review of the ages of the group responsible for the decrease in the number of pockets showed that 11 of the 14 patients were below the age of 23 which was the median age for the group of 75 completely covered third molars. These findings suggest that periodontal hazards involved in extracting third molars may be reduced in young individuals, and are not as great in the extraction of centrally placed molars as in lingually or buccally placed completely covered third molars.

A review of the results of the extraction of cervically placed completely covered and partially covered third molars indicated that although initially the pockets were more severe in the partially covered group than in the cervically placed completely covered group, approximately the same percentage and severity of pockets and/or root exposures occurred after extractions in both groups (see Table XII). Since it might be expected that a larger percentage of pockets would occur where a root surface has been exposed than where it has not, it is quite possible that some of the cases of completely covered cervically placed third molars were actually partially covered which clinical probing did not reveal. Aside from probing inadequacy the lack of a significant difference in the results may in part be attributed to the surgical procedures common to the extraction of both

TABLE XII
Comparison of Cervically Placed Completely Covered and Partially Covered Third Molars

	<i>Before</i>	<i>1 Year After</i>
	<i>Extraction</i>	<i>Extraction</i>
Completely Covered		
Cervically placed (40)		
No. of pockets	12	20
CEJ to base (av. mm.)	2.6	3.2
Partially Covered (75)		
No. of pockets	28	56
CEJ to base (av. mm.)	3.6	3.6

groups of third molars. In addition, if the ages of the completely covered and partially covered third molars are compared, 71 per cent of the pockets following extraction of completely covered third molars occurred in patients above the median age of 23, and 47 per cent occurred in patients above the median age of 22 following the extraction of partially covered third molars (see Table XIII). This finding indicated that the presence of pockets prior to the extraction of partially covered third molars is more important, to a certain extent, than the age of the patient. However, it was noted that this finding tended to disappear in the youngest patients in the group of partially covered third molars. This finding was due possibly to the shorter period of root exposure on the distal of second molars in the youngest patients. As a means of preventing the loss of periodontal support distal to the second molars, it appears likely that the number of pockets prior to extraction and after extraction could be reduced considerably if partially covered third molars were extracted at an early age in their development when the patient is in the early twenties. This finding would apply to cervically placed completely covered third molars during their early development.

A review of the results of the extraction of third molars according to disto-lingual, central, and disto-buccal placement showed that the most severe pockets and/or root exposure occurred following the extraction of third molars that were in disto-buccal

TABLE XIII
Patient's Age Versus Periodontal
Pockets and/or Root Exposure

<i>One Year After Extraction</i>	<i>Total No. Pockets</i>	<i>No. Pockets Above Median Age</i>
Completely Covered (75) Median age 23	38	27
Partially Covered (75) Median age 22	56	27
Completely Erupted (75) Median age 28	20	16

version (see Table XIV). Next in severity were those pockets associated with the extraction of lingually placed third molars. The number of pockets and/or root exposure was essentially the same in percentage as far as buccally and lingually placed third molars were concerned. There were fewer pockets and/or root exposures prior to and after extraction of centrally placed third molars than in the lingually and buccally placed groups probably due to the greater number of completely erupted third molars in the centrally placed group.

It was also noted that pocket formation and/or root exposure occurred less frequently where the ascending ramus did not closely approximate the distal of the second molar than when approximating closely the second molar. This finding probably points out the relationship of a lack of space for proper eruption, severity of impactions, and difficulty in extracting third molars. In a study of serial yearly radiographs and casts from 5 to 17 years of 100 school children, a positive relationship appeared to exist between probability of third molars becoming impacted and limiting parameters of a triangle formed by the ascending ramus, cant of the occlusal plane, size of the third molar, and distance from second molar to the anterior surface of the ascending ramus. Although further study must be done it appears obvious that the ability to predict the probability of developing impactions of third molars would allow these molars to be

TABLE XIV
Number and Severity of Pockets According
to Lingual, Central, and Buccal
Placement of Third Molars

<i>Placement</i>	<i>No. Cases</i>	<i>Pockets and/or Root Exposure</i>	
		<i>Before Ext.</i>	<i>1 Yr. After Ext.</i>
Buccal	82	25	43
CEJ to base (av. mm.)		3.1	5.3
Central	72	20	31
CEJ to base (av. mm.)		2.3	3.2
Lingual	71	22	40
CEJ to base (av. mm.)		2.9	4.6

extracted before pockets could develop on the distal of second molars and at time when periodontal hazards are minimal.

There appeared to be no significant difference between the maxilla and the mandible in the percentage of severity of periodontal pockets and/or root exposure following the extraction of third molars. The extraction of buccally placed maxillary third molars which were partially covered resulted more frequently in pocket formation and/or root exposure than apically and buccally placed completely covered maxillary third molars. There was an absence of the buccal plate of bone in many of the cases of buccally placed partially covered molars and there was little tendency for it to reform to the height of that of the second molar. Similar findings occurred in the disto-lingual aspects of mandibular molars but slightly less frequently.

Disto-lingual root exposure of the second molars occurred most frequently in the mandible and disto-buccal root exposure most frequently in the maxilla.

The depth of the gingival crevice on the distal of second molars of the mandible, as measured from the cemento-enamel junction to the free gingival margin, exceeded 3 millimeters most frequently in the partially covered third molars prior to extraction and in completely covered third molars after extraction. The initial differ-

ence was probably related to the high gingivitis score (2.46) in the partially covered third molars. The slightly greater number of cases where the gingival crevice exceeded 3 millimeters after extraction of completely covered molars was attributed to the greater number of cases in this category in which the ascending ramus closely approximated the second molar. Almost invariably the gingival crevice exceeded 3 millimeters when the anterior border of the ascending ramus of the mandible swept down to join the body of the mandible in close approximation with the second molar. In the maxilla the depth of the gingival crevice exceeded 3 millimeters in approximately the same percentage of cases in cervically placed completely covered third molars as in partially covered third molars prior to and after their extraction. It appears possible that removal of excess gingival tissue at the time of extractions of third molars would be more advantageous than doing a gingivoplasty at a later date.

The many complaints of food impaction following extraction of third molars was primarily due to the presence of deepened gingival crevices or periodontal pockets. An attempt was made to determine if other factors might be a cause of food impaction that persisted even after the extraction site had healed and toothbrushing could be accomplished. The only difference between patients having food impaction and those not having it appeared to be the presence or absence of a distal step between the mandibular and maxillary second molars. While food impaction occurred in all cases where a distal step was present, a significant number of patients had food impaction where there was a straight terminal plane. The significance of this finding remains obscure.

The extraction of 75 completely erupted third molars resulted in a loss of periodontal support in only two instances. In both cases the third molars were hypererupted, in close approximation with the root of the second molar, and only a very thin layer of septal bone separated the roots

of the second and third molars.

The probability of cervically placed completely covered third molars eventually becoming partially exposed and necessitating their extraction is difficult to estimate. It can be assumed that a considerable number of cases of cervically placed completely covered third molars will eventually become partially exposed and require extraction. Therefore, there seems to be no reason to treat cervically placed completely covered and partially covered third molars differently. Since there appears to be no effective treatment at the present to avoid the high incidence of periodontal pockets and/or root exposures occurring prior to and following extraction of these two types of impactions, it appears that the extraction of third molars early in their development is the only method for preventing the loss of periodontal support on the distal aspect of second molars.

In order to explore the benefit of the early extraction of third molars, fifteen early developing third molars were extracted in patients of 13 to 16 years of age. Little or no root development was present in any of the cases. No periodontal pockets and/or root exposure were present one year after their extraction. Additional cases are being followed at the present time.

Of the original 225 cases 86 cases have been followed for two years, and 38 for three years after extraction of third molars. A review of these cases does not indicate any significant change in the pattern of results obtained after one year.

A review of the cases where reformation of the height of the alveolar crest occurred showed that such a reformation occurred almost exclusively in young patients in which the roots of the third molars were not completely developed.

CONCLUSIONS

Within the limits of the study the following conclusions were made:

1. The presence and/or extraction of

completely and partially covered third molars results in a high incidence of periodontal pocket formation on the distal of second molars.

2. Except in young patients, apically placed completely covered third molars should not be extracted simply because they are impacted. After completion of the roots of third molars or after the early twenties in age of patients, the potential for loss of periodontal support of second molars is significantly greater from extrac-

tion of impacted third molars than from their retention.

3. The potential for reformation of the normal height of the alveolar crest on the distal of the second molar bears a positive relationship to the terminal period of development of the third molar.

4. All impacted or potentially impacted third molars should be extracted as early in their development as possible to prevent the high incidence of loss of supporting structure on the distal of second molars.

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 AMERICAN BOARD OF PERIODONTOLOGY

The American Board of Periodontology recently announced that the following individuals successfully passed the 1962 Board examination which was held at Indiana University School of Dentistry, Indianapolis, Indiana, on April 8, 10 and 11, 1962:

Saul T. Asnis, Ph.G., B.S., D.D.S.
165 N. Village Avenue
Rockville Centre, New York

Charles W. Conroy, A.B., D.D.S.
Ohio State University
College of Dentistry
Columbus 10, Ohio

William C. Hurt, D.D.S.
Dental Clinic
Womack Army Hospital
Fort Bragg, North Carolina

Jules D. Kartman, D.D.S.
U.S.A.F. Hospital
Keesler Air Force Base, Mississippi

Frank J. Malone, A.B., D.D.S.
913 Candler Building
Atlanta 3, Georgia

Theodore J. H. Rinck, D.D.S.
Dental Department
U.S.N.S. Treasure Island
San Francisco, California

The Board also voted to hold the 1963 examination in early April at Indiana University School of Dentistry. Anyone desiring additional information may write the Secretary of the Board, Dr. B. O. A. Thomas, 668 Homer Avenue, Palo Alto, California.