

A Prospective Study of Complications Related to Mandibular Third Molar Surgery

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A prospective study that evaluated the surgical and postsurgical problems of 9,574 patients of a wide range of ages who had had 16,127 third molars removed was performed. It was concluded that removal of mandibular third molar teeth during the teenage years resulted in decreased operative and postoperative morbidity.

Modern dentistry is practiced with an emphasis on preventive care. However, this principle is not always applied to the treatment of impacted third molars. To obtain statistical information that would assist the clinician in planning for the proper treatment of these teeth, a prospective study was conducted in an attempt to delineate indications for surgery, to determine the timing of the procedure, and to assess the complications resulting from the surgery. Particular attention was directed to the correlation between patient age and surgical and postsurgical complications.

Methods

Information was collected on 9,574 patients who had had a total of 16,127 mandibular third molars removed surgically. Males constituted 42.8% (4,097) of the study population, and females, 57.2% (5,477). The patients were divided into the following age groups: up to and including the age of 24 years (Group 1); from the age of 25 to 34 years, inclusively (Group 2); and the ages of 35 years and above (Group 3). The age groups chosen corresponded to those used in the Chalmers J. Lyons study. Data collected for each patient included age, AAOMS classification of impaction, reason for tooth removal, intraoperative problems, postoperative visits, and the number of days until the patient was

asymptomatic. Data collection was limited to six months following surgery. A total of five oral and maxillofacial surgeons participated in the study.

Results

The 6,455 patients in Group 1 (67.5%) had a mean age of 19.6 years with a range of 12 to 24 years. The 1,942 patients in Group 2 (20.3%) had a mean age of 28.7 years with a range of 25 to 34 years. The 1,177 patients in Group 3 (12.3%) had a mean age of 45.3 years with a range of 35 to 83 years.

Of the 16,127 mandibular third molars removed, 8,037 (49.8%) were on the left side and 8,090 (50.2%) were on the right. Sixteen per cent (2,649) of the teeth were erupted and 84% (13,478) were impacted. According to AAOMS classification of impacted third molars, 16.5% (2,223/13,478) were soft-tissue impactions, 72.6% (9,786/13,478) were

Table 1. Main Indications for Removal of 16,127 Mandibular Third Molars of 9,574 Patients

Indications	No. of Molars (%)
Caries in 2nd molars	44 (0.3%)
Caries in 3rd molars	310 (1.9%)
Nonfunctional tooth	5,319 (32.9%)
Pain	337 (2.1%)
Prosthetics	215 (1.3%)
Pericoronal infection	975 (6.0%)
Orthodontics	2,679 (16.6%)
TMJ symptoms	16 (0.1%)
Cyst or tumor	47 (0.3%)
Other	6,185 (38.4%)

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Table 2. Postoperative Complications from Third Molar Removal within Each Age Group*

	Group 1 (12-24 Yr.)	Group 2 (25-34 Yr.)	Group 3 (35-83 Yr.)
Alveolar osteitis	466 (7.2%)	234 (12.5%)	89 (7.6%)
Secondary infection	432 (6.7%)	96 (4.9%)	25 (2.2%)
Dysesthesia	35 (0.54%)	41 (2.11%)	17 (1.35%)
Total	933 (14.5%)	371 (19.1%)	131 (11.1%)

* There were 6,455 patients in Group 1, 1,942 patients in Group 2, and 1,177 patients in Group 3. Numbers represent number of patients with complications plus percentages of total.

partial bony impactions, and 10.9% (1,469/13,478) were complete bony impactions. Table 1 lists the various reasons why the teeth were removed. Non-function was the main reason. Others included pericoronal infection, orthodontic reasons, caries, pain, and cyst or tumor formation.

The overall complication rate was 10.8% (1,707/16,127 teeth); complications experienced were alveolar osteitis (6.3%), secondary infection (3.7%), dysesthesia (0.6%), and bleeding (0.2%). The highest incidence of alveolar osteitis was in Group 2 (Table 2). There was a 10.1% (148/1,469 teeth) incidence of alveolar osteitis with complete bony impacted teeth, while with partial bony impactions it was 7.6% (741/9,786; Table 3). Of the 975 teeth removed because of pericoronal infection, 112 culminated in alveolar osteitis (11.5%; Table 4). Almost 45% of patients who had alveolar osteitis required four or more postoperative office visits until the symptoms resolved (Table 5).

Of the 9,574 patients, 5.8% (553/9,574) had infections after the extractions (Table 2). Of all Postoperative infections 97.5% (582/597) occurred in cases of partial bony or complete bony impactions (Table 3). Extraction of 1,469 complete bony impacted teeth resulted in 148 infections, an infection rate of 10.1%. Of the 9,786 cases of partial bony impaction, infections resulted in 434 instances, or 4.4%. Removal of 47 teeth because of the presence of cysts or tumors resulted in eight infections, a rate of

Table 3. Postoperative Complications from the Removal of Third Molars in Different Tooth Positions

	Erupted (n = 2,649)	Tissue Impaction (n = 2,223)	Partial Bony Impaction (n = 9,786)	Complete Bony Impaction (n = 1,469)
Alveolar osteitis	2.0%(53)	3.7%(82)	7.6%(741)	10.1%(148)
Secondary infection	0.2%(6)	0.4%(9)	4.4%(434)	10.1%(148)
Dysesthesia	0.19%(5)	0.23%(6)	0.64%(63)	1.23%(19)

Table 4. Postoperative Complications Versus Reason for Removal in 9,574 Cases of Third Molar Removal

	Alveolar Osteitis (n = 789)	Infection (n = 553)	Dysesthesia (n = 93)
Caries in 2nd molar	6.8%	2.3%	4.5%
Caries in 3rd molar	3.5%	1.6%	1.0%
Pain	6.2%	2.1%	2.7%
Prosthetics	4.2%	1.9%	0.0%
Pericoronitis	11.5%	2.2%	1.0%
Orthodontics	1.9%	5.5%	0.2%
TMJ symptoms	56.3%	0.0%	0.0%
Cyst or tumor	17.0%	17.0%	12.7%

17.0% (Table 4). Table 5 depicts the number of postoperative visits that were made until patients were symptom-free following infections.

The total patient population incurred 93 postoperative dysesthesias (0.96%; Table 2). Group 1 had an incidence of 0.54%; Group 2, of 2.11% and Group 3, of 1.35% (Table 2). When related to the total numbers of teeth removed, dysesthesia occurred at a rate of 0.57% (93/16,127). Over 88% of postsurgical dysesthesias resulted from removal of partial bony or full bony impacted teeth (Table 3). In the patients who had dysesthesia, altered sensation was prolonged in many cases, as is shown in Table 6.

Discussion

The incidence of postoperative alveolar osteitis was 1.6 times greater in group 2 (25-34 years) than it was in either Group 2 or Group 3. It could be speculated that there was a greater number of difficult impactions or problem teeth in this group because there were also more dysesthesias. Overall, the incidence of alveolar osteitis was five times greater following surgery for complete bony impactions than for erupted teeth, four times greater following surgery for partial bony impactions than for

Table 5. Number of Postoperative Visits until Patients who had Complications from Third Molar Removal Were Symptom-free

	Alveolar osteitis (n = 789)	Infection (n = 553)	Dysesthesia (n = 93)
1 visit	2.2%	1.9%	13.0%
2 visits	18.0%	21.5%	25.0%
3 visits	35.2%	43.6%	21.7%
4 visits	26.3%	12.8%	21.7%
5 visits	12.0%	10.6%	6.5%
6+ visits	6.3%	9.6%	12.0%

Table 6. Number of Postoperative Days until Patients Who Had Complications from Third Molar Removal Were Symptom-free

	Alveolar Osteitis (n = 789)	Infection (n = 553)	Dysesthesia (n = 93)
7-14 days	74.6%	11.0%	18.4%
15-30 days	20.5%	38.5%	15.2%
31-60 days	4.2%	27.5%	21.7%
61-120 days	0.4%	16.7%	22.8%
121-180 days	0.2%	5.2%	9.8%
180+ days	0.1%	1.0%	12.1%

erupted teeth, and two times greater following removal of tissue impactions than for erupted teeth. Surgery in cases in which there was pericoronitis resulted in twice the incidence of alveolar osteitis than in nonpericoronitis cases. In the presence of either cysts or tumors, alveolar osteitis occurred nearly three times more often than it did with erupted teeth. This would seem to indicate that an increased incidence of alveolar osteitis can be anticipated with increased tissue manipulation and bony surgery.

Secondary infection following third molar removal was three times greater in Group 1 than in Group 3. However, for the entire patient population, the infection rate was only 5.8% (553/9,574). This figure was even lower when based on the total number of teeth removed, i.e., 3.4% (553/16,127). The incidence of secondary infection following surgery for complete bone impaction was 51 times greater than that after removal of erupted teeth—again, reflective of increased surgical intervention. A similar outcome was seen when partial bony impactions and erupted teeth were compared, secondary infection being 38 times greater with impactions.

Based on total teeth removed, the incidence of nerve dysesthesias was 0.57%. Group 2 had four times as many dysesthesias as did Group 1. Overall, the occurrence of nerve dysesthesias was 6.5 times greater for patients over 24 years of age than for patients under 24. The closer proximity to the inferior alveolar nerve of teeth that were partially or completely covered with bone most likely accounts for the greater incidence of dysesthesia (3.5 and 6.5 times, respectively) seen with this type of surgery than with the removal of erupted teeth. In this study, 55.3% (51/92) of cases with nerve dysfunction were symptom-free within two months, and 78% (72/92) were symptom-free within three

Table 7. Postoperative Complications from Third Molar Removal Occurring in All Age Groups

	Group 1 (12-24 Yr.)	Group 2 (25-34 Yr.)	Group 3 (35-83 Yr.)
Alveolar osteitis	466 (4.9%)	234 (2.4%)	89 (0.9%)
Secondary infection	432 (4.5%)	96 (1.0%)	25 (0.3%)
Dysesthesia	35 (0.37%)	41 (0.43%)	17 (0.17%)
Total	933 (98.8%)	371 (3.8%)	132 (1.4%)

* There were 6,455 patients in Group 1, 1,942 patients in Group 2, and 1,177 patients in Group 3. Numbers represent numbers of patients with complications plus percentages of total.

months. However, 12.1% (11/92) had nerve dysfunction still present at six months, the limit of the study.

The results of this study show that increased numbers of complications (alveolar osteitis, infection, and dysesthesias) occur in the removal of the impacted third molars of older patients. On this basis, it is suggested that, when indicated, third molars should be removed during the teenage years, thereby decreasing the incidence of postoperative morbidity.

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