The American Association of Oral and Maxillofacial Surgeons Age-Related Third Molar Study

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Purpose: The purpose of this investigation was to assess the frequency of complications of third molar surgery, both intraoperatively and postoperatively, specifically for patients 25 years of age or older.

Materials and Methods: This prospective study evaluated 3,760 patients, 25 years of age or older, who were to undergo third molar surgery by oral and maxillofacial surgeon's practicing in the United States. The predictor variables were categorized as demographic (age, gender), American Society of Anesthesiologists' classification, chronic conditions and medical risk factors, and preoperative description of third molars (present or absent, type of impaction, abnormalities or association with pathology). Outcome variables were intraoperative and postoperative complications, as well as quality of life issues (days of work missed or normal activity curtailed). Frequencies for data collected were tabulated.

Results: The sample was provided by 63 surgeons, and was composed of 3,760 patients with 9,845 third molars who were 25 years of age or older, of which 8,333 third molars were removed. Alveolar osteitis was the most frequently encountered postoperative problem (0.2% to 12.7%). Postoperative inferior alveolar nerve anesthesia/paresthesia occurred with a frequency of 1.1% to 1.7%, while lingual nerve anesthesia/paresthesia was calculated as 0.3%. All other complications also occurred with a frequency of less than 1%.

Conclusion: The findings of this study indicate that third molar surgery in patients 25 years of age or older is associated with minimal morbidity, a low incidence of postoperative complications, and minimal impact on the patient's quality of life.

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During the early 1990s, the American Association of Oral and Maxillofacial Surgeons (AAOMS) Board of Trustees envisioned the need to identify the outcomes of procedures commonly performed by Oral and Maxillofacial Surgeons (OMSs). In 1995, the AAOMS Board of Trustees appointed the 5 member special subcommittee for Outcomes Assessment which was created to design and implement the investigation of procedure-related outcomes. The overarching goal of the Oral and Maxillofacial Outcomes System was to establish a specialty-specific data repository for tracking national practice trends, estimating risk-adjusted outcomes of care, and determining associations between alternative processes of care and outcomes. Among the many charges of this subcommittee was to coordinate efforts with the AAOMS Third Molar Clinical Trial research group to complement their longitudinal third molar investigation of patients aged 25 years or less. The purpose of the AAOMS Age-Related Third Molar Study was to collect frequency data for patients 25 years of age and older undergoing extraction of at least 1 third molar on the day of surgery, with postoperative information collected at the longest follow-up visit. Because of the magnitude of statistical analysis, this first article will report only frequencies of intraoperative and postoperative morbidity. Subsequent publications will provide in-depth analyses of the complications associated with third molar surgery, including the association

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between age, medical illness and/or medicaments, degree of impaction, as well as neurovascular complications, and all other forms of complication ranging from postoperative infection to damage of adjacent structures.

Materials and Methods

OVERVIEW

A clinical data repository in partnership with Outcomes Science, Inc (Boston, MA) was developed that would track national trends, estimate risk-adjusted outcomes of care, and determine associations between alternative methods of treatment and clinical outcomes. For purposes of this study, the data, collection materials, and methods were developed in the alpha and beta testing phases conducted in 2000. The AAOMS *Parameters of Care Document*[1] was used as a guideline by the AAOMS Outcomes Committee in conjunction with 2 database management vendors: Covance (Washington, DC) and Outcomes Science. They provided expertise in the development of objectives and goals for the data collection instruments (Figs 1, 2) used in the alpha and beta testing.[2,3] A detailed discussion in the development of the data repository was previously published.[2]

STUDY DESIGN/SAMPLE

The study sample was composed of a consecutive series of patients derived from the population of patients 25 years of age or older who were evaluated and had undergone extraction of 1 third molar by an OMS between January 2001 and December 2001 in the United States. Eligible office-based ambulatory settings included community-, dental school-, or hospital-based practices.

The OMS's selected to be in the study were composed of volunteers derived from the population of OMS's practicing in the United States during the study interval. To be eligible for study enrollment, the OMS participants had to *1*) be an AAOMS member and agree to submit demographic, clinical, and patient satisfaction data to the AAOMS national data repository for all patients that met the eligibility criteria and *2*) have internet access. The investigators strove to obtain regional representation from the 6 AAOMS districts (district I, northeast; district II, mid-Atlantic; district III, southeast; district IV, midwest; district V, southwest-mountain; district VI, Pacific Coast and western). The 63 participating surgeons grouped by AAOMS district were for district I (15%, n = 10), II (12.7%, n = 8), III (15.9%, n = 10), V (22.2%, n = 14), and VI (25.4%, n = 16). As indicated, each participating surgeon obtained appropriate Human Investigation Review Board approval.

Data collected for each participating surgeon included name, years in practice, and board certification status. The participating surgeons mean length of practice was 18.9 years. The length of practice in years ranged from 0 (started practice in 2001) to 45. All but 14.5% of surgeons were board certified, and the mean duration since certification was 15.6 years. Years in practice while certified ranged from 0 (certified in 2001) to 43.

STUDY VARIABLES

The predictor variables were categorized as demographic, the American Society of Anesthesiology system,[4] and significant chronic medical conditions and risk factors. Demographic data included gender and age. The American Society of Anesthesiology system was defined as: Class 1, healthy, no medical problems; Class 2, mild systemic disease; Class 3, severe systemic disease, but not incapacitating; Class 4, severe systemic disease that is a constant threat to life; and Class 5, moribund, little chance of survival but submitted to operation in desperation. Chronic medical conditions included such entities as heart disease, hypertension, diabetes, immune deficiency, malignancy, organ transplantation, and other local or systemic conditions. Risk factors included: *smoking* cigarettes, cigars, or pipes during the 2 months before surgery; *drinking* 5 or more alcohol-containing drinks (more than 60 g of ethanol) per day over the 2 months before surgery (a single alcoholic beverage contains approximately 12 g of ethanol); or taking any of the following *medications* at the time of surgery (oral contraceptives, aspirin, ibuprofen or other nonsteroidal anti-inflammatory drugs, anticoagulants such as warfarin, or corticosteroids). Using the *AAOMS Parameters of Care* definitions, each third molar, whether extracted or retained, was classified as absent (if the third molar was not present, whether congenitally absent or previously lost or extracted), full bony (if most or all of the crown was covered by bone; requires mucoperiosteal flap elevation and bone removal), partial bony impacted (if part of the crown is covered by bone; requires mucoperiosteal flap elevation and bone removal), soft tissue impacted (if the occlusal surface of tooth covered by soft tissues; requires mucoperiosteal flap elevation), or erupted (if the third molar is so positioned that the entire clinical crown is visible). Associated pathology or abnormal finding for each third molar were defined as *gross caries*, if decay was present that involved more than 1 surface of the third molar with or without pulpal involvement; *periodontal disease*, if the third molar was associated with periodontitis with advanced destruction, defined as presence of periodontal probing depths greater than 6 mm with attachment loss greater than 5 mm and radiologic evi-

AAOMS Surgeon ID: **Patient ID:**
DOB: _ _/_ _/_ _ _ _ or Age _____ (years) **Date of Surgery: _ _ / _ _ / _ _ _ _**

Gender:	○ Male ○ Female
ASA Class:	○ I ○ II ○ III ○ IV ○ V
Chronic Conditions (check all that apply):	□ Heart Disease □ Hypertension □ Diabetes □ Immune Deficiency □ Malignancy □ Organ transplant candidate □ Other local/systemic □ Other_____
Risk Factors:	□ Smoking □ Alcohol □ Medications
Chronic Conditions (check all that apply):	□ Heart Disease □ Hypertension □ Diabetes □ Immune Deficiency □ Malignancy □ Organ transplant candidate □ Other local/systemic □ Other_____
Preoperative classification of all third molars:	1 □ Absent □ Full bony impacted □ Partial bony impacted □ Soft tissue impacted □ Erupted 16 □ Absent □ Full bony impacted □ Partial bony impacted □ Soft tissue impacted □ Erupted 17 □ Absent □ Full bony impacted □ Partial bony impacted □ Soft tissue impacted □ Erupted 32 □ Absent □ Full bony impacted □ Partial bony impacted □ Soft tissue impacted □ Erupted
Preoperative pathology/abnormal finding, if any:	Gross caries □ 1□ 16 □ 17 □ 32 Periodontal disease □ 1 □ 16 □ 17 □ 32 Acute/chronic infection □ 1 □ 16 □ 17 □ 32 Pathology of adjacent tooth due to 3rd molar □ 1 □ 16 □ 17 □ 32 Acute/chronic infection of adjacent tissues □ 1 □ 16 □ 17 □ 32 Cyst/Tumor □ 1 □ 16 □ 17 □ 32 Fractured tooth or root □ 1 □ 16 □ 17 □ 32 Internal or external resorption □ 1 □ 16 □ 17 □ 32 Mandibular fracture □ 1 □ 16 □ 17 □ 32 Unopposed, hyper-erupted and/or non-functional □ 1 □ 16 □ 17 □ 32 Other □ 1 □ 16 □ 17 □ 32
3rd molar(s) extracted:	□ 1 □ 16 □ 17 □ 32
Which medications were prescribed?	**Antibiotics** □ Penicillin □ Clindamycin □ Tetracycline □ Erythromycin □ Other, specify _____ **Chemotherapeutic agents:** □ Peridex □ Other, specify _____ **Pain medications:** □ Tylenol □ Tylenol w/codeine □ Tylenol w/ oxycodone □ Ibuprofen □ Naprosyn □ other, specify _____ □ None □ Other
If new patient visit, indicate type:	○ 99201 ○ 99202 ○ 99203 ○ 99204 ○ NA
Intraoperative Complications:	□ None □ Inferior alveolar nerve injury □ Lingual nerve injury □ Unexpected/prolonged hemorrhage □ Unplanned need for parenteral drugs/fluids □ Unplanned transfusions of blood/blood components □ Retention, aspiration, migration or ingestion or root/tooth fragment □ Compromised airway □ Maxillary/mandibular fracture □ Injury to adjacent tooth □ Condition requiring unplanned additional surgery □ Death □ Other
Additional Comments:	

FIGURE 1. AAOMS Age-Related Third Molar Study: clinical course form.

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dence of bone loss (tooth mobility may be increased); *pathology of adjacent tooth due to third molar*, such as caries, root resorption, periapical infection; and *other* if 1 or more third molars were associated with preoperative pathology/abnormal finding(s) that were not included among the options listed. Operative and perioperative data were collected and recorded (Tables 1-7; Figs 1, 2).

Data collected at follow-up included postoperative complications, the need (if any) for additional surgical procedures or treatment; diagnostic tests required to treat a complication; and if the patient required hospitalization to treat the complication (Table 6). Quality of life data collected at follow-up included the number of days the patient missed work and was unable to perform normal daily activities (Table 7).

To ensure patient and surgeon anonymity, data entered in the national data repository did not include patient/surgeon names or social security numbers. Rather, patient and surgeon data were tracked using unique identification numbers. Surgeons were asked to submit data to the national repository using the world wide web. Outcomes Science provided onsite education and training to all site participants and developed a Participants Instruction Manual (with definitions) for the site participants to use as a refer-

Surgeon ID: **Patient ID:** **Date of Follow-up:** __ __/__ __/__ __

How many days of work did the patient miss as a result of third molar extraction? _____days How many days was patient unable to perform normal daily activities? _____days	
Postoperative Complications:	□ None □ 1 □ 16 □ 17 □ 32 Alveolar Osteitis □ 1 □ 16 □ 17 □ 32 Acute/Chronic infection □ 17 □ 32 Inferior alveolar nerve injury □ 17 □ 32 Lingual nerve injury □ Facial/trigeminal nerve dysfunction □ Unexpected/prolonged trismus □ Unexpected/prolonged hemorrhage □ Unplanned need for parenteral drugs/fluids □ Unplanned transfusions of blood/blood components □ Retention, aspiration, migration or ingestion of root/tooth fragment □ Compromised airway □ Maxillary/mandibular fracture □ Injury to adjacent tooth □ Oral, antral and/or nasal fistula formation □ Condition requiring unplanned additional surgery □ Death □ Other
Surgical Procedures related to pathology/complication:	□ Incision/drainage □ Packing for alveolar osteitis □ Extraction of teeth (not 3 rd molar) □ Sinus closure □ Sequestrectomy/ debridement □ Other_____
Diagnostic Tests (related to complication):	□ PA/Occlusal film □ Panoramic radiograph □ Neck CT □ Other CT Scan □ CBC/WBC MRI_____ Biopsy _____ □ Culture and Sensitivity Other _____
Check all that apply:	□ Patient cared for in an ED as a result of a pathology/complication □ Patient transferred by ambulance to another health care facility □ Patient hospitalized for the third molar extraction because of underlying chronic condition □ Patient hospitalized as a result of pathology/complication

FIGURE 2. AAOMS Age-Related Third Molar Study: follow-up form.

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ence. Each of the participants in the study entered data via the internet using a handheld wireless personal digital assistant device or directly online real-time summary data specific to his/her practice, as well as aggregate data from all other participating surgeons were available throughout the study. However, access to other surgeons was not made available.

INCLUSION/EXCLUSION CRITERIA

All patients 25 years of age and older who were undergoing extraction of at least 1 third molar by an OMS, either as in an inpatient or outpatient were eligible for inclusion in this study. Patients were to be 25 years of age or older at the time the third molar extraction was performed. Both male and female patients were eligible, without respective to underlying dental/medical conditions or comorbidities. Patients who did not receive a postoperative follow-up were excluded from the study.

Data Management/Analyses

The 3 major types of data entry errors addressed in this study were *1*) missing data; *2*) incorrect data; and *3*) excess variability. Onsite education along with use of the participant manual alone contributed to a reduction in the frequency of these errors. In addition, incorporated within the software were line edit checks that prompted users to edit their entries for not only missing data but also for values that were illogical or out of range.

Table 1. PATIENT POPULATION CHARACTERISTICS

	No. of Patients	Frequency (%)
Gender		
Male	1,933	52.0
Female	1,786	48.0
Age		
25–29	916	24.4
30–39	1,259	33.5
40–49	759	20.2
50–59	466	12.4
60–69	190	5.1
70–79	108	2.9
80–89	58	1.5
90–99	4	0.1
ASA classification		
I Healthy	2,727	72.5
II Mild systemic illness	942	25.1
III Severe systemic illness (not incapacitating)	85	2.3
III Severe systemic illness (life threatening)	2	0.05
IV Moribund	4	0.1
Chronic conditions		
Chronic heart disease	179	4.8
Hypertension	383	10.2
Diabetes	101	2.7
Immune deficiency	7	0.2
Malignancy	23	0.6
Organ transplant candidate	9	0.2
Organ transplant recipient	1	0.0
Other chronic local or systemic conditions	160	4.3
Other chronic conditions	359	9.5%
Total chronic conditions	1,222	24.8 % had at least 1 chronic condition
Risk factors		
Smoking	612	16.3
Alcohol	339	9.0
Medications	348	9.3
1 Risk factor	916	24.4
2 Risk factors	160	4.3
3 Risk factors	21	0.6
Total with at least 1 risk factor	1,097	29.2

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Table 2. THIRD MOLAR CHARACTERISTICS

Tooth Number	Impaction Type	Number	Frequency (%)
1	Unknown	365	9.7
	Absent	1,016	27.0
	Full bony impacted	384	10.2
	Partially impacted	197	5.2
	Soft tissue impacted	118	3.1
	Erupted	1,680	44.7
	Total known present	2,379	63.3
16	Unknown	386	10.3
	Absent	975	25.9
	Full bony impacted	401	10.7
	Partially impacted	196	5.2
	Soft tissue impacted	134	3.6
	Erupted	1,668	44.4
	Total known present	2,399	63.8
17	Unknown	361	9.6
	Absent	975	26.1
	Full bony impacted	401	10.7
	Partially impacted	196	5.2
	Soft tissue impacted	134	3.6
	Erupted	1,668	44.7
	Total known present	2,424	64.9
32	Unknown	348	9.3
	Absent	769	20.5
	Full bony impacted	713	19.0
	Partially impacted	568	15.1
	Soft tissue impacted	166	4.4
	Erupted	1,196	31.8
	Total known present	2,643	70.3

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To minimize selection bias and ensure that the sites consecutively entered all appropriate patient records in the database, an audit form was developed and sent to all participating sites. The audit was designed to validate data in the database against the source. In conducting the audit, personnel at each site were asked to send source data, from which the initial form was completed. The records used for the audit were to be original sources for the data collected (ie, chart records) rather than paper versions of the online data entry form. The audit data submitted were redacted medical record excerpts for selected patients. An account was created in the online data entry system for the entry of all audit data. Identifications of the patients were concealed, and patient numbers were used as identification. The patient numbers on the audit records were matched to the system-generated number of the original records to enable field-for-field analysis of each record. An audit report was written providing the percentages of matching data items.

DATA ANALYSIS

Data was gathered and subjected to multiple forms of statistical analysis. Actual line items of information totaled 14,240 and equaled 2,380 pages of data. Because of the magnitude of the information gathered, it was determined that this data would be reported, analyzed, and discussed in multiple stages with specific levels of focus. The present investigation was designed to report demographic data associated with the patient population including age range (25 years or older), gender, specific frequencies associated with third molar presence, impaction classification, associated pathology, coexisting medical illness and/or medicaments, intraoperative and/or postoperative com-

Table 3. PREOPERATIVE DIAGNOSIS

Diagnosis	Tooth Number	Number	Frequency (%)
Caries	1	721	19.2
	16	764	20.3
	17	660	17.6
	32	688	18.3
Periodontal disease	1	435	11.6
	16	485	12.9
	17	661	17.6
	32	618	16.4
Infection	1	235	6.3
	16	271	7.2
	17	627	16.7
	32	617	16.4
Adjacent pathology	1	132	3.5
	16	142	3.8
	17	281	7.5
	32	267	7.1
Adjacent tissue	1	107	2.8
	16	125	3.3
	17	294	7.8
	32	265	7.0
Cyst/tumor	1	10	0.3
	16	7	0.2
	17	55	1.5
	32	63	1.7
Fractured tooth	1	16	0.4
	16	20	0.5
	17	21	0.6
	32	26	0.7
Resorption	1	3	0.1
	16	4	0.1
	17	5	0.1
	32	5	0.1
Mandibular fracture	1	0	0.0
	16	0	0.0
	17	0	0.0
	32	0	0.0
Unopposed/hyper/ nonfunctional	1	431	11.5
	16	427	11.4
	17	233	6.2
	32	246	6.5
Other	1	75	2.0
	16	59	1.6
	17	69	1.8
	32	76	2.0
Any pathology or abnormality	1	1,634	43.5
	16	1,694	45.1
	17	1,972	52.4
	32	2,005	53.3

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plications, as well as quality of life issues (days of work missed or normal activity curtailed). Further and in-depth analyses will be provided in subsequent publications focused on the association between age, third molar position, medical illness and/or medicaments with complications of third molar surgery, neurovascular complications, and all other forms of complication ranging from postoperative infection to damage to adjacent structures.

Table 4. PATTERN OF EXTRACTIONS FOR 3,760 PATIENTS

Extraction Pattern	Frequency	Percent
1 only	270	7.2
16 only	322	8.6
17 only	490	13.0
32 only	496	13.2
1 and 16	196	5.2
1 and 17	28	0.7
1 and 32	155	4.1
16 and 17	139	3.7
16 and 32	29	0.8
17 and 32	240	6.4
1, 16, and 17	99	2.6
1, 16, and 32	105	2.8
1, 17, and 32	98	2.6
16, 17, and 32	97	2.6
1, 16, 17, and 32	996	26.5
Total	3,760	100

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Results

Of the 63 surgeons who were sent a database audit verification form, 39 surgeons (62%) signed and confirmed that all patients meeting the inclusion criteria were entered consecutively in the online database. We conducted a second, more detailed audit of the 63 surgeons who returned the database verification

Table 5. INTRAOPERATIVE COMPLICATIONS FOR 3,760 PATIENTS

Complications	Number	Frequency (%)
Intraoperative inferior alveolar nerve injury	14	0.4
Intraoperative lingual nerve injury	2	0.1
Unexpected hemorrhage	28	0.7
Unplanned parenteral drugs/ fluids	3	0.1
Unplanned transfusion	0	0.0
Aspiration or ingestion of fragments	29	0.8
Compromised airway	20	0.5
Maxillary/mandibular fracture	1	0.0
Injury to adjacent tooth	3	0.1
Unplanned additional surgery	6	0.2
Death	0	0.0
Other complications	46	1.2

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Table 6. POSTOPERATIVE COMPLICATIONS

Complications	Tooth Number	Number	Frequency in % Per Patient	Frequency in % Per Tooth
Alveolar osteitis	1	6	0.2	0.3
	16	4	0.1	0.2
	17	261	6.9	11.9
	32	282	7.5	12.7
	Any maxillary	10	0.3	0.3
	Any mandibular	543	14.4	12.3
	All third molars	553	14.7	6.6
Acute/chronic infection	1	6	0.2	0.3
	16	0	0.0	0.0
	17	16	0.4	0.7
	32	21	0.6	1.0
	Any maxillary	6	0.2	0.2
	Any mandibular	37	1.0	0.8
	All third molars	43	1.2	0.5
Inferior alveolar anesthesia/paresthesia	17	24	0.6	1.1
	32	37	1.0	1.7
	All mandibular	61	1.6	1.4
Lingual nerve anesthesia/paresthesia	17	6	0.2	0.3
	32	6	0.2	0.3
	All mandibular	12	0.4	0.3
Facial/trigeminal nerve dysfunction	Any tooth	8	0.2	0.1
Unexpected/prolonged trismus	Any tooth	47	1.3	0.6
Unexpected/prolonged hemorrhage	Any tooth	5	0.1	0.1
Unplanned postoperative parenteral drugs/fluids	Any tooth	1	0.0	0.0
Unplanned postoperative transfusion	Any tooth	0	0.0	0.0
Retention, aspiration, migration, or ingestion	Any tooth	5	0.1	0.1
Postoperative compromised airway	Any tooth	0	0.0	0.0
Maxillary/mandibular fracture	Any tooth	0	0.0	0.0
Injury to adjacent tooth	Any tooth	3	0.1	0.0
Oral, antral, nasal fistula	Any tooth	4	0.1	0.1
Unplanned additional surgery	Any tooth	5	0.1	0.1
Other complications	Any tooth	60	1.6	0.7

NOTE. 3,760 third molar patients, and 8,333 third molars removed; 3,930–maxillary; 4,403–mandibular; 1,947–#1; 1,983–#16; 2,187– #17; 2,216–#32.

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forms. The second audit included 6 sites selected from each of the 6 AAOMS districts. Patient records (n = 30) were retrieved from each of the 6 sites. The audit consisted of a direct comparison of the patient data entered online with a copy of the patient record. For demographic variables, the percent agreement between the source data (ie, patient record and data entered online) averaged 72% and ranged from 38% (date of surgery) to 94% (chronic conditions). For procedures and related information, the agreement percentage between the source data and database averaged 99.3% and ranged between 95% and 100%. For anesthetic technique variables, the average percent agreement was 80% and ranged from 51% (preoperative third molar classification) to 96% (preoperative pathology). For medications, the percent agreement averaged 91% and ranged from 80% (pain medications) to 98% (chemotherapeutic agents). For

Table 7. QUALITY OF LIFE ISSUES MEASURED IN NUMBER OF WORK DAYS MISSED OR DAYS WITH NORMAL ACTIVITY CURTAILED

	Number	Frequency (%)
Days of work missed	0	1,284 (34.1)
	1	1,022 (27.2)
	2	844 (22.4)
	3	286 (7.6)
	4	147 (3.9)
	5	105 (2.8)
Days with normal activity curtailed	0	1,173 (31.2)
	1	1,168 (31.1)
	2	682 (18.1)
	3	284 (7.6)
	4	152 (4.0)
	5	202 (5.4)

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intraoperative complications, the percent agreement averaged 98%. Percent agreement could not be computed for the missed days of work or ability to perform daily activities. However, the percentage agreement for postoperative complications was 98% and 99% for surgical procedures and diagnostic tests related to a complication. For studies of this magnitude, the acceptable level of error, set a priori, was less than 10%. All categories verified by audit met these criteria.

Between January 2001 and December 2001, 4,648 patients were initially enrolled in the study, from which 3,760 returned for a postoperative evaluation. The results are summarized in Tables 1 through 7. From among the 3,760 patients (52% male; 48% female) all were 25 years of age or older, with 9,845 third molars of which 8,333 were removed (Table 1). The majority of the patients involved in the study were healthy (72.5%) and the overall number of patients was reduced with advancing age (Table 1). Hypertension and chronic heart disease were the most frequently encountered chronic conditions, representing approximately 10.2% and 4.8% of the patient population, respectively. At least 1 risk factor, including smoking (16.3%), medications (9.3%), and alcohol use (9.0%) was encountered in greater than 29.2% of the patients (Table 1).

Almost one quarter (20.5% to 27.0%) of third molars were absent upon initial patient evaluation (Table 2). Maxillary third molars were observed to be erupted (44.4% to 44.7%) more frequently than mandibular third molars (31.8% to 44.4%). Similarly, mandibular third molars (10.7% to 19.0%) were more often observed to be full bony impacted as compared with maxillary third molars (10.2% to 10.7%) (Table 2). Caries (17.6% to 20.3%), periodontal disease (11.6% to 17.6%), and infection (6.3% to 16.7%) were the most frequently encountered preoperative diagnoses (Table 3). Some pathology or abnormality was associated with 43.5% to 53.3% of the third molars. Mandibular third molars were associated with a slightly higher frequency of pathology or abnormality (Table 3). The most frequent combination of third molar extractions was for all 4 third molars (26.5%), followed by a combination of 2 (0.7% to 5.2%), then a single tooth (7.2% to 13.2%), and finally 3 teeth (2.6% to 2.8%) (Table 4).

Intraoperative complications occurred with a frequency of less than 1% (Table 5). None of the patients required a blood transfusion. Only 3 of the 3,760 patients enrolled in this investigation required additional unplanned parenteral fluids or drugs intraoperatively, and only 1 patient required them postoperatively (Table 6). There were no deaths from among the 3,760 patients that participated in this investigation (Table 5). None of the patients experienced compromised airways postoperatively (Table 6), whereas the frequency of intraoperative airway compromise was 0.5% (Table 5). None of the patients experienced fractures of the mandible, and only a single patient experienced a maxillary alveolar fracture (Table 6). Similarly, and with the exception of alveolar osteitis, postoperative complications occurred with a very low frequency (Table 6). Alveolar osteitis was the most commonly encountered postoperative problem and occurred with a frequency of about 2 or 3 in a thousand encounters for maxillary third molars (0.2% to 0.3%), and slightly more than 1 in 10 (11.9% to 12.7%) for mandibular third molars (Table 6). Acute or chronic infections occurred with a frequency of 0.0% to 1.0% per patient (Table 6). Inferior alveolar nerve anesthesia/paresthesia was encountered postoperatively with a frequency of 1.1% to 1.7%. Lingual nerve anesthesia/paresthesia occurred with a lower frequency (0.3%) (Table 6), between 3 and 6 times that for inferior alveolar anesthesia/paresthesia. Lastly, almost one third of patients (31.2% to 34.1%) had minimal inconvenience associated with the extraction and neither missed work nor had normal activities curtailed (Table 7).

Discussion

The focus of this, the AAOMS Age-Related Third Molar Study, was to provide the largest prospective evaluation of patients 25 years of age or older undergoing third molar surgery. In particular, this study provides the OMS with reliable data related to preoperative risk factors and postoperative complications associated with the removal of third molars for this specific population (aged 25 years or older). Previous investigations have relied on smaller sample sizes, all ranges of age, or retrospective analysis for the evaluation of similar data, therefore limiting the ability for direct comparison. Also, the AAOMS Third Molar Clinical Trial study was based on investigation of the disease process associated with the retention of third molars in the younger patient population, hence providing supplemental data to the present study.[1-17] It must be stated from the outset that this particular investigation investigated only patients seeking third molar surgery by OMSs and not the entire universe of patients receiving third molar surgery. Thus, it could be possible that less difficult third molars could have been removed by other dentists, which could have had an impact upon the frequency of complications for the universe of all patients having had third molars removed. Moreover, approximately one quarter of the patients in this investigation presented with at least 1 third molar missing. Again, we do not know whether this was a congenital absence or whether these teeth were removed by another dentist, thereby influencing the frequency of complications for the universe of all patients requiring third

molar surgery. Subsequent publications emanating from this investigation will discuss in depth the association between age, medical illness and/or medicaments with complications of third molar surgery, as well as neurovascular complications, and all other forms of complication ranging from postoperative infection to damage of adjacent structures.

How does the AAOMS Age-Related Third Molar Study impact the OMS in practice? In summary, the typical patient who is 25 years of age or older, presenting to the OMS's office with a third molar problem will most likely be a healthy (72.5%) male or female (Table 1). Yet, for those patients that do have a chronic medical condition, hypertension (10.2%) or some other form of cardiac disease (4.8%) will most often be presented. Almost one third (29.2%) of these patients will have at least 1 medical risk factor, the most frequent being smoking (16.3%). Retention of 3 third molars will most often be encountered, with maxillary thirds most commonly found to be erupted and mandibular third molars found equally to be erupted or impacted (soft tissue/partial/full bony). Almost half (43.5% to 53.3%) will be associated with some form of pathology, more frequently caries (17.6% to 20.3%) and periodontal disease (11.6% to 17.6%).

Consequences of surgery having the greatest impact on the patient, patient's family, and surgeon include death, morbidity requiring hospitalization, and finally some form of untoward outcome rendering the patient disabled, such as a fractured jaw or anesthesia/paresthesia. None of the patients experienced compromised airways postoperatively, and among those identified intraoperatively, it could not be determined whether they were an anesthetic consequence that merely required jaw repositioning, or perhaps a throat pack/drape requiring repositioning or removal. In either event, the outcome was favorable.

From the standpoint of informed consent and medicolegal consequences, the frequency of anesthesia/paresthesia is of paramount importance. The postoperative anesthesia/paresthesia frequency was relatively low. As expected, anesthesia/paresthesia of the inferior alveolar nerve was more commonly observed than the lingual nerve, with mandibular third molar surgery. The surgical complexity associated with full bony impactions may account for the higher frequency of these types of injuries, as compared with soft tissue impactions and erupted teeth. As a result of good surgical technique and experience, none of the patients experienced fractures of their mandible. The fractured maxilla associated with the removal of the maxillary left third molar was merely an alveolar fracture and not a complete Le Fort level fracture.

This investigation shows that the removal of third molars in an adult patient population is a safe surgical procedure with minimal morbidity, no mortality, and no long-term negative impact on the patient's quality of life.

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