Late Mandibular Fracture After Third Molar Surgery: A Survey of Connecticut Oral and Maxillofacial Surgeons

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Purpose: This study investigated the incidence and causative factors involved in late mandibular fractures after third molar surgery.

Materials and Methods: A questionnaire was sent to 106 oral and maxillofacial surgeons in Connecticut, asking them about their experience with late fractures over a 10-year period.

Results: A 79% response indicated 28 fractures occurring in 611,000 extractions, for an incidence of 0.0046%. The cause was found to be multifactorial and included age, gender, type of impaction, preexisting infection, and failure to maintain a soft diet in the postoperative period. Most fractures occurred between the 1st and 21st days postoperatively. Three of the fractures resulted in malpractice litigation.

Conclusion: Men over the age of 25 years should be specifically informed about the risk of late mandible fracture after third molar surgery. This group of patients should be educated about the quality and duration of a soft diet.

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Contemporary oral and maxillofacial surgery practice includes the use of a detailed informed consent designed to educate the patient about the risks and complications and enable them to contribute to the decision-making process about surgery, as well as to prevent malpractice litigation. Discussions of late risks and complications, although relatively uncommon, should be included both in the preoperative risk/benefit discussions and in the postoperative instructions.

Although other complications have been extensively studied and reported,^{1,4} the incidence and causes of late mandibular fractures have not. This retrospective survey of the 10-year experience of Connecticut oral and maxillofacial surgeons was designed to determine the incidence, precipitating factors, and outcomes of late mandibular fractures after third molar surgery.

Patients and Materials

A 2-page, 14-question survey was sent to 106 oral and maxillofacial surgeons who were on the mailing list of the Connecticut Society of Oral and Maxillofacial Surgeons, asking them to report their experience with late mandibular fractures. A late fracture was defined as one occurring any time after the patient had left the operatory or operating room. The survey covered the 10-year period between 1987 and 1997.

Data were also collected regarding the age and experience of the surgeon, the type of impaction, the gender and age of the patient, any history of previously existing infection or pathologic conditions, and the date on which the fracture occurred. Any event precipitating the fracture was recorded, as was the final outcome and any legal ramifications. Comments also were requested. No data were collected in reference to occupation, smoking, or bruxism.

Results

Eighty-four surgeons returned the questionnaire, a 79% response rate. Twenty-eight late fractures, all unilateral, were reported for the 10-year period during which the responding surgeons removed an estimated 611,000 impacted mandibular third molars. The incidence of late fracture was thus 0.0046%. The number of mandibular third molars extracted annually ranged from 50 to 600, with a mean of 500 per surgeon. The

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Table 1. AGE OF PATIENTS SUSTAINING A LATE MANDIBULAR FRACTURE

Age of Patient (yr)	No. of Patients
16-19	0
20-25	6
26-35	8
36-45	7
45-60	7
	28

responding surgeons had been in practice from 1 to over 25 years, with a mean of 20 years. Seven had been in practice less than 5 years, and 37 had been practicing more than 20 years. Four of the fractures were reported by surgeons who had practiced less than 5 years.

The patients' ages ranged from 20 to 60 years, with an average of 39 years. None of the patients were younger than 20 years old, whereas 20 of 28 were older than 25 years (Table 1). Six patients were female, with a mean age of 28 years, and 22 were men, with a mean age of 40 years.

Eighteen of the 28 fracture patients had a history of infection before the extractions, whereas 2 were reported as having "large" cysts associated with the impacted third molars. Anatomic descriptions of the impacted teeth before surgery included all but the partial bony distoangular variety. Eighteen were full bony, and 9 were partial bony impactions (Table 2). One surgeon did not describe the position of the tooth.

The fractures occurred from the 1st postoperative day to the 56th postoperative day. Nineteen of the 28 fractures occurred between days 8 and 21 after surgery, with a mean of 12 days (Table 3).

Twenty-one of the 84 responding surgeons reported late fractures. Of those 21 surgeons, 5 reported 2 incidents, and 1 reported 3 occurrences. These 6 surgeons had all been in practice more than 15 years.

The precipitating event was reported in 24 of the 28 cases. Fractures occurred while chewing in 18 of 24 cases, but the type of food was reported for only 10 of these. Assaults accounted for 2 fractures, and 1 fracture occurred during a fall. One fracture each occurred during sports, exercise, and yawning, respec-

Table 2. TYPE OF IMPACTED TOOTH

Anatomic Position	Partial Bony	Full Bony
Vertical	3	6
Horizontal	1	6
Mesioangular	5	3
Distoangular	—	3
Total	9	18

Table 3. TIME OF POSTOPERATIVE FRACTURE

Postoperative Day	No. of Patients
1-7	7
8-14	11
15-21	8
22-29	0
30-60	2

tively. One was a pathologic fracture occurring in the only case of postextraction osteomyelitis in this survey (day 56 in a 60-year-old patient).

Of those fractures that occurred during chewing, the patient ages ranged from 20 to 60 years, with a mean age of 41 years. The type of foods implicated are listed in Table 4.

Therapy for the fractures included closed reduction in 22 patients, open reduction in 5, and no therapy in 1. Legal outcomes were reported as 3 lawsuits, one of which was settled out of court.

Comments were sparse but included "without gross pathology, such as large cyst or odontogenic tumor; I think the incidence of late fracture is zero."

Discussion

It is apparent from this survey that although the incidence of late mandibular fracture after third molar impaction surgery is low, it is not zero. Numerous authors have studied the complications of third molar surgery, both prospectively and retrospectively, some studies involving large cohorts of patients.¹⁻⁴ However, whereas intraoperative mandibular fracture is a much-feared complication, few studies record or even discuss the late postoperative fracture. Therefore, there is little documentation, except for occasional anecdotal reports, suggesting that the incidence is indeed small. This survey confirms that the incidence is low, occurring in only about 0.005% of impacted

Table 4. PRECIPITATING FACTORS

Mastication of food	Bagel—2 Nuts—1 Steak—1 Spareribs—1 Bacon—1 Frozen candy bar—1 Toast—1 Sewing thread—1 Doritos—1
Other	Assault—2 Fall—1 Sports—1 Exercise—1 Yawning—1 Osteomyelitis—1

third molar surgeries in a 10-year period. Nevertheless, for these 28 patients and their surgeons, the fracture and the necessary therapy was a major event.

The term *late* is defined arbitrarily when describing surgical complications. In this study, a fracture occurring after the patient has been dismissed from the office or the operating room was considered late. These fractures could therefore be considered to be indirectly the result of the surgery rather than a direct, intraoperative complication.

The age and the experience of the surgeon seem to have little, if any, bearing on the incidence of fracture. Only 4 of the 28 fractures were reported by surgeons who had been in practice 5 years or less. Sisk et al⁵ have reported a higher rate of other complications, such as alveolar osteitis and nerve dysesthesia, when the surgery was performed by residents as compared with faculty.

The type of impaction seems to be significant. Not surprisingly, full bony impactions were implicated more commonly (double) than partial impactions. Full bony impactions generally occupy a greater volume of the mandibular body and require more bone removal during surgery. The postoperative result is a smaller or weaker strut, or cortical shell of bone, which thus may be an important causative factor in late fractures.

The age of the patient appears to be significant. Few fractures in this survey occurred in patients younger than 25 years old, the age-group most frequently undergoing impaction surgery in the United States. Osborn et al³ reported that 68% of the patients in their study were younger than 25 years old, whereas Goldberg et al² and Sisk et al⁵ reported mean ages of 19 and 19.3 years, respectively. However, the preponderance of fractures in this survey occurred in the age-group considerably over 25 years, with a mean age of 39 years. Males with such fractures averaged over 40 years. This finding supports the data of Bruce et al⁶ that the complication rate more than doubles in third molar surgery after the age of 24 years.

Eighteen of the 28 patients, or 64%, had a history of previous preoperative infections in the third molar site. Goldberg et al⁷ reported a 21% preoperative infection rate in a series of 500 third molar patients. Although no description of the severity or duration of the infections was collected, it is reasonable to assume that chronic or deep infection will decalcify or destroy bone, thereby contributing to the likelihood of fracture, both during and after third molar surgery.

Gender also plays a role in late fractures. Most third molar surgery investigations report a higher ratio of female to male patients undergoing the procedure: 57% female in the Osborn et al study³ and 62% female in the Goldberg et al study.² Yet, in this study, 7 female and 21 male patients sustained the complication. Although the rate of mandibular fracture is well

known to be higher in men and boys secondary to assaults, sports, and motor vehicle accidents, a greater incidence should not be anticipated in a study of late impaction surgery complications. Intuitively, a higher rate of fracture might be expected among older, perhaps osteoporotic women, but these data show middle-aged men to be disproportionately at risk.

The temporal point at which the fractures occurred varied widely, from 1 day to 8 weeks, but the largest cluster of patients sustained their fracture in the period from 8 to 21 days. It is during this period that granulation tissue is being replaced by connective tissue in the extraction site. In older patients, a lag phase in healing occurs during this period. Two thirds of the socket is not filled with osteoid or bone until the 38th day.⁸⁻¹⁰ The fact that most fractures in this study occurred during the period when the mandibular bone strength was weakest confirms that the risk of fracture is greatest during the second and third postoperative weeks.

Of considerable interest is the finding that 18 of the 28 fractures occurred during chewing. The masticatory force required to break down food before deglutition can place considerable stress on bone weakened by surgery and not yet fully restored or calcified. Eating bagels, nuts, steak, spareribs, bacon, and frozen candy bars requires considerable masticatory force and hardly constitutes a soft diet. Even assuming that all third molar surgery patients received postoperative dietary instructions, perhaps inadequate emphasis is placed on the quality and duration of the soft diet. Also, noncompliance may be a greater problem than has been previously recognized in the cause of this late complication. Possibly, the issue of noncompliance accounts for the low rate (10.7%) of malpractice action after late fractures.

The data from this survey show that the patient at greatest risk for late post-third molar extraction fractures of the mandible is the noncompliant man 25 years of age or older, who has had a preoperative infection. This group should be identified and educated preoperatively and given unambiguous, postoperative instructions concerning the quality and necessary duration of a soft diet postoperatively.

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