Incidence of chronic neuropathic pain subsequent to surgical removal of impacted third molars

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To determine the incidence of atypical odontalgia/chronic neuropathic pain subsequent to surgical removal of impacted third molars, a telephone survey and a clinical investigation were carried out. Patients operated on for impacted mandibular third molars during 1994–96 in the Oral Surgery Clinic, School of Dentistry, University of Bergen, Bergen, Norway, were contacted by telephone. Answers were obtained from 1035 (71%) out of a total of 1458 operated patients. Median observation time was 5 years 9 months, ranging from 4 years 5 months to 6 years 9 months. All except 23 (2.2%) patients stated that they had no long-term symptoms or problems from the surgical site, jaw, or face after the third molar removal. These 23 patients were all examined clinically and radiologically, and symptoms and findings were evaluated. Seventeen patients had TMJ dysfunction: primarily pain of muscular and joint origin. Three patients had a periodontal problem associated with the adjacent second molar, with deep bony pockets and recurrent periodontal infection while two had chronic pulpitis of a second molar. One patient reported a temporary maxillary pain after removal of an ipsilateral mandibular third molar. None of the patients met the criteria for a diagnosis of atypical odontalgia/neuropathic pain. A 95% confidence interval of 0–0.38% of incidence rate of postoperative neuropathic pain was calculated. It is concluded that atypical odontalgia/chronic neuropathic pain subsequent to surgical third molar removal is rare. □ *Atypical odontalgia; epidemiology; molar third; oral surgery; postoperative pain*

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It has been claimed that damage of peripheral tissue or nerve frequently results in the development of a chronic pain state (1, 2). Both peripheral and central mechanisms are involved in the development of chronic pain after injuries to the nervous system (1, 3).

Chronic neuropathic pain (1) is characterized by onset in relation to damage or injury to peripheral nerves, e.g. in relation to trauma or surgical procedures (4). Onset can, however, be delayed for days and months (4). The pain is dull, deep, and aching and there may be paroxysmal sharp pain (4, 5). A peculiar feature is that pain persists long after complete and normal healing of peripheral tissues (6) and is often accompanied by allodynia, hyperalgesia, and hyperesthesia (4–6). There is also a lack of response to otherwise reliable pain elimination methods. Pre-injury pain has been claimed to increase the likelihood of later neuropathic pain development (4–6).

Atypical odontalgia is often used as a diagnostic term when pain is related to area of present or lost teeth (7–9). Several authors have suggested that deafferentation mechanisms play a significant role (3, 4, 7).

A number of case reports (10–12) and treatment studies (9, 13–16) have reported trigeminal neuropathic pain with onset related to dental treatment with associated nerve damage, e.g. endodontic treatment, apical surgery, and dental extractions. Recruitment of patients into these studies is made or described in such a way that no conclusions on incidence can be made.

Bronica (17) and Klausner (18) have emphasized the importance of collection of epidemiological data on incidence and prevalence of chronic pain disorders. The IASP (International Association for Study of Pain) publication 'Classification of Chronic Pain' 1994 (19) states prevalence figures of secondary trigeminal neuralgia, from facial trauma 5–10%, 'common' after orthognatic surgery, and 1–5% after removal of impacted teeth. Marbarch et al. (20) reported a prevalence of 3% of chronic neuropathic pain after endodontic treatment. Campbell et al. (21) reported 2.5% after surgical endodontic treatment, and Jacobs et al. (22) have suggested somewhat higher figures. Other studies on which the IASP prevalence figures are based have not been found.

Third molar removal is the most common procedure in oral surgery. A large proportion of these removals is prophylactic based on recommendations made from balanced assessments of benefits and risks including all short- and long-term complications (23–25). Incidence of postoperative neuropathic pain would thus be of importance in a reappraisal of recommendations for prophylactic third molar removals as well as in relation to preoperative patient information.

The aim of this investigation was to determine and evaluate the incidence of chronic neuropathic pain after surgical removal of impacted third molars.

Table 1. Immediate postoperative complications in 97 patients after 1458 third molar operations

	n	%
Postoperative bleeding	2	0.1
Sensory impairment	5	0.3
Infection	11	0.8
Alveolitis	91	6.2
Total	109	7.4

Patients and methods

Consecutive surgical patients' records from February 1994 to October 1996 were reviewed to find cases matching the following inclusion criteria:

- one fully developed mandibular third molar, possibly together with maxillary third molar
- operatively removed
- under local anaesthesia only
- in the Oral Surgery Clinic, School of Dentistry, University of Bergen
- available chart

Both specialists and residents performed the surgical procedures. Only local anesthesia with Xylocain 2% Adrenaline ('Astra'®) without preoperative analgesics or antibiotics was used. The third molar was removed using a buccal approach involving deflection of a mucoperiosteal flap, bone removal with burs and division of the tooth as needed under irrigation with normal saline. No lingual retractors were used. Postoperative analgesics were provided using a Paracetamol (500 mg) and Codeine (30 mg) combination (Pinex Forte, 'Alpharma'®). The patients were instructed to take the first tablet within 1 h after completion of surgery. Further analgesic medication was then used as needed.

All charts were reviewed regarding age at time of surgery, preoperative pain, and immediate postoperative complications. All complications in 97 patients (Table 1) resolved within 12 months after surgery except 2 sensory impairments that resolved completely after 18 months. All the 97 patients with immediate postoperative complications (Table 1) were also contacted and separately asked more specifically about any further subjective symptoms in relation to registered complications.

All patients were contacted by telephone by a national poll survey firm or staff at the clinic, and asked the following question: *'You had one (or more) impacted wisdom tooth/-teeth removed by an operation in 1994/5/6. Apart from pain and swelling immediately after the operation, do you now have any symptoms like pain, discomfort, swelling, abnormal skin or mucus membrane sensations or sensitivity, that you attribute to the wisdom tooth surgery'.*

Patients with a positive response to this question were examined in the clinic by an experienced oral surgeon after consent had been obtained. Complaint history was reviewed especially regarding time relation between surgery and first symptoms, whether there was pain before surgery, and about the development, course, and nature of complaints.

Clinical and radiographic examination included local neurological evaluation, with regard to sensory and motor functions, and possible trigger areas. Furthermore, an evaluation of muscular status was performed by bimanual palpation of masticatory and adjacent muscles in addition to an evaluation of TMJ function and joint sounds. An evaluation of the ipsilateral dentition was also made, with emphasis on periodontal and periapical status.

Orthopantomographic and intraoral radiographs from the area in question were evaluated by independent radiologists with special focus on alveolar healing, signs of bone infection as well as periodontal and periapical status. Consultation from specialists in periodontology and endodontics were obtained as needed.

Patients without local pathological conditions who met at least three of the criteria listed in Table 2 would be classified as having neuropathic pain.

Statistics

Differences between groups of patients were tested with using the chi-square test. In the present situation of zero recorded observations, a formula suggested by Gardner et al. (26) was used to calculate the upper limit of the confidence interval.

Results

A total of 1458 patients met the inclusion criteria for the study. Number and characteristics of sample, dropouts, and responders are given in Table 3. Composition of the dropout group, including the subgroup of immediate

Table 2. Criteria of postoperative neuropathic pain. At least three of the criteria must be fulfilled to receive a diagnosis of postoperative neuropathic pain

Finding	Reference
Continuous dull pain with bursts of sharp pain	Marbach 1993 (4), Graff-Radford & Solberg 1992 (5)
Mainly limited to area of damaged nerve	Marbach 1993 (4), Graff-Radford & Solberg 1992 (5)
Persistence after normal and complete local healing	Marbach 1993 (4), Bates & Stewart 1991 (6), Klausner 1994 (24),
Onset after nerve damage or surgical procedure	Marbach 1993 (4)
Delayed onset (days–years)	Marbach 1993 (4)
Hyperalgesia, allodynia, trigger zones	Marbach 1993 (4), Graff-Radford & Solberg 1992 (5), Bates & Stewart 1991 (6)

Table 3. Long-term symptoms after surgical third molar removal: characteristics of sample, dropouts and responders

			Age*				♂/♀ ratio	Preoperative pain	
	n	%	Median	<30	30–49	≥50		*n*	%
Sample	1458	100	25	1060	335	63	0.87	479	32.9
Dropouts	423	29.0	23	312	83	28	0.88	137	32.4
Responders	1035	71.0	24	748	252	35	0.87	344	33.2

* Age at time of operation.

Table 4. Reasons for no response from 423 (29.0%) subjects in evaluation of long-term symptoms after surgical third molar removals

	n	%
Dead	2	0.5
Abroad	30	7.1
Contact obtained, but not willing to answer	72	17.0
Contact not obtained	96	22.7
Unknown address	223	52.7
Total	423	100.0

complications, did not differ significantly from the sample according to age, sex, and presence of preoperative pain. Reasons for dropouts are listed in Table 4. Dropout rate for the subgroup with immediate complications was 22.7% compared to 29.0% for the whole group. Time between surgery and survey ranged from 4 years 5 months to 6 years 9 months; median observation time was 5 years 9 months. A negative response to the initial question was obtained from 1012 respondents.

Twenty-three patients (2.2%) indicated presence of pain or other symptoms following the third molar surgery; 3 of these with reports of immediate complications. Characteristics of these patients and evaluation of the etiology of the symptoms are given in Table 5. All patients with TMJ dysfunction except 2 declined treatment, as symptoms were mild. The remaining 2 patients were treated with bite splints and exercises, and symptoms improved markedly after a few weeks. The 5 patients with localized dental problems were treated according to diagnoses, and all subjective symptoms had disappeared 1 month after treatment had ended.

One female patient aged 42 described a dull, aching pain in the left maxilla of some year's duration (Table 5). The pain started approximately 2 months after removal of a left mandibular third molar. She had been completely pain-free for approximately 7 months at the time of clinical examination. Clinical evaluation showed no signs of hyperalgesia or allodynia, nor muscular tenderness or other TMJ dysfunctional symptoms. All teeth in both the left maxilla and mandible were intact. Roentgenological evaluation showed no signs of pathological conditions in bone. As this patient met only a minor proportion of the criteria for neuropathic pain (Table 1), she was classified as not having postoperative neuropathic pain.

No definite cases of postoperative neuropathic pain were found in the present study. The upper border of the 95% confidence interval was calculated to 0.38%.

Discussion

The aim of this study was to evaluate incidence of chronic postoperative pain. Identification of patients with positive outcome scores was therefore based only on subjective reports of pain and symptoms. In view of the large proportion of young patients with a high geographical mobility, the present dropout rate of 29% is highly satisfactory. The dropout group did not differ significantly from the respondent group regarding demographic variables. Length of observation time should also be

Table 5. Characteristics and evaluation of 23 responders with long-term symptoms after surgical third molar removal

					Age groups*		
	n	%	♂	♀	<30 *n*	30–49 *n*	≥50 *n*
Preoperative pain							
Yes	9	39.1	3	6	4	5	0
No	14	60.9	8	6	4	10	0
Total	23	100	11	12	8	15	0
Late postoperative findings							
TMJ/myofacial dysfunctional symptoms	17	73.9	6	11	6	11	0
Periodontal problem in second molar	3	13.0	0	3	0	3	0
Chronic pulpitis in second molar	2	8.7	1	1	2	0	0
Temporary facial pain	1	4.4	0	1	0	1	0
Total	23	100	7	16	8	15	0

* Age at time of operation.

adequate for chronic neuropathic pain to develop. Standardized and experienced clinical and radiological evaluation would ensure quality of registered data.

The term prevalence has been used to describe frequency of atypical odontalgia (19). It was considered more appropriate to use the term incidence in this report to describe occurrence of new cases of pain in the population of patients having had third molar surgery.

Removal of third molars is a well-defined and standardized surgical procedure. The use of local anesthetics and analgesic regimen and the patients' experience of immediate postoperative pain have been described earlier (27, 28). The majority of present complaints were attributable to TMJ dysfunctional symptoms. Raustia and Oikarinen (29) reported an increase in TMJ dysfunction 3 months after mandibular third molar removal. Two percent of the present group of patients reported TMJ-related pain. However, prevalence of TMJ dysfunctional symptoms in the general population is about 9–12% (30, 31), and in a considerable number of cases the recorded TMJ dysfunctional symptoms may have occurred coincidentally with the surgical procedure, and not as a result of it. Present selection criteria do not allow any epidemiological conclusions on TMJ dysfunctions after third molar removal.

Marbach et al. (20) reported a prevalence of 3% of chronic neuropathic pain after endodontic treatment. A high (75%) percentage of preoperative pain may be related to their findings, as preoperative pain has been claimed to increase likelihood of post-treatment neuropathic pain (4, 5). Moreover, details of the criteria for classification of neuropathic pain give rise to suspicion that patients with TMJ dysfunctional symptoms might have been included, and that their reported prevalence might be too high.

Response rates presented by Campbell et al. (21) and Jacobs et al. (22) of 57% and 44%, respectively, seem too low to allow valid conclusions regarding incidence rates. In relation to response rate to a written questionnaire, patients with complaints (e.g. pain) will probably have a higher response rate than those without complaints. This may lead to overestimation of incidence rates. Moreover, from description of diagnostic evaluations, the occurrence of TMJ dysfunctional symptoms might have been underestimated.

Kugelberg et al. (32) have described long-term periodontal problems related to third molar removal. Two patients in the present study reported subjective symptoms from periodontal disease, possibly related to the surgical procedure. The present study probably underestimates incidence of this type of problem, as selection criteria were subjective symptoms only.

A group of 97 patients with 109 complications registered in the immediate postoperative period were included in the study. Only three of these patients reported long-term symptoms.

Numerous case reports (10–12) and treatment reports (9, 13–16) of chronic neuropathic pain confirm associations between chronic neuropathic pain and various forms of trauma to peripheral nerves, including those resulting from treatment procedures. There is little doubt that chronic neuropathic pain does occur after events also in this anatomical region. However, the present incidence of these associations is far less than the earlier IASP statement (19) of 1–5% occurrence of neuropathic pain after surgery for impacted teeth.

The present low incidence is in accordance with long-term clinical experience. Long-standing chronic pain has not been identified as a significant complication after third molar surgical procedures in earlier reviews to assess the appropriateness of prophylactic removal of third molars (23–25).

Despite a definite surgical trauma to peripheral nerves in soft tissues and bone, along with injury to afferent end organs in the periodontal ligament, findings of chronic neuropathic pain were absent in this group of patients. This may be related to the relatively low proportion of patients with preoperative pain, and to adequate pain stimulus control during and immediately after surgery. The importance of preemptive analgesia has been pointed out by Foreman (33). Activation of the central mechanisms responsible for development of chronic neuropathic pain may require injury of a certain magnitude, e.g. injuries to peripheral nerves of certain dimensions, which is not exceeded in this type of procedure. Reports on increased incidence of neuropathic pain after major surgery or trauma support this view (34–36). However, no cases of neuropathic pain were reported even in the present 5 cases of peripheral nerve injury indicated by temporary sensory disturbances.

In conclusion, an absence of atypical odontalgia or neuropathic pain in this group of patients with a common and defined surgical trauma indicates that the incidence of late postoperative neuropathic pain after minor oral surgery, e.g. removal of impacted third molars, is extremely low, not exceeding 0.38%.

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