

The relationship of smoking to localized osteitis

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The relationship between smoking and localized osteitis was studied in 200 patients who had 400 mandibular third molars removed. Information on how much patients smoked each day and whether cigarettes, cigars, or a pipe was smoked, as well as the postoperative smoking habits of each patient, was recorded. Results indicated that there is a significant difference in the incidence of postoperative localized osteitis at extraction sites of mandibular third molars between smokers and nonsmokers; smoking after extraction caused a definite increase in the incidence of localized osteitis.

Cigarette smokers are a declining minority in our population. The proportion of smokers among American men dropped almost 14% in 13 years, reaching a level of 37.5% in 1978. For adult women in the same period, the figures dropped from 33.3% to 29.6%.¹ Adult smokers in the United States, however, still purchase 607 billion cigarettes each year.²

The relationship between smoking and cancer and other diseases of the lung and circulatory system is well known; relationships between smoking and other problems are currently being discovered. For instance, recent studies have shown that cigarette smokers require larger doses of pain-relieving and anxiety-reducing medications.³⁻⁷ It has also been reported that consumption of alcohol by a smoker will increase the risk of lung, esophageal, laryngeal,^{8,9} and oral cancer.¹⁰ A number of studies have shown that smokers have a decreased ability to utilize vitamin C, resulting in an increased requirement for this vitamin.¹¹ Women who smoke heavily and use oral contraceptives have greatly increased risks of fatal heart attacks and strokes.¹²

Two recently completed studies of localized osteitis included information on tobacco smoking. In the first study,^{13,14} all patients were specifically asked if they smoked. However, no inquiries were made regarding the frequency of smoking or postoperative smoking habits. Smokers had more than a fourfold greater incidence of localized osteitis in specially treated extraction sites of mandibular third molars. Nine of 142 smokers (6.4%), compared with only five of 362 nonsmokers (1.4%), had localized osteitis postoperatively. Chi-square analysis showed these differences were significant at the .01 level.

In this study the use of tobacco was evaluated more closely. Information was obtained on how much the patient smoked each day and whether cigarettes, cigars, or a pipe was smoked. Immediately after each procedure, the oral surgeon recorded operative information on a separate data form. At the appointment for removal of sutures four to six days postoperatively, a third data form was completed. Data concerning postoperative smoking was recorded at that time, as each patient had maintained a daily record of the quantity of smoking.

■ Methods

Two hundred patients were screened and selected for extraction of both mandibular third molars; some patients also had maxillary third molars extracted. All patients were in good health with no complicating medical factors and were between 15 and 35 years old. No patients with infections or severe pericoronitis, or patients taking antibiotics were accepted for the study. All patients, except four, received a combination of fentanyl (.05 to .1 mg) and diazepam (10 to 20 mg) intravenously for preoperative sedation. Two patients received diazepam alone. One patient received fentanyl and pentobarbital. Lidocaine HCl, with 1:100,000 epinephrine was then used for local anesthesia. Postoperative medications given orally for pain were acetaminophen (650 mg), with or without codeine sulfate (30 to 60 mg), or meperidine HCl (25 to 50 mg). The extraction sites of the mandibular third molars were irrigated with one of two randomly selected volumes of normal saline solution (either 60 or 120 mg). The three data forms previously mentioned were completed for each patient—preoperatively, immediately postoperatively, and four to six days postoperatively. A fourth data form was also used for patients who had postoperative complications.

Specific criteria for the determination of localized osteitis were: a severe pain in the alveolus of the surgical site two or more days postoperatively; the presence of fetid odor from the surgical site; and the presence of a foul, grayish exudate from the surgical site; and the presence of denuded bone in the surgical site. A surgical site was deemed to have localized osteitis when at least two of these four criteria were present. Osteitis was treated in a conventional manner

with a sedative dressing placed in the site after irrigation with normal saline solution.

■ Results

Of 200 patients who had extractions, 46 (23%) were smokers. Twenty-six of the 46 smokers (57%) were female. This represents 23.9% of the total number of females. The remaining 20 smokers (43%) were male, representing 22% of the total number of males. One of the males smoked a pipe. All other smokers used cigarettes.

The incidence of localized osteitis in extraction sites of mandibular third molars in the smokers was 12% (11 of 92 sites). The one pipe smoker, who smoked a minimal amount of tobacco, had no postoperative problems. The incidence of localized osteitis in the nonsmokers was 2.6% (eight of 308 sites). This represents an almost fivefold greater incidence of localized osteitis in tobacco smokers than in nonsmokers. The difference is significant at the .001 level.

The incidence of localized osteitis, when analyzed according to the frequency of preoperative smoking, was also interesting. There were eight cases of localized osteitis in 310 extraction sites in those who smoked no cigarettes, an incidence of 2.6%. In those who smoked less than half a package of cigarettes per day, there were no cases of localized osteitis in 20 sites. In patients who smoked 10 to 19 cigarettes daily, there were five cases of localized osteitis in 40 sites, or 12.5%. In patients who smoked a package or more of cigarettes daily, there were six cases of localized osteitis at 30 extraction sites, or 20%. The difference in the postoperative incidence of osteitis when comparing those who smoked less than half a package per day with those who smoked more was significant at the .001 level.

In evaluating the incidence of localized osteitis in the 38 patients who smoked postoperatively, there is an even greater discrepancy between the two groups. Seven cigarette smokers and one pipe smoker did not smoke postoperatively. In the patients who smoked postoperatively, 11 cases of localized osteitis occurred in 76 sites, or 14.5%; whereas, in those who did not smoke postoperatively, there were only eight cases in 324 sites, or 2.5%.

The seven smokers who did not smoke at all for five days after the operation had no cases of localized osteitis. The smoking habits of the 38 patients who smoked postoperatively are separated into five-cigarette increments by postoperative day (Table 1). Twelve patients smoked the day of surgery, even though they were requested by the surgeon and in postoperative instructions to refrain from the use of tobacco the first day. It should be noticed that 84% of

Table 1 • Smoking habits of 38 patients who smoked postoperatively.

No. of cigarettes	Day 0	Day 1	Day 2	Day 3	Day 4
1 to 5	8	18	12	12	12
6 to 10	4	5	12	13	10
11 to 15	0	4	6	5	7
16 to 20	0	4	5	6	6
More than 21	0	1	3	2	0
Total	12	32	38	38	35

Table 2 • Postoperative smoking habits of ten patients with localized osteitis.

No. of cigarettes	Day 0	Day 1	Day 2	Day 3	Day 4
0	6	0	0	0	1
1 to 5	4*	7*	2	1	2
6 to 10	0	2	5	6	3
11 to 15	0	1	2*	1	2
16 to 20	0	0	0	2*	2*
More than 21	0	0	1	0	0

*Bilateral localized osteitis (one case).

these patients smoked the first day after surgery, and all of them were smoking by the second day after surgery.

In ten of the 38 patients who smoked postoperatively, localized osteitis developed (Table 2). This is an incidence of 26.3%. In one of the ten cases, localized osteitis developed bilaterally. Forty percent of this group smoked the day of surgery and all ten patients smoked the day after surgery. Eight of the ten were smoking more than five cigarettes by the second postoperative day.

■ Discussion

Of a population of patients selected for extraction of third molars, 23% smoked cigarettes, which is well below the national level. However, investigators have reported that whites, women, and men in higher income brackets and with more formal education are less likely to smoke than other people.^{15,16} Our population of patients was predominantly white and female and included many college and postgraduate students.

Highly significant differences were noticed between the smoking and nonsmoking groups of patients. The differences were greater when comparing those who smoked postoperatively with those who did not. The results of this study compare favorably with those of our last study,¹⁴ showing that smokers have a risk factor more than four times as great as nonsmokers that localized osteitis will develop in

extraction sites of mandibular third molars.

We have been able to lower the reported incidence of localized osteitis by various techniques^{14,17,18} (as in this study, to 2.5% in the postsurgical sites of the nonsmoker). However, the patient who smokes postoperatively greatly increases high risk (26.3% in this study) even when such methods are used.

There are several possible explanations for the increased incidence of localized osteitis in smokers. Local considerations include the introduction of a foreign substance that could act as a contaminant in the surgical site and the suction applied to the cigarette, which might dislodge the clot from the alveolus and interrupt healing. Conceivably, the heat from the burning tobacco, the contaminants in the smoke, or the systemic effects of the ingredients in cigarettes on the clotting mechanism could also cause problems postoperatively. More than 3,000 components of tobacco smoke have been identified, and a number have been linked to the possible development of specific diseases.¹⁹ About 90% of cigarette smoke consists of a dozen gases that are hazardous to health. The remaining 10% is particulate matter, two substances of which are tar and nicotine.²⁰ The nicotine can cause the release of catecholamines that raise blood pressure and heart rate. One to five percent of the smoke is carbon monoxide, which will form carboxyhemoglobin in the blood, displacing oxygen. Carbon monoxide can alter the walls of the arteries, making them more permeable—possibly having an adverse affect on clotting.²⁰ The response of platelets to disodium adenosine diphosphate (ADP), a standard aggregating stimulus, is changed by inhalation of the smoke of a single cigarette.²¹ Coagulation, the rate of the initial formation of clots, the maximum thrombus strength, and the rate of formation and retraction of clots all showed changes when the blood of smokers was compared with that of nonsmokers.²² All these factors thus could have an effect on the developing clot in the alveolus.

■ Summary

Four hundred mandibular third molars were removed from 200 patients in this study. Comparisons disclosed the following:

—Of the female patients, 23.9% and, of the male patients, 22% were identified as smokers.

—Localized osteitis occurred at 11 of 92 (12%) surgical sites of patients identified preoperatively as smokers but at only eight of 308 (2.6%) extraction sites of nonsmokers.

—Patients identified as heavy smokers (half a package per day or more) had a significantly greater postoperative incidence of localized osteitis.

—Localized osteitis occurred at 11 of 76 (14.5%) extraction sites of patients identified as postoperative smokers, whereas, in patients who did not smoke postoperatively, there was an incidence of localized osteitis of eight of 324 (2.5%).

—Localized osteitis occurred in ten of 38 patients (26.3%) who smoked postoperatively. However, there was no occurrence in seven patients identified as smokers preoperatively who did not smoke postoperatively.

—Of the ten patients in whom localized osteitis developed 40% smoked on the day of surgery and all ten smoked the day after surgery.

These results indicate that there is a significant difference in the incidence of postoperative localized osteitis at extraction sites of mandibular third molars between smokers and nonsmokers. Smoking after removal of mandibular third molars will cause a definite increase in the incidence of localized osteitis. A patient should, therefore, be cautioned against smoking cigarettes for an indetermined period of time after oral surgery. Based on data obtained in these two studies, our patients are being advised both orally and in writing to discontinue the use of cigarettes for five days postoperatively.

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