

Influence of smoking upon the postoperative course of lower third molar surgery

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ABSTRACT

Objectives: To determine whether smoking influences the postoperative course (pain and trismus) of lower third molar surgery, with a clinical evaluation of surgical wound condition and analysis of the possible differences between smokers and nonsmokers.

Design: The study subjects were randomly distributed into two groups (smokers and nonsmokers) and subjected to lower third molar extraction in the Unit of Oral and Maxillofacial Surgery (Madrid Complutense University, Spain). The study variables were trismus after 7 days, the intensity of pain and the need for rescue medication during a period of one week. The surgical wound was also assessed (color, presence of plaque, etc.).

Results: Two cases of postoperative infection were documented among the smokers, and postoperative trismus was found to be greater among the latter (p=0.05).

Conclusions: There were no statistically significant differences between the two groups in terms of pain, though trismus was greater among the smokers. Smoking did not influence wound condition (color, marginal inflammation, appositioning of the margins, ulceration, etc.).

Key words: *Third molar surgery, postoperative complications, smoking.*

RESUMEN

Objetivos: Determinar si tras la cirugía del tercer molar inferior el tabaco influye en el postoperatorio (dolor y trismo) y valorar clínicamente el estado de la herida, analizando las posibles diferencias entre fumadores y no fumadores.

Diseño del estudio: Los pacientes que participaron en el estudio fueron distribuidos de forma aleatoria en dos grupos: Fumadores y no fumadores. Se les realizó la extracción quirúrgica de los terceros molares inferiores en la Unidad de Cirugía Bucal y Maxilofacial de la Universidad Complutense de Madrid. Las variables registradas fueron el trismo a los 7 días, la intensidad del dolor y la necesidad de medicación de rescate durante un periodo de una semana. Se analizó también el estado de la herida (coloración, presencia de placa, etc.).

Resultados: Hubo dos casos de infección postoperatoria en el grupo de pacientes fumadores. El trismo postoperatorio fue mayor en los fumadores (p=0.05)

Conclusiones: No hubo diferencias estadísticamente significativas en cuanto a dolor, pero sí se observó un mayor trismo en el grupo de fumadores. El tabaco no influyó en el estado de la herida (color, inflamación de los bordes, confrontación de los mismos, ulceración, etc.).

Palabras clave: *Cirugía del tercer molar, complicaciones postoperatorias, tabaco.*

INTRODUCTION

Smoking exerts a series of systemic effects upon the heart, blood vessels, central nervous system and endocrine glands, reducing pulmonary capacity and inducing peripheral vasoconstriction. It has also been associated with birth defects and fetal complications (1). Among these general actions, fibrinolytic activity has been shown to decrease in smokers compared with nonsmokers, with a delay in wound healing (2).

In relation to its local effects, smoking has been described as an etiological factor in different oral disorders such as potentially cancerous lesions and oral cancer. Smokers have a higher prevalence of leukoplakia than nonsmokers, with a positive dose-response relation. Cases of leukoplakia with areas of erythroplakia or associated with *Candida* infection are more frequent among smokers, and an increased risk of malignant transformation has been reported in such situations – with a direct relationship between dose and exposure time (3).

Squamous cell carcinoma (SCC) is the most common oral malignancy, representing over 90% of all cases. Oliver et al. (4), in 92 cases of SCC, found smoking to be the most relevant etiological factor (80% of the affected patients were smokers).

Although dental plaque is the main etiological factor underlying periodontal disease, smokers are more affected by the latter – presenting more plaque, tartar and gingivitis. Moreover, periodontal treatment tends to be less effective in such individuals (5-9). According to Eichel and Shahrik (10), this is because tobacco smoke exerts an inhibitory effect upon the oral leukocyte population.

As early as 1949, Pindborg (11) reported smoking to be a cause of acute ulcerative gingivitis, attributable particularly to tobacco smoke-induced gingival vasoconstriction, or its toxic effects upon the polymorphonuclear cells.

Studies have been made of many of the effects of tobacco smoke upon different cell types. In this sense, Pabst et al. (12) have found smoking to produce deleterious effects upon the host immune system, including neutrophil and macrophage function. In effect, nicotine affects the phagocytic activity of these cells, thereby increasing the risk of bacterial colonization (13).

Based on the above effects and considering that smoking can affect local vascularization, the host defense mechanisms and cell lines, it may be postulated that such actions could to some extent influence the postoperative course of patients subjected to oral surgery. On the other hand, although lower third molar surgery is one of the most frequent interventions in oral surgery, the relationship between tobacco smoking and the postoperative complications in such patients has not been sufficiently investigated to date.

The fact that smoking affects blood supply and fibrinolysis suggests that it may influence the development of dry socket. According to Meechan et al. (2), smoking reduces alveolar blood supply after dental extraction, and dry socket was found to be more common among smokers. The same conclusions were drawn by Larsen (14) in a series of 70 patients. In effect, dry socket was observed in 10% of the nonsmokers versus in 44% of the smokers – this difference being statistically significant.

These studies, and other data pointing to nicotine-mediated deleterious effects upon the immune system, suggest that the postoperative course of lower third molar surgery – where the raising of a flap and an osteotomy are required – may differ between smokers and nonsmokers. The present study was designed to determine whether tobacco smoking exerts an influence upon the postoperative course in the form of increased pain and trismus, in patients subjected to lower third molar surgery, with a clinical evaluation of surgical wound condition and an analysis of the differences recorded between smokers and nonsmokers.

PATIENTS AND METHOD

A controlled, randomized prospective one-year study was conducted, comprising 64 patients subjected to lower third molar extraction in the Unit of Oral and Maxillofacial Surgery (Madrid Complutense University, Spain). Informed consent to participation was obtained in all cases.

The patients were randomly distributed into two groups (smokers and nonsmokers) by means of a random numbers table. The postoperative controls were made by an independent examiner.

The following inclusion and exclusion criteria were applied.

Inclusion criteria

- Healthy volunteers over age 18 years and requiring surgical lower third molar extraction.
- Absence of systemic disease.
- Absence of any habitual medication.

Exclusion criteria

- Pregnant or nursing women.
- Allergy to local anesthetics, antibiotics or analgesics.
- Patients with cardiovascular disease or any other systemic pathology.

A panoramic X-ray study was carried out before the operation to assess the anatomical structures adjacent to the target third molar, and a pre- and postoperative case form was completed for each patient, containing the corresponding epidemiological and clinical data.

Surgical extraction was in all cases carried out by the same surgeon, according to a standardized protocol, with articaine anesthesia (0.5 mg) with adrenalin 1:100,000 as vasoconstrictor.

A festooned mucoperiosteal flap was raised with posterior releasing incisions, using tungsten carbide drills for the osteotomy and tooth sectioning, under hyposodium physiological saline irrigation.

The surgical time was recorded from the time of incision to the completion of suturing. Following the operation, the patients received verbal and written instructions on the postoperative measures to be applied.

No antibiotic treatment was prescribed postoperatively, and the patients received only magnesium metamizol as analgesic treatment – with written instructions indicating the administration of one capsule only in the event of pain, as often as required and with a minimum interval of 6 hours between doses. Sodium diclofenac was also prescribed as antiinflammatory treatment

(50 mg/8 hours via the oral route for 3 days).

The following study variables were documented:

Pain intensity and the need for rescue analgesia. The patients received verbal and written instructions on the use of a visual analog scale (VAS) for the scoring of pain (from 0 = no pain, to 100 = worst imaginable pain). The patients completed the pain questionnaire after 1, 8, 24, 48 and 72 hours, and likewise recorded the number of analgesic doses consumed and the intensity of pain (none, mild, moderate or intense) during 7 days.

Trismus was evaluated by measuring the maximum interincisal distance before surgery and again 7 days after extraction.

Wound appearance and condition were assessed in terms of color, marginal swelling, ulceration, the presence of plaque. etc.

The SAS statistical program was used for analysis of the results obtained. The Student t-test was used for the comparison of two means, with the F-test for contrasting more than two means. The chi-square test was in turn used for comparing percentages in frequency tables.

RESULTS

The mean patient age was 23.5 years (range 18-53 years) – no significant age differences being recorded between smokers and the nonsmokers. Most of the patients were women (71.9%).

A total of 51.6% of the patients included in the study were nonsmokers, while 23.4%, 15.6% and 9.4% respectively smoked 1-9, 10-19 and over 20 cigarettes/day. At evaluation 7 days after surgery, the patients reported no significant reduction in smoking during the postoperative period.

The mean duration of surgery was 11.03 minutes (11.2 and 10.9 minutes among smokers and nonsmokers, respectively; $p = ns$).

There were two cases of possible postoperative infection or alveolitis (the patients reporting prematurely due to intense pain). This represented a 3.1% incidence - both patients being smokers. On relating infection to the duration of surgery, the mean operating time was seen to be 11 minutes among the subjects without infection, versus 16 minutes in the case of the two patients with postoperative infection ($p=0.05$).

Although differences between smokers and nonsmokers were recorded in the degree of postoperative pain, statistical significance was not reached regarding pain as rated with the visual analog scale or in terms of the number of analgesic doses used (Figures 1 and 2).

Postoperative trismus was significantly greater among smokers (11.35 mm) than in the nonsmokers (7.84 mm) ($p<0.05$) (Figure 3).

An evaluation was made of the influence of the number of previous episodes of pericoronaritis upon both postoperative pain and trismus. Accordingly, large differences in postoperative pain were recorded after 48 and 72 hours – with nearly two-fold higher scores among the patients who had experienced three or more episodes of pericoronitis. Likewise, trismus was seen to be greater among the patients who had experienced three or more episodes of pericoronitis (11.2 mm) than in those who had never suffered pericoronaritis or who had experienced no more than two such episodes (8 mm).

he smokers spent significantly more time on sick leave af-

ter extraction than the nonsmokers (1.87 versus 1.27 days; $p<0.10$).

Based on the results obtained, it can be concluded that smoking did not influence surgical wound appearance (color, marginal swelling, appositioning of the wound margins, etc.). Rather, this parameter was influenced by patient oral hygiene, since 68.8% of the patients claimed not to have brushed in the zone at the time of suture removal – 60.9% of the study series presenting bacterial plaque in the region of the wound and sutures.

DISCUSSION

In the present study no antibiotics capable of altering the results were used before or after surgical extraction. In fact, the systematic prescription of antibiotic coverage is subject to controversy, and some authors recommend avoiding antibiotic treatment after lower third molar extraction (15), since the percentage of infections is very low.

Pain as assessed with the visual analog scale (VAS) revealed no significant relation to smoking. This coincides with the observations published by Sáez-Cuesta et al. (16).

Increased trismus was recorded among smokers – suggesting that the latter may present a generally poorer postoperative course than nonsmokers, leading them to remain on sick leave for longer periods of time. In our series this difference proved significant ($p<0.1$). Berge in 1997 (17) found patients who smoked over 19 cigarettes/day, and the duration of surgery, to be prognostic factors for increased occupational absenteeism.

As has been commented above, infection and alveolitis were found to be more common among smokers than in nonsmokers – in coincidence with the observations of other authors such as Larsen (14) and Meechan (2). Tobacco smoking exerts a negative influence upon wound healing, since it has been shown to impair polymorphonuclear cell function (12).

Patient hygiene was seen to influence surgical wound condition (color, marginal inflammation, ulceration, etc.). In this context, the importance of providing patients with instructions on correct oral hygiene after surgical extraction should be stressed, since 68.8% of our patients claimed not to have brushed the surgical zone in the 7 days after extraction. Some authors consider smokers to have poorer oral hygiene than nonsmokers (18), though this could not be confirmed on the basis of our own findings.

Lastly, we are of the opinion that patients should be advised to avoid smoking after surgery, in order to ensure as smooth a postoperative course as possible. In a study by Campbell et al. (19), almost 60% of all patients viewed as very positive the recommendations of the dentist to stop smoking in order to improve oral health.

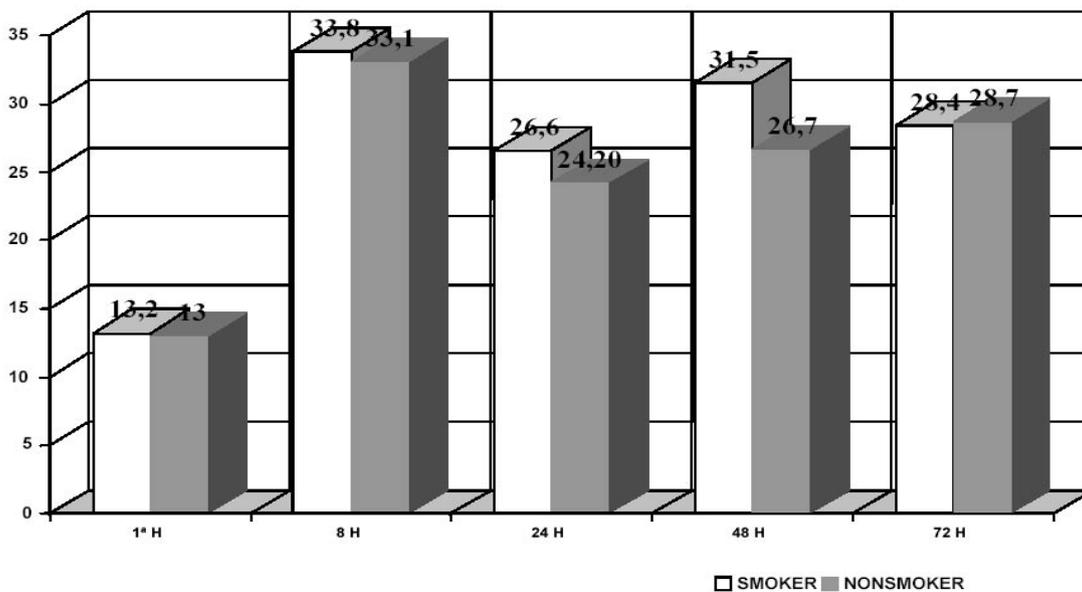


Fig. 1. Postoperative pain in relation to smoking (visual analog scale, VAS).

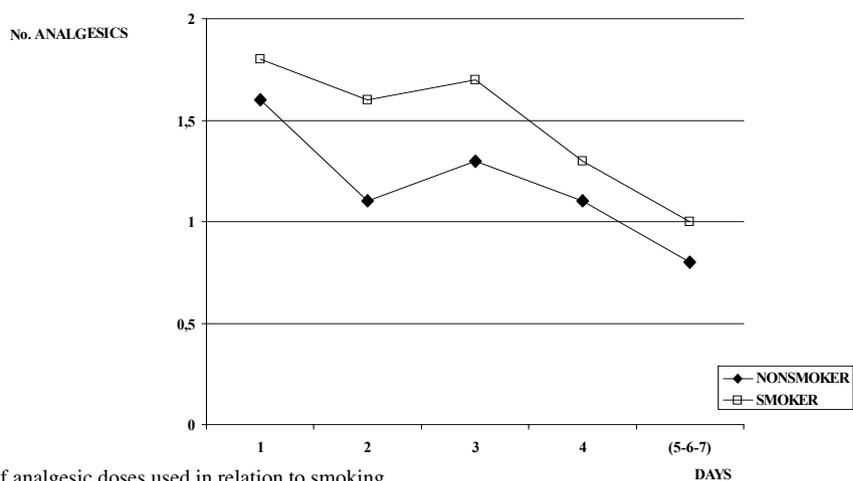


Fig. 2. Number of analgesic doses used in relation to smoking.
PAIN / SMOKING

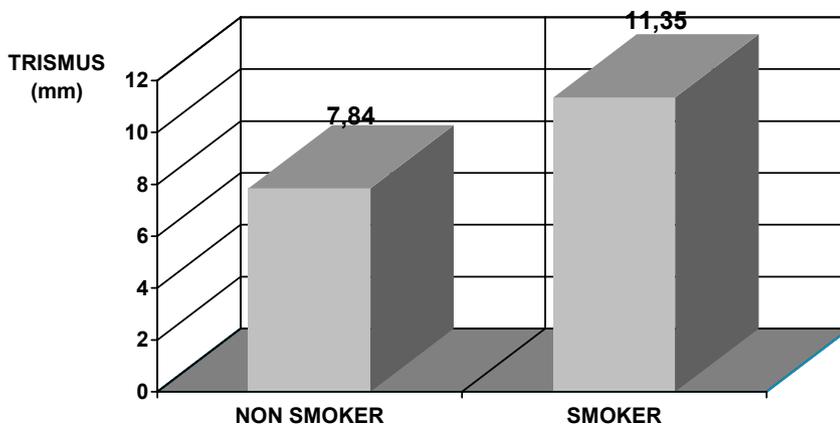


Fig. 3. Relation between trismus and the number of cigarettes smoked.
TRISMUS / NUMBER OF CIGARETTES

CONCLUSIONS

No statistically significant differences have been recorded in terms of pain, though trismus was seen to be more frequent among smokers. On the other hand, smoking was not seen to influence surgical wound condition (color, marginal swelling, appositioning of the wound margins, ulceration, etc.).

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