g post-extraction dry socket

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Abstract

Purpose: To evaluate the efficiency of oxidized regenerated cellulose (ORC) in preventing post-extraction dry socket.

Materials and Method: We present a single blind, randomised study on 30 patients to evaluate the efficacy of the ORC, placed only once within the alveolus, on the reduction of the incidence of impacted third molar post-extraction dry socket alveolitis and its post-operative effects on patients.

Results. A reduction of 42.65% in the occurrence of alveolitis and a more favourable post-operative period in the experimental group was observed. In the control group, the appearance of alveolitis was 30.76% opposite to 5.88 % in the experimental group.

Conclusions: The oxidized regenerated cellulose (ORC), applied only once after the extraction of impacted third molars, seems to be an appropriate option for the reduction of alveolitis. It improves the buccal aperture and oedema in the post-operative period, although further double blind studies with larger samples are necessary.

Key words: Alveolar osteitis, dry socket, oxidized regenerated cellulose

Introduction

Dry socket alveolitis is a post-extraction complication which can be defined as a postoperative pain in and around the extraction site, which increases in severity at any time between 1 and 3 days after the extraction accompanied by a partially or totally disintegrated blood clot within the alveolar socket with or without halitosis (1).The incidence of alveolitis after the extraction of impacted third molars is high, between 20-30% of extractions (2-6).

It may be a self-limiting pain, but it does cause considerable problems in patients. Antibiotics are efficient in the prevention of alveolitis but they are expensive and generate resistances, thus justifying the research of new treatments which will give similar results with less cost and less undesirable effects (7-9). The introduction of oxidized regenerated cellulose has opened up new lines of investigation.

The intention of this study is to present the data obtained in a pilot study carried out to evaluate the efficacy of oxidized regenerated cellulose, placed within the alveolus only once, on the reduction of the incidence of dry socket alveolitis after the extraction of impacted third molars and its post-operative influence on patients.

Materials and method

The study was carried out in a private clinic from October 2009 to March 2010. The design of the investigation work consisted of a pilot study on 30 patients with informed consent using methods for a prospective, parallel, single blind clinical trial. The oxidized regenerated cellulose sheet (Interceed; Johnson and Johnson medical, Inc, New BurnSwick, NJ) was administered topically (intra-alveolar) versus a control treatment which consisted of not administrating any intra-alveolar medication.

The subjects studied were patients of both sexes, included consecutively, between 18 and 60 years, who presented with lower impacted wisdom teeth indicated for extraction with a difficulty index of between 4 and 7 on a scale of 0 to 10 according to Koerner (10). All patients were systemically healthy with no history of hospitalization and were not taking any medication.

The independent variable was the placing or not of the ORC sheet in the alveolus after the extraction of the impacted wisdom tooth. The extraction was carried out following the same technique: anaesthesia with two cartridges of 2% lidocaine combined with epinephrine, in the lower alveolar nerve and the buccal nerve, at the level of the bottom of the vestibule. An incision was performed, osteotomy of the bone and when it was necessary dental section was carried out before its extraction. After curettage of the alveolus, the material shaped in the form of a button and applied in the orifice of socket under nice digital pressure, apiece of gauze 2cm × 2cm wrapped and applied on the socket area, the patient was asked to bite on the gauze for five minutes. ORC was introduced into the socket of 17 patients (experimental), while the rest 13 patients did not receive ORC (control). The patients were not told whether they received the ORC or not (single blind).

All patients took, as post-operative treatment, diclofenac sodium 100 mg and 500mg of paracetamol on demand, no antibiotics were prescribed, the number of pills taken each day during the first week were registered in the data collection notebook. Before the intervention, the buccal aperture and the pain with which the patient presented were registered on a verbal scale of 1 to 5 (8). On the third and the seventh post-operative day the buccal aperture was measured again (with a gauge). Facial edema as well as pain was evaluated daily on a visual analogue scale (VAS) of 0 to 100mm during the first week post-operative. A metric registeration of the edema was made, marking on the face of the patient the following points: mandibular angle, lateral cantus, base of the nasal wing, nasal commissures and pogonion on the side of the intervention. Taking the mandibular angle as a reference, the researchers measured the distance between this point and the rest of the marks (11). The sum of all the measures was the facial size for that day. This measurement was carried out before the surgical procedure and the third and last day of follow up. The main variable was evaluated as, whether post-operative alveolitis appeared or not, using the diagnostic criteria specified by Blum (1), postoperative pain in and around the extraction site, which increases in severity at any time between 1 and 3 days after the extraction accompanied by a partially or totally disintegrated blood clot within the alveolar socket with or without halitosis. The tolerance to the treatment, on a verbal scale of one to five, was also evaluated (8).

The chi squared test was applied for the comparison of the proportions and the Student t test for the comparison of the means between the two groups.

Results

The control group consisted of 13 patients, with 17 in the experimental group. All completed the protocol. There were 30 impacted wisdom tooth extractions (14 left and 16 right). The mean age of the sample was 27.8 years (Standard Deviation, SD = 8.63 years), and 21 women and 9 men were treated. The mean difficulty was 5.23 (SD = 1.07) using the Koerner scale (10). There were no significant differences between the difficulty of the extractions in the control and experimental group. The data as regards sex, mean age, right and left lower wisdom tooth and difficulty by group are shown in table 1. No significant differences were found between the two groups, before treatment, as regards facial size, pain and buccal aperture.

In relation to the incidence of alveolitis –the primary aim of this study-, we detected the appearance of 4 cases of alveolitis (30.76%) in control group, while only one case in the experimental group, (5.88%) was found (statistically significant difference).

The data referring to the pain and edema suffered by the patients in the first week post-operative produced significant differences at the 7^{th} and 8^{th} days only (Tables 2).

The data regarding the buccal aperture and the facial size on the third and the eighth

day post-operative and the mean of the number of tablets taken each day showed no significant difference between groups (Table 3). No adverse effects were presented and the patients adequately tolerated the treatment carried out (Table 3).

Table 1. Data relative to sex, mean age, tooth extracted, difficulty of extraction, facial size, pain (VAS) and buccal aperture before treatment, by groups. (SD=Standard Deviation)

	Sex		Mean Age	Difficulty	Facial size mm	Pain 0-100 mm	Buccal aperture mm
	male	female					
Study	**5**	**12**	**29years (SD = 10,24 years)**	**5,17 (SD =1,18)**	**423.41 (SD = 36.55)**	**1.18 (SD =0.72)**	**46.05 (SD= 6.19)**
Control	**4**	**9**	**26,3 years (SD= 5,96 years)**	**5,30 (SD =0,94)**	**428.85 (SD = 22.99)**	**1.81 (SD= 1.31)**	**47.07 (SD= 6.46)**

Table 2- Pain and edema data in the first week post-operative (Vas scale) (SD= Standard deviation) (*= statistically significant difference p ‹ 0.05; Student t)

	Pain (0-100 mm)							
	6 hours	2 days	3 days	4 days	5 days	6 days	7 days*	8 days*
Experimental Group	**58.08 SD=34.6**	**38.36 SD=24.77**	**38.77 SD=22.03**	**30.41 SD=26.30**	**23.53 SD=28.03**	**16.98 SD=27.27**	**8.82 SD=14.01 ***	**2.14 SD=3.70**
Control Group	**46.15 SD=38.42**	**29.02 SD=20.07**	**31.64 SD=24.79**	**23.08 SD=18.4**	**25.96 SD=22.4**	**26.05 SD=30.23**	**22.29 SD=29.25**	**11.98 SD=18.34**
	Edema (0-100 mm)							
	2 days	**3 days**	**4 days**	**5 days**	**6 days**	**7 days ***	**8 days ***	
Experimental Group	**56.35 SD=30.67**	**49.46 SD=31.58**	**37.97 SD=29.17**	**24.13 SD=25.58**	**14.37 SD=23.44**	**3.81 SD=4.82**	**1.14 SD= 1.55**	
Control Group	**48.86 SD=25.67**	**48.33 SD=28.94**	**29.11 SD=25.83**	**20,37 SD=16.94**	**17.31 SD=19.68**	**11.10 SD=13.99**	**6.12 SD= 10.13**	

Table 3- Data of facial size and buccal aperture on the third and last day of follow up, number of pills taken per day and tolerance to treatment (Verbal scale of 1 (totally tolerable) to 5 (totally intolerable)

	Tolerance (1-5)	Facial size		Buccal aperture		Pills/day
		3 day after extraction	8 day after extraction	3 day after extraction	8 day after extraction	
Experimental group	**1.41 (SD= 0.79)**	**463.17 mm (SD= 35.02)**	**442.76 mm (SD= 38.73)**	**34 mm (SD= 11.29)**	**39 mm (SD= 8.69)**	**1.89 (SD= 1.10)**
Control group	**1.38 (SD= 0.50)**	**454.23 mm (SD= 23.95)**	**457.46 mm (SD= 24.97)**	**27.61mm (SD= 11.26)**	**36 mm (SD= 13.01)**	**2.13 (SD= 1.14)**

Discussion

The prevention of alveolitis is fundamental. Different etiopathological theories exist, the main ones being fibrinolytic and bacterial (2-6, 12). Numerous medications have been used in its prevention. Anti-fibrinolytic agents, saline mouthwashes (7,13), tranquiliser dressings (14). However, the most effective have been the antiseptics and antibiotics, especially tetracycline, both systemically and locally (8,9). Despite the fact that some antibiotics produce a decrease in the incidence of alveolitis, their high cost,

their significant side effects and the possibility of generating resistances limit their use.
Oxidized regenerated cellulose is characterized by its hemostatic action (15), and so helps in firm clot formation which results in initiation of normal healing process and blocks the way against contamination.
In the presence of exudate the ORC transforms into a soft, conformable,biodegradable gel, and thus allows contact with all areas of the wound (19) so protecting the wound from external bacterial contamination.

Oxidized regenerated cellulose maintains a physiologically moist microenvironment at the wound surface, this environment is conducive to granulation tissue formation, epithelialization and rapid wound healing (24).
ORC has been shown to stimulate fibroblast chemotaxis and proliferation (23) which results in faster formation of collagen and consequent wound healing.

In the literature there is no published clinical trial similar to the present study which has used the oxidized regenerated cellulose ORC placed in the alveolus as a study medication for the prevention of alveolitis after the extraction of impacted third molars. Therefore, this study was compared with other trials of other products and other presentations like chlorhexidine. Neither have we found articles with which to compare the buccal aperture, facial size and complexity of extraction data.
The number of patients studied, although very small to find statistically significant differences, is sufficient to draw conclusions. In other published studies the numbers of patients included were between 20 and 67 per group, as opposed to 13 and 17 in this study (2-4,16,17). The mean age of our patients was 27.8 years. Other studies have a mean patient age of studied patients less than in our study (17-19). With respect to the proportion of males and females (30% men – 70% women), other studies also refer to a proportion of 1:2 in favour of women (17-19). Others were found were both sexes were balanced (3,16,20).
The incidence of alveolitis was low in the experimental group, which was clinically and statistically significant in respect to the control group (reduction of 42.65%). Delibalsi et al. (16) found similar percentages of alveolitis using mouthwashes of saline and 0.2% chlorhexidine (20.9% versus 23.7%). The percentage found when a mouthwash of chlorhexidine with amoxicillin-clavulanate was 8.9%. In the study by Berwick and Lessin (2) they found no differences in the incidence of alveolitis in the groups under study (chlorhexidine 0.12% and cetylpyridium 0.05%).
Larsen (3) found 16% of alveolitis in the control group (placebo), whilst 8% was obtained in the experimental group (mouthwash with 0.12% chlorhexidine for one week post-extraction). Ragno and Szkutnik (4) obtained a reduction of 50 % using the same study groups. Bonine (18) and Hermesch et al (19), also found reductions in alveolitis of around 50% using 0.12% chlorhexidine mouthwashes. These reductions are slightly higher than those found in our study (42.65%).
We have found no significant differences in respect to facial size, although we did detect statistically significant differences in facial oedema in the last days of the follow up (Table 2). Studies of application of different medications conducted by other authors referred to a better recovery in the experimental group and significant difference in pain and edema started at the 3^{rd} – 4^{th} day postoperative (21), perhaps the fact that the medication was deposited more than once could be the explanation.

In respect to the buccal aperture and pain experienced, no significant differences were found. No secondary effects were seen that had been referred to in other similar studies (16).

Conclusion

The data presented indicates that the oxidized regenerated cellulose ORC, applied only once, post-extraction in the alveolus, decreased alveolitis in a percentage similar to that achieved in other studies (2,16,18,20). The use of the experimental treatment produced a better patient recovery, especially with reference to the buccal aperture and post-extraction edema. Unfortunately, the sample size and the lack of statistical differences limit the conclusions that could reach this study. In this respect, this preliminary data should be followed by further studies applying a double blind protocol and a larger sample size.

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تقييم كفاءة السيليلوز المعدل المؤكسد في منع حدوث التهاب العظم الجاف بعد قلع الأسنان

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الخلاصة
هدف البحث: تقييم كفاءة السيليلوز المعدل المؤكسد في منع حدوث التهاب العظم الجاف بعد قلع الأسنان
طريقة البحث: نقدم دراسة غير فئوية على ٣٠ مريض لتقييم كفاءة السيليلوز المعدل المؤكسد حيث يوضع مرة واحدة في العظم لتقليل نسبة الأصابة بألتهاب العظم الجاف بعد قلع ضرس العقل المطمور وأثره على المريض بعد الجراحة
النتائج: أظهرت النتائج نقصان بنسبة ٤٢.٦٥% في حدوث التهاب العظم بعد القلع لدى المرضى في مجموعة العلاج مع علامات مفضلة بعد الجراحة، وكانت نسبة الأصابة لدى مجموعة المرضى غير المعالجين بالسيليلوز المعدل المؤكسد ٣٠.٧٦ % مقابل ٥.٨٨ % لدى مجموعة العلاج
الأستنتاج: استخدام السيليلوز المعدل المؤكسد بوضعه مرة واحدة في العظم بعد القلع يبدو انه اختيار صائب لتقليل الأصابة بألتهاب العظم الجاف بعد قلع ضرس العقل وهو ايضا يحسن المظهر الدهليزي و يقلل التورم بعد القلع، على الرغم من ذلك فهناك حاجة الى دراسة اخرى تشمل عدد أكبر من المرضى