Original Study

INVESTIGATING THE EFFECT OF CHITOHEM POWDER ON BLOOD CLOTTING AND THE COMPLICATION OF TOOTH EXTRACTION

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ABSTRACT

Aim: In the present study, the effect of using chitohem powder in comparison with the conventional method on wound healing after extraction of teeth was investigated in patients referred to the Maryam Dental Clinic in 2016.

Materials and Method: The present clinical trial was conducted on 60 patients with indication of bilateral extraction in the same jaw. The jaw in each patient was randomly divided into test and control groups. The rate of bleeding in minutes, pain with VAS index, healing rate with Healing Scale index and incidence of dry socket based on BLUM criteria were investigated.

Result: The bleeding time was (2.73 ± 9.0) in the study group and (2.95 ± 4.10) in the control group ($P < 0.0000$). Also, the pain level on the third day in the study group was significantly decreased ($p < 0.05$). Healing time, dry socket incidence and the use of analgesics in the study group were better than the control group ($p < 0.1$).

Conclusion: The application of chitohem powder in tooth socket reduces bleeding time after dental extinction and pain levels up to 3 days after surgery.

Key words: Chitin, Chitosan, Dressing, Tooth Extraction, Wound Healing, Homeostasis.

Introduction

Dry socket is a painful complication that, in some cases, after the tooth extraction, a blood clot forms in the socket, which, in addition to protecting the bones and nerves, also initiates the healing process.[1] If for any reason the blood clot is moved from its place, it causes a dry socket. In this case, the bones and nerves are exposed to stimulus within mouth's environment. All patients experience pain after the end of the effect of the anesthetic substance, but within a few days it becomes less intense.[2] At the same time, a severe pain occurs from the second or third day after extrusion, due to the dry socket. Dry Socket is one of the main factors in delaying the repair process.[3] One of the main causes of this complication is the presence of bacterial agents and another effective factor in the loss of blood clots in the tooth socket.[4-6]

As a result, extraction of teeth leaves an open wound in the soft tissue and bone.[7,8] Disorder of wound healing is one of the important problems after teeth extraction.[9,10] The chitoham powder, which consists of natural cellulose, causes stopped bleeding and is used for all types of bleeding, especially arterial arteries. Regarding the prevalence of bleeding of post-teeth extraction and its complications and considering the positive effect of Regenerated Cellulose Oxidized on the stop time of bleeding, this study aimed to investigate the effect of chitoham powder on dental bleeding time and other complications due to teeth extraction on patients referring to surgical department of dental school of Tehran University of Medical Sciences in 1965-96.

Materials and Method

Before you remove your teeth, you will feel some pressure in the place. This pressure is due to the need of the dentist or surgeon to open the tooth socket, and to do this, the tooth will be moved forward and back before being pulled.

Surgery of the tooth of the wisdom is painless due to the anesthesia of the target area. However, if you feel pain during the treatment, talk with your dentist or surgeon to inject more than anesthetic substances. The length of time needed for tooth surgery is different depending on the patient's condition.

In this case, simple surgical operations may take several minutes, but more complicated operations of wisdom tooth extraction will require more than 20 minutes. In this clinical trial study, 60 patients who had an indication of bilateral teeth extraction in one jaw were examined. Samples were selected among patients referring to the surgery department of the Faculty of Dentistry of Tehran University of Medical Sciences and a private clinic who were willing to participate in the study and follow up courses. Written and informed consent for the research was obtained from all individuals. This study has received the necessary permission from the ethics committee of the dental unit of Islamic Azad University with code D-122-P.

Exclusion criteria included: systemic diseases, need for sutures at the treatment site, patients under 20 and over 60 years of age, pregnant women and those who use contraceptive pills, the presence of painful conditions inside the mouth such as teeth with indications of root canal therapy, having any painful conditions in the body, neurological diseases and the use of related drugs, requiring prophylaxis with antibiotics, smoking and alcohol, Use of steroids, antibiotics and analgesics other than those specified in the study and those that delay the healing of the tissue such as: external object, ischemia, necrotic tissue, and tissue trauma. Each patient's jaw was randomly divided into study and control groups.

In the study group, the chitoham powder (ChitoTech Inc.) was placed in the tooth socket, and a piece of gauze was placed on it. In the control group, according to conventional method, gauze was used according to the standard method. Chitohm powder was used according to the manufacturer's instructions,[11] so that the chitoham powder and the CT Applicator were first removed and then

the bleeding site was cleaned with sterile gauze. Then the Hemovac nozzle was placed in the applicator's aperture. While the handle of the applicator was in the hand, the mini- Hemovac body was pressed with the help of thumb and chitoham powder was powdered. Dry compression was applied to the bleeding site for 2-3 minutes.

The intervention variables included pain threshold, Dry Socket, complication during surgery, trauma, diabetes and platelet count, which were matched according to Split mouth study in all groups. Since the pain threshold is different in patients, an attempt was made to reduce the effect of this interfering agent by increasing the number of samples and using the split mouth method. To control the trauma involved during extraction, the tooth was removed by surgeon. With regard to a similar study and with a 95% confidence level, 30 samples were considered for each group and a total of 60 samples were considered.[5]

Results

The research was conducted on 60 samples in two groups of 30 individuals, and the stopping time of bleeding after 2 to 5 minutes, healing and common complications after extraction of teeth in two 3-day and 7-day intervals after tooth extraction were studied. The characteristics of the individuals according to the treatment groups showed that 19 men and 11 women with a mean age of 33 ± 9.8 participated in this study.

Extracted teeth were 18 maxilla and 12 mandibular. Time to stop bleeding and other indicators for study and control groups are shown in Table 1. After 2 to 5 minutes after tooth extraction, 92% of those who used normal saline gauze had bleeding, while only 14% of bleeding occurred in people using chitohum powder. The bleeding time in the control group was 2.95 ± 10.4 minutes, while in patients who used chitohum powder after bleeding was 2.73 ± 9.0 minutes. This difference was significant between the two groups ($p < 0.00000$). Pain on the third day was 1.7 in the control group and 0.7 in the study group, which is 70% less than the control group ($p < 0.005$).

The pain of the seventh day in the control and study group was 0.7 and 1 respectively, that difference was not significant. ($p < 0.1$) Healing on the third day was 1.8 in the control group and 0.8 in the study group. It was 2.2 times more in the control group ($p < 0.1$). Healing on day 7 in the control group was 0.8 and in the study group was 0.2, which was not statistically significant ($p < 0.1$). The occurrence of dry socket on day 3 and also day 7 in the control group was 6 cases and in the study group was 2 cases ($P < 0.1$). On the third day, the rate of analgesics was 18 in the control group and 12 in the study group ($p < 0.1$). The rate of use of analgesics on day 7 was 6 in the control group and was 2 in the study group, which was 3 times more in control group than the study group ($p < 0.1$).

Group	Bleeding Time (Min.)	Pain (Day)		Healing (Day)		Dry Socket (Day)		Analgesics Consumption (Day)	
		3	7	3	7	3	7	3	7
Control	2.95	1.7	0.7	1.8	0.8	6	6	18	6
Study	2.73	0.7	1	0.8	0.2	2	2	12	2
Test	p<00000	p<0.005	p<0.1	p<0.1	p<0.1	p<0.1	p<0.1	p<0.1	p<0.1

Table 1: - Time to stop bleeding, healing status and tooth extraction complications by type of chitoham powder

Discussion

The results of our study showed that the use of chitoham powder in comparison with the control group significantly reduced the bleeding time and pain on the third day. It was also effective in accelerating healing and reducing the dry socket's incidence, but this effect was not. Kordestani et al. in evaluating the effect of using chitoham powder on patients undergoing angiography showed that the chitoham powder used in patients undergoing angiography in reducing the time of homeostasis, discharging, and also using sand bag are consistent with the findings of the research. Haraji et al. Showed that an emphasis has been put on the use of 0.3% chlorhexidine gel in preventing dry socket and pain intensity in order to reduce the incidence of dry socket following the use of an antimicrobial agent on the importance of the role of bacteria in the formation of a dry socket, suggested that microbial agents can play a role of an agent in the development of dry socket. Patient satisfaction is an important factor in their collaboration and professional success in the dental clinic.[6] Available studies indicate that chitosan, through the recall and activation of neutrophils and macrophages, generation of cytokines by macrophages and fibroblasts, and stimulation of the formation of angiogenesis facilitates the primary phase of the wound healing process.[7] Chitosan can also facilitate the formation of granulation and epithelial tissue.[8] The hemostatic effect and antimicrobial activity of chitosan also play a valuable role in the process of wound healing. Bioaccumulation ability of chitosan hydrogel allows close contact with oral mucosal surfaces.[9] The ability of chitoham powder to stop bleeding was also observed in this study. Another benefit of chitosan is its simultaneous use in patients taking oral anticoagulant.[10] Other reports confirm that chitosan has the potential to form a regular layer of collagen fibers that has more regular forms and denser patterns. These unique chitosan properties and its low cost make this substance more applicable to the dental domain, as it eliminates the need for other needed items in the field of dentistry, such as barrier membranes and grafts, resulting in reduced time and cost of surgery.[11] It is recommended that future studies focus on the effect of chitoham powder on more specific factors such as bioindicators of inflammation, soft tissue repair and hard tissue reconstruction, and also examine the effect of this hemostasis on various drugs in order to investigate the possible effects of accelerating wound healing in the presence of these drugs. The present study showed that

chitoham powder can affect the quality of life of patients after surgery and can provide faster stopping of bleeding, early healing of the wound, and less complications after surgery. The results of our study showed a decrease in the amount of pain, accelerated healing process and reduced the incidence of dry socket, but these differences were not statistically significant compared to the control group, which contrasts with other studies.[12]

The possible causes of this inconsistency can be related to the following:

1) The relevance of the research to the report of the subjects.
2) Different methods of dressing (in this study, according to the manufacturer's instructions, after removing the teeth, this dressing was used for one hour in the dry socket of the tooth)
3) Difference in the type of used substance (chitosan hydrogel versus chitoham powder used in this study). From the difficulties and limitations of the present project, it was difficult to find samples from individuals who have indication of the removal of bilateral teeth in one jaw.

In addition, the results of the study were reported by patients, especially regarding pain, subsequent referral of the patient on days 3 and 7, and follow-up of post-teeth extraction recommendations.

Conclusion

It seems that the use of chitoham powder reduces bleeding time and pain, as well as decreases the incidence of dry socket and the use of analgesics and heals. Therefore, further research is recommended in this regard.

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