

Influence of Post-operative Instructions on Wound Healing. A Randomized, Single-blinded Clinical Trial.

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ABSTRACT

Postoperative instructions that are properly delivered can play a major role in treatment outcomes, especially excellent wound healing. This study aimed to examine the mode of delivering postoperative instructions in decreasing the side effects of poor wound healing following simple tooth extraction. This single-blinded, randomized clinical trial was conducted on 400 patients presented for simple extraction of unimpacted teeth. The patients were randomly assigned to two groups of verbal and verbal plus written instructed groups. Collected data were analysed using descriptive and inferential statistics at a significance level of 95%. More men (51.5%) were seen. The participants' mean age was 37.3 ± 14.3 years (range, 18-87 years). The results showed that the mode of delivering instructions had a marked relation with socket healing. The post-extraction healing score was significantly higher in the verbal and written instructed group compared with the verbal instructions alone ($P = 0.00$). The age ($P = 0.04$) and type of instruction ($P = 0.00$) were significantly associated with excellent wound healing. Only the type of instruction that independently predicted the excellent wound healing ($OR = 0.12$; $P = 0.00$). The mode of delivering post-operative instruction affected the post extraction socket healing. Patients who received written and verbal instructions reported excellent post extraction socket healing than those who had verbal instructions only. All medical practitioners are recommended to use both verbal and written post-operative instruction.

Keywords: Verbal, Written, Postoperative instruction, Post-extraction socket healing

INTRODUCTION

Removal of an unimpacted tooth with dental forceps or elevators known as simple tooth extraction or intra-alveolar extraction is frequently carried out by oral surgeons, resident doctors, general dental practitioners as well as students; thus, it may continue to remain the most performed dento-alveolar surgery in the outpatient clinics⁽¹⁾. Though it is described as a simple procedure, complications can occur even with an experienced operator if post-operative instructions are not adequately delivered⁽²⁾. It has been reported that post-operative instructions that are correctly delivered can decrease post-extraction side effects, such as stress, anxiety, pain, and poor wound healing, in patients undergoing dental extraction⁽³⁾.

Postoperative-instruction (PI) is the instruction given to patients after surgical procedures⁽⁴⁾. The role of PI

cannot be overemphasized, and this is recognised by all practicing surgeons globally. The provision of post-operative advice and instructions, and its documentation, is considered best practice^(5, 6). The use of the inappropriate mode of transmission of PI can decrease patients' satisfaction, compliance, and increase post-operative morbidity, especially poor wound healing⁽⁷⁾. Also, failure to deliver appropriate post-operative information can lead to misunderstanding, unnecessary complications, complaints, and even allegation^(8, 9).

Verbal instruction is when postoperative instruction is given orally from a post-operative instruction form by an expert while written instruction is when post-operative instruction form is given to the patient to read without any explanation by an expert⁽⁶⁾. Verbal

PI is most common and is considered the traditional mode of transmission of PI worldwide⁽¹⁰⁾. Also it has the advantages of being cost-effective and less cumbersome⁽¹¹⁾. However, the use of verbal PI has the disadvantage of being neither understood nor retained well after surgery, and is operator dependent⁽¹²⁾. In the literature, the uses of written plus verbal PI were reported^(13, 14). It was reported that although written instructions need the patient to be literate, it is easier for the patient to comply with⁽¹⁴⁾. Several workers believe that to increase patient understanding, compliance, and improve treatment outcome, verbal reinforcement with written instructions are necessary⁽¹⁵⁾.

Though it is often assumed that verbal PI alone is guaranteeing a better treatment outcome compared with written PI⁽¹⁶⁾, we questioned whether this is the case. Also, the relationship between postoperative instructions with anxiety, stress, compliance, satisfaction and postoperative sequelae is well studied⁽¹⁰⁻¹⁵⁾ but their relationship with wound healing has not been yet. The aim of this study was to compare post-extraction socket wound healing outcome in patients who received verbal and written PI versus verbal PI alone after simple tooth extraction. We hypothesized that the type of PI after simple tooth extraction would not influence the post-extraction socket wound healing outcome.

MATERIALS AND METHODS

Study design

This randomized, single-blind clinical trial was designed according to CONSORT (Consolidated Standards of Reporting Trials) guidelines for randomized clinical trials and was approved by Research Ethics Committee of the University of Benin Teaching Hospital (UBTH). Informed written consent was obtained from all consecutive study participants who accepted the study.

Sample selection and eligibility criteria

Study samples were patients that presented to the Department of Oral and Maxillofacial Surgery, University of Benin Teaching Hospital (UBTH) for simple tooth extraction of unimpacted teeth from February 2017 to March 2019. Exempted from the study were those with: age less than 18 years, lack of formal education, immunocompromised, medically compromised, presence of acute local infections, steroid therapy, and radio-chemotherapy. Extractions lasting more than 30 minutes were also excluded.

Sample size estimation and randomization

The sample size was obtained by calculating the dependent variable (healing score) in a pilot study involving 30 patients, considering a 5% significance level and 80% statistical power. A difference of means between the two groups was 5.3 and the standard deviation of the means of the control group was 2.6. By using the sample size formula for comparison of two means: $(2\sigma^2 (Z_{\alpha} + Z_{\beta})^2 / d^2)$, where d is the difference in means, σ is the standard deviation of the means of the control group, Z_{α} is significance level, Z_{β} is the statistical power. The calculated sample size with 10% attrition was 400. The study participants were randomly assigned into two groups of randomised clinical trials with parallel design and 1:1 ratio. Patients in group A were given verbal instructions while those in group B had both verbal and written post-operative instructions. The verbal instructions were a direct version of the written form (Figure 1) read to the patient by same Dental Surgery Assistant in English language.

Surgical protocol

All patients had forceps extraction of the teeth by a single operator who was blinded for which group each patient belonged, using the same surgical protocol and pharmacological protocol. Mouth rinse was performed with an aqueous solution of 0.2% chlorhexidine digluconate for one minute. Local anaesthesia (LA) was obtained using 2% lignocaine hydrochloride with 1:80000 adrenaline. The LA was given slowly and carefully after negative aspiration. All extracted teeth were delivered intact without crown or root fracture with dental forceps only, no subluxation with dental elevator was done prior to the forceps extraction. Haemostasis was achieved with pressure on a gauze for 15 minutes. The duration of the procedure was recorded with a stopwatch (from the beginning to the end of the procedure).

Post-operative care

All patients were instructed to apply 0.12% chlorhexidine digluconate aqueous solution for one minute to control dental plaque before tooth extraction and from the second day, every 12 hours for seven days. All patients were given amoxicillin trihydrate (Vamoxil, ® Vadis, Nigeria) 500mg capsule eight hourly or erythromycin (Eromycin ® Fidson, Nigeria) 250mg tablet 6 hourly for those who were allergic to penicillin, metronidazole (Loxagyl®, May & Baker Plc, Nigeria) 400mg tablet 8 hourly, both for five days. Also, they were given Paracetamol (Paracetamol®, Emzor, Nigeria) 1000mg tablet 8 hourly for three

days. These drugs were commenced immediately after surgery. Post-operative instruction was given according to the study's protocol.

Evaluation procedure

The wound healing was assessed with the modified extraction socket healing index⁽¹⁷⁾ (Table 1) by the same blinded operator. The gingival colour, swelling, pain on palpation, bleeding on palpation, and suppuration was measured at one week after surgery. The granulation and epithelialization-degree were measured at 3rd and 6th weeks, respectively. The wound scores were graded as thus: 0 = Very poor healing; 1-2 = Poor healing; 3 - 4 = Good healing; 5-6 = Very good healing; 7 = Excellent healing.

Statistical analysis

In the descriptive statistic, continuous variables were summarised in ranges and means with standard deviation while the categorical data were presented in frequency and percentages. Prior to inferential statistics, the normality of continuous variables was performed with the Shapiro-Wilk test. The chi-square χ^2 test was used to compare the percentage of the categorical variable between the two groups, while the independent t-test was used to compare the means of continuous variables between the two groups at a 95% confidence interval. The data were analysed using Statistical Package for the Social Science (SPSS) version 21 (IBM, Chicago, USA). By using two-tailed test, a p-value of less than 0.05 was taken as significant.

RESULTS

The 400 patients selected for this study were divided equally into two groups with 200 patients in each group. All the patients presented for outcome assessment. The mean age of the patients was 37.3 ± 14.3 years (range, 18-87 years). Table 2 shows the frequency distribution of the study subjects. The majority of them 159(39.8%) % of the patients were within the age group of 15-30 years, this was closely followed by 31-45 years with frequency of (141, (35.3%). More males (51.5%) were seen compared to their female counterpart. The majority (96.3%) of the studied sample had their posterior teeth extracted in the course of the study. The range and the mean of the healing index score were 3-7 and 6.47 ± 0.95 , respectively. More than half (70.5%) of the studied subjects had excellent healing of the post-extraction socket and none had very poor or poor healing of the extraction socket (Table 2). The mean (SD) of surgery

time in the verbal instructed-group and the verbal and written instructed-group were 24(3.62) and 23(5.50) minutes, respectively, but the mean difference was not statistically significant ($P = 0.57$).

The comparison between the verbal and verbal and written groups is shown in table 3. The verbal and written-instructed group was significantly older than the verbal-instructed group with a mean difference of 4.36 years (95% C.I (confidence interval), 1.57-7.14). Though more males were seen in the verbal -instructed group, no gender predilection was observed in the written and verbal-instructed group. This observed variation was not statistically significant ($P=0.55$). Posterior teeth were mainly extracted in both groups compared to anterior teeth but this not statistically significant (Table 3). Interestingly, the healing score was significantly lower with a mean difference of 0.77 (95% C.I, 0.59-0.94) in the verbal-instructed group than the verbal and written-instructed group ($P = 0.00$) Table 4 shows the univariate analysis of the study subjects. Only age and type of post-operative instruction were significantly associated with healing grades (Table 4). In the multivariate statistics as shown in table 5, only the type of post-operative instruction was a significant independent predictor of excellent extraction socket healing. The verbal and written post-operative instruction is 0.12 more likely to improve socket healing than verbal instruction (Table 5).

DISCUSSION

The post-operative period is influenced by the understanding of the instructions presented by the professional to minimize complications and to improve the quality of life of the patients⁽¹⁸⁾. Efficient communication between doctor and patients increases the level of understanding and therefore delivering health care services. Adequate education given after oral surgical procedures has been demonstrated to improve patient satisfaction and decrease post-operative morbidity^(2, 4, 19). Such education includes the prediction of postoperative events, medication instructions and advice on homecare of surgical wounds. Post-operative advice and instruction leaflets are important adjuncts to verbal communication and serve to reinforce and confirm any information given verbally. They play a vital role in helping patients to deal with postoperative concerns and management⁽²⁰⁾. To the best of our knowledge, this is the first study to determine the relationship between post-operative instructions and wound healing. However, the

association between post-operative instructions and post-operative pain, swelling, bleeding, compliance and patients' satisfaction was previously studied^(5,7,8). In our study, more than half of the patients had excellent wound healing, and none had poor wound healing. No previous study has reported on wound healing as regard the mode of post-operative instructions making it is comparison limited. The probable reason for the excellent healing outcome could that all patients were treated by a single and experienced operator⁽⁷⁾. Surprisingly, there was a male preponderance in the present study unlike in the previous study where a higher number of females are reported^(6,8,10). Though the likely reasons for this male predominance are not readily available, however it raises the awareness for the concerned by the male patients as regard their dental health.

The finding that the majority of the patients were less than 45 years is similar to previous studies. and the likely reason for this finding could be related to the frequency of dental condition in this group of the population globally¹⁰. The patients in the verbal group were significantly younger than those in the verbal and written instructed-group combined. Besides, there was an association between age and the mode of deliverance of post-operative instruction. However, age was not an independent predictor of excellent post-operative socket healing in the present study. Though no previous study on this topic for comparison, the likely reason for the observed association between age and mode of post-operative instruction could be related to compliance to post-operative instructions is a stronger more influential factor in wound healing than the effect of age. This is an indication that patients who received verbal and written post-operative instructions comply more with the instructions than those who received only verbal post-operative instructions.

In our study, the healing score was significantly higher in the patients had both written and verbal post-operative instructions than those had verbal instruction only. Similar findings were reported by previous studies^(5,7,9) that evaluated the relationship between the type of instruction and variables such as post-operative pain, swelling, bleeding, compliance and satisfaction. Vallerand et al.,⁽¹⁴⁾ showed that providing post-operative instructions both verbal and written improved compliance of the instructions given by professionals following third molar removal. Houts et al.,⁽¹⁵⁾ stated that patients remembered only 14% of the information when given verbally, compared to 80% when combined with pictograms, while some

other authors found that verbal instructions alone were ineffective. Gheisari et al.⁽¹²⁾ reported that patients who received verbal and written instructions reported the least intense pain and the most satisfaction, and patients who received verbal instructions were the least satisfied and most intense pain. Matijevic et al.,⁽⁷⁾ in their study on the effect of the surgeons experience, the mode of instruction given to the patient and the patient's gender on post-operative pain intensity following lower wisdom tooth surgery, showed that the delivery mode of post-operative information has no effects on post-operative pain intensity. As indicated by Adebayo et al.,⁽¹⁾ who concluded that the provision of both written and verbal post-operative instructions to patients after minor oral surgery enhances compliance. Van Wikj et al.⁽¹⁷⁾ concluded that providing post-operative instructions to patients in the form of information-dense text decreases the need to provide additional information and increases patient satisfaction with the procedure.

In this study, the use of written PI as an adjunct provides a clear additional benefit of excellent healing quality. In particular, post extraction socket wound healing was influenced by the type of PI given. The written and verbal post-operative instruction had a higher influence on post-operative healing than verbal post-operative healing alone. There was no previous study association between type of post-operative instructions and wound healing making the comparison difficult.

Though previous studies on physician-patient's relationship as regards post-operative instructions utilized surgical extraction of impacted mandibular molars, the present study recruited patients for simple extraction of unimpacted teeth in order to have large sample size to have statistical power necessary to detect association between patient characteristics and treatment outcome. Further study on the association between the number of roots and type of the jaws is necessary in future.

Conclusively, the mode of delivering post-operative instructions affected the post-extraction socket healing. Patients who received written and verbal instructions reported the most excellent post extraction socket healing than those who had verbal instructions only.

Table 1: The post-extraction socket healing index

Parameters	Score 0	Score 1
Gingival colour	Totally/partially red	Pink
Granulation tissue	Present	Absent
Epitheliazation degree	Partial	Complete
Swelling	Present	Absent
Bleeding on palpation	Present	Absent
Pain on palpation	Present	Absent
Suppuration	Present	Absent

Van Wijk et al¹⁷.

Table 2: Frequency distribution of the study samples (n=400)

Variable	Frequency	Percentage
Age group(years)		
≤30	159	39.8
31-45	141	35.3
46-60	79	19.8
61-75	17	4.20
>75	4	1.00
Gender(n(%))		
Male	206	51.5
Female	196	48.5
Tooth position		
Anterior	15	3.8
Posterior	385	96.2
Healing score grading		
Very poor	0	0.00
Poor	0	0.00

Good	24	6.00
Very good	94	23.5
Excellent	282	70.5
Type of post-operative instruction		
Verbal alone group	200	50.0
Verbal + Written group	200	50.0

Table 3: The bivariate analysis of the study subjects

Variables	Verbal alone group	Verbal +Written group	P-Value
Age(years)			
Range	18-87	18-86	
Mean(SD)	35.1(11.1)	39.5(16.6)	0.002
Gender(n(%))			
Male	106(53.0)	100(50.0)	
Female	94(47.0)	100(50.0)	0.55
Tooth Position(n(%))			
Anterior	7(3.5)	8(4.00)	0.79
Posterior	193(96.5)	192(96.0)	
Healing Score			
Range	3-7	5-7	
Mean(SD)	6.09(1.15)	6.86(0.45)	0.00

Table 4: The univariate analysis of the study subjects

Healing Grade						
Variable	Very poor	Poor	Good	Very Good	Excellent	P-Value
Age group						
15-30	0(0.00)	0(0.00)	9(37.5)	48(51.1)	102(36.2)	
31-45	0(0.00)	0(0.00)	9(37.5)	30(31.9)	102(36.2)	0.04
46-60	0(0.00)	0(0.00)	6(25.0)	9(9.6)	64(22.7)	
61-75	0(0.00)	0(0.00)	0(0.00)	7(7.4)	1(3.50)	
67-90	0(0.00)	0(0.00)	0(0.00)	0(0.00)	4(1.40)	

Gender						
Male	0(0.00)	0(0.00)	11(45.8)	49(52.1)	146(51.8)	
Female	0(0.00)	0(0.00)	13(54.2)	45(47.9)	136(48.2)	0.85
Tooth position						
Anterior	0(0.00)	0(0.00)	0(0.00)	7(7.40)	8(2.80)	
Posterior	0(0.00)	0(0.00)	24(100)	87(92.6)	274(97.2)	0.08
Type of instruction given						
Verbal alone group	0(0.00)	0(0.00)	24(100)	73(77.7)	103(36.5)	0.00
Verbal +Written group	0(0.00)	0(0.00)	0(0.00)	21(22.3)	179(63.5)	

Table 5: The multivariate analysis of the study subjects

Variable	B	SE	Wald	OR	95%C.I	P-Value
Age	0.009	0.10	0.808	1.009	0.99-1.03	0.37
Type of post-operative instruction	2.14	0.28	58.7	0.12	0.07-0.20	0.00

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Postoperative instructions after simple(forcep) extraction form

WHAT TO DO

1. Firmly bite on the cotton pack placed on the extraction site for thirty minutes
2. Take cold and soft diet on the day of extraction
3. Take liquid or semi-solid food for next 24 hours
4. Apply an ice pack on the cheek over the extraction site, 4-5 times for the first 24 hours to prevent swelling
5. After 24 hours, gently rinse the wound with warm salt water 3-5 times a day and continues for 3-5 days
6. Take antibiotic and painkiller as prescribed by the doctor
7. If there is bleeding at home, bite on a clean gauze or rolled cotton wool for at least 30 minutes and if persist report immediately to our emergency unit

WHAT NOT TO DO

1. Do not embark on strenuous activities for 48 hours after extraction
2. Do not eat hot food for the first 3 hours to prevent burnt or trauma to lip or tongue due to numbness
3. Do not spit saliva forcefully for one hour after extraction
4. Do not rinse vigorously or brush for 24 hours after extraction
5. Avoid hot, spicy and sticky foods for 24hours after extraction
6. Do not drink cold drink/juice with straw
7. Avoid touching or pricking the wound with finger or any sharp object
8. Avoid brushing near the wound area for 2-3days
9. Do not smoke for 7 to 10 days

Figure 1: The post-extraction instruction form.

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Compliance with Ethical Standards

Conflict of Interest: Authors declares that he has no conflict of interest.

Funding: This work was not supported by any funding agency

Ethical approval: All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Informed consent: Informed written consent was obtained from all individual participants included in the study.

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