

Patients' acceptance of corticotomy-assisted orthodontics

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Objective: To study patients' acceptance of corticotomy-assisted orthodontics as a treatment option.

Methods: Adult patients seeking orthodontic treatment were asked to complete two sets of questionnaires; the first set included questions about age, sex, and level of education and general questions about orthodontic treatment; and the second set was related to the corticotomy-assisted orthodontics. Before answering the corticotomy questions, a brief description of the clinical procedure was explained and photographs of an actual procedure were shown.

Results: A total of 150 subjects were approached and 129 (86%) agreed to answer the questionnaires (72 male and 57 female patients). Of these, only 3.1% did hear about corticotomy and 7.8% selected corticotomy instead of extraction. Fear from the surgery (53.2%) was the most frequent reason for not selecting corticotomy followed by fear from pain (36.9%). The acceptance of corticotomy between males and females was similar. No relationship was found between the level of education and prior knowledge of the procedure, $P=0.857$. Prior knowledge about corticotomy was not a factor in selecting it as a treatment option ($P=0.556$) to reduce the treatment time ($P=0.427$).

Conclusion: The acceptance of corticotomy-assisted orthodontics as a treatment option was low. Fear from the surgery was the main reason for not selecting it. The acceptance of corticotomy-assisted orthodontics was not related to patient's level of education or sex.

Keywords: orthodontic treatment, corticotomy-assisted orthodontics, patient acceptance, cross sectional survey, alveolar decortication

Introduction

In orthodontics, teeth are repositioned to create a more esthetic and/or functional dental complex. This dictates a series of decisions and procedures that, in turn, require some knowledge of the various disciplines intimately related to orthodontics. These include growth and development of the dentition and the face, tooth movement, and characterization of the form and pattern of the dentofacial complex.¹ In cases where tooth-size and arch-length discrepancy is large (moderate to severely crowding), orthodontic treatment necessitates moving the teeth into new positions.^{2,3} For this purpose, space is required. This space can be gained either by extraction of teeth or by expansion of the arches.⁴⁻⁶

Nowadays, the individual's appearance, particularly the dental appearance, is considered an essential feature when determining the facial attractiveness and hence plays a requisite role in human social interactions.⁷⁻¹⁰ It has been shown in a recent report that there was a relationship between dental malocclusion and the psychosocial well-being and self-esteem.¹¹ Furthermore, in recent years, there is an increase in the number of adult patients who are seeking orthodontic treatment, and thus a reduction in orthodontic therapy time is considered to be an important objective.¹²⁻¹⁵

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Adult orthodontic treatment is different and challenging, as it demands special concepts and procedures.^{16,17} The introduction of corticotomy-assisted orthodontic treatment that paved the way for treating adult cases is different from conventional orthodontic treatment methods and provided a solution to many limitations in adult orthodontic treatment by delivering rapid tooth movement and also avoiding extractions.^{12,18–22}

However, corticotomy-assisted orthodontics is an invasive surgical procedure that requires the elevation of buccal and often a lingual/palatal flap for decortication of alveolar bones followed by bone augmentation.²¹ This extensive physical injury causes the initiation of transitory demineralization process and increases regional bone turnover leading to the regional accelerated phenomenon.^{12,19}

One might anticipate that because of a decrease in the treatment time, adult patients may be more interested in orthodontic treatment. However, it could be argued that the surgical phase may in fact prevent patients from considering corticotomy-assisted orthodontics as a treatment option. This, however, has not been extensively studied.

So far, utilization of corticotomy-assisted orthodontics is considerably low in Saudi Arabia. This could be because the technique involves significant postoperative injury and periodontal risks, is time-consuming, and is often seen as highly invasive.¹⁵

Thus far, no previous study investigated patients' perception and/or acceptance of this procedure. Therefore, this study was aimed to assess patients' acceptance of corticotomy-assisted orthodontics and to evaluate whether they prefer this procedure rather than extraction for orthodontic purposes.

Materials and methods

This study was conducted at the Faculty of Dentistry, King Abdulaziz University, Jeddah, Saudi Arabia. The study was reviewed and approved by the Research Ethics Committee at the Faculty of Dentistry, King Abdulaziz University, and informed consent was obtained. The study was conducted in accordance with the principles of the Declaration of Helsinki.

Adult patients seeking orthodontic treatment were asked to complete two sets of questionnaires; the first set included questions about age, sex, and level of education, and general questions about orthodontic treatment; and the second set of questions was related to the corticotomy-assisted orthodontics. Prior to answering the corticotomy questions, a brief description of the clinical procedure of corticotomy-assisted orthodontics was described and photographs of an

actual procedure were shown. Participation was voluntary, all questionnaires were anonymous, and no personal information was collected. Inclusion criteria were as follows: dental patients who were 21 years or older, with no history of orthodontic treatment, with no craniofacial deformity, and not medically handicapped.

Statistical analysis

Frequency distributions were calculated and tabulated for each answer in the questionnaires and the number of subjects responding to each question. Comparison of data between variables was performed using the chi-square tests and the Fisher's exact tests for nominal data and the independent Student's *t*-test for continuous data. The level of statistical significance was considered at $P < 0.05$. Statistical analysis was performed using the Statistical Package for Social Sciences (released 2011, IBM SPSS Statistics for Mac, Version 20.0, IBM Corporation, Armonk, NY, USA).

Results

A total of 150 subjects were approached and 86% (129 subjects) agreed to answer the questionnaires comprising 72 males and 57 females. The mean age among males was 37.4 (± 12.8) years and among females was 34.2 (± 9.4) years with no significant difference between them, $P = 0.09$.

Most of the subjects had a college degree (63%) as shown in Table 1. Only 3% of the subjects did know about corticotomy-assisted orthodontics before their current dental visit. Only ~8% of the respondents choose corticotomy-assisted orthodontics rather than extraction. But this percentage increased to 50% if the corticotomy was the only available option. Approximately 32% of the sample chose corticotomy in order to reduce the treatment time.

Fear from the surgery (53.2%) was the most frequent reason for not choosing corticotomy-assisted orthodontics, followed by fear from pain (36.9%).

The chi-square and the Fisher's exact analyses showed that the responses for male and female patients were similar (Table 2). Moreover, no significant relationships were found between the level of education and knowledge about the procedure, $P = 0.857$.

Table 3 shows that prior knowledge about corticotomy was not a factor in selecting it as a treatment option even if it was the only treatment option or to reduce the treatment time.

Discussion

In modern society, there is an increased demand to reduce the orthodontic treatment time, particularly in adult patients.

Table 1 Summary of the results of the questionnaires with frequency and percentage

	Frequency (n)	%
Sex		
Males	72	55.8
Females	57	44.2
Level of education		
High school or less	45	34.9
College	81	62.8
Postgraduate	3	2.3
Would the cost of braces be a concern?		
Yes	88	68.2
No	41	31.8
Would pain, soreness, and discomfort put you off the idea of braces?		
Yes	78	60.5
No	51	39.5
Would you agree to extract in order to straighten your teeth?		
Agree	77	59.7
Disagree	52	40.3
Orthodontic treatment is a long process; is time a concern to you?		
Yes	112	86.8
No	17	13.2
Did you hear about corticotomy-assisted orthodontic treatment before this visit?		
Yes	4	3.1
No	125	96.9
Would you choose corticotomy-assisted orthodontic rather than extraction?		
Yes	10	7.8
No	119	92.2
If corticotomy-assisted orthodontic reduces the treatment time by half, would you choose it?		
Yes	41	31.8
No	88	68.2
If corticotomy-assisted orthodontic was the only option, would you agree?		
Agree	64	49.6
Disagree	65	50.4
Would the added cost of corticotomy-assisted orthodontic be a concern?		
Yes	109	84.5
No	20	15.5
What is the most significant reason for not selecting corticotomy-assisted orthodontic (choose only one)		
Fear from surgery	35	53.8
Fear from pain	24	36.9
Bone graft	6	9.2

Table 2 Summary of the results of the questionnaires with frequency and percentage by sex

	Sex				P-value
	Males		Females		
	Number	%	Number	%	
Level of education					
High school or less	21	29.2	24	42.1	0.117
College	48	66.7	33	57.9	
Postgraduate	3	4.2	0	0	
Would the cost of braces be a concern?					
Yes	51	70.8	37	64.9	0.473
No	21	29.2	20	35.1	
Would pain, soreness, and discomfort put you off the idea of braces?					
Yes	44	61.1	34	59.6	0.866
No	28	38.9	23	40.4	
Would you agree to extract in order to straighten your teeth?					
Agree	42	58.3	35	61.4	0.724
Disagree	30	41.7	22	38.6	
Orthodontic treatment is a long process; is time a concern to you?					
Yes	63	87.5	49	86.0	0.798
No	9	12.5	8	14.0	
Did you hear about corticotomy-assisted orthodontic treatment before this visit?					
Yes	2	2.8	2	3.5	0.812
No	70	97.2	55	96.5	
Would you choose corticotomy-assisted orthodontic rather than extraction?					
Yes	6	8.3	4	7.0	0.781
No	66	91.7	53	93.0	
If corticotomy-assisted orthodontic reduces the treatment time by half, would you choose it?					
Yes	21	29.2	20	35.1	0.473
No	51	70.8	37	64.9	
If corticotomy-assisted orthodontic was the only option, would you agree?					
Agree	34	47.2	30	52.6	0.542
Disagree	38	52.8	27	47.4	
Would the added cost of corticotomy-assisted orthodontic be a concern?					
Yes	60	83.3	49	86.0	0.682
No	12	16.7	8	14.0	
What is the most significant reason for not selecting corticotomy-assisted orthodontic (choose only one)					
Fear from surgery	23	60.5	12	44.4	0.286
Fear from pain	11	28.9	13	48.1	
Bone graft	4	19.5	2	7.4	

Hence, corticotomy-assisted orthodontics has gained considerable attention and is being reported more frequently in recent publications.^{12,18–21} Corticotomy-assisted orthodontics has the ability to provide faster treatment time and possibly avoid the extraction protocol, since the debate to extract or not to extract to relief dental arch crowding still exists.^{23–25}

The corticotomy technique is generally performed under local anesthesia. After raising a full thickness flap, decortication of the buccal cortical bone is initiated using a round

bur, and if required, the palatal/lingual cortical bone as well. Vertical grooves are then made in the interdental spaces and connected with a horizontal scalloped corticotomy cuts around the apices of the teeth. Bone graft is then applied and the flap is repositioned and sutured. Orthodontic activation is initiated 2 weeks after the surgery to take advantage of the regional accelerated phenomenon effect. Activation of orthodontic appliances is then performed every 2 weeks until the end of treatment.^{18–21,26,27}

Table 3 The relationship between previous knowledge about corticotomy-assisted orthodontics and choosing it as a treatment option

	Previous knowledge about corticotomy-assisted orthodontics				P-value
	Yes		No		
	Number	%	Number	%	
Would you choose corticotomy-assisted orthodontic?					
Yes	0	0.0	4	3.1	0.556
No	10	7.8	115	89.1	
If corticotomy-assisted orthodontic reduces the treatment time by half, would you choose it?					
Yes	2	1.6	2	1.6	0.427
No	39	30.2	86	66.7	
If corticotomy-assisted orthodontic was the only option, would you agree?					
Agree	2	1.6	2	1.6	0.987
Disagree	62	48.1	63	48.8	

Corticotomy-assisted orthodontics is thought to provide an increase in the net alveolar bone volume after orthodontic treatment due to the combination of selective decortication and alveolar augmentation. Therefore, teeth can then be moved almost 25%–30% faster compared to traditional orthodontic treatment. This technique is used to treat moderate-to-severe malocclusions and the need for extractions is reduced.²⁸

There is an increase in the number of both case reports and animal studies, in the last 15 years, showing that corticotomy-assisted orthodontics is becoming a popular surgical procedure.^{18–20,29–31} Nonetheless, this extensive surgery could discourage some patients from accepting it.

It is well known that orthodontic treatment requires significant patient compliance^{32,33} and that patient compliance is significantly influenced by experiences such as pain. Orthodontic patients often experience pain during treatment.³⁴ Moreover, treatment efficacy and the level to which patients are capable or prepared to accept the proposed treatment steps should be addressed.³⁵ Therefore, orthodontic therapy may fail if it concentrates only on occlusion and function while overlooking the patient's perceptions.

Thus far, there are no published reports that have investigated patients' acceptance and expectations from corticotomy-assisted orthodontic treatment and no reports about the pain experienced in corticotomy patients. However, one study evaluated the effect of corticotomy on maxillary canine retraction compared with the conventional technique.³⁶ The results demonstrated that alveolar corticotomy decreased the

canine retraction time; however, a moderate degree of pain and discomfort was reported.

There are several orthodontic techniques and devices that can facilitate tooth movement, such as skeletal anchorage devices.^{37–39} Even though this technique was shown to be acceptable by patients and does not produce pain and discomfort,⁴⁰ treatment duration does not appear to be decreased.⁴¹

This study investigated the acceptance of corticotomy-assisted orthodontics by adults seeking orthodontic treatment. The results showed only 7.8% selected corticotomy-assisted orthodontics rather than extraction. This could be because only 3.1% had prior knowledge of this procedure. Another possible reason is that the associated morbidity may deter patients from selecting this procedure as most of the participants listed fear and pain as the main reasons for not selecting corticotomy.

Corticotomy-assisted orthodontics is considered less invasive; however, some adverse effects to the periodontium have been reported in addition to swelling and pain postoperatively.^{13,42} That is why modification of this technique has been an on going challenge to reduce the surgical field and time.^{14,15,43}

Currently, there are no reports that investigated patients' experience with corticotomy-assisted orthodontics. Therefore, further studies that assess the postoperative pain with corticotomy in comparison with traditional orthodontic activation are needed.

It should be noted that an important limitation of the present study is the absence of an adolescent group seeking orthodontic treatment. Another limitation is the sample size. However, the current findings identified the low acceptance of corticotomy-assisted orthodontics among adult patients seeking orthodontic treatment.

In conclusion and based on the results of this study, the acceptance of corticotomy-assisted orthodontics as a treatment option is low. Fear from the surgery was listed as the main reason for not choosing this treatment option. The acceptance of corticotomy-assisted orthodontics was not related to patient's level of education or sex.

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Disclosure

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