# ORIGINAL RESEARCH

# Patients' acceptance of corticotomy-assisted orthodontics

#### Khalid H Zawawi

Department of Orthodontics, Faculty of Dentistry, King Abdulaziz University, Jeddah, Saudi Arabia **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 corticotomyassisted 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.<sup>1</sup> In cases where tooth-size and arch-length discrepancy is large (moderate to severely crowding), orthodontic treatment necessitates moving the teeth into new positions.<sup>2,3</sup> For this purpose, space is required. This space can be gained either by extraction of teeth or by expansion of the arches.<sup>4–6</sup>

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.<sup>7–10</sup> It has been shown in a recent report that there was a relationship between dental malocclusion and the psychosocial well-being and self-esteem.<sup>11</sup> 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.<sup>12–15</sup>

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Adult orthodontic treatment is different and challenging, as it demands special concepts and procedures.<sup>16,17</sup> 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.<sup>12,18–22</sup>

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.<sup>21</sup> This extensive physical injury causes the initiation of transitory demineralization process and increases regional bone turnover leading to the regional accelerated phenomenon.<sup>12,19</sup>

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.<sup>15</sup>

Thus far, no previous study investigated patients' perception and/or acceptance of this procedure. Therefore, this study was aimed to assess patients' acceptance of corticotomyassisted 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 corticotomyassisted 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 ( $\pm$ 12.8) years and among females was 34.2 ( $\pm$ 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	I.	Summary	of	the	results	of	the	questionnaires	with
frequen	су	and perce	nta	ge					

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

	Frequency (n)	%		Sex				P-value	
Sex				Males		Females			
Males	72	55.8		Number	%	Number	%		
Females	57	44.2			/0	Humber	/0		
Level of education			Level of education				(0.1	o <del></del>	
High school or less	45	34.9	High school or less	21	29.2	24	42.1	0.117	
College	81	62.8	College	48	66.7	33	57.9		
Postgraduate	3	2.3	Postgraduate	3	4.2	0	0		
Would the cost of braces be	a concern?		Would the cost of bra	ces be a con	cern?				
Yes	88	68.2	Yes	51	70.8	37	64.9	0.473	
No	41	31.8	No	21	29.2	20	35.1		
Would pain screness and dis	scomfort put you off the idea of	braces?	Would pain, soreness,	and discomf	ort put	you off the i	dea of b	races?	
Yes	78	60.5	Yes	44	61.1	34	59.6	0.866	
No	51	39.5	No	28	38.9	23	40.4		
Would you agree to extract i	n order to straighten your teeth	27.5	Would you agree to e	xtract in ord	er to st	raighten you	teeth?		
Agree	77	. 59.7	Agree	42	58.3	35	61.4	0.724	
Disagroo	52	40.3	Disagree	30	41.7	22	38.6		
Orthodoptic treatment is a la	$J_{z}$		Orthodontic treatmer	it is a long pr	ocess; i	s time a cono	ern to	you?	
		o you:	Yes	63	87.5	49	86.0	0.798	
Tes	112	0.00	No	9	12.5	8	14.0		
	۲ <i>۲</i> 	13.2	Did vou hear about co	orticotomy-as	sisted o	orthodontic t	reatme	nt before	
Did you near about corticoto	my-assisted orthodontic treatm	ent before	this visit?						
this visit?	4	2.1	Yes	2	2.8	2	35	0.812	
res	4	3.1	No	70	97.2	55	96 5	0.012	
	125	96.9	Would you choose co	rticotomy-as	sisted o	orthodontic r	athor th	an	
Would you choose corticotor	my-assisted orthodontic rather f	than	extraction?	i cicocomy-as	sisted 0		auter ut	an	
extraction?				/	0.2	4	7.0	0 70 1	
Yes	10	7.8	Tes	0	0.3	4 52	7.0	0.701	
No	119	92.2		00 	91.7	55	93.0		
If corticotomy-assisted ortho	dontic reduces the treatment tir	ne by half,	If corticotomy-assisted	i orthodontic	: reduce	es the treatm	ent tim	e by naif,	
would you choose it?			would you choose it?						
Yes	41	31.8	Yes	21	29.2	20	35.1	0.473	
No	88	68.2	No	51	70.8	37	64.9		
If corticotomy-assisted ortho	dontic was the only option, wou	ıld you	If corticotomy-assisted orthodontic was the only option, would you						
agree?			agree?						
Agree	64	49.6	Agree	34	47.2	30	52.6	0.542	
Disagree	65	50.4	Disagree	38	52.8	27	47.4		
Would the added cost of corr	ticotomy-assisted orthodontic b	e a	Would the added cost	of corticoto	my-assi	sted orthodo	ontic be	a	
concern?			concern?						
Yes	109	84.5	Yes	60	83.3	49	86.0	0.682	
No	20	15.5	No	12	16.7	8	14.0		
What is the most significant r	eason for not selecting corticot	omy-	What is the most sign	ificant reason	for not	t selecting co	rticoto	ny-	
assisted orthodontic (choose	only one)		assisted orthodontic (	choose only o	one)	-			
Fear from surgery	35	53.8	Fear from surgery	23	60.5	12	44.4	0.286	
Fear from pain	24	36.9	Fear from pain	11	28.9	13	48. I		
Bone graft	6	9.2	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.<sup>12,18–21</sup> 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.<sup>23–25</sup>

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.<sup>18–21,26,27</sup>

	Previous k corticoton	tics	P-value		
	Yes		No		
	Number	%	Number	%	
Would you ch	noose corticot	omy-assis	ted orthodonti	c?	
Yes	0	0.0	4	3.1	0.556
No	10	7.8	115	89.1	
If corticotomy	y-assisted ortho	odontic r	educes the trea	tment tin	ne by half,
would you ch	oose it?				
Yes	2	1.6	2	1.6	0.427
No	39	30.2	86	66.7	
If corticotomy	y-assisted ortho	odontic w	as the only op	tion, wou	ld you
agree?					
Agree	2	1.6	2	1.6	0.987
Disagree	62	48.1	63	48.8	

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

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.<sup>28</sup>

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.<sup>18–20,29–31</sup> Nonetheless, this extensive surgery could discourage some patients from accepting it.

It is well known that orthodontic treatment requires significant patient compliance<sup>32,33</sup> and that patient compliance is significantly influenced by experiences such as pain. Orthodontic patients often experience pain during treatment.<sup>34</sup> Moreover, treatment efficacy and the level to which patients are capable or prepared to accept the proposed treatment steps should be addressed.<sup>35</sup> 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 corticotomyassisted 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.<sup>36</sup> 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.<sup>37–39</sup> Even though this technique was shown to be acceptable by patients and does not produce pain and discomfort,<sup>40</sup> treatment duration does not appear to be decreased.<sup>41</sup>

This study investigated the acceptance of corticotomyassisted 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.<sup>13,42</sup> That is why modification of this technique has been an on going challenge to reduce the surgical field and time.<sup>14,15,43</sup>

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

The author reports no conflicts of interest in this work.

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