

Impact of facial deformity on the patient's perception in orthodontic treatment: A case-control study

Impacto da deformidade facial na percepção do paciente em tratamento ortodôntico: Um estudo caso-controle

Impacto de la deformidad facial en la percepción del paciente en el tratamiento de ortodoncia: Un estudio de casos y controles

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Abstract

This study evaluated the impact of facial deformity on pain perception of patients undergoing orthodontic and orthodontic-surgical treatment. A case-control study was carried out with a population-based of individuals in orthodontic treatment. Cases and controls were defined by the Oral Health Impact Profile (OHIP-14). The case group (n=54) included individuals who responded "never" to at least one of the questions, and in control (n=44), those who responded "rarely and sometimes" frequently and "always" to both questions. Cases and controls were paired by sex, age, and clinical conditions in the ratio of 1:1. For data analysis, the odds ratios were estimated with respective confidence intervals of 90%. There was no significant difference between the groups with and without deformities relative to the distribution of the female and male sexes (p=1.000), which allowed pairing the case and control groups in a ratio of 1: 1. Patients with facial deformity showed 2.14 (CI90%: 1.08-4.24) times more chance of reporting the impact on physical pain (p=0.0662). Patients with a facial deformity and orthodontic surgical treatment are twice as likely to perceive physical pain.

Keywords: Occlusion; Facial deformity; Pain; Quality of life; Orthodontic.

Resumo

Este estudo avaliou o impacto da deformidade facial na percepção da dor de pacientes submetidos a tratamento ortodôntico e ortodôntico-cirúrgico. Estudo caso-controle realizado com uma população de indivíduos em tratamento ortodôntico. Casos e controles foram definidos pelo domínio dor física do Oral Health Impact Profile (OHIP-14). O grupo caso (n = 54) incluiu indivíduos que responderam "nunca" a pelo menos uma das perguntas, e no controle (n = 44), aqueles que responderam "raramente e às vezes" com frequência e "sempre" a ambas as perguntas. Casos e

controles foram pareados por sexo, idade e condições clínicas na proporção de 1:1. Para a análise dos dados, os odds ratios foram estimados com respectivos intervalos de confiança de 90%. Não houve diferença significativa entre os grupos com e sem deformidades em relação à distribuição dos sexos feminino e masculino ($p = 1.000$), o que permitiu parear os grupos caso e controle na proporção de 1:1. Pacientes com deformidade facial apresentaram 2.14 (IC90%: 1.08-4.24) vezes mais chance de relatar o impacto na dor física ($p = 0.0662$). Pacientes com deformidade facial e em tratamento ortodôntico-cirúrgico tem duas vezes mais chance de perceber a dor física.

Palavras-chave: Oclusão; Deformidade facial; Dor; Qualidade de vida; Ortodontia.

Resumen

Este estudio evaluó el impacto de la deformidad facial en la percepción del dolor en pacientes sometidos a tratamiento ortodôntico y ortodôntico-quirúrgico. Se realizó un estudio de casos y controles con una población de individuos sometidos a tratamiento de ortodoncia. Los casos y controles se definieron por el dominio de dolor físico del Perfil de Impacto en la Salud Oral (OHIP-14). El grupo de casos ($n = 54$) incluyó individuos que respondieron "nunca" a al menos una de las preguntas, y en el grupo de control ($n = 44$), aquellos que respondieron "rara vez y a veces" con frecuencia y "siempre" a ambas preguntas. Los casos y controles se emparejaron por sexo, edad y condiciones clínicas en una proporción de 1:1. Para el análisis de datos, se estimaron las razones de posibilidades con los respectivos intervalos de confianza del 90%. No hubo diferencia significativa entre los grupos con y sin deformidades en relación a la distribución de los sexos femenino y masculino ($p = 1.000$), lo que permitió emparejar los grupos de casos y controles en la proporción de 1:1. Los pacientes con deformidad facial tenían 2.14 (IC90%: 1.08-4.24) veces más probabilidades de informar el impacto sobre el dolor físico ($p = 0.0662$). Un paciente con deformidad facial y sometido a tratamiento ortodôntico-quirúrgico tiene el doble de probabilidades de percibir dolor físico.

Palabras clave: Oclusión; Deformidad facial; Dolor; Calidad de vida; Ortodoncia.

1. Introduction

Quality of life has been defined by the World Health Organization (WHO) as being “the individual’s perception of his/her position in life, within the context of culture and value systems in which he/she lives and in relation to his/her objectives, expectations standards and concerns” (WHO 1993). In this sense, the dentofacial deformity may affect the oral health-related quality of life (OHRQoL) of individuals by causing functional and dentofacial changes and affecting their self-confidence and social relationships (Bortoluzzi et al. 2017; Pelo et al. 2018; de Araujo et al. 2020).

Individuals with facial deformities may receive treatment using orthodontic surgery (Wang et al. 2017), and this demand is determined according to the patient's complaint. The purpose of surgical treatment is to promote aesthetic and functional changes concerning harmony and balance of the face, normality of chewing, and speech function, consequently impacting the quality of life of the individual (Beluci & Genaro 2016).

However, there are controversies related to the impact of facial deformity on the individual's OHRQoL. Some studies are unanimous in recognizing the negative impact (Guimarães et al. 2014; Bortoluzzi et al., 2015; Kilinc & Ertas 2015); others affirm that dental esthetics has a direct influence on the OHRQoL, irrespective of the facial deformity (Guimarães et al. 2014; Isiekwe et al. 2016). It is known that individuals with severe malocclusion have a greater negative impact on oral health than the general population, directly affecting the quality of life. It is probably related to functional limitation, pain, and impairment in the social interaction of these individuals (Corso et al. 2018; Sun et al. 2018).

Improvement of the patient's OHRQoL is considered a result of orthodontic treatment (Silvola et al. 2016; Corso et al. 2018; Capalbo et al. 2021). Orthodontic and orthodontic-surgical treatments are expensive, long-lasting, and cause pain and discomfort for a patient. Thus, it is essential to understand how facial pain is associated with OHRQoL during orthodontic treatment of malocclusion and which patients benefit most from the treatment. Evaluating the quality of life is expected to improve the quality and effectiveness of orthodontic and orthodontic-surgical care (Silvola et al. 2016).

To assess the impact of OHRQoL, the Oral Health Impact Profile (OHIP-14) is recognized as one of the most valid and reliable instruments (Montero & Gómez-Polo 2017). Furthermore, when the domains that comprise the OHIP-14 are evaluated separately, physical pain is the one that shows the highest impact on the quality of life of patients with a facial

deformity (Lee et al. 2008; Bortoluzzi et al., 2015; Bortoluzzi et al. 2017) and is, therefore, an important aspect of evaluating in the diagnosis and treatment plan (Torres et al. 2017).

Finally, we considered the absence of association in the literature between exposure to risk factors and facial deformity and the hypothesis that these individuals are more likely to report physical pain. Thus, this study aimed to evaluate the impact of facial deformity on the physical pain perceived by patients undergoing orthodontic and orthodontic-surgical treatment using an observational case-control study design.

2. Methodology

This study was previously approved by the Research Ethics Committee (CAAE # 19627713.9.0000.5385). All the participants were informed about the exam procedures and assured of the confidentiality of the information collected. This study was conducted following STROBE protocol.

This observational case-control study was conducted with a population-based of 350 adult individuals undergoing orthodontic treatment in a Postgraduate Clinic in Orthodontics. The minimum size of 98 individuals determined by the sample calculation provided a level of significance of 5%, test power of 80%, and effect size of 1.5.

The following eligibility criteria were applied: (1) patients with the availability of pre-treatment orthodontic record; (2) age over or equal to 18 years at the time of starting with orthodontic treatment; (3) complete permanent dentition, except for third molars; (4) patients without facial deformity (ANB between 0 and 4°) and with the indication for conventional corrective orthodontic treatment; (5) patients with skeletal malocclusion in preoperative treatment for orthognathic surgery; (6) absence of syndromes; (6) absence of previous orthodontic treatment; and (7) at the initial stage of orthodontic treatment (alignment and leveling). In addition, all of the patients who attended the inclusion criteria and who agreed to participate in the research were evaluated about age, gender, and skeletal malocclusion (Corso et al. 2016; de Araújo et al. 2020).

The impact of the initial stage of alignment and leveling of the teeth on physical pain was evaluated 60 days after beginning with corrective orthodontic treatment, using the Oral Health Impact Profile (OHIP-14) (Oliveira & Nadanovsky 2005; Bortoluzzi et al. 2011). The OHIP-14 has two items in each of the following domains: functional limitation, physical pain, psychological discomfort, physical incapacity, psychological incapacity, social incapacity, and social disadvantage. The total OHIP-14 score is obtained by the sum of scores of the responses: 0 = never, 1 = rarely, 2 = sometimes, 3 = frequently and 4 = always.

The outcome variable “physical pain” was used to define cases and controls. The item-level physical pain has two questions. Patients who responded “never” (score 0) to at least one of the questions were included in the control group. Patients included in the case group were those who responded “rarely” (score 1), “frequently” (score 2), “sometimes” (score 3), and “always” (score 4) to both questions. Of the patients selected, 55% (n=54) were considered eligible for inclusion in the case group, and 45% (n=44) in the control group. Cases and controls were matched by sex and age in the ratio of 1:1.

The facial deformity was considered as an exposure factor. The facial deformity was classified according to ANB angle and defined the skeletal malocclusion. Class I skeletal malocclusion is identified by ANB between 0 and 4°. Class II and III were characterized by the sagittal relationship and positive (ANB greater than 7o) and negative (ANB less than -3o) about the maxilla and the mandible. An orthodontist and a maxillofacial surgeon performed all evaluations.

Data Analysis

The odds ratios with their respective intervals of confidence of 90% were estimated. The option was to adopt the significance level of 10% because it was a study of prevention and so that important information of associations close to the threshold of 5% would not be lost. Analyses were performed with the R program (R Foundation for Statistical Computing,

Vienna, Austria).

3. Results

According to Table 1, 55.1% of the patients were female, and 44.9% of the male sex. The Group with facial deformity consisted of significantly older patients than those in the Group without deformity ($p=0.016$). There was no significant difference between the groups with and without deformities relative to the distribution of the female and male sexes ($p=1.000$), which allowed pairing the Case and Control Groups in a ratio of 1:1.

Table 1. Baseline of sample of Groups with and without facial deformity.

Variable	Total Sample	Facial Deformity		p-value
		Without	With	
Median Age (minimum; maximum)	23.0 (15.0;46.0)	21.5 (15.0;46.0)	27.0 (15.0;40.0)	0.0160
Sex				1.0000
Female	54 (55.1%)	28 (56.0%)	26 (54.2%)	
Male	44 (44.9%)	22 (44.0%)	22 (45.8%)	

Source: Authors.

Table 2 shows the responses of the physical pain item-level (OHIP-14) for the cases and controls. Patients with facial deformity showed 2.14 (IC90%: 1.08-4.24) times more chance of reporting the impact of physical pain ($p=0.0662$).

Table 2. Impact of facial deformity on physical pain (OHIP-14).

Variable	Cate- gory	N(%)	Case (With physical pain impact)	Control (Without physical pain impact)	^s OR (#IC90%)	p-value
			Frequency (%)	Frequency (%)		
Facial Deformity	With out	50 (51.0%)	23 (46.0%)	27 (54.0%)	Ref	
	With	48 (49.0%)	31 (64.6%)	17 (35.4%)	2.14(1.08-4.24)	0.0662

^sOdds ratio. #Interval of Confidence. Source: Authors.

4. Discussion

The main finding of the present study was that facial deformity influenced the perception of physical pain reported by the patients evaluated, negatively impacting the oral health-related quality of life. Other studies have previously reported the negative influence of facial deformity in the literature (Lee et al. 2007; Esperão et al. 2010; Rusanen et al. 2010; Chen et al. 2015; Migliorucci et al. 2015; Bortoluzzi et al. 2017), and this was the reason why it was defined as the factor of exposure in this case-control study. Therefore, the importance of this investigation lies in the fact that it is the first case-control study to investigate the impact of facial deformity on the physical pain of orthodontic patients. The previous studies (Lee et al. 2007;

Esperão et al. 2010; Rusanen et al. 2010; Chen et al. 2015; Migliorucci et al. 2015; Bortoluzzi et al. 2017) evaluated the impact on the OHRQoL in general, without observing the specific item-levels.

Our findings showed that patients with facial deformity had more chance of reporting the impact of physical pain. All the patients selected for the case group presented severe facial deformity and were at the pre-surgical stage of orthodontic treatment may have contributed to the results shown. In addition to interference in aesthetic appearance, facial deformity causes functional changes which, depending on their severity, may lead to painful symptomatology, as has been demonstrated in the literature (Rusanen et al. 2010; Rustemeyer & Gregersen 2012; Bortoluzzi et al. 2015; Migliorucci et al. 2015). Thus, we affirm that pain was an important aspect to be evaluated and must be observed with attention in surgical patients (Bock et al. 2009; Rusanen et al. 2010; Bortoluzzi et al. 2015).

The majority of the studies that have evaluated the quality of life in patients with a facial deformity had a cross-sectional design (Lee et al. 2008; Bortoluzzi et al. 2017; Rusanen et al. 2010; Chen et al. 2015; Migliorucci et al. 2015), emphasizing the need for conducting case-control studies (Al-Ahmad et al. 2008; Esperão et al. 2010). that are ideal for investigating the risk factors for a specific condition. Furthermore, the facial deformity is not a common condition, and a sample consisting only of surgical patients may not be feasible for use in cross-sectional studies of association. However, in the case-control design, careful selection of the groups is necessary (Pandis 2014a). The case and control groups were paired without showing statistically significant differences in the present study, therefore avoiding a possible selection bias (Pandis 2014a; Pandis 2014b).

As a limitation, we point out that the case-control design does not indicate the prevalence or incidence of the condition of interest. However, these studies are easier to conduct than the cohort type, mainly concerning less frequent conditions in the orthodontic clinic, such as surgical treatment.

5. Conclusion

In conclusion, patients with a facial deformity and orthodontic surgical treatment are twice as likely to perceive physical pain. We also suggest that longitudinal studies be carried out to evaluate the impact of orthognathic surgery treatment on the quality of life of individuals.

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