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Dental Anxiety, Fear, and Root Canal Treatment Monitoring of Heart Rate and Oxygen Saturation in Patients Treated during the Coronavirus Disease 2019 Pandemic: An Observational Clinical Study



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ABSTRACT

Introduction: The present study aimed to evaluate anxiety in patients and to monitor their heart rate (HR) and blood oxygenation (SpO₂) before, during, and after a root canal treatment (RCT) during the state of alarm in 2 different periods of strict and partial confinement.

Methods: The patients who required a primary RCT were selected. Demographic, preoperative, and postoperative variables were registered, including perceived dental anxiety, fear, HR, and SpO₂. Spearman correlation, chi-square, Mann-Whitney, and Kruskal-Wallis tests were used for frequency distribution and variable interaction, and Wilcoxon and Mann-Whitney tests were used to compare HR and SpO₂ between groups and different treatment points.

Results: Ninety-six patients were included. The median Modified Dental Anxiety Scale scores were 8 (interquartile range [IQR], 6–9.25) and 6 (IQR, 5.5–8) in patients treated during the strict and partial confinement periods. The median fear scores were 2 (IQR, 0–5) and 3 (IQR, 1–5), respectively. Having a previous dental bad experience resulted in higher dental anxiety and fear ($P < .05$). HR was increased in patients with higher MDAS and fear scores and in those treated during the strict confinement ($P < .05$). In treatment time points T6 (x-ray taking), and T7 (post-treatment), HR decreased compared with the other evaluated treatment time points ($P < .05$). No clinical differences were found regarding SpO₂. **Conclusions:** Self-perception on dental anxiety and fear was similar to other studies in a nonpandemic context. Patients with higher levels of dental anxiety and those treated in the strict confinement period presented an elevated HR. However, it can be stated that RCT performed by endodontists does not result in a significant alteration in patients. (*J Endod* 2021;47:189–195.)

KEY WORDS

Coronavirus disease 2019; dental anxiety; endodontics; heart rate; oximetry; severe acute respiratory syndrome coronavirus 2

In December 2019, an outbreak of pneumonia cases of unknown cause was reported in Wuhan, China¹. A new coronavirus was identified and subsequently described by the International Committee on Taxonomy of Viruses as severe acute respiratory syndrome coronavirus 2². On January 30, 2020, the World Health Organization (WHO) declared the outbreak as a public health emergency of international concern³ and on February 11 named the resulting disease as coronavirus disease 2019 (COVID-19)⁴.

By July 1, 2020, the WHO had reported 10,357,677 confirmed cases of COVID-19 worldwide, including 508,051 deaths⁵. Because of various circumstances, Spain has suffered severely from the effects of this virus and is 1 of the countries with the highest number of confirmed cases and deaths per million inhabitants⁵. Given the little testing performed and the death rate forecast to exceed 40,000 during this period⁶, it can be assumed that the contagion and mortality data were an underestimation of the real

SIGNIFICANCE

RCT does not result in excessive anxiety and fear, even in a pandemic context. When performed by trained specialists, RCT does not produce a significant alteration or disturbance in patients' HR or SpO₂ levels.

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impact of the pandemic. On March 13, with 141,392 cases and 5,377 deaths reported worldwide and 5,753 confirmed cases in Spain, the Spanish government declared a 15-day state of alarm. Subsequently, the state was extended for several periods until June 21. One of the measures adopted was the confinement of the population. The confinement measures set out in Royal Decree 463/2020 of March 14 included restrictions on freedom of movement outdoors, except to buy essential supplies, medical products, and seek medical assistance. In this context, the annex of the order SND/310/2020 of March 31 established that dental clinics were considered essential services. However, the national dental institutions, although without the power to adopt any measure in this regard, appealed to the responsibility of all its members to deal with emergencies and urgent treatments exclusively and postpone nonessential procedures. Other countries' dental institutions, including the American Dental Association, published similar recommendations. These included "dental pain from pulpal inflammation and extensive dental caries or defective restorations causing pain" as urgent dental care⁷. Dental treatment in China was also limited to emergency dental services. Accordingly, during the COVID-19 outbreak in Beijing, China, pulp and periapical disease were the most commonly treated emergencies⁵. This shows that even in a pandemic, people still need dental services when suffering from a toothache, cellulitis, or abscess⁸.

In this context, it is logical that most attention and effort would be focused on controlling the expansion of the disease. However, the psychological consequences of COVID-19 should not be neglected⁸. People living in a pandemic under lockdown can suffer from different levels of psychological distress. In a recent study, people in quarantined areas of China experienced an increased fear of becoming infected and felt the need to receive psychological support⁹. People under quarantine presented a higher prevalence of psychological damage, including increased levels of anxiety compared with those in nonquarantined areas⁹, a condition that was also reported during the 2002–2004 severe acute respiratory syndrome coronavirus epidemic¹⁰.

Patients undergoing an endodontic procedure can present varying levels of anxiety, resulting from factors related and unrelated to the endodontic procedure itself. Dental anxiety and fear result from multiple aspects but are mainly influenced by life experiences¹¹. Contextual experiences and

external circumstances can increase the risk of anxiety¹². Rapid and verified information in a pandemic is critical to reducing unnecessary levels of stress, anxiety, and depression¹³. People who are more satisfied with the health information they receive have lower levels of anxiety, stress, and depression during a disease outbreak¹⁴. Thus, authorities need to provide accurate and consistent information about the disease and protective measures¹⁵. Among the factors directly related to the endodontic procedure, cognitive conditioning has been reported as the most common anxiety pathway¹⁶. Patients associate root canal treatment with fear and pain, and they anticipate it as a negative experience¹⁷. In this context, a recent systematic review¹⁸ reported moderate levels of anxiety with a low level of evidence. However, the data were recorded under normal conditions, rather than in an exceptional situation such as a lockdown in a pandemic.

Understanding the current situation is invaluable in setting a background in which to gain hindsight and predict future dental needs⁵. Thus, the present study aimed to evaluate the level of anxiety in patients and monitor their heart rate (HR) and blood oxygenation (SpO₂) before, during, and after root canal treatment (RCT) during the state of alarm in Barcelona, Spain, as well as to evaluate changes in patients treated during the strict and partial confinement periods. Secondary aims were to analyze possible relationships with the patients' anticipated dental anxiety and fear according to sex, age, treated tooth, and prior dental bad experience and to evaluate patient self-perception concerning treatment during the current pandemic.

MATERIALS AND METHODS

Study Design

The present study was a prospective cross-sectional study with a longitudinal cohort design to evaluate HR and SpO₂ before, during, and after root canal procedures in patients treated during 2 different time phases of the state of alarm (strict and partial confinement). The guidelines were followed for observational studies of the Strengthening the Reporting of Observational Studies in Epidemiology.

Setting

The present study was conducted during the strict confinement phase (March 14–May 21) and partial confinement (May 25–June 18) in Barcelona, Spain. Partial confinement is defined as the period of gradual lifting of

restrictions from the end of strict confinement to the beginning of the so-called "new normal." The root canal treatments were performed in private dental offices with the approved supervision of the University Ethics Committee (ENDECL201801E3) by 3 dentists with a master's degree in endodontics and at least 3 years of experience. The dental assistants recorded all patient data before, during, and after each procedure.

Participants

Ninety-six patients (45 during strict confinement and 51 during partial confinement) who required a primary RCT were initially screened. Inclusion criteria were patients over 18 years old with no abnormal medical conditions who signed an informed consent form. Only root canal treatments that were initiated and finished in a single visit were included. Exclusion criteria were patients taking prescribed anxiolytic or antidepressant medication, hypertensive patients, patients with psychiatric disorders, pregnant women, and patients with a score of 19 or more on the Modified Dental Anxiety Scale (MDAS) or a score of 8 in determining their fear toward the endodontic procedure.

Variables, Data Sources, and Measurement

The following variables and their interactions were considered for analysis:

1. Demographic variables: age and sex
2. Preoperative variables
 - a. Anticipatory dental anxiety measured with the MDAS, a single-selection response out of 5 different options in 5 items resulting in a score between 5 and 25¹⁹
 - b. Fear of the endodontic treatment as an anticipatory self-reported patient measure on a 0–10 numeric option score, with 0 indicating no fear and 10 extreme fear
 - c. A previous negative experience during dental treatment (dichotomous answer)
 - d. Treatment considerations related to the COVID-19 context in a 7-item self-reported questionnaire designed for this specific study (dichotomous answer) (Table 1)
 - e. HR and SpO₂ data using a pulse oximeter (SIH Corp, Hamburg, Germany)
3. Intraoperative variables
 1. HR and SpO₂ measures at 6 treatment time points (during anesthesia, rubber dam isolation, high-speed drilling and access cavity, root canal

TABLE 1 - Answer Distribution to Questions Regarding the Pandemic and State of Alarm Context

Question	Strict confinement		Partial confinement		P value*
	Yes (%)	No (%)	Yes (%)	No (%)	
1. Consider that you are more nervous to visit today	11.4	88.6	31.3	68.63	.036*
Male	10	90	26.1	73.9	1.00/.664
Female	12.5	87.5	35.7	64.2	
2. Concerned about when you might be attended	59.9	40.9	45.1	54.9	.248
Male	60	40	56.5	43.5	1.00/.228
Female	58.3	41.7	35.7	64.3	
3. Agree with only emergency and urgent treatments	13.6	86.3	41.2	58.8	.006*
Male	20	80	43.5	56.5	.495/.986
Female	8.3	91.7	39.3	60.7	
4. Concern about not being attended	61.4	38.6	66.7	33.3	.746
Male	60	40	69.6	30.4	1.00/.92
Female	62.5	37.5	64.3	35.7	
5. Postponed treatment due to fear of contagion in the clinic	9	90.9	15.7	84.3	.512
Male	5	95	8.7	91.3	.737/.391
Female	12.5	87.5	21.4	78.6	
6. Pain as the major reason to attend to the clinic	77.3	22.7	74.5	25.5	.941
Male	70	30	87	13	.490/.127
Female	83.3	16.7	64.3	35.7	
7. Considering postponing nonemergency treatments	15.9	84.1	17.6	82.4	.876
Male	10	90	17.4	82.6	.572/1.00
Female	20.8	79.2	17.9	82.1	

*Significant differences between time periods. Significance was set at $P < .05$.

instrumentation, intraoral cone fit radiography, and end of the procedure)

- The total time of the procedure in minutes

Procedure

First, the patients listened to an explanation of the study and signed an informed consent form. Afterward, in the waiting room, they responded to a self-reported questionnaire on demographic traits and other features, including whether they had had a previous negative dental experience, perceived fear, and anticipatory dental anxiety (MDAS) as well as questions related to the pandemic and confinement (Table 1). Then, with the patient seated in the dental chair, the dental assistant measured and recorded preoperative HR and SpO₂ data using a pulse oximeter placed in the patient's left-hand forefinger. Finally, the endodontist initiated the RCT procedure in a standardized manner.

RCT Procedure

Articaine 40 mg/mL epinephrine 1/100,000 (Ultracain; Normon, Madrid, Spain) was used as a local anesthetic. A round diamond and an Endo-Z bur (Dentsply Maillefer, Ballaigues, Switzerland) were used for tissue removal and access cavity performance under rubber dam isolation. Patency was achieved with a #10 K-file (Dentsply Maillefer), and the working length was established with the aid of an apex locator. Root canal instrumentation was performed using a Reciproc instrument (VDW, Munich, Germany) and apical enlargement

with ProFile .04 instruments (Dentsply Maillefer) powered by an endodontic torque control motor (VDW Gold, VDW). Four percent sodium hypochlorite solution was used during the procedure, and final irrigation was performed with 10% citric acid and 4% sodium hypochlorite. The thermomechanical compaction technique with gutta condensers (Dentsply Maillefer) was used to obturate the root canal space with a calibrated tapered master cone (Autofit; SybronEndo, Orange, CA) coated in a resin sealer (AH Plus Jet, Dentsply, Maillefer). The coronal seal was achieved with a flowable composite and a temporary filling. Patients were given postoperative instructions and a prescription for ibuprofen 600 mg for 3 days only if needed.

Bias

Possible biases were identified, and offset measures were performed accordingly. Extreme dental anxiety in patients can alter or can show out-of-range measurements during the procedure. Thus, patients with an MDAS score of 19 or over were not considered for inclusion¹⁹.

Sample Size

The sample size was calculated using anticipatory dental anxiety data from a pilot study on 11 patients scheduled for RCT before the pandemic and not related to this study. During each time period, 41 patients were considered necessary, assuming the resulting standard deviation of 2.4 in a 2-sided test. An alpha risk of 0.05 and a beta risk of 0.2 were accepted. No

dropouts were considered because all data were recorded on the same visit.

Statistical and Data Analysis

Because of mobility restrictions, each endodontist uploaded the data to an online Excel (Microsoft Corp, Redmond, WA) spreadsheet without identifying patients' names or clinical histories. Frequency distributions were analyzed using the chi-square and Mann-Whitney tests. Differences regarding the 2 time periods in the responses to the self-reported questionnaire were analyzed using chi-square tests. Spearman correlation, Mann-Whitney, and Kruskal-Wallis tests were used accordingly to analyze variable relationships with MDAS, and Wilcoxon and Mann-Whitney tests were used to compare pulse and oxygen saturation between groups and within the different treatment time points. The level of statistical significance was set at .05. The R software version 3.5.1 (Free Software Foundation, Boston, MA) was used to analyze all of the data.

RESULTS

Patients

A total of 96 patients (53 women and 43 men) were treated. Patient age ranged from 22–81 years, with a mean age of 47.3 ± 16.3 years. Teeth group distribution consisted of 9 anterior teeth, 26 premolars, and 61 molars (Table 2). The mean time to perform an RCT was 54.45 ± 12.58 minutes, with no differences between the groups ($P > .05$).

TABLE 2 - Distribution of the Sample in the 2 Time Periods (Strict and Partial Confinement)

Variable	Time period		P value
	Strict confinement	Partial confinement	
Age (mean ± SD)	43.3 ± 15.8*	50.6 ± 16.3*	.03
Sex, n (%)			
Male	20 (44.4)	23 (45.1)	1.00
Female	25 (55.6)	28 (54.9)	
Tooth, n (%)			
Anterior	6 (13.3)	3 (13.3)	.499
Premolar	10 (22.2)	16 (22.2)	
Molar	29 (64.4)	32 (64.4)	

SD, standard deviation.

*Significant differences between the two time periods. Significance was set at $P < .05$.

Anticipatory Dental Anxiety and Fear

Regarding perceived dental anxiety levels, the median MDAS scores were 8 (interquartile range [IQR], 6–9.25) and 6 (IQR, 5.5–8) in the 2 periods (strict and partial confinement) (Table 3). The median scores of perceived endodontic treatment fear were 2 (IQR, 0–5) and 3 (IQR, 1–5), respectively. No differences were found regarding age and sex ($P > .05$). The majority of the patients (63.2%) reported having no previous negative dental experience, with no difference between sexes ($P > .05$) or in patients treated in the first and second confinement periods ($P > .05$). Having had a prior negative dental experience was directly related to higher levels of perceived dental anxiety and fear ($P < .05$).

Regarding questions on the pandemic and confinement measures, no differences were found on the patients' sex or between patients treated during the 2 time periods ($P > .05$) (Table 1). However, patients treated during partial confinement reported significantly more unease ($P < .05$).

Patient Hemodynamic Changes

Table 4 shows the median scores of HR and SpO₂ before the treatment and at different time points. HR values were significantly higher in patients who received treatment during strict confinement in all of the evaluated time points ($P < .05$). In addition, HR also increased in patients with higher levels of dental anxiety in both periods ($P < .05$). Patients treated during the 2 confinement periods with an MDAS over 10 showed an increase of + 4.5 bpm and +10.9 bpm compared with patients with a lower MDAS. The different measurements during T6 and T7 revealed a significant reduction in the patients' HR compared with the other time points ($P < .05$). No difference was found in SpO₂ during the different RCT time points ($P > .05$) but was higher in patients treated during partial confinement ($P < .05$). The time needed to perform an RCT did not

affect patient HR or SpO₂ in the 2 groups in the posttreatment measures ($P > .05$).

DISCUSSION

During confinement, schools, universities, and shops were closed, except for those selling food and necessities. However, regulations did not cover the closure of health centers, which includes dental offices. Although no legal restriction was enforced, most Spanish dental associations recommended providing only emergency and urgent dental care. Similar measures were taken in other countries. On March 16, 2020, the American Dental Association also suggested that dentists should limit their practices to all but urgent and emergency care⁷. The health authorities in China suspended nonemergency dental treatment in some cities. However, patient perception of a dental emergency might differ from professional criteria and might consider dental care more important than presumed. Accordingly, most of the patients in the present study did not agree with these measures of limiting dental treatments to emergency and urgent care.

In one of the two 24-hour emergency dental centers in Beijing, China, a marked reduction of dental service was observed in the outbreak of severe acute respiratory syndrome coronavirus 2 in February 2020⁸. The main reason for seeking treatment was pulp and periapical disease (72.5%, including 15.7% of abscesses and cellulitis and 10.5% of trauma cases), a higher percentage than in a prepandemic period (37.7%)⁸. These results are consistent with those reported by a public hospital in Montpellier, France, where acute pain (74%) was the main reason for seeking dental care²⁰, and underline the importance of endodontists' work in health care. Fear of a contagion of a disease of this magnitude does not impede people from seeking dental care when needed, at least in some individuals⁸. However, some 12% of the patients who came to the clinic had already postponed their visit

because of the risk of contagion, which may suggest that a higher proportion of the global population was still reluctant to visit a dentist. A limitation to the present study is a lack of knowledge of how many patients might have postponed seeing a dentist out of fear or anxiety and might explain why only 1 patient scored over 19 for anticipatory dental anxiety.

It appears crucial to provide dental care, even in unfavorable situations. However, 40.9%–54.9% of the patients in the present study reported apprehension about when or whether they could receive treatment. Unlike public health services in other countries, the Spanish public health service provides limited dental treatment for adults restricted to emergency treatment and extractions, which does not include restorative or endodontic therapy. Thus, patients have to seek general dental treatment in the private sector, limiting access to more disadvantaged populations²¹.

The increasing new daily reported cases and mortality rates resulting from the increasing spread of the virus gives rise to reactions of fear, anxiety, and psychological stress¹⁴. This is not specific to this pandemic because these sensations were also reported during the last severe acute respiratory syndrome epidemic in 2003²². Thus, levels of anxiety in a pandemic are not exclusively limited to patients with COVID-19⁹. Under this hypothesis, after the WHO declared the public health emergency of international concern, a cross-sectional study was performed in China (January 31–February 2) showing that 36% of the evaluated population reported having different levels of anxiety, 8.5% of which were severe or extremely severe¹⁴. Patients in the present study reported no abnormal levels of dental anxiety compared with other studies conducted in a nonpandemic context²³ or with the latest published meta-analysis¹⁸. Indeed, only 1 patient in the present study reported a high level of anxiety and was thus excluded.

It can be assumed that in a pandemic, only patients requiring emergency treatment or pain-related treatment will seek dental care. However, access to general dental care, which is already limited to the individual's economic resources, may also, in this context, be further hampered by higher levels of fear, anxiety, and economic uncertainty. Accordingly, patients might have postponed endodontic treatment because of the pandemic or never even presented, similar to data reported by Guo et al⁸. Thus, the levels of anxiety and fear of contagion are probably an underestimation of all patients requiring endodontic treatment. This may explain why both anticipatory dental anxiety and fear were lower in the present study than others in which RCT was performed¹⁸. Patients treated in the present study are probably less likely to be

TABLE 3 - Anticipatory Anxiety and Fear in Patients in Both Groups according to Age, Sex, and Having a Prior Bad Experience (Median [Quartile 1 (Q1)–Quartile 3 (Q3)])

Variable	Strict confinement		Partial confinement	
	Median (Q1–Q3)	P value	Median (Q1–Q3)	P value
MDAS (5–25)	8 (6–9.2)		6 (5.5–8)	
Age	0.08	.581	–0.17	.223
Sex				
Male	7.5 (5–9.2)	.702	7 (5–8)	.961
Female	8 (6–9.2)		6 (6–8.2)	
Prior bad experience	8 (6–9)	.745	7.5 (6–10.2)	.031*
Fear (0–10)	2 (0–5)		3 (1–5)	
Age	–0.17	.256	–0.25	.076
Sex				
Male	2 (0–5)	.494	3 (1–4)	.750
Female	3 (0–6.5)		2.5 (1–5.25)	
Prior bad experience	5 (3–7)	.011*	3.5 (2–7.5)	.017*

MDAS, Modified Dental Anxiety Scale.

*Significant relation to MDAS or fear in each period. Significance was set at $P < .05$.

affected by anxiety and fear and have a greater ability to control them or detach themselves from their environment. However, the levels of anticipatory anxiety reported in our study were lower when only partial confinement measures were in place. Although not statistically significant ($P > .05$), the measures adopted to restrict mobility may have created a sensation that the worst part of the pandemic had already ended, positively affecting patients' anxiety and fear. Subsequently, a previous study has shown that patients in confinement have higher levels of anxiety and fear⁹.

The scores for dental anxiety and fear were strongly correlated in both the periods under study ($P < .05$). Individuals with

increased self-perceived anxiety traits can be more prone to stressors, having a more active response to state anxiety situations like a root canal procedure²⁴. Even though, by definition, there are differences between self-perceived anxiety and fear, the 2 are associated, and self-perception can be measured with question items or numeric scales¹⁸. The MDAS or fear in the present study was not affected by sex or age ($P > .05$). However, data have reported higher levels of dental anxiety and fear in women^{16,19} or no differences according to sex²⁵. Regarding age, it has been reported that anxiety decreases in older patients²⁶ or that there are no differences across different age groups²⁵.

TABLE 4 - Heart Rate (HR) and Oxygen Saturation (SpO₂) of Patients in the Different Time Points (Median Quartile Range [Quartile 1–Quartile 3])

HR	Strict confinement	Partial confinement	P value
Pretreatment (T1)	77.5 (68.7–84.2) ^{ac}	68 (62.5–77.5) ^{ade}	<.001*
Anesthesia (T2)	78 (67.7–84.2) ^{ac}	69 (64–78) ^{bd}	.017*
Rubber dam (T3)	77.5 (70–85) ^{ac}	71 (66–81) ^c	.045*
Access cavity (T4)	78.5 (69–85) ^{ab}	71 (65.5–78.5) ^{bc}	.015*
Instrumentation (T5)	78 (66.7–82.5) ^c	69 (63.5–77) ^d	.007*
X-ray (T6)	74 (66.7–82.2) ^{cd}	68 (62.5–73) ^e	.004*
Posttreatment (T7)	72 (65–85.2) ^d	66 (61–71) ^f	<.001*

SpO ₂	Strict confinement	Partial confinement	P value
Pretreatment (T1)	97 (96–98)	98 (97–99)	.028*
Anesthesia (T2)	97 (95–98.2)	98 (97–98.5)	.071*
Rubber dam (T3)	97 (96–98.2)	98 (97–98)	.422
Access cavity (T4)	98 (96–98)	98 (97–98)	.209
Instrumentation (T5)	97 (96–98)	98 (97–99)	.036*
X-ray (T6)	97 (95–98.2)	98 (97–99)	.019*
Posttreatment (T7)	97 (95–98.2)	98 (97–99)	.006*

T1–T7 indicates the time point.

P values evaluate differences between changes in each period.

Values with different superscript letters within each column have statistically significant differences.

*Significant differences between each time period. Significance was set at $P < .05$.

Dental anxiety and fear have been reported in some 10% of the general global population^{27,28}. This perception is brought about by the release of several hormones, including cortisol, which enhances the sympathetic-mediated cardiovascular response, including HR increase²⁹. Compared with values recorded the day before a dental visit, HR increases on the day of a dental visit³⁰. One of the limitations of the present study is the lack of patient HR data at rest or before the pandemic or confinement. However, an increase in HR was observed during the initial stages compared with the end of the treatment, which is consistent with data reported in other procedures³¹. This increase appears to remain constant until the access cavity is completed. Patients perceive anesthesia inoculation and high-speed noise as 2 key moments of fear and anxiety in dental treatment³². However, anesthesia inoculation was not found to raise HR levels in the present study. Despite being a highly feared moment for patients, HR may be balanced because of the vasovagal response when the vagus nerve is stimulated³³. Articaine 40 mg with epinephrine was used in the procedures conducted in the present study because it exerts minor effects on healthy patients' HR and oxygen saturation³⁴.

Individual self-perception of anxiety and fear is linked to situations, episodes, or an individual's immediate environment¹⁷. However, under normal circumstances, the HR is not completely regular, and the beats per minute can vary. Still, the heart is not a metronome, and the beats per minute are variable. Variability is natural and defined as heartbeat variability and reflects the heart's ability to react to numerous physical or psychological stimuli³⁵. HR was not constant during the RCT procedures in the present study. HR was generally higher during strict confinement in all of the evaluated treatment time points ($P < .05$). This might indicate that, contrary to self-perception, physical bodily reactions are more difficult to conceal, an individual is unaware of his or her response, or the context affects him or her more than her or she expresses outwardly. HR in strict confinement and partial confinement was higher during the initial stages of the RCT, lower in the last stages, and lower still upon completion of the treatment ($P < .05$), which can be explained by patients' relief that the treatment has finished. However, no measure was triggered at any time point. The findings of the present study showed higher HR data in patients with higher levels of dental anxiety ($P < .05$), which is consistent with data reported for other dental procedures such as tooth extractions³⁶.

Regarding SpO₂ monitoring, although some statistical differences were found in different time points, no clinically relevant alterations occurred. Levels were constant throughout the entire procedure, which is in accordance with the data reported by Alemany-Martínez et al.³⁷ during the extraction of mandibular molars, which is a more invasive treatment. Moreover, all of the patients treated in the present study presented no systemic diseases, were categorized as American Society of Anesthesiologists 1 or 2, and showed high SpO₂ levels. Only minor differences were found in older patients because the lungs decrease their lung capacity with age and hence their possibility of capturing oxygen.

Within the limitations of this study, we can conclude that self-perception of dental

anxiety and fear was not high compared with that of other studies. HR was higher at the initial treatment time points and decreased as the treatment finished. Patients with higher levels of anxiety and those treated during strict confinement presented significantly higher HR. However, no measure was significantly altered during the RCT procedure. Thus, it can be stated that under normal conditions, RCT performed by trained specialists does not produce a significant alteration or disturbance in patients.

CREDIT AUTHORSHIP CONTRIBUTION STATEMENT

Juan Gonzalo Olivieri: Conceptualization, Methodology, Investigation, Writing - original draft. **Carlota de España:** Methodology,

Investigation, Resources, Writing - original draft. **Marc Encinas:** Methodology, Investigation. **Xavier-Fructuós Ruiz:** Resources, Investigation. **Queralt Miró:** Formal analysis, Validation. **Jordi Ortega-Martínez:** Resources, Writing - review & editing. **Fernando Durán-Sindreu:** Writing - review & editing.

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