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POSTOPERATIVNI INTENZITET BOLA NAKON LEČENJA APIKALNOG PARODONTITISA

POSTOPERATIVE PAIN INTENSITY AFTER TREATMENT OF APICAL PERIODONITIS

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Sažetak

Uvod: *Tokom lečenja apikalnog periodontitisa, može doći do pogoršanja hroničnog stanja i pojave bola pri perkusiji, palpaciji ili čak otoka u predelu vrha korena zuba.*
Cilj *ovog istraživanja bio je da se utvrdi razlika u intenzitetu bola nakon endodontske terapije kod simptomatskog i asimptomatskog hroničnog apikalnog periodontitisa, između inicijalnog i ponovljenog tretmana.*
Materijal i metode: *Istraživanje je sprovedeno na 80 pacijenata podeljenih u dve glavne grupe: I grupu činili su pacijenti sa simptomatskim, a II grupu pacijenti sa asimptomatskim oblicima hroničnog apikalnog periodontitisa. Obe grupe su dalje podeljene na po dve podgrupe – pacijente koji su prvi put podvrgnuti endodontskoj terapiji i one koji su bili podvrgnuti reviziji (retretmanu). Svim ispitanicima je dodeljen upitnik u koji su unosili podatke o prisustvu i karakteristikama bola u određenim vremenskim intervalima: 6, 12, 24 i 48 sati, te 7 dana nakon inicijalne intervencije.*
Rezultati: *Pojava bola nakon endodontske terapije bila je česta, ali najčešće blagog do umerenog intenziteta. Bol se javljao već nakon 6 sati, a najizraženiji je bio posle 12 sati od intervencije. Bol pri perkusiji bio je intenzivniji od spontanog bola.*
Zaključak: *Nije zabeležena značajna razlika u učestalosti spontanog bola ili bola na perkusiju između zuba koji su bili simptomatski i asimptomatski pre početka terapije, iako je bol uvek bio izraženiji kod prethodno asimptomatskih zuba. Bol nakon revizionog tretmana bio je izraženiji u poređenju sa zubima koji su prvi put lečeni, u svim vremenskim tačkama. Intenzitet bola pri perkusiji bio je veći kod slučajeva retretmana, a statistička značajnost potvrđena je 12 sati nakon intervencije.*

Ključne reči: *apikalni periodontitis, postoperativni bol, endodontska terapija*

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Abstract

Introduction: *During the treatment of apical periodontitis, the problem can be the worsening of the chronic condition and the appearance of pain during percussion, palpation, or even the appearance of swelling in the area of the tip of the tooth.*
Aim *of the study was to determine the difference in the intensity of pain after endodontic therapy in symptomatic and asymptomatic chronic apical periodontitis, between initial and repeated treatment.*
Materials and methods: *The study was conducted on 80 patients, divided into two groups: I group comprised patients with symptomatic forms, and II group, patients with asymptomatic forms of chronic apical periodontitis. Both groups were divided into two subgroups consisting of patients who received endodontic therapy for the first time and patients who underwent retreatment. All patients were given a VAS questionnaire, in which they recorded pain and described its characteristics at specific time points: 6, 12, 24, 48 hours, and 7 days after the initial intervention.*
Results: *The occurrence of pain after endodontic therapy is quite common, but is usually mild or tolerable. Pain began as early as 6 hours and was most intense after 12 hours from the intervention. Percussion pain was stronger than spontaneous pain.*
Conclusion: *There was no difference in the occurrence of spontaneous pain or pain on percussion in teeth that were symptomatic or asymptomatic before the start of therapy, although pain was always more pronounced in previously asymptomatic teeth. The pain experienced after revision was always higher than in the group of teeth with newly initiated endodontic treatment at all time points. The intensity of percussion pain was also stronger in retreatment cases, but statistical significance was confirmed at the 12-hour time point after the intervention.*

Key words: *apical periodontitis, postoperative pain, endodontic treatment*

Introduction

Periapical lesions occur as a continuation of pathological changes of the dental pulp, and depending on the duration and intensity of the stimulus that caused them, they can be acute or chronic[1]. The prevalence of apical periodontitis increases if the teeth are untreated, but also if the performed endodontic therapy was inadequate. The frequency of apical periodontitis was significantly higher in teeth with inadequate fillings (72.2%) than in those with successful endodontic therapy (25.9%)[2].

Periapical lesions are mostly asymptomatic and are diagnosed mostly through control radiographs[3]. The suppurative form or the diffuse periapical process may have symptoms all the time, but also the existence of a permanent or occasional sinus tract. However, the clinical expression of chronic periodontitis is not static and it can be activated or exacerbated[4].

Endodontic therapy is the first choice for the healing of periapical tissues. After endodontic therapy, especially when it refers to teeth with a periapical lesion, it is necessary to monitor the patient's condition through control examinations.

Usually, in the first days after the completion of the instrumentation, a problem can be the exacerbation of the chronic condition and the appearance of pain on percussion, palpation, and even the appearance of swelling in the area of the apex of the tooth[5]. It is this appearance of pain that is the cause of mistrust that occurs in the patient. This is especially emphasized if, before the start of the treatment, the tooth did not cause pain or any discomfort, and the problems appeared after the start of the treatment.

Numerous studies have been conducted on the presence of postoperative pain and its aetiology and character. In his study, Alamassi et al. described the presence of 1.7% to 70% of postoperative pain[6]. This wide range of reported incidence is due to the different design of the studies performed, the preoperative condition of the teeth, the time of registration of pain, the index of pain measurement and the severity of pain included in the statistical analysis, as well as the procedure or technique of the treatment itself[7]. A higher incidence of postendodontic pain was determined in the treatment of necrotic teeth. According to a meta-analysis by Sathorn et al., the percentage of teeth where swelling is possible is 8.4%[8].

Aim: This paper aimed to analyze the occurrence of pain after initial endodontic therapy and retreatment between symptomatic and asymptomatic chronic apical periodontitis.

Materials and Methods

The examination was carried out in 80 patients at the private health care institution Private Dental prachce Vita Dent from Gevgelija, North Macedonia, who underwent endodontic therapy due to the existence of symptomatic or asymptomatic chronic apical periodontitis, with a lesion larger than 2 mm. Before the start of the treatment itself, the patients were informed about the protocol of the appropriate treatment, and according to the recommendations of the ethical committee, consent to participate in the trial was requested.

Patients over 18 years of age were included. Each patient had their card with data that had been recorded and was relevant to the trial. Before the start of the treatment, the tooth was recorded with a retroalveolar X-ray.

The patients were divided into two groups of forty participants each, based on their clinical presentation: the first group included patients with an asymptomatic form of chronic apical periodontitis, while the second group comprised patients who, in addition to radiographic changes, also exhibited symptoms such as percussion sensitivity, discomfort during mastication, and occasional exacerbation of periodontitis.

The two groups were divided into two subgroups, which differed according to whether that tooth was previously treated or not. In the first subgroup, endodontic therapy was performed on a tooth that was not previously endodontically treated, while in the other, retreatment was performed. All therapy, treatment, and testing were performed by a single therapist to exclude interpersonal variability in treatment.

The whole process of endodontic therapy was performed in the same way in terms of instrumentation, odontometry, type of endomotor, irrigation protocol, intersession application of medications, as well as the same type of definitive filling.

In the first visit, a complete treatment of the root canal and adequate irrigation was performed. An NSK endomotor was used for machining using the V-Taper Gold Rotary File (Fanta, Fanta Denta) machining instrument system. Irrigation according to the same protocol for each patient: NaOCL (sodium hypochlorite—Cerkamed), in a concentration

of 2% solution, followed by copious irrigation with saline solution, during processing, followed by the final irrigation with 17% EDTA solution (Cerkamed), and final irrigation with CHX 2% (Cerkamed) and Canal Clean (Cerkamed).

After the completion of that phase, medication was applied to all treated subjects, Solutio Chlumsky (Phytopharm - Phenolum 3 g, Camphora 6 g and Aethanolum 1 g) and the tooth was temporarily closed with phosphate cement.

In both groups and subgroups, each patient was given a questionnaire with a visual analogue scale (VAS), a psychometric response scale for subjective characteristics or attitudes that cannot be directly measured, where the patient noted whether there was pain or swelling[9]. Moreover, if pain or swelling was felt, the patient described its characteristics at specific time points: 6, 12, 24, 48 hours and seven days after the initial intervention when instrumentation and root canal treatment were completed.

Each patient made an appointment seven days after the intervention, when the tooth was filled with Dia Dent (Dia-Proseal), and the patient handed in the completed questionnaire.

Results

Table 1 shows the results obtained by comparing the intensity of spontaneous pain and pain on percussion, at the analyzed time points: 6, 12, 24, 48 hours and 7 days after endodontic treatment.

On average, the VAS score was higher for percussion pain compared to spontaneous pain at all time points: patients had significantly stronger percussion pain than spontaneous pain after 6 hours ($p = 0.000005$), after 12 hours ($p = 0.0000026$), after 24 hours ($p = 0.0005$) and after 48 hours ($p = 0.0018$), and non-significantly higher after 7 days after the treatment ($p = 0.27$). Z (Wilcoxon Matched-Pairs Signed-Rank Test) ***$p < 0.0001$ was used for comparison.

Table 2 shows the degree of spontaneous pain after therapy in symptomatic or asymptomatic cases. There was no difference in the occurrence of spontaneous pain in teeth that were symptomatic or asymptomatic before the beginning of the therapy; that is, in both types of periodontitis, the pain was equal. The tested difference in the distribution of patients with symptomatic and asymptomatic chronic apical periodontitis was statistically insignificant for the entire follow-up period ($p = 0.39$, $p = 0.7$, $p = 0.086$, $p = 0.36$ and $p = 1.0$, respectively, at the analyzed time points).

Table 1. Frequency distribution of spontaneous and percussive pain

Time after intervention	Type of pain	Pain				
		No pain n (%)	Mild n (%)	Moderate n (%)	Severe n (%)	Unendurable n (%)
6 hours	Spontaneous	56 (70)	17 (21.25)	2 (2.5)	2 (2.5)	3 (3.75)
	On percussion	47 (58.75)	23 (28.75)	2 (2.5)	4 (5)	4 (5)
12 hours	Spontaneous	50 (62.5)	22 (27.5)	3 (3.75)	2 (2.5)	3 (3.75)
	On percussion	45 (56.25)	24 (30)	2 (2.5)	5 (6.25)	4 (5)
24 hours	Spontaneous	58 (72.5)	15 (18.75)	1 (1.25)	4 (5)	2 (2.5)
	On percussion	54 (67.5)	15 (18.75)	4 (5)	4 (5)	3 (3.75)
48 hours	Spontaneous	67 (83.75)	9 (11.25)	3 (3.75)	1 (1.25)	
	On percussion	63 (78.75)	10 (12.5)	2 (2.5)	4 (5)	1 (1.25)
7 days	Spontaneous	75 (93.75)	5 (6.25)			
	On percussion	74 (95.5)	5 (6.25)	1 (1.25)		

Table 2. Spontaneous pain in symptomatic and asymptomatic chronic apical periodontitis

Time after intervention	Type of chronic apical periodontitis	Spontaneous pain					**P-value**
		No pain n (%)	Mild n (%)	Moderate n (%)	Severe n (%)	Unendurabl n (%)	
6 hours	Symptomatic	27 (67.5)	10 (25)	2 (5)	0	1 (2.5)	exact p = 0.39
	Asymptomatic	29 (72.5)	7 (17.5)	0	2 (5)	2 (5)	
12 hours	Symptomatic	24 (60)	12 (30)	2 (5)	0	2 (5)	exact p = 0.7
	Asymptomatic	26 (65)	10 (25)	1 (2.5)	2 (5)	1 (2.5)	
24 hours	Symptomatic	29 (72.5)	9 (22.5)	0	0	2 (5)	exact p = 0.086
	Asymptomatic	29 (72.5)	6 (15)	1 (2.5)	4 (10)	0	
48 hours	Symptomatic	34 (85)	5 (12.5)	0	1 (2.5)		exact p = 0.36
	Asymptomatic	33 (82.5)	4 (10)	3 (7.5)	0		
7 days	Symptomatic	37 (92.5)	3 (7.5)				$\chi^2 = 0.2$ p = 1.0
	Asymptomatic	38 (95)	2 (5)				

Exact (Fisher's Exact Test); χ^2 (Chi-square test)

Table 3 shows the degree of pain on percussion after therapy of symptomatic or asymptomatic cases. Patients with symptomatic and asymptomatic chronic apical periodontitis did not differ significantly in the frequency of pain on percussion, although pain was always more pronounced in previously asymptomatic teeth. The only significant difference was after 24 hours, when pain on percussion was stronger in asymptomatic cases.

In present study, the pain that occurs in teeth after treatment of previously untreated teeth or teeth where retreatment was performed after a previously unsuccessful outcome was followed. The obtained results showed that the pain experienced after the revisions was always higher than pain after the initial endodontic treatment of a group of teeth. Graphs 1 and 2 show the degrees of spontaneous and percussive pain and their decline.

The results of the statistical analysis presented a significantly stronger intensity of spontaneous pain in patients with retreatment compared to patients with first treatment during the first day after the intervention; in terms of pain intensity after 6, 12 and 24 hours after the endodontic intervention.

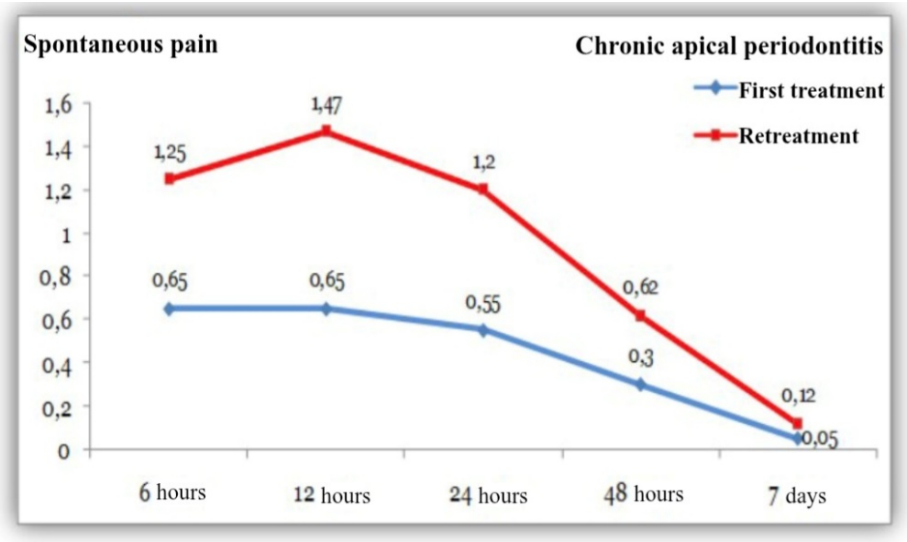
Patients in whom endodontic treatment was performed on a previously untreated tooth had pain on percussion less often than retreatment patients. Percussion pain intensity was stronger in the retreatment group compared to the first treatment group throughout the entire follow-up period of the patients, but statistical significance was confirmed only at the time point 12 hours after the intervention (p = 0.023).

Table 3. Distribution of pain on percussion in symptomatic and asymptomatic chronic apical periodontitis

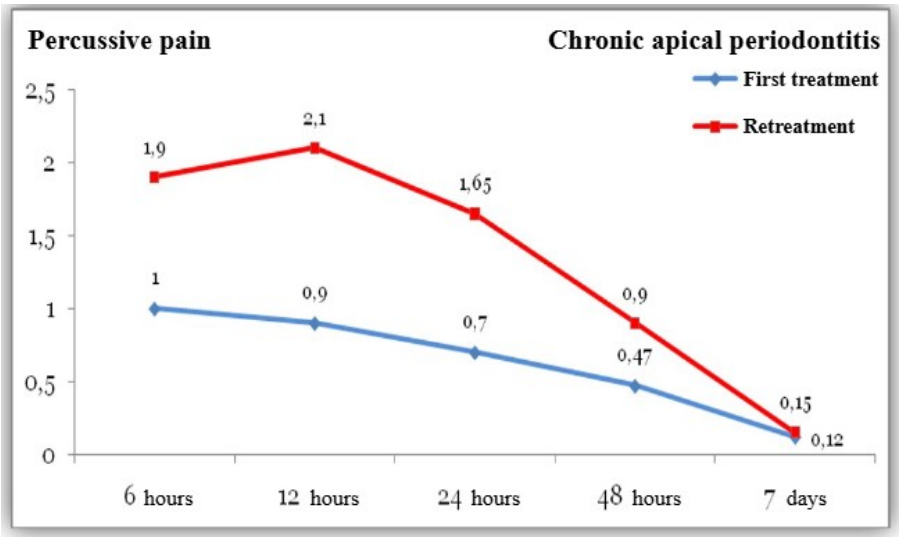
Time after intervention	Type of chronic apical periodontitis	Pain on percussion					**P-value**
		No pain n (%)	Mild n (%)	Moderate n (%)	Severe n (%)	Unendurable n (%)	
6 hours	Symptomatic	21 (52.5)	15 (37.5)	1 (2.5)	2 (5)	1 (2.5)	exact p = 0.43
	Asymptomatic	26 (65)	8 (20)	1 (2.5)	2 (5)	3 (7.5)	
12	Symptomatic	20 (50)	15 (37.5)	1 (2.5)	2 (5)	2 (5)	exact

hours	Asymptomatic	25 (62.5)	9 (22.5)	1 (2.5)	3 (7.5)	2 (5)	p = 0.71
24 hours	Symptomatic	25 (62.5)	13 (32.5)	0	0	2 (5)	exact ***p = 0.0001
	Asymptomatic	29 (72.5)	2 (5)	4 (10)	4 (10)	1 (2.5)	
48 hours	Symptomatic	30 (75)	8 (20)	0	1 (2.5)	1 (2.5)	exact p = 0.063
	Asymptomatic	33 (82.5)	2 (5)	2 (5)	3 (7.5)	0	
7 days	Symptomatic	36 (90)	3 (7.5)	1 (2.5)			exact p = 0.675
	Asymptomatic	38 (95)	2 (5)	0			

Exact (Fisher's Exact Test); χ^2 (Chi-square test) ***p < 0.0001



Graph 1. Occurrence of spontaneous pain after retreatment and initial endodontic therapy



Graph 2. Occurrence of percussive pain after retreatment and initial endodontic therapy

Discussion

Pain is a personal and subjective feeling and difficult to quantify and standardize[10,11]. It can be influenced by various factors, such as fear of dental procedures, anxiety, as well as many other physical and psychological factors that can affect the patient's perception of pain and reaction thresholds[12,13]. Most clinical studies use numerical, verbal, and visual analogue scales[14]. In this study, the widely accepted VAS scale was used. In addition to its simplicity, it is considered a reliable and reproducible measurement tool for clinical trials of pain[15]. Patients were informed about the purpose of the study and self-reported the level of pain. This phenomenon is called the Hawthorne effect, which means that when subjects are familiar with how to record their symptoms, interpretations and subjectivity of the pain response are minimized[16].

The occurrence of postoperative pain is not a rare occurrence in endodontics. It can last from a few hours to a few days after endodontic therapy, but it still largely depends on the diagnosis due to which endodontic therapy does[17]. According to studies by Kane et al., the reported incidence of post-obturation pain occurred in 18.75% of vital teeth and 13.15% of non-vital teeth (necrosis)[18].

The pain that occurs postoperatively in apical periodontitis may originate either from the extrusion of infected material into the periapical tissue or from a disturbance of the subtle balance between the bacteria present in the canal and the patient's immune response[19,20,21]. The balance can be disturbed at any stage of endodontic therapy, especially if a procedure is incorrect[22,23,24].

In our study, pain was observed early after the completion of root canal treatment, so after 6 hours of treatment, 30% of cases had spontaneous pain, and 41.25% of patients had percussive pain. After 12 hours, the highest intensity of spontaneous and percussive pain was observed. Furthermore, the pain gradually decreased, so after 7 days of endodontic treatment, only a few patients complained of both types of pain. At all time points, patients had significantly stronger percussion pain than spontaneous pain, except after 7 days of treatment, when that difference was insignificant. In terms of intensity and spontaneous and percussion pain, the patients mostly described it as mild at all time points. Our results were reduced compared to those of De-Figueiredo et al., in which, after 24 hours, pain was detected in 40% of the subjects and that in approximately 3% swelling occurred as a consequence of the therapy[17]. In our study, we did not have swelling, but the percentage of patients who presented with very severe pain was close.

One of our stated goals was to investigate whether the intensity and occurrence of pain depend on whether the teeth were symptomatic or asymptomatic before the start of the intervention. Symptomatic periodontitis has been shown to have a higher incidence of pain in the first 48 hours. Percussion pain was also more frequent and of greater intensity in symptomatic patients, but the difference was insignificant in all investigated periods, except after 24 hours.

Based on a similar conclusion, Abdel Hameed et al., showed a higher incidence of postoperative pain (15.9%) in previously symptomatic than in asymptomatic patients (7.1%)[20]. The finding of Sadaf et al. was similar, and led them to the same conclusion[25].

When asked whether we should expect painful symptoms if we perform endodontic treatment on teeth that have not been treated or on teeth where retreatment is indicated, it has been shown that retreatment causes clinical symptoms and pain much more often. This difference after 6 hours of treatment, after 48 hours and after 7 days was at the border of significance, but was significantly different after 12 and after 24 hours of treatment. It is interesting to note that the cases with very severe pain manifestations were detected in retreatments. Percussion pain intensity was stronger in the retreatment group compared to the first treatment group throughout the patients' follow-up period, but statistical significance was confirmed only at the 12-hour post-intervention time point. According to the results of Siqueira et al., there is no significant difference in terms of the incidence of postoperative pain between the initial treatments and the retreated ones, although they also showed mild pain in 10% of cases, moderate in 3.3%, and severe in 1.9%[26].

Conclusion

According to the results obtained from the examination and their analysis from this prospective study, the following conclusions can be drawn that in all time points, patients had significantly stronger pain on percussion than spontaneous pain, except after the seventh day of treatment which showed an insignificant difference. Symptomatic periodontitis had a higher incidence of

spontaneous pain and pain on percussion in the first 48 hours. The tested difference in terms of pain intensity was statistically insignificant for the entire follow-up period, except after 24 hours between percussive pain in symptomatic and asymptomatic cases. After retreatment, the appearance of clinical symptoms of spontaneous pain and percussion is much more frequent. It was significantly different for spontaneous pain after 12 and 24 hours of treatment, and for percussive pain at the time point of 12 hours after the intervention.

Conflicts of Interest

The authors declare that they have no conflict of interest.

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