



# Clinical analysis of heat gutta-percha vertical condensation in the treatment of pulpitis and periapical periodontitis

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## ABSTRACT

**Objective:** To explore the clinical effect of heat gutta-percha vertical condensation in the treatment of pulpitis and periapical periodontitis. **Methods:** A total of 120 patients with pulpitis and periapical periodontitis who were admitted in our hospital from February, 2015 to February, 2016 were included in the study and randomized into the observation group and the control group. The patients in the observation group were given heat gutta-percha vertical condensation for root canal filling, while the patients in the control group were given cold gutta-percha lateral condensation root canal filling. The root canal filling was evaluated. The changes of GI, SBI, and PD before and after treatment were observed. **Results:** The correct filling, shorting filling, and extra filling in the observation group were significantly superior to those in the control group. After treatment, GI, SBI, and PD were significantly reduced, and the reduced degree in the observation group was significantly superior to that in the control group. **Conclusions:** Heat gutta-percha vertical condensation in the treatment of pulpitis and periapical periodontitis can significantly enhance the therapeutic effect, and improve GI, SBI, and PD, with a significant clinical effect; therefore, it deserves to be widely recommended.

## 1. Introduction

Pulpitis and periapical periodontitis are the common diseases of stomatology, with a multiple characteristics, and are highly occurring in adult individuals[1]. A continuous development of pulpitis can cause the bacterial infection or necrosis in partial or all dental pulp tissues, resulting in the inflammation of periapical tissues which are severely damaged when teeth receiving external striking, thus inducing periapical periodontitis[2]. The root canal filling treatment is mainly adopted in the clinic. With the updating and improvement of medical equipment and the development of root canal filling technology, heat gutta-percha filling is gradually applied in the clinic, with an ideal efficacy[3]. The study is aimed to explore the clinical effect of heat gutta-percha vertical condensation in the treatment of pulpitis and periapical periodontitis.

## 2. Materials and methods

### 2.1. General materials

A total of 120 patients with pulpitis and periapical periodontitis who were admitted in our hospital from February, 2015 to February, 2016 were included in the study. Inclusion criteria: (1) those who were in accordance with the diagnostic criteria of pulpitis and periapical periodontitis in the Practical Endodontic Disease Therapeutics[4]; (2) those who were confirmed by oral X ray; (3) those whose apical foramen was normally developed; (4) those who had no root canal calcification and severe periodontal lesions; (5) those who had no serious systemic diseases before operation. The patients were randomized into the observation group and the control group. In the observation group, there were 60 cases, among which 32 were male, and 28 were female; aged from 27 to 41 years old, with an average age of (33.7±5.2) years old; with 21 front teeth, 23 premolar teeth, and 16 molar teeth. In the control group, there were 60 cases, among which 34 were male, and 26 were female; aged from 28 to 42 years old, with an average age of (34.5±5.1) years old; with 20 front teeth, 23 premolar teeth, and 17 molar teeth. The

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comparison of the general materials between the two groups was not statistically significant ( $P>0.05$ ).

## 2.2. Methods

The patients in the observation group were given heat gutta-percha vertical condensation for root canal filling. A small amount of paste was smeared on the apical area of main gutta-percha which was placed into the root canal to reach a depth of trial point, with a heating system temperature of 200 °C. After heating processing, a pressure was added downward. After the dental cusp was steadily fixed, the spearhead was withdrawn. The gutta-percha spear was used for root canal filling. The patients in the control group were given cold gutta-percha lateral condensation root canal filling. The main gutta-percha point was inserted. A lateral pressurizer was used for pressing for 10 s. After withdrawing the pressurizer, a side point was inserted. The above methods were repeated for close root canal filling. After filling being finished, the excessive filling materials were removed. Apical X ray was performed to examine the filling effect.

## 2.3. Observation indicators[5]

The root canal filling was evaluated. Correct filling: the root canal was tightly sealed, with a distance between the root tip and the filling materials <2 mm. Short filling: the root canal was not tightly sealed, loosening sometimes, with a distance between the root tip and the filling materials 2 mm. Extra filling: the filling materials were exceeding the root tip. The changes of GI, SBI, and PD before and after treatment were observed.

## 2.4. Statistical analysis

SPSS 18.0 software was used for the statistical analysis. The measurement data were expressed as mean  $\pm$  SD, and  $t$  test was used.  $Chi$ -square test was used for the enumeration data.  $P<0.05$  was regarded as statistically significant.

## 3. Results

### 3.1. Comparison of the root canal filling between the two groups

In the observation group, 55 (91.7%) had correct filling, 4 (6.7%) had short filling, and 1 (1.7%) had extra filling; while in the control

group, 43 (71.7%) had correct filling, 9 (15.0%) had short filling, and 8 (13.3%) had extra filling. The correct filling rate in the observation group was significantly higher than that in the control group, but the extra filling was significantly lower than that in the control group ( $P<0.05$ ).

### 3.2. Comparison of GI, SBI, and PD before and after treatment between the two groups

After treatment, GI, SBI, and PD were significantly reduced ( $P<0.05$ ). GI, SBI, and PD in the observation group were significantly lower than those in the control group ( $P<0.05$ ) (Table 1).

## 4. Discussion

Pulpitis and periapical periodontitis, with a high morbidity in the clinic, can destroy the periodontal tissues and anatomical structures, resulting in loss of periodontal tissue attachment and loosening teeth which were then fallen off[6]. The first treatment is to relieve the pain, eliminate the infection lesions, and promote the healing of dental pulp and periapical tissues in order to retain the involved teeth[7]. The root canal filling is the most effective method to treat pulpitis and periapical periodontitis currently, through three-dimensional filling to avoid the invasion by the outside bacterial and pollutants, which can create a favorable condition for healing, in order to reach the goal of retaining the teeth[8]. Incomplete root canal filling will induce teeth lesions in different degrees and aggravated inflammation, while dense filling will greatly reduce the recurrence rate of lesions, which can strengthen the treatment effectiveness[9].

Among the traditional treatments, the cold gutta-percha lateral condensation root canal filling technology is a common and classic filling method, through lateral pressure to change the morphology of gutta-percha in order to reach the goal of sealing the root canal[10]. Due to the limitation of lateral filling pressure strength and restricted deformation ability, a deviation will occur in the integrity of gutta-percha point, and a large gap will be formed between the main and assistant teeth, resulting in the leakage of gutta-percha and affecting the therapeutic effect. Moreover, the cold gutta-percha lateral condensation filling can not form a preferable adaption with the root wall, which can affect the three-dimensional filling effect and

**Table 1**

Comparison of GI, SBI, and PD before and after treatment between the two groups (mean  $\pm$  SD).

Groups	n	GI		SBI		PD	
		Before treatment	After treatment	Before treatment	After treatment	Before treatment	After treatment
Observation	60	2.45 $\pm$ 0.82	1.17 $\pm$ 0.47**	3.21 $\pm$ 0.54	1.49 $\pm$ 0.62**	6.33 $\pm$ 0.52	4.11 $\pm$ 0.45**
Control	60	2.43 $\pm$ 0.65	1.56 $\pm$ 0.48*	3.20 $\pm$ 0.48	2.15 $\pm$ 0.45*	6.31 $\pm$ 0.58	5.62 $\pm$ 0.57*

\* $P<0.05$ , when compared with before treatment; \*\* $P<0.05$ , when compared with the control group.

probably result in root canal rupture during the pressing process[11].

It is reported that[9] on the basis of acquaintance with the teeth and oral cavity, the total effective rate of heat gutta-percha vertical condensation in the treatment of pulpitis and periapical periodontitis can reach 95.0%, with an excellent therapeutic effect. The heat gutta-percha vertical condensation filling can alter its biological characteristic through heating the gutta-percha to let it in a semi-flow fluid state, which can produce a preferable filling and plasticity to completely seal the gap in order to improve the root canal filling quality; meanwhile, a preferable mobility is beneficial for the filling of assistant root canal which can combine with the main root canal through cooling processing in order to improve the therapeutic effect[12,13]. During the heat gutta-percha filling, the main gutta-percha point is placed. Through the heating apparatus, the gutta-percha point crown root is often continuously pressed, in combined with the heat gutta-percha injection technology to fill the crown root, which can prevent the extra filling and guarantee the dense filling. In combined with the advanced equipments, a real-time monitoring of heat temperature can be achieved, and the pressure can be precisely regulated; therefore, the heat gutta-percha vertical condensation in the treatment of pulpitis and periapical periodontitis has received more and more extensive concerns[14,15].

The heat gutta-percha filling in combined with vertical condensation can increase the filling amount of gutta-percha point, and tightly seal the root canal, with obvious advantages of filling stability and accuracy, which can greatly shorten the filling time, with a high efficiency[16].

The results in the study showed that the correct filling, shorting filling, and extra filling in the observation group were significantly superior to those in the control group ( $P < 0.05$ ); after treatment, GI, SBI, and PD were significantly reduced ( $P < 0.05$ ), and the reduced degree in the observation group was significantly superior to that in the control group ( $P < 0.05$ ), suggesting that the heat gutta-percha vertical condensation in the treatment of pulpitis and periapical periodontitis has a better clinical effect.

In conclusion, heat gutta-percha vertical condensation in the treatment of pulpitis and periapical periodontitis can significantly enhance the therapeutic effect, and improve GI, SBI, and PD, with a significant clinical effect; therefore, it deserves to be widely recommended.

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