Stomatologija, Baltic Dental and Maxillofacial Journal, 7:40-4, 2005

Chemomechanical Caries Removal for Children

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SUMMARY

Pain is still an actual problem in dentistry, and a usage of anaesthetics can be still limited, so new ways of caries treatment are still being searched in order to ease this process both to a patient and a doctor. Efficiency of chemomechanical tooth treatment to children was studied. 30 children within two age groups of 3-6 and 7-13 years took part in this research, and their teeth with caries were treated in two different ways - chemomechanical and traditional. Teeth with the same class of cavities were treated. There are presented records about the need of anaesthetics' usage, cleaning duration and patients' complaints in this study. Results show that chemomechanical treatment could be as effective as traditional one, causes less pain and lowers the need for anaesthetics. There was noticed less removal of solid tissue cleaning carious cavity.

Key words: dental caries, chemomechanical caries removal, anaesthesia

INTRODUCTION

The rotary instruments are used in the traditional caries removal, which often causes pain and is unpleasant to many patients and needs anaesthetics. In same cases, like allergy, anxiety or other diseases the usage of anaesthetics can be restricted. The usual tooth treatment can be problematic in children dentistry because children are more sensitive to pain than adults.

The drilling can cause same adverse effects to the tooth pulp, that's why the alternative method of caries removal is needed. Carisolv® method is a chemomechanical caries removal which is gentle and preserving the sound tooth tissue.

MATERIAL AND METHODS

Aims of the research:

- To evaluate the new chemomechanical method of caries removal using Carisolv® gel for deciduous and permanent teeth of children comparing it with traditional caries removing by rotary instruments;
- To determine the need of anaesthetics.

Material and instruments used in the study were developed as an alternative for rotary instruments in University of Gothenburg in Sweden and produced by MediTeam Dental AB, Sweden. The material is the Carisolv® gel which is comprised of two solutions to be mixed prior to application on the carious lesion. The first contains glutamic acid, leucine, lysine, sodium hydroxide with pH 11, purified water. The second solution contains sodium hypochlorite 0,5%, viscosity and dye agent. The essence of the chemomechanical method is gentle removing of carious dentine from the cavity with special designed instruments due to proteolytic effect.

There are many indications and very few contraindications to this method of caries removal. It is recommended to use in treatment of root and crown caries, marginal caries of crowns and bridges, deep caries. The method allows minimal invasive technique and reduces the risk of damaging sound tooth tissue removing just decayed dentin as compared to the treatment with conventional excavators or drills. In vitro studies showed that the application of Carisolv® results to a dentine surface free from smear layer debris leaving patent dentine tubules [1].

The subjects were children visiting paediatric dentist in Vilnius University Žalgiris hospital and to whom at least 2 primary caries lesions in teeth of the same group are diagnosed.

The DMFS score is very high among children in Lithuanian. According to epidemiological data of year 1996 it was 4.6 for 5-7 year olds in primary and 1.6 in permanent teeth and 5.8 for 12 year olds [3]. In this research participated children who had 2 or more same caries lesions in the same group of the teeth, for example, 16 and 26 or 55 and 65 that were on the different sides of the same jaw. One of chosen teeth (experimental tooth) was treated with Carisolv® gel and another was treated by drilling and excavating usual way. Experimental tooth was chosen in the right side of the jaw and the control one- in the left side.

A positive answer for taking part of the children in the study from their parents was obtained.

Two dentists practicing within children dentistry took part in the study with assistance of one dental nurse. The operator (dentist who was trained to work with Carisolv® treated teeth using Carisolv® gel or usual way during one visit and the other way during next visit. The independent

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Table 1. Age and diagnosis of patients in traditional treatment group

		Diagnosis in chemomechanical treatment group		Total
		caries media	caries profunda	
Age groups	2.5 - 6	10	9	19
	7 - 13	8	3	11
Total		18	12	30

Table 2. Age and diagnosis of patients in traditional treatment group

		Diagnosis in traditional treatment group		Total
		caries media	caries profunda	
Age groups	2.5 - 6	9	9	18
	7 - 13	8	3	11
Total		17	12	29

Table 3. Complaints within chemomechanical treatment group

		Frequency	Percent	Valid percent
Valid	pain	7	23.3	23.3
	other	7	23.3	23.3
	no complaints	14	46.7	46.7
	unpleasant taste and smell	1	3.3	3.3
	pain and unpleasant taste	1	3.3	3.3
	Total	30	100.0	100.0

Table 4. Complaints within traditional treatment group

		Frequency	Percent	Valid percent
Valid	positive	15	51.7	51.7
	4	6	20.7	20.7
	5	8	27.6	27.6
	Total	29	100.0	100.0

examiner (specialist in paediatric dentistry) checked cavity after caries removing if the cavity is free of caries using sharp probe. Teeth were filled with usual materials: glasjonomer, composites or amalgam. The anaesthesia was given if the patient asked for it or if the treatment was nor possible to continue because of the pain.

The study was conducted in compliance with the protocol, GCP and the applicable regulatory requirements.

The following determinations were made:

- Number of the tooth (permanent or deciduous);
- The method (chemomechanical or drilling);
- Patients' previous experience of treatment;
- Patients' complaints for pain, bad taste, smell or other inconvenience;
- The usage of anaesthetics;
- Time for removing caries.

Occurrences analysed in the research were the following:

- The structure of complaints in chemomechanical and traditional treatment groups;
- The usage of anaesthetics in both groups;
- The comparison of cleaning duration in both groups;
- The usage of drill in the chemomechanical treatment group.

RESULTS

The subjects of research (teeth with primary caries lesions) were divided into two groups -experimental group (chemomechanical treatment using Carisolv® gel) and control group (using traditional treatment model- by drilling and excavating usual way).

Diagnosis in age groups

In research participated 30 children from age 2.5 to 13 years, visiting paediatric dentist in Vilnius University Žalgiris Hospital.

19 children had deciduous teeth (63 per cent of all children), 11 children had permanent teeth (37 per cent). To 35 subjects/teeth caries media was diagnosed (60 per cent of all subjects); 19 of them were deciduous (54 per cent of this group) and 16- permanent (46 per cent).

Caries profunda was diagnosed to 24 teeth (40 per cent of all subjects), 18 of them were deciduous (75 per cent of all caries profunda cases) and 6 of them were permanent (25 per cent) (see Table 1 and Table 2). To one tooth (deciduous) was diagnosed pulpit under treatment and later the subject was excluded from the study. The tooth with diag-

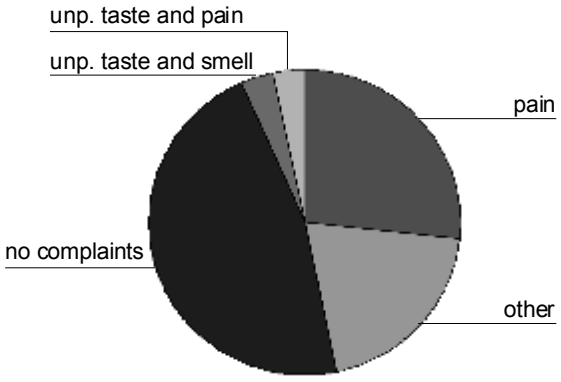

Fig. 1. The structure of complaints in chemomechanical treatment group

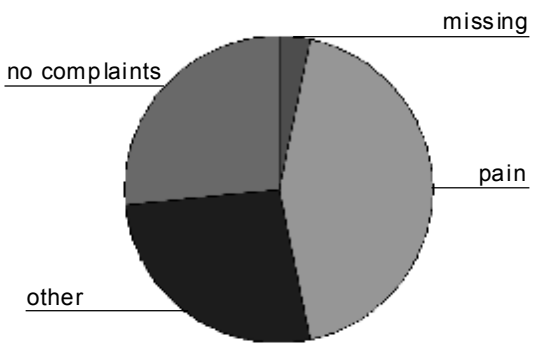

Fig. 2. The structure of complaints in traditional treatment group

Table 5. Use of anesthetics in chemomechanic treatment group

		Frequency	Percent	Valid percent
Valid	positive	1	3.3	3.3
	negative	29	96.7	96.7
	Total	30	100.0	100.0

Table 6. Use of anesthetics in traditional treatment group

		Frequency	Percent	Valid percent
Valid	positive	9	30.0	31.0
	negative	20	66.7	69.0
	Total	29	96.7	100.0
Missing	System	1	3.3	
Total		30	100.0	

Table 7. Cleaning duration in chemomechanical and traditional treatment group

	Chemomechanical treatment group	Traditional treatment group
Minimum of cleaning duration	3	1
Maximum of cleaning duration	20	20
Mean of cleaning duration	10.5	5.9

Table 8. The usage of drill in chemomechanical treatment group

		Frequency	Percent	Valid percent
Valid	positive	18	60.0	60.0
	negative	12	40.0	40.0
	Total	30	100.0	100.0

nosed pulpit belonged to traditional treatment group, but the other tooth of the same child was treated with chemomechanical treatment and was used for study.

The structure of complaints in chemomechanical and traditional treatment groups

Children participating in research could choose such descriptions for their complaints:

- Pain;
- Unpleasant taste;
- Unpleasant smell;
- Other;
- No complaints.

In chemomechanical treatment group the biggest part of cases was cases without complaints- 46.7 per cent or 14 cases from 30 answers. The complaints for pain made 23.3 per cent or 7 cases. There were also one complaint for unpleasant taste and smell (3.3 per cent) and one complaint for unpleasant taste and pain (3.3 per cent). The rest of cases were the answers so called "other complaints" (23.3 per cent or 7 cases). (See Table 3, also Fig. 1)

The structure of "other complaints" was:

- 5 cases- a little pain (16,6 per cent of all complaints in chemomechanical group);
- 1 case- a little sensitiveness (3,3 per cent);
- 1 case- an unpleasant sound of instruments (3.3 per cent).

In traditional treatment group there were 21 cases with complaints generally (72.4 per cent of the whole group). The biggest percentage of complaints made complaints of pain (51.7 per cent or 15 cases from 29 answers). 8 children treated by traditional treatment method had no complaints (27.6 per cent). (See Table 4, also Fig. 2)

"Other complaints" made 20.6 per cent of answers or 6 cases and their structure is:

- 2 cases- a little sensitiveness (6,89 per cent of traditional treatment group answers);
- 4 cases- a little pain (13.79 per cent).

The usage of anesthetics in chemomechanical and traditional treatment groups

Anaesthetics in both groups were used if patient asked for them or if the treatment was not possible to continue because of the pain.

The anaesthesia was used in 10 cases from 59 subjects (16.9 per cent of all subjects). In chemomechanical treatment group anaesthetics were used only once (3.3 per cent). (See Table 5, also Fig. 3)

In traditional treatment group anesthetics were used in 9 cases (in 31 per cent of all traditional treatment cases). (See Table 6, also Fig. 4)

The comparison of cleaning duration in chemomechanical and traditional treatment groups

There is a big variance between cleaning in both- chemomechanical and traditional treatment groups. There

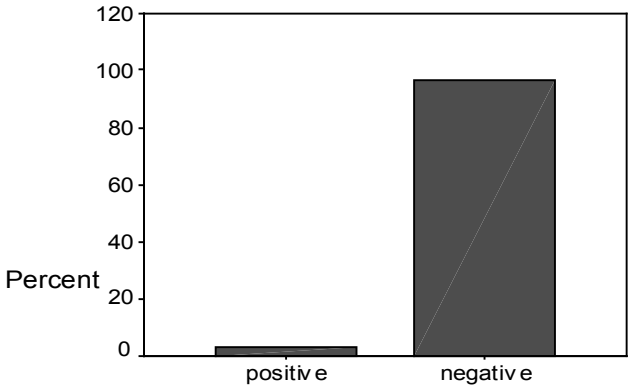

Fig. 3. The use of anesthetics in chemomechanical treatment group

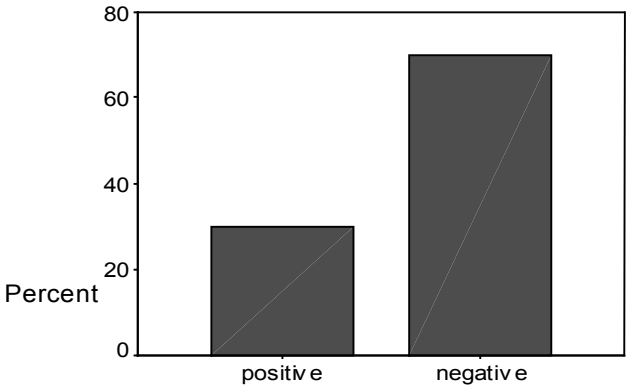

Fig. 4. The use of anesthetics in traditional treatment group

were excepted such evaluations as minimum value of cleaning duration, maximum value of cleaning duration and the average of cleaning duration in both groups. (See Table 7)

The usage of drill in the chemomechanical treatment group

In 30 cases of teeth that were treated chemomechanical way by using Carisolv® gel the drill was used 18 times (this made 60 per cent of all experimental/chemomechanical treatment group). (See Table 8)

DISCUSSION

Chemomehanical methods of caries treatment consider to be less painful compare to the use of rotary instruments. This may be due to the fact that Carisolv® instruments are specially designed for a safe scraping action, have 90 degree edge and not a sharp cutting profile. That allows working in two or more directions and reduces breaking off dentine and opening more dentin tubules [4]. Therefore can this method be indicated for deep cavities and near the pulp [5]. The results of the study have proofed that the chemomechanical method is effective and more comfortable for patients than traditional treatment with rotary instruments or excavator.

In one of the biggest studies where the new method was compared with traditional treatment [6] 107 patiens were treated with Carisolv® and 20 with rotary instruments. Just 3 patients from 107 needed anaesthetics from the Carisolv® group and 9 ones from the control group. 74% of all patients had no complains att all or very little discomfort. In comparison it was 1 patient from 29 in need of anaestheticsin Carisolv® group and 9 from 29 in control group in our study. 46,7% of patiens treated with Carisolv® had no complains with comparison with 26,7% of those in the control group. Our results are less remarkable as of Ericson [6], but we had just 26,6% were complains about pain from totally 47,7% of complains. The children are usually more sensitive and more expressive, which could influence different results in our study in comparison to Ericsons study, where the majority of subjects were adults.

In some of the previous studies a lot of patiens are complaining about a bad smell and taste of Carisolv® gel [6], [7]. There were 37 patients from 107 who regarded that Carisolv® tastes bad and 23 that it smells unpleasant. These complains we can compare more with the study of G:M. Maragakis et al. [7], though it was less complains about bad taste in our study (7 compared to 1). The results of need of anaesthetics are almost the same, because Maragakis did not use them at all and we used them just ones. Therefore our study has showed that chemomechanical treatment is less painful even used in deep cavities. The children in Maragakis study would not recommend this method most because of the bad taste, which is a surprising result because ruberdam was used.

Some researchers assert that chemomechanical caries removal takes longer time than the drilling or excavation [8], but some says that it can take a shorter time [6]. Our study the cleaning time with Carisolv® was 10,5 min and 5,9 min with drilling. The similar results were obtained by Ericson (10,4min compared to 4,4min) and by Maragakis (6min51s compared to 11,81min). The patiens in Maragakis [7] study said that it seemed to take longer time with chemomechanical treatment than drilling, but Ericsons [6] patiens thought that it was shorter with Carisolv®. On the other hand, the total treatment with drilling can be longer because of the use of anaesthesia, which takes 5-10min. In our study the working time with Carisolv® could be longer because of the little experience and training of operators in working with Carisolv®.

Carisolv® is still not in a position to replace rotary instruments for caries removal, but can be as an alternative in many cases, especially when treating children, anxious and allergic patients.

CONCLUSIONS

According to results of research, the following conclusions were made:

1. Using Carisolv® gel the number of complaints of pain declined more then twice, which means that this method is much less painful than traditional method by drilling.
2. Using this method almost half of patients had no complaints at all. There's also could be asserted that chemomechanical method almost had no such qualities as unpleasant taste or unpleasant smell.
3. Little painfulness of chemomechanical method also is emphasized by low level of the need to use anesthetics. In this group anesthetics were used only once, when in traditional treatment group anesthetics were used 9 times more frequently.
4. The need of using drill still remained, but it was used only for 60 per cent of teeth in chemomechanical treatment group.
5. The average mean of cleaning time was also longer than in traditional treatment group. But also there could be noted that the specialists participated in research were trained to work with Carisolv® gel, but they have had little practice at working with it. This reason partly decided the higher indices of results.

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Received: 18 04 2005
Accepted for publishing: 20 06 2005