Trends Biomater. Artif. Organs. Vol. 16 (1) pp 21-24 (2002) *http://www.sbaoi.org*

COMPARATIVE EVALUATION OF CHELATING GELS – INDIGENOUSLY DEVELOPED Vs COMMERCIALLY AVAILABLE

Gopi Krishna and A. Parameswaran

Department of Conservative Dentistry & Endodontics
Meenakshi Ammal Dental College
Chennai 602 102

Chelating gels are employed by dentists for the removal of smear layer and debris from inside the root canal. Evaluation of indigenously developed EDTA gel for its quality of chelating performance and potency with a commercially available gel. This paper highlight various advantages of this indigenous gel in the form of its comparable clinical efficiency, ease of manipulation and lost effectiveness.

INTRODUCTION

Traditionally the management of grossly carious tooth was limited to extractions, but with the advent of an exciting branch in dentistry namely endodontics, a new era has been ushered wherein it is possible to conservatively treat and save such teeth.

One of the fundamental principles in endodontic therapy is the efficient removal of the diseased pulp inside the tooth and replace it with a suitable material. Thus cleaning and shaping of the root canals dictates the success or failure of the treatment to a large extent. The common obstacles one faces during this crucial part of the treatment are in the form of calcified canals, pulp stones, dentinal obstructions and sclerosed canals. Chelating agents are employed to overcome these problems. The most commonly employed such agent is Ethylene Diamine Tetracetic acid, which was advocated first by Nygaard and Ostby in 1957[1] The aim of our study was to evaluate the chelating efficacy of an indigenously developed EDTA gel by comparing it with a commercially available gel.

MATERIALS AND METHODS

The indigenous gel was prepared using 19% EDTA solution with medical grade methyl cellulose being employed as the base. File Eze (19% EDTA gel) was the commercially available gel which was compared.

The test specimens comprised of 40 dentinal discs harvested from freshly extracted human premolars. Each specimen was standardized to a uniform thickness of 2mm each. All the test specimens were stored in 10% buffered formalin throughout the duration of the study.

Each specimen was mounted on self cure acrylic resin blocks of 4 mm thickness. The surface of each specimen was then polished using a sequence of carborundum discs of grade 800, 1000 and 1200 respectively. Finally each specimen was flushed with 10 ml saline. The specimens were divided into 5 test groups of 10 specimens of each (Table 1).

Table 1: Test Groups

GROUPS	TREATMENT REGIME
Group I	File - EZE for 1 min.
Group II	Indigenous Gel for 1 min.
Group III	File - EZE for 3 min.
Group IV	Indigenous Gel for 3 min.
Group V	Saline (Control)

Table 2 : List of Mean & Standard Deviation of VICKERS HARDNESS NUMBER of the test groups

Group	Before Treatment	After Treatment
I. File - EZE (1 min)	63.4 +/- 6.4	51.6 +/- 3.2
II. Indigenous Gel (1 min)	66.2 +/- 5.4	58.7 +/- 4.4
III. File - EZE (3 min)	62.8 +/- 7.1	45.2 +/- 2.8
IV. Indigenous Gel (3 min)	59.4 +/- 4.0	44.2 +/- 3.9
V. Control (Saline)	67. 2 +/- 8.5	68.1 +/- 5.2

After the conditioning procedure each specimen's hardness was evaluated using Metallux Minoload Hardness tester with a load of 200 grams and indentation time of 30 seconds. Vickers microhardness values [Table 2] was obtained using the formula :

Hv – 1.854 x P/d2
P = Constant load of 200g.
D = Diameter of indentations formed.

The Vickers hardness number of each specimen was thus evaluated before and after the conditioning procedure. The results were then statistically evaluated for any significance using the paired T test.

RESULTS

The group I specimens (File Eze – 1 minute) dentinal microhardness was reduced by 18% compared to the Group II specimens (Indigenous gel – 1 minute) whose microhardness reduced by 11%. This difference was statistically significant (P = 0.03)

The group III specimens (File Eze – 3 minutes) dentinal microhardness was reduced by 25 % compared to the Group IV specimens whose microhardness reduced by 23% (P= 0.06) . This difference was statistically insignificant.

DISCUSSION

Chelating agents, especially EDTA are routinely employed as irrigants inside the root canal for their excellent chelating action. EDTA forms the active ingredient in most of the common chelating solutions and gels such as Tublicid, EDTAC, File – Eze and RC-Prep. At times the action needs to be localized hence the role of EDTA gels increases in significance.

Nygaard-Ostby first suggested the use of EDTA for cleaning and widening canals. [1] Later, he introduced EDTAC, EDTA with Centrimide, quarternary ammonium bromide, used to reduce surface tension and increase permeability. The optimal pH for the demineralising efficacy of EDTA on dentin was shown to be between 5.0 and 6.0. [2,3] Stewart and others developed the first gel based EDTA for the localized usage in cases of canal obstructions, calcified orifices, sclerosed canals and canal irregularities [4]. This paved the way for a more cleaner, thorough and faster biomechanical preparation of the root canal system.

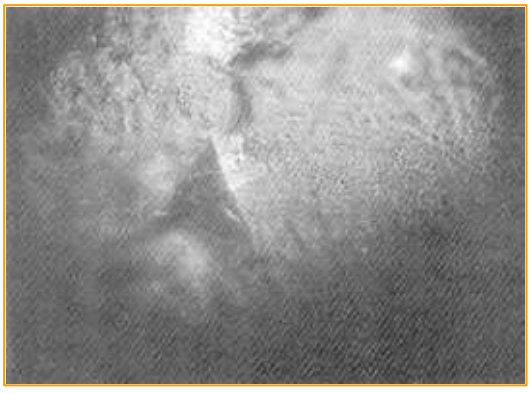

Fig 1 : File Eze – 1 minute

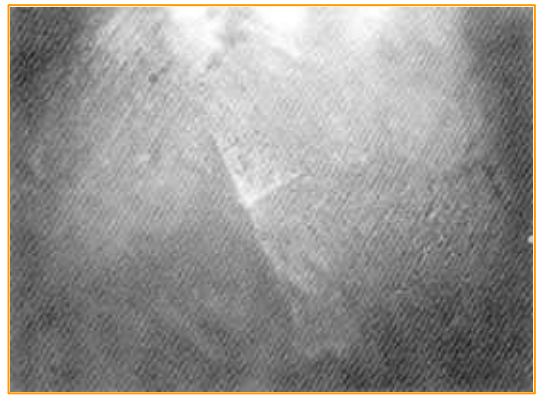

Fig 2 : Indigenous Gel – 1 minutes

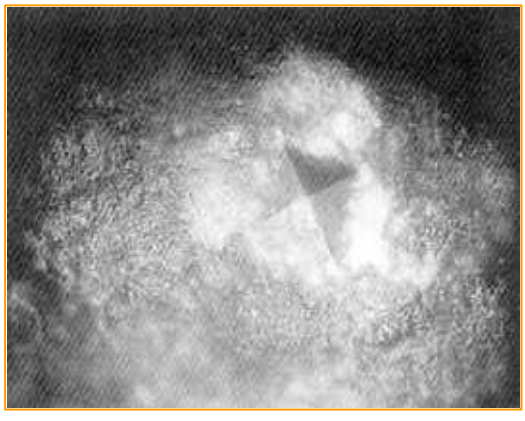

Fig 3: File Eze – 3 minutes

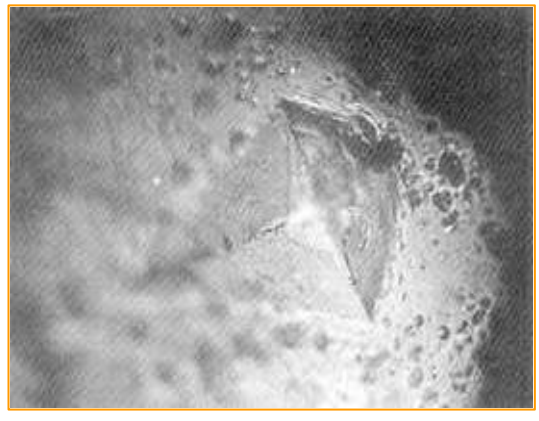

Fig 4 : indigenous Gel – 3 minutes

Goldman and colleagues have shown that the optimal working time of EDTA is 15 minutes, after which time no more chelating action can be expected [5,6].

Although EDTA liquid is commercially manufactured in India, the gel form is imported. The purpose of this study was to evaluate the efficacy of an indigenously prepared gel using methyl cellulose as the base. Methyl cellulose was chosen as the base as it is a group of nonionic, surface active, water soluble polymers with a remarkable property of Rheology Control and biocompatibility [7,8].

The results of this study indicate that the commercially available gel performed better over a test period of 1 minute whereas when the products were compared during a test period of 3 minutes the both the products were comparable. Although long time clinical trials are warranted before the clinical usage, this indigenously prepared gel offers an exciting chairside alternative in preparing an efficient EDTA gel, which is a safe, efficient, biocompatible and economical alternative to the imported commercially available gels.

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