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Root canal sealing in paraendodontic surgeries – Comparative study between two techniques performed on extracted bovine teeth

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ABSTRACT
The objective of this study was to compare the efficiency of the apical sealing of the Lysanda® paste with the single-cone filling technique; Measure the degree of infiltration with methylene blue dye. Forty (40) single-root bovine teeth, straight canals, of similar length, with intact roots and complete risogenesis. Their crowns were removed and all were instrumented with the sequence of files K #25 to K #70 where the apex was surpassed. Afterwards, the teeth were divided into two groups of twenty, and worked as follows: Group I: Endodontic treatment with transsurgical filling of the root canal using the single cone technique with FillCanal® cement and Group II: Endodontic treatment with trans-surgical filling of the root canal using the Lysanda® paste filling technique. Each tooth group was placed submerged in a container containing 2% methylene blue for 7 days. After this period, they were removed and washed with running water and then dried. The teeth were fragmented along well-defined parallel planes with a metal disc and then cleaved. They were evaluated according to their degree of infiltration. The experiment showed favorable results for the paste, which obtained an average infiltration of 2.97 mm in the apical 1/3, an average of less than 4.35 mm in the cone. The Lysanda paste obtained a lower mean than the single cone technique, and can be used in the simultaneous filling technique in the® office during surgery.

Keywords: Paraendodontic surgery, Transsurgical filling, Lysanda® Paste, Cement FillCanal®, Apical seal.

1 INTRODUCTION

Paraendodontic surgery is considered a surgical procedure performed to solve difficulties of an endodontic treatment or when not solvable by it. The success of surgery is higher when it is supplemented by root canal retreatment (ORSO et al., 2006).

This surgical procedure is performed when conventional endodontic treatment is unsuccessful. The most common indications for surgery are in case of perforations, fractured instruments, calcifications and anatomical abnormalities (COHEN, 2011).

Periapical injury occurs in non-vital teeth as a result of a chronic, asymptomatic, low-intensity aggression due to the presence of necrotic tissue, which originates from a microbial invasion of the

root canal system. Radiographically, it appears as a radiolucent lesion circumscribed in the region of the dental apex, and can be classified as a cyst or periapical granuloma, which are only differentiated in a histological examination due to the presence or absence of an epithelial lining around the lesion (NEVILLE, 2002).

Among the surgical modalities in the paraendodontic procedure are periapical curettage with apicoplasty, apicoectomy with retrograde filling, apicoectomy with retrograde instrumentation and root canal obturation, and root canal filling simultaneously with surgery (LEAL et al., 2005).

According to Sette Dias et al., (2008) the instrumentation of the channel(s) is done without caring about not going beyond the new foramen. The Root canal instrumentation should be associated with serum irrigation sterile physiological test, using an endodontic aspirator to remove the Irrigating solution from the inside of the surgical pocket. After proper preparation of the channel root, a gutta-percha cone is tested, in order to promote a apical seal, no matter how much it exceeds the new foramen. Once the gutta-percha cone has been tested, the channel is dried with sterile absorbent paper cones. The channel is filled with cement endodontic, using an endodontic file or lentular drill, also without care about the extravasation of this through the root foramen. The cone of pre-selected gutta-percha wrapped in endodontic cement is then introduced into the root canal and pulled by its apical portion, until Observe proper adaptation of it. Both the apical and coronary portions of the cone are cut with a red-heated instrument. The surgical shop is cleans, excess endodontic cement is carefully eliminated, the store It is irrigated with 0.9% saline solution and filled with a clot. The suturing of the flap occurs in a conventional manner, in accordance with the flap performed. Finally, the coronary portion of the tooth is restored with a temporary cement, taking care to introduce a ball of sterile cotton in the pulp chamber. The suture can be removed seven days after the Surgery According to Sette Dias et al., (2008) the instrumentation of the channel(s) is done without caring about not going beyond the new foramen. The Root canal instrumentation should be associated with serum irrigation sterile physiological test, using an endodontic aspirator to remove the Irrigating solution from the inside of the surgical pocket. After proper preparation of the channel root, a gutta-percha cone is tested, in order to promote a apical seal, no matter how much it exceeds the new foramen. Once the gutta-percha cone has been tested, the channel is dried with sterile absorbent paper cones. The channel is filled with cement endodontic, using an endodontic file or lentular drill, also without care about the extravasation of this through the root foramen. The cone of pre-selected gutta-percha wrapped in endodontic cement is then introduced into the root canal and pulled by its apical portion, until Observe proper adaptation of it. Both the apical and coronary portions of the cone are cut with a red-heated instrument. The surgical shop is cleans, excess endodontic cement is carefully eliminated, the store It is irrigated with 0.9% saline solution and filled with a clot. The suturing of the flap occurs in a conventional manner, in accordance with the flap performed. Finally, the coronary portion of the tooth is restored with a

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According to Sette-Dias (2008), in the filling of the root canal during surgery, the root canal(s) are instrumented, without caring about not going beyond the new foramen. Root canal instrumentation should be associated with irrigation with sterile saline, using an endodontic aspirator to remove the irrigating solution from the interior of the surgical site. After adequate preparation of the root canal, a gutta-percha cone is tested in order to promote an apical seal, no matter how much it exceeds the new foramen. Once the gutta-percha cone has been tested, the channel is dried with sterile absorbent paper cones. The canal is filled with endodontic cement, using an endodontic file or lentular drill, also without caring about its extravasation through the root foramen. The pre-selected gutta-percha cone wrapped in endodontic cement is then introduced into the root canal and pulled by its apical portion, until adequate adaptation is observed. Both the apical and coronary portions of the cone are cut with an instrument heated to red. The surgical site is cleaned, excess endodontic cement is carefully eliminated, the surgical site is irrigated with 0.9% saline solution and filled with a clot. The suture of the flap occurs in a conventional manner, in accordance with the flap performed.

When choosing the retroturturator material, its properties are taken into account. Among the available materials, Mineral Trioxide Aggregate (MTA) was used because of its biocompatibility, sealing capacity, radiopacity and low toxicity (WINIK et al., 2006). Cements can be classified into: resinous cements where the base is made of epoxy or polyvinyl resin, cements based on zinc oxide and eugenol that contain or do not contain medicines, cements that contain calcium hydroxide and, more recently, cements based on glass ionomers. All have different properties and clinical performance. Cements based on zinc oxide and eugenol, as they have been on the market for a longer time, have several studies evaluating their properties. (ALONSO et al., 2005).

According to Alonso et al. (2005), current filling techniques basically consist of filling the root canals with gutta-percha and endodontic cement. This occupies the central space that has been modeled, while the cement fills in the irregularities of the root canal system and minimizes the discrepancies between its walls and the cone. The cement then acts as a bonding agent between the gutta-percha and the dentin walls. In addition, they also fill any existing accessory channels.

Lysanda® paste has eugenol, zinc oxide, mineral resin, vegetable oil and dye in its composition. It has the advantages of not being irritating to the oral mucosa, it does not have an unpleasant taste, it is perfectly tolerated by the patient, when correctly manipulated it is a quick prey in the oral environment, which reduces the feeling of discomfort and saves the professional's clinical work time, in addition to faithfully reproducing the oral anatomy, it is a molding material obtained from the reaction of 2 pastes: the first is based on zinc oxide and the second is based on eugenol. This reaction leads to the formation of zinc eugenolate, which gives the product the final characteristics suitable for its intended use (printing material). It is suitable for the functional molding of edentulous mouths, which provides accuracy in the smallest details and excellent dimensional stability. In impressions for total dentures, it is the material of choice. Its thin and smooth consistency allows the smallest details to be copied without displacing or compressing the mucosa, providing a better fit of the prostheses. (leaflet) References.

Because it is non-irritating to the oral mucosa, easy to manipulate, quickly attaches to the oral environment when handled correctly, and because of its ability to copy, Lysanda® paste can seal the root canal through the transsurgical filling technique. In addition to saving the professional's clinical work time.

The purpose of this work is to carry out an experiment, promoting the filling of the root canal in a conventional way and comparing it with the filling performed with the Lysanda® molding material in order to verify the efficiency of the apical seal of each material.

2 MATERIALS AND METHODS

2.1 MATERIALS

2.1.1 The materials used during the laboratory phase of the work were

- 03 spatulas 70
- 40 extracted, single-rooted, straight-canal bovine teeth
- 01 Contra-angle
- 01 litre of 2% methylene blue
- 500 mL of sodium hypochlorite 2.5%
- 02 bottles of hydrogen peroxide 10 volumes
- 01 High Rotation Pen
- High Speed Diamond Ball Drills
- 02 number 02 low rotation ball drills for handpiece
- Low-speed stem-conical drill bits for handpiece
- 10 brocas Carborundum
- 01 paper tip box

- 01 box of gutta-percha with standardized main cone
- Cement FillCanal®
- 01 Clinical Tweezers
- 01 Curved hemostatic forceps
- 02 Glass Plates
- Paste Lysanda®
- 10 disposable syringes
- 02 bottles of colourless enamel
- 01 Digital Pachymeter

2.2 METHODS

A total of 40 cattle teeth collected after slaughter, duly authorized according to the clarification term, were used **no anexo** *****. Osteeth were uniradicular canals of similar length, with intact roots and complete risogenesis. The teeth remained for 1 hour in 2.5% sodium hypochlorite and for another 1 hour in 10 volumes of hydrogen peroxide, with the objective of cleaning. On each tooth, crowns were removed with a carburudum drill. The organic and inorganic remains of the pulp chambers and root canals were removed with files #8 and #10 under 2.5% sodium hypochlorite irrigation and aspiration.

All teeth were instrumented using the Oregon technique of the University of Oreon Health Sciences Center with a K file, and then the working length (CT) was determined.

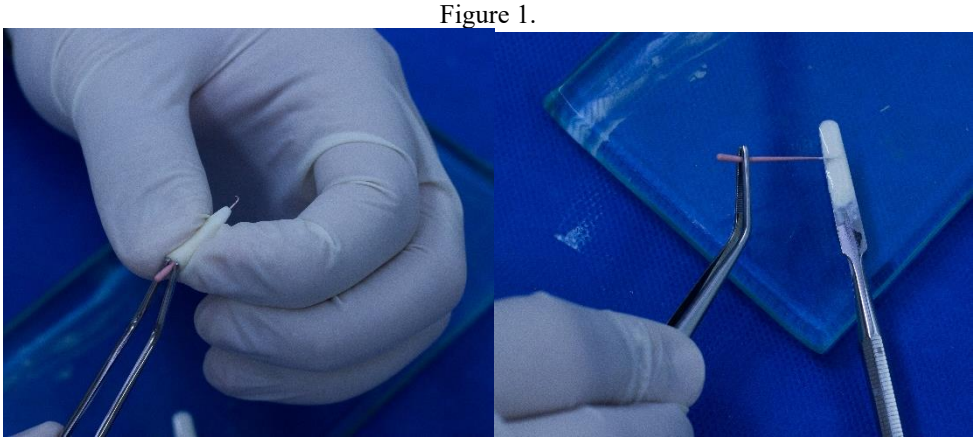
The teeth were instrumented with the sequence of files K #25 to K #70, where the apex of the elements was exceeded, and under irrigation with a 2.5% sodium hypochlorite solution. The root canals were dried by aspirations with a metal sucker tip, followed by absorbent paper cones.

Then, the teeth were divided into two groups of twenty, being worked as follows:

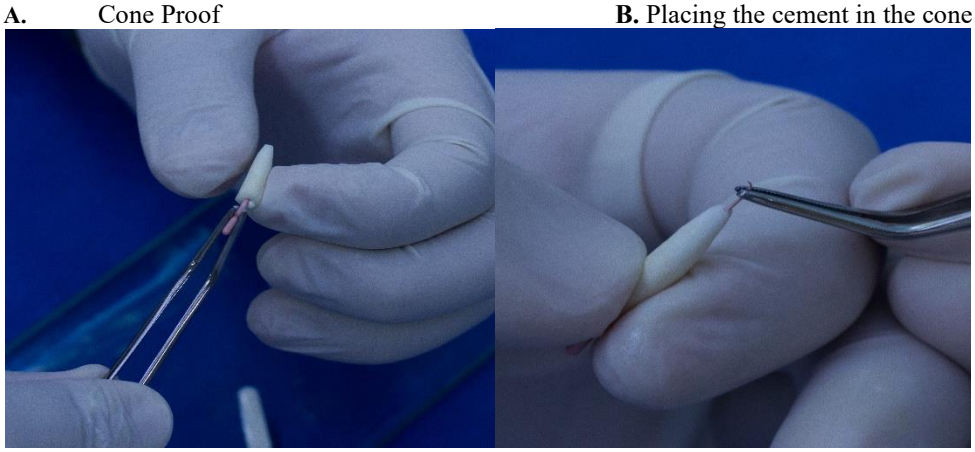
2.2.1 Group I: Endodontic treatment with transsurgical root canal filling using the single-cone technique with FillCanal® cement

After instrumentation of the teeth, apicoplasty of about 1 mm of the apical 1/3 was performed with a fissured conical trunk drill and the cone test was performed (Fig. 1-A). The FillCanal® cement was manipulated in the proportion of two drops of the liquid to one portion of the powder, according to the manufacturer's instructions, by brushing it on the cone and on the walls of the conduit (Fig. 1-B). After the cone was introduced into the canal (Fig. 1-C), the apical traction of the canal was performed with clinical forceps (Fig. 1-D), and the gutta-percha was cut immediately afterwards with a heated instrument. All teeth were isolated with nail enamel, leaving only the apical region/cutting surface without insulation.

Figure 1.



A. Cone Proof **B.** Placing the cement in the cone

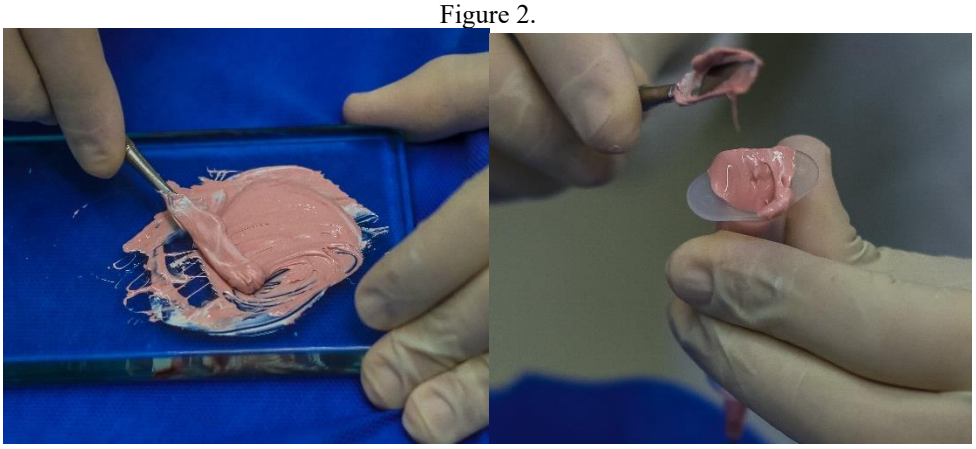


C. Introduction of the cone into the channel **D.** Apical cone traction

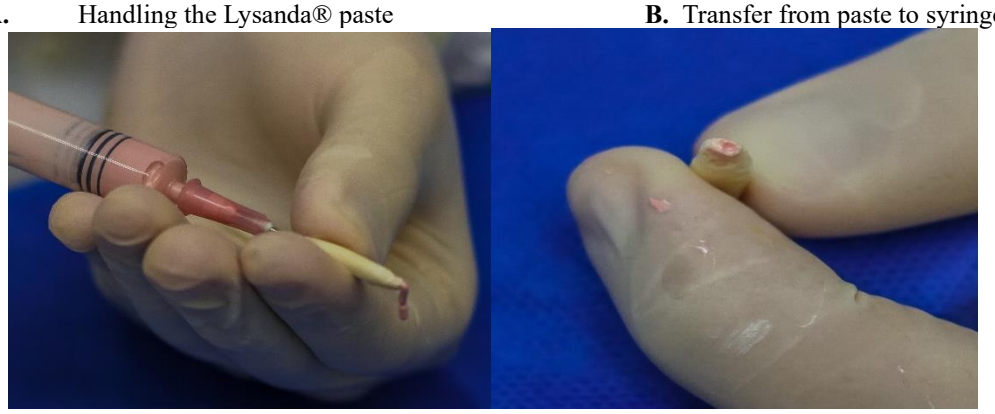
2.2.2 Group II: Endodontic treatment with trans-surgical root canal filling using the Lysanda® paste filling technique

After instrumentation of the teeth, apicoplasty of about 1 mm of the apical 1/3 was performed with a fissured conical trunk drill and the paste was inserted into the conduit. How to handle: place equal lengths of white and red paste on a clean and dry glass plate. The two parts were spatulated until a homogeneous pink mass was obtained (Fig. 2-A). With the aid of a spatula, the contents were transferred to a disposable syringe with an aspiration needle (Fig. 2-B). The material was introduced until it exceeded the apex (Fig. 2-C) and then the excess was removed (Fig. 2-D). All teeth were isolated with nail enamel, leaving only the apical region/cutting surface without insulation.

Figure 2.



A. Handling the Lysanda® paste **B.** Transfer from paste to syringe



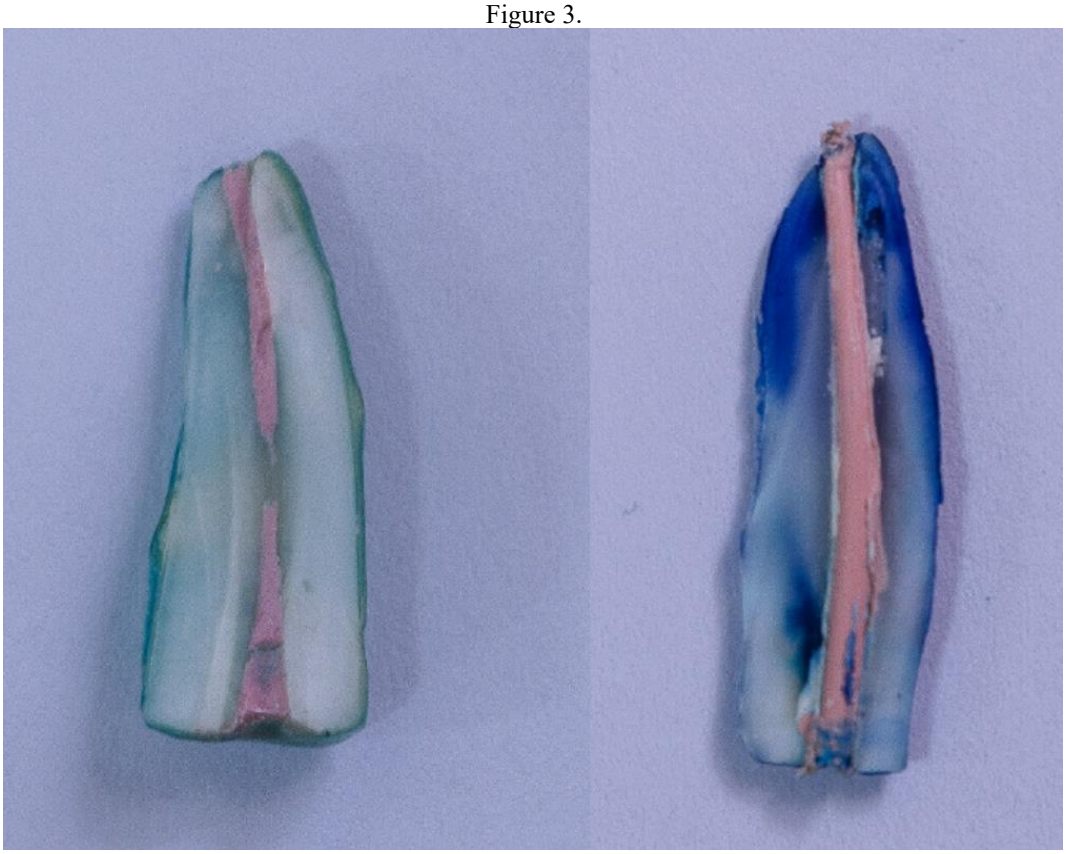
C. Slurry extravasation by the apex **D.** Removal of excesses

Each tooth group was placed submerged in a container containing 2% methylene blue, pH 7.2, fully covered by the solution, for a period of 7 days. After this period, they were removed and washed with running water and then dried. The teeth were fragmented along well-defined parallel planes with a metallic disc and then cleaved. They were evaluated according to their degree of infiltration, using a 6 POL (150 mm) MTX digital caliper, measuring from the apex to the region where the 2% methylene blue had infiltrated.

3 RESULTS

The experiment, when comparing the efficiency of the lysanda® paste and the single cone, showed favorable results to the paste that obtained an average infiltration of 2.97 mm in the apical 1/3, an average of less than 4.35 mm of the cone.

Figure 3.



A. Infiltration of Lysanda® paste **B.** Gutta-percha cone infiltration

FIGURE 4.

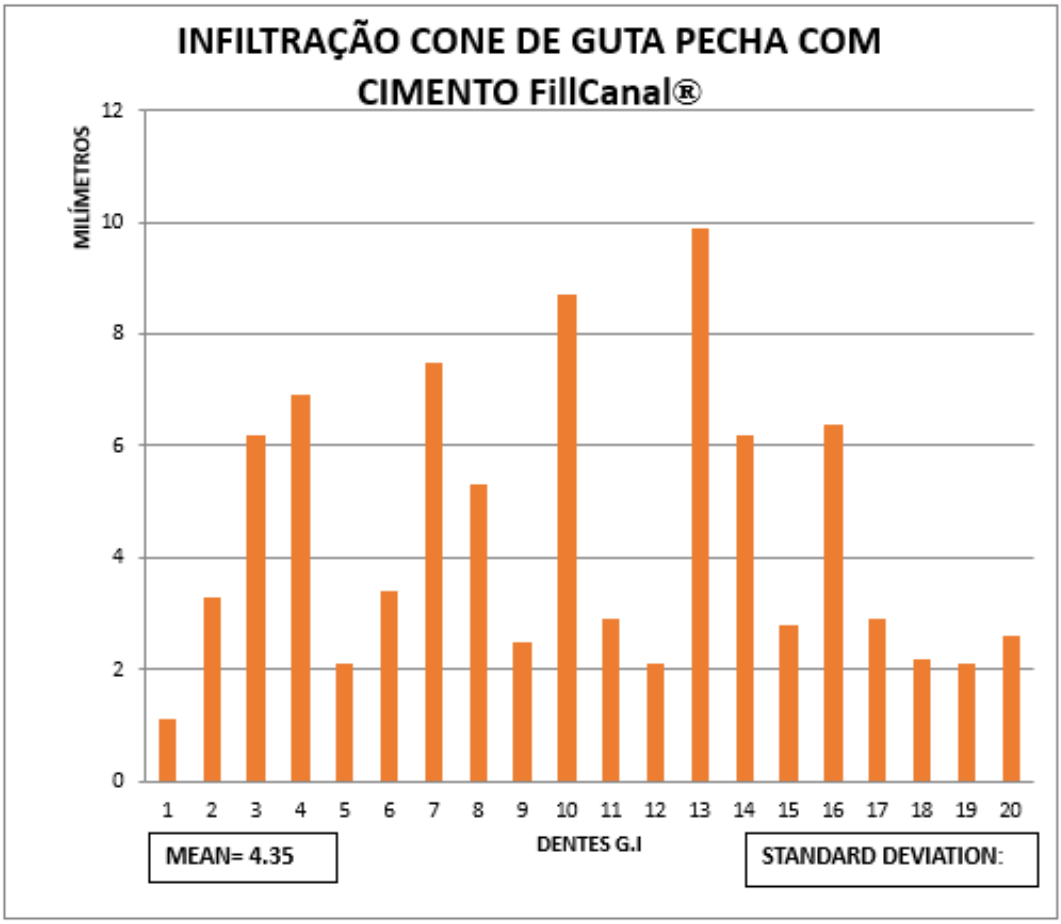
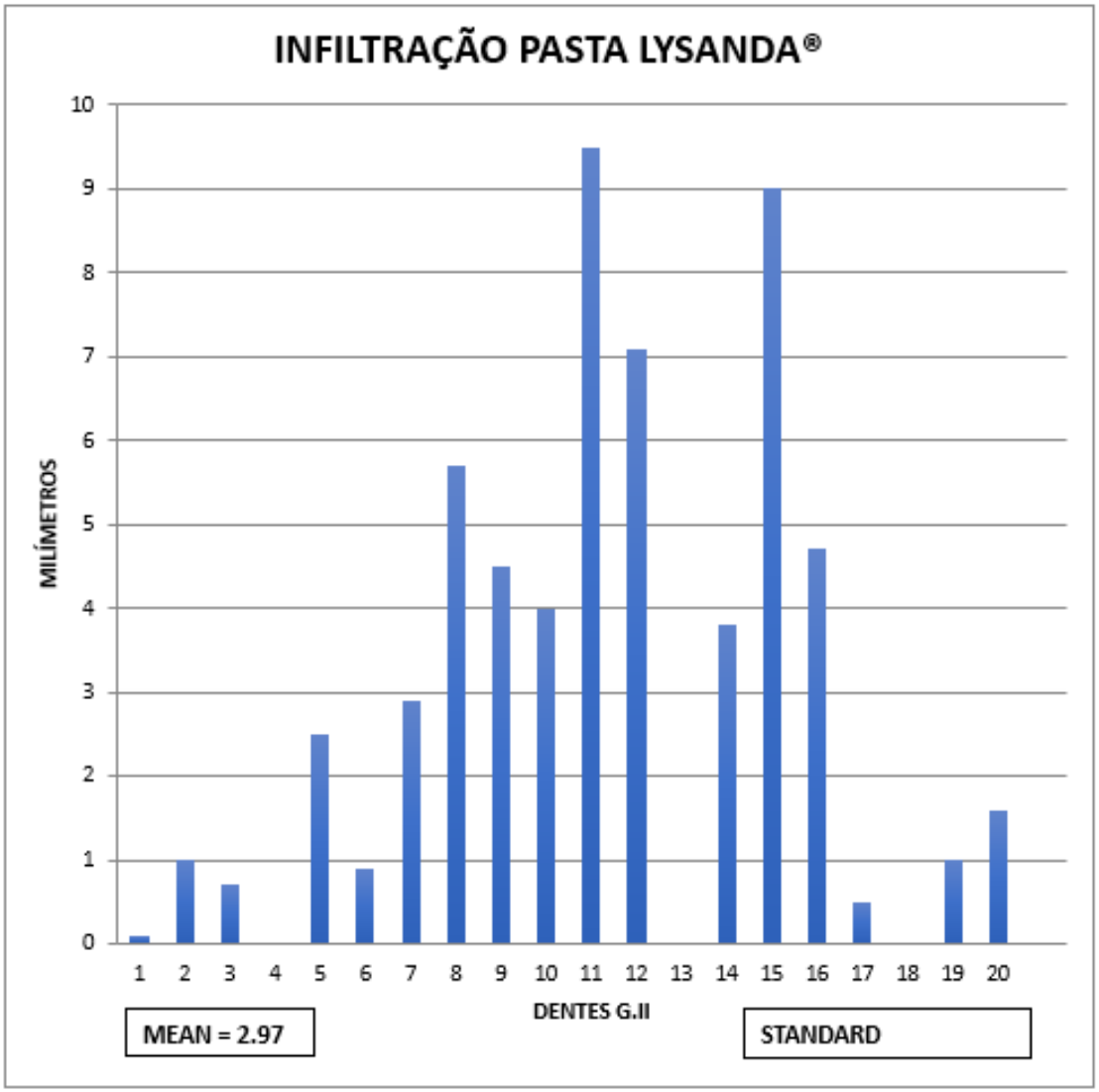


FIGURE 5.



4 DISCUSSION

According to Sette Dias et al., (2008) the need for periapical surgery has decreased due to the great development of endodontics in recent years. However, we believe that, in well-indicated cases, this modality can lead to clinical success.

Paraendodontic surgery is one of the resources used in order to maintain the tooth element in the cavity when it is not possible to remove the etiologic agent via endodontics. Apical preparations such as curettage, apicoectomy, and apicoplasty promote the removal of residual irritants from the apical portion of the tooth followed by the simultaneous filling technique in the same session. Therefore, the choice of the filling material is of great importance for the sealing of the apical third inside the root canal. A greater efficiency of peripheral sealing and a correct surgical planning will promote a satisfactory result.

For Samadi et al., (2013) the technique used has some limitations, such as the fact that the gutta-percha cone has no viscosity. Its state, seen as solid, does not allow adhesion to the canal walls, requiring the use of endodontic cement. Another limitation is its inability to penetrate and form spaces

with indentations, lateral channels, resorption areas, apical delta, isthmus, and this role is played by cements. Because cements are soluble, the shutter does not fulfill its main purpose: a perfect and long-lasting seal.

According to Sette-Dias et al. (2008), the success of paraendodontic surgery depends on surgical access, apical preparation, and the choice of an appropriate material that promotes satisfactory apical sealing. It does not seem convenient to us to prepare an apical cavity properly and to mishandle a good material or even to use a material without good performance in retrobturation, on the other hand, it does not seem sensible to us to correctly use a good retroturturator material that will be inserted into a very shallow, non-retentive cavity or that does not encompass all the root canals of the tooth in question.

Lyzanda® paste is also recommended by several authors who not only prove its sealing capacity, but also its ability not to be irritating to the oral mucosa. And it has the following characteristics: high fluidity, small amount of eugenol, low contraction during setting and excellent flow. In this way, you get the benefits of precision molding, without the compression of tissues (BUL).

The possibility of access to the open apex during the surgical procedure allows the use of the technique of inserting the material, taking advantage of all its characteristics, with the power of copying and consequently the ability to seal. As a disadvantage, this material is radiolucent, which does not prevent the use of this technique because the success is due to clinical examinations (absence of symptoms) and imaging with new bone formation.

Apical root preparation, using ball drills on a handpiece, is confronted with several problems, such as a preparation that is not parallel to the canal, difficulty in accessing the root end, and a risk of lingual perforation.

In our statistical analysis, in group 1, which was used the single cone technique, the apical infiltration in all teeth was shown in the specimen, with great statistical differences between group 2, which was used the Lysanda® paste, where they presented 17 teeth with apical infiltration, verifying an average of 2.97 mm of the 20 teeth analyzed compared to the group of the gutta cone, which obtained an average of 4.35, and a discrepancy of 1.35 mm.

5 CONCLUSION

In this comparative study of single-session obturator methods in paraendodontic surgery in relation to apical marginal infiltration, it was concluded that the Lysanda paste obtained a® lower mean than the single cone technique. In this way, the paste can be used in the technique of simultaneous filling in the office during the surgical procedure, considering that our experiment did not present clinical difficulties such as humidity and difficulty of access, as occurs in the mouth. However, future studies and clinical case reports will be necessary to prove the clinical success of this technique.

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