



## Comparison Between Sealpex Cement VS AH Plus Cement: A Bibliographic Review

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Article History	Abstract
Received: 11 June 2023 Revised: 05 Sept 2023 Accepted: 08 Sept 2023	<p>Root filling cements have been of great help in endodontic treatment due to their ease of use and clinical management, the choice of sealer being essential and the properties that each of them predisposes to its biocompatibility, which is why we have made a comparison between calcium hydroxide (sealapex) and epoxy resin (AH-Plus), so that sealapex maintains stable biocompatibility and releases calcium hydroxide that favors the internal structures of the periodontium, however it does not have a very fluid dispersion inside the canal, making it difficult for the material to adhere to the root walls, while the AH-Plus cement has better adherence and fractionally easy adaptability to the root walls, however the level of antimicrobial activity that each one has precedes a study carried out against the microorganisms of streptococcus faecalis being so that the sealapex has a h to the inhibitory 6.0mm and the AH-Plus cement a 7.92mm halo provided an effective inhibition of invading microorganisms, as detailed in the analysis, the AH-Plus cement, being a resinous base, has the property of adequately adhering This generates a peripheral sealing of the site and an easy biocompatibility of the periodontal structures, being that after a correct obturation, the preferred restorative material must be taken into account so as not to generate micro leaks which can spread by starting a bacterium. that disintegrates the entire endodontic treatment.</p>
CC License CC-BY-NC-SA 4.0	<p><b>Keywords:</b> Composite Resin, Glass Ionomer, Filling Cements</p>

### 1. Introduction

Transcendentally it has been evidenced that after an endodontic process there is a series of factors and determinants which will guarantee long-term success in the treatment of the duct of the tooth being thus

a very important point the proper selection of the filling cements that we are going to use since it must be taken as a precedent that this must be kept dimensionally stable thus generating a bio compatibility with the periodontium and the structures that make it up (Alvear et al., 2017).

In general, endodontic procedures are intended to restore the functionality of the dental organ, so it is essential to determine the side effects of the biomaterials that are going to be used for its use, in the base etiology it is described that the characteristic of a sealant cement must predetermine a uniform seal throughout the root conformation which does not cause the production of toxic effects on the basis of the tissues of the periapex Because it could lead to a stop of scarring and the spread of inflammation of the tissue to which it is exposed (Collado et al., 2017).

Due to this, two types of filling cements are introduced which have different compositions and physical-mechanical properties for their performance, so we describe calcium hydroxide (Sealapex) and epoxy resin (AH-Plus) as sealants of filling which inside the tooth generate adequate adhesion and conformation of the apical coating, It must be taken into consideration that each of the sealing cements must present a biocompatibility appropriate to the environment (Alvear et al., 2017).

So the fundamental area that must be preceded in sealing cements is their level of antimicrobial capacity since this factor will be the indicator that frames the efficiency of the same, since not only must these two types of cements be evaluated or compared, but also the percentages of the inhibitory halo will generate an idea of the level at which a sealant cement must be found for the Production of a barrier that allows microorganisms not to penetrate the walls of the root canal and therefore it is not easily contaminated (Collado et al., 2017).

Calcium hydroxide (Sealapex) and epoxy resin (AH-Plus) are cements of choice since these specifically promote the elimination of *Streptococcus faecalis*, although we have mentioned that by maintaining differences between compositions the two have a development that significantly improves the internal biological condition of the duct (Costa et al., 2021).

## **2. Methods**

This article corresponds to a bibliographic review of an inclusive nature in which a series of data is configured which preceded from 2015 to 2022, thus giving rise to several criteria that will help us shape the benefits, uses and application of sealing cements based on calcium hydroxide and resin as well as the modifications or repercussions suffered by each one. Based on the bibliographic reference framework of the review, we determined several indicators according to the progression and biocompatibility of cement in the root canal. Research Question. What type of cement is best for proper sealing?

### **Data Extraction**

For the present work, the inclusion criteria highlighted the factors and characteristics that enabled easy handling, adhesion and the favorable properties that each of these generates to the structures of the periodontium. In the exclusion criteria, all bibliographic publishers which did not have a specific scientific basis were discarded as well as those articles that did not correspond to the years 2015-2022. An exhaustive search was carried out in search engines such as Pubmed, Scielo, Researchgate, Elsevier for the collection of information. For the specific bibliographic study of the information, articles were identified which have comparisons of the uses, properties, efficacy and efficiency of calcium hydroxide cements and epoxy resin.

### **Development**

In endodontic treatment, it seeks to fulfill the main objective of eliminating microorganisms and preventing reinfection in the root canals. For this reason, the filling of the root canals is a key aspect to meet this objective. The filling consists of hermetically filling the root canals with an inert material and a sealant cement that stimulates the periapical repair process (Brito et al., 2016).

The processes of root filling, specifically, help our deteriorated dental organ to have greater longevity, which is why the choice of sealant cement is essential as well as its chemical-mechanical development, which guarantees the inhibition of any microorganism. In addition, duct sealing materials must have biocompatibility and adequate antimicrobial and physicochemical properties to ensure successful sealing (Bezerra et al., 2018).

Among the different types of duct sealants we find epoxy resin cements, which are paste-paste systems, where the base is a resin that when mixed with the catalyst presents a slow setting, which leads to a longer time of work in clinic. In addition, they allow us a greater adhesion to the dentin, easy handling and improve the seal (Jáuregui, 2015). The use of antibacterial duct sealants has become important in the elimination of persistent microorganisms, in addition, there are sealants that favor the repair of periapical tissue, for example, the calcium hydroxide present in Sealapex sealant releases hydroxyl ions, which provides an alkaline pH, which exerts an antibacterial effect and helps in tissue repair (Alameda et al., 2020).

At present, different types of duct sealants with different formulations have been analyzed, for example, calcium hydroxide-based sealants, which have stood out for their favorable properties such as; compatibility with tissues, their antibacterial action and anti-exudative actions, creation of favorable conditions for the formation of mineralized tissue, the dissolution capacity of necrotic tissue, and hydrolytic action against bacterial endotoxin (Bezerra et al., 2015).

Among the materials used as root canal sealants are epoxy resin-based materials, which have excellent physicochemical properties. For example, resin-based AH Plus duct sealant is widely used in root canal therapy and is considered the standard for comparing all new sealants due to its characteristics and properties which precede specific functions such as adhesion, uniform propagation of the material within the root cavity, the adaptability, the level of exposure in wet bases and the antibacterial level that is predisposed in each of them (Sun et al., 2020).

### **Sealapex Cement Sealapex Seasailor**

Sealapex sealant cement is a cement based on calcium hydroxide, which has antibacterial characteristics especially against microorganisms such as *Streptococcus faecalis* and has solubility mechanisms that allow it to release calcium hydroxide in the cavitory duct even if it is in a humid environment with a very long working time that allows the operator easy handling of it. However, having these capabilities makes it dimensionally unstable, so in an in vitro study shows that (Heredia et al., 2017) the (calcium hydroxide sealant (Sealapex) caused an inhibitory halo of 6.0 mm). before the defense of invading microorganisms (Chambilla & Sánchez, 2021).

Calcium hydroxide pastes have been used as an intraduct medication in the control of exudates, to treat internal and external root resorptions, as a bactericide and in cases where root perforations occur, this due to its property of stimulating periapical tissues in order to maintain health, In addition its antimicrobial effect (Gómez & Child, 2018).

So based on the inhibition generated by the sealing cements there is an interaction between cement and dentin that generally transcends the irrigation of the cements in the root base thus creating a force of union and adhesion by action of the thrust that occurs due to the irrigation of the materials thus promoting an easy integration to the tissues so we must keep in mind that the more fluid is chemically found a biomaterial this will easily retract through all adjacent ducts and walls in which it is difficult to disperse and adaptability of the material (Neelakantan et al., 2015).

The processes in which it influences are the easy healing of the apical tissue and the formation of hard tissue, this is composed of two tubes of 12 gr one of catalyst and another of base which when mixed have characteristics of chemical integration providing us with a series of advantages and disadvantages in the environment (Vallejo & Maya, 2015).

Advantages; (1) Biocompatibility with internal structures and helps duct compensation; (2) High antibacterial activity (Díaz, 2017). Disadvantages; (1) Release of formaldehyde in trace amounts; (2) Its radiopacity is deficient.

### **Features and handling**

Sealapex sealant cement has particular characteristics that should be considered when choosing an endodontic sealant, for example, its alkaline pH helps in the reduction of bacteria. In addition, it is a cement that consists of a base and a catalyst, which are used in equal parts, these are handled for 1 or 2 minutes until obtaining a mixture of homogeneous color and its setting time in the ducts is, generally, 30 to 40 minutes, this time is accelerated in the presence of moisture (Herrera et al., 2019).

### **AH Plus Sealing Cement**

AH Plus cement was introduced by Dentsply/DeTrey, this is a sealant based on amino-epoxy resin and its properties depend on its composition. In some studies, different authors mention the adequate compliance that AH Plus has with most of Grossman's postulates such as: sealing, adhesion, fluidity or antimicrobial capacity; Important aspects of interest within the dental area (Gallegos, 2015).

The AH-Plus cement is a type of epoxy resin as described by the theory has a very effective adaptability in its environment and this generates that adhesion properties are present and therefore an easy insertion into the root cavity that enables a direct penetration into the walls of the duct like any other filling cement to be in the presence of moisture continues to maintain its proportion, Compared to sealapex this does not produce a calcium release (Concha et al., 2020).

However, through the data obtained in the study (diffusion on Müller-Hinton agar to check the antimicrobial activity of endodontic sealants against *Enterococcus faecalis* and other common bacterial species in infections of the root canal system, the measurement of the inhibitory halo of the resinous sealant AH Plus was 7.92 mm) which shows that it generally has a high antimicrobial activity (Alvear et al., 2017). It consists of two pastes that are mixed homogeneously which allow us to have a short working time compared to calcium hydroxide (sealapex), however, having a resinous base has a better dispersion that facilitates its use and generates a better adhesion which provides certain advantages and disadvantages (Alvear et al., 2017).

La Pasta A: Epoxy resin Calcium tungtenate Zirconium oxide Aerosol, Iron oxide

Pasta B: (1) Ademantine amine; (2) N,N-Dibenzyl-5-oxa nonane-diamine-1,9 TCD-diamine Zirconium Tugstenate Aerosol (Alvear et al., 2017); (3) Silicone oil.

Advantages; (1) It has excellent histic tolerance, low mutagenic effect and no genotoxic and carcinogenic activity since it does not release formaldehyde; (2) Fast setting time, high radiopacity, easy removal, low solubility and acceptable biocompatibility; (3) Some studies show that Ah Plus is the best resin-based sealant that apically seals ducts (Alvear et al., 2017)

Disadvantages; (1) Short handling time; (2) Low capacity for biocompatibility with tissues adjacent to the apical foramen (Alvear et al., 2017).

### **Features and Handling**

AH Plus duct sealant cement consists of an amino-epoxy resin base and this has key characteristics that must be taken into account when sealing ducts, for example, it has long-lasting sealing properties, exceptional dimensional stability, self-adhesive properties and good radiopacity. In addition, for its application in duct sealing all known techniques can be used (Herrera et al., 2019).

So after a correct filling is essential the proper choice of restorative material because if it were to generate micro leaks the root cavity and the materials used would be exposed to all kinds of external agents that enter the oral cavity creating an infectious focus and therefore bacterial contamination of the duct thus spoiling the mechanisms used, Since in many cases an endodontic retreatment can occur

simply by the incorrect choice of the restoration thus taking us even to a possible extraction of the tooth and a functional loss of said structure (Herrera et al., 2019).

### 3. Results And Discussion

This literature review aims to compare two types of duct sealing cements; Sealapex and AH Plus to determine which duct sealant is the most efficient when used in an endodontic treatment, for this reason, it is important to emphasize that endodontic cements based on calcium hydroxide (Sealapex) are stimulators of osteoblasts, cells responsible for regenerating bone and periodontal tissue (Herrera et al., 2019).

On the other hand, AH Plus presents different important characteristics of endodontic sealants, for example, properties such as sealing, adhesion and antimicrobial capacity. AH Plus cement evidences a deeper penetration into the dentinal tubules and this may be due to the physical properties it has such as fluidity, solubility, viscosity, chemical composition, working time and setting (Vega, 2020).

Authors such as Balguerie et al. mention that resin-based endodontic sealants such as HA Plus show more adhesion to dentin and gutta-percha, good penetration and adaptation, which translates into positive effects. In addition, Bernardes in 2010 mentions that the high concentration of resin in AH plus is responsible for its great fluidity, on the other hand, the presence of calcium hydroxide in Sealapex decreases this property, that is, resin-based cements such as AH Plus obtain better fluidity results compared to Sealapex that contains a greater amount of calcium hydroxide (Vega, 2020).

Another important aspect is the setting time, in the case of AH Plus it is within the time indicated by the manufacturer while in the Sealapex the setting time increases significantly, for example, Desai and Chandler in 2009 mention that the Sealapex takes 2 to 3 weeks to set at 100% relative humidity, and is unable to set in a dry environment. In addition, when mentioning radiopacity, which is an important characteristic that distinguishes the sealant from other materials and anatomical structures and evaluates the quality of the seal, by means of radiographs, it is evident that the sealant with more radiopacity is AH Plus compared to Sealapex (Vega, 2020).

A low or non-existent solubility is also a feature of great importance that duct filling cements must have, this because the degradation of the sealant can cause gaps in the seal and these spaces can become a route for microorganisms and their toxic products to enter the periapical tissues and affect the success of endodontic or duct treatment (Vega, 2020).

When talking about the solubility AH Plus, it presented the lowest percentage, this is because epoxy resin cements have a relatively low solubility in water. On the other hand, Sealapex cement showed the highest percentage of solubility, this aspect may be related to its complex and heterogeneous setting reaction, since, in the cement a hard surface is produced, but the deepest part of the mixture can maintain a pasty consistency, therefore, porosities would facilitate the entry of water, which can increase its solubility. However, this issue is controversial, authors such as Barzuna in 2005 mentioned that when talking about the solubility of Sealapex, it has been shown that this characteristic does not affect the ability to seal the duct, since allowing the dissociation of ions favors the induction of apical mineralization and an antibacterial action (Vega, 2020).

### 4. Conclusion

When comparing both duct sealants it can be concluded that both are effective for filling the ducts in an endodontic treatment, however, there are important characteristics that are key to the success of the filling. In this way and based on the information collected, it can be mentioned that the AH Plus resin-based sealant is more effective in sealing, this because its characteristics such as sealing, adhesion and antimicrobial capacity, in addition to its physical properties such as fluidity, solubility, viscosity, chemical composition, Working time and setting are better and these key aspects determine the success of root canal treatment.

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