

Eradication Of Endodontic Infection By Instrumentation Role Of Nursing In The Management

Nisreen Adnan Deeb Ashour¹, Ola Adnan M Alqahtani², Rana Fahad Alsharif³, Abdulaziz Thamer Noamaani⁴, Fahad Mohammed Alamri⁵, Hanan Ammar Alammar⁶, Majid Saeed Alsaaidi⁷, Sawsan Abdulkader Alalshi⁸, Hassan Ahmed Hadadi⁹, Lina Ahmad Aljawi¹⁰, Mustafa Abdullah Alshehri¹¹, GhadyAdnan Alqahtani¹², Fadwa Mohammed N Alrefae¹³, Hamdan Saud Hamdan Alotaibi¹⁴, Mona Munir Alotaibi¹⁵

¹family Dentistry Registrar, Al-Noor Specialist, Hospital - Dentel Center

²hera General Hospital, Endodontics Dentistry

³heraa General Hospital, Senior Registrar Pediatric Dentist

⁴hera General Hospital, Dental Resident

⁵general Dentist, Taif Dental Center

⁶general Dentist, Western Hawiyah Primary Health Care Centre

⁷dentist, Alotaibi Health Center

⁸general Dentist, Eastern Nakhb Primary Health Care Center

⁹ministry Of Interior, General Dentist

¹⁰dentist, Ministry of Health

¹¹general Dentist-General Dentistry, Thadiq General Hospital

¹²dentist, Alqunfdah General Hospital

¹³technician Nuers, King Fahad Hospital in Jeddah

¹⁴nurse, Ezdihar Phc

¹⁵nursing Specialist, King Saud Medical City

Abstract

There are a number of various working processes that are involved in endodontic therapy. These procedures include the isolation of the operating field, access to the pulp chamber, cleaning and shaping stages, and finally, the necessity for a three-dimensional filling of the canals. During each stage, a set of instruments that are either single-use or sterilizable is required. Nursing has a very essential part in the management of endodontic infection eradication because they will be the first line of defense in recognizing the symptoms being experienced by the patient. When it comes to reusable tools, it is essential to pay attention to the removal of material that has been deposited on the blades, which is not easy to remove manually. This review demonstrated that the use of single-use or first-use instruments necessitates the implementation of procedures associated with presterilization or sterilization.

Keywords: *endodontic infection, canals, sterilization.*

Introduction

Endodontics is a subspecialty of odontology that investigates all of the diseases that strike the tooth pulp, including those that are necrotic and those that are vital. Because it is a discipline, it

is necessary for the professional to maintain concentration and accuracy for extended periods of time in order to perform properly. Furthermore, success cannot be separated from the effectiveness of the instruments that the endodontist uses [1]. The use of endodontic

instrumentation is subject to a number of key considerations in comparison to other dental specialties, including the following: One is the fracture of the intracanal instrumentation, which is not always possible to eliminate or bypass since such events depend on the torsional and flexural stress that occurs during treatment or changes that occur during the disinfection phase and sterilization [2]. Endodontic instruments are different from one another depending on the phases of the operation and the methods that are utilized by the operators. Rubber dams, rubber dam punches, clamp forceps, dental floss, and spatulas are utilized in order to isolate the operative area. On the other hand, diamond burs, multiblades, and burs for removing amalgam and crown are utilized in order to open the pulp chamber and remove the carious tissue [3].

Instruments that are usually referred to as endodontic files are utilized throughout the glide path and shaping phases. The type of endodontic file utilized varies depending on the approach that is utilized by the expert, which can be either manual or mechanical, with constant or variable tapers, and with differing diameters [3].

In addition, during the shaping phases, canal irrigants are utilized. These irrigants include sodium hypochlorite at a concentration of 5%, EDTA, and chlorhexidine. These irrigants are then combined with the following materials in order to provide a three-dimensional filling of the canals: gutta-percha or resin cones, zinc oxide-eugenol-based cements, or epoxy resins [4]. It is possible for the devices to be either disposable or reusable through the use of sterilizing techniques, depending on their own nature.

The production phase of the disposable tools may be the source of contamination if the instruments are not supplied in a sterile state. Additionally, contamination may occur during dental treatments due to environmental contamination or the presence of biological fluids from the patient, including saliva, crevicular fluid, blood, and purulent exudate. More than seven hundred different species of bacteria can be found in the oral cavity. These bacteria are able to form biofilms and structure themselves into plaque and tartar on the hard surface of the dental elements [5]. In order to avoid contaminating the root canal system that has been disinfected and cleaned with canal irrigants, it is essential that the single-use filling

material, which may be gutta-percha or resin cones, does not come into touch with the germs that are typically found in the oral cavity [6].

When a professional uses reusable devices, they run the risk of contracting an infection. Furthermore, if the procedures for sterilization and disinfection are not carried out correctly, patients may also be put in danger of contracting an infectious disease [7]. Due to the fact that the instruments that are used to probe the glide path and shaping come into closer contact with the deep tissues of the patient, such as nerve tissue and vascular tissue, the risk of cross infection by pathogens is extremely high. As a result, disinfection procedures must necessarily be associated with sterilization procedures. In addition to dry heat sterilization, the various methods of sterilization include autoclaving at temperatures ranging from 121 to 135 degrees Celsius, the utilization of 2% glutaraldehyde, the utilization of sterilization glass beads, and so on [7].

When it comes to dentistry, endodontics, like with other subspecialties, comes into intimate contact with biological fluids and finds itself operating in an area that is contaminated by the presence of germs. Given these considerations, it is imperative that the sterilizing operations be carried out effectively. The prevention of cross infection, as well as the study and comprehension of the stages of disinfection and sterilization, as well as the weak points of each stage and the ways in which they influence the physical and mechanical properties of dental equipment, are of the utmost significance [8].

Review:

In order for endodontic therapy to be successful, it is necessary to eliminate any bacteria that may be present in the root-canal system and to take measures to prevent repeat infections. In order to remove the inflammatory and necrotic tissue, microbes/biofilms, and other debris from the root-canal region, the root canal is shaped using different types of instruments, including hand and rotational instruments, while receiving continual irrigation. Instrumentation's primary purpose is to make irrigation, disinfection, and filling more efficient and effective. According to the findings of a number of investigations that made use of cutting-edge methods, such as microcomputed tomography (CT) scanning, it

has been established that the tools do not penetrate a significant amount of the main root canal wall [9].

The employment of two or more irrigating solutions in a predetermined order is the foundation of optimal irrigation, which is based on the consistent application of these solutions in order to achieve the objectives of safe and efficient irrigation. Historically, syringes and metal needles of varying sizes and tip designs have been utilized in order to administer irrigation solutions into the root canal space. However, both clinical experience and research have demonstrated that this traditional method most of the time leads to irrigation that is inefficient. This is especially true in peripheral locations, such as the anastomosis of canals, fins, and the most apical part of the main root canal. As a result, a great number of the compounds that are utilized for irrigation have undergone chemical modifications, and a number of mechanical devices have been developed in order to enhance the penetration and efficiency of irrigation [9].

Root canal therapy is performed with the purpose of not only preserving a tooth that would otherwise be lost owing to pulpal or periradicular pathosis, but also preventing discomfort both during and after the procedure. It is possible for this kind of pain to occur following endodontic instrumentation or obturation. Extrusion of numerous irritants toward the periapical region during canal preparation is one of the factors that might lead to postinstrumentation pain (PIP) [10]. These irritants include dentin debris, necrotic tissue, bacteria, and irrigants.

There have been reports that indicate that the prevalence of postoperative pain following endodontic therapy might range anywhere from 3 percent to 58 percent. The maintenance of asepsis throughout the endodontic procedure, the selection of endodontic instruments that produce less apical extrusion, the completion of the chemomechanical procedures in a single visit to prevent re-growth and colonization of bacteria, and the utilization of intracanal medications in between appointments are some of the various suggestions that have been offered in order to prevent the development of PIP [11].

In order to gain a better understanding of the impact that various clinical techniques, such as

the utilization of various local anesthetics, premedication, irrigants, and irrigation devices, have on the pain experienced during and after surgical procedures, numerous studies have been carried out. When it comes to the ejection of debris, the root canal preparation technique and the cross-sectional design of the tools both play a role [12].

Both hand instrument and rotary NiTi instrument procedures were shown to be responsible for debris extrusion, according to the findings of the research conducted by Reddy and Hicks, which was one of the early studies to compare the effects of hand and rotary NiTi instruments on the apical extrusion of debris. Other research has demonstrated that the extrusion process differs depending on the rotary instrument being used. The results of another study that examined the expression of neuropeptides, substance P, and calcitonin gene-related peptide in periodontal ligament following root canal preparation using various instruments revealed that neuropeptide release was distinct for each of the instruments that were examined, indicating that the periradicular inflammation that occurs after instrumentation can vary depending on the instrument [13,14,15].

There are a number of medical conditions that the dentist encounters on a daily basis that require additional knowledge. These conditions include cardiac diseases, pulmonary diseases, hypertension, diabetes, bleeding disorders, pregnant patients, multiple drug interactions, infectious diseases, renal complications, diabetes, and patients who are undergoing radiation therapy [15]. When treatment is carried out in a healthy individual, it is sufficient to concentrate on the technical part of the procedure, but when there is a need to treat patients with systemic illness who are under medical management, it is equally important to avoid any potential medical emergency or complication [15].

The research that has been carried out in this field over the past few years has been on the impact that sterilizing processes have on endodontic instruments. Particular attention has been paid to the instruments' resistance to cyclic and torsional fatigue, as well as the superficial topographic changes that occur in the instruments throughout the process. There is a study by Sheth et al. [9] that compares two of the

three primary ways of sterilization that we are going to investigate in this systematic review. These two sterilization methods are autoclaving and glass bed sterilization. This study is one of the most current studies that analyzes different methods of sterilization. The use of glutaraldehyde and the sterilisation of glass beads will be investigated in yet another recent investigation that was carried out previously [16].

Apical periodontitis is an inflammatory disease that is produced by the invasion of microorganisms into the root canal. This invasion subsequently spreads to the extraradicular tissues, which ultimately results in the destruction of bone that is next to the root. There is much evidence that microorganisms are arranged in a wide variety of biofilms. Because of factors such as the formation of persistent cells, the presence of an extracellular polymeric matrix, and the presence of bacteria in a dormant condition, the biofilm form is beneficial to the bacteria because it allows them to avoid the action of antimicrobials and the response of the host. Consequently, biofilms present an extraordinarily difficult obstacle for endodontic therapy [10].

In the root canal, the most effective way for lowering the amount of bacterial biofilm and interrupting it is the use of mechanical equipment. However, due to the intricate anatomy of the root canal, the deep bacterial invasion, and the physical limitations of the equipment, it is not possible to entirely eliminate the bacterial load. Additionally, curvatures can reduce the effectiveness of instrumentation in cleaning canal walls since they do not expose them to the cleaning process. It is possible that the inner side of the curve in the apical part of the canal and/or the outer side of the curvature in the mid-root region will not be cleansed. Irrigants are consequently required in order to improve disinfection and make it easier to remove necrotic tissue and debris from regions that are difficult to access [11].

The field of endodontics that uses minimally invasive techniques has been gaining popularity as part of the movement to preserve as many dental components as possible. For the purpose of preserving healthy hard tissue and ensuring that the tooth continues to function and keep its strength, it has been suggested that instruments with lower tapers and tip diameters, as well as

those constructed with alternative geometric designs and metallurgical qualities, be utilized [12]. When it comes to curved canals, it might be beneficial to reduce the size of the preparation in order to reduce the number of unwanted cutting effects and transportation (see reference 12). In curved canals, however, the utilization of standard irrigation methods may put the disinfection of the apical third in jeopardy due to the limited area within the canal as well as the proposed apical size of 20–25. It has been reported that the flow that is generated by the needle is impossible to reach the working length (WL) in canals that are minimally formed, regardless of the size of the needle or the flow rate [13].

Conclusion:

It is possible that the cleaning of the apical region of teeth that have canals that are curved could be regarded a subject of experiencing anatomical difficulties. However, it is interesting to note that the curvature did not appear to have any impact on the effectiveness of the disinfection process for the file systems in this investigation. According to the findings, the force that is generated by the instruments in curved canals is responsible for the removal of more dentin apically on the outside side of the curvature. On the other hand, this result could be explained by the fact that the tensions between instruments and canal walls are greater in curved canals than they are in straight canals. After the phase of debris removal and after the phase of cleanliness and decontamination, the rinsing phase can be carried out with distilled and drying water. This is the role that nursing plays in the elimination of endodontic infection. After this phase, the operator is able to handle the decontaminated endodontic material because the bacterial charge has been significantly reduced, although it has not been completely eliminated. During this phase, the assistant's job is to check the macroscopic changes that have occurred in the blades of the instruments and to get rid of instruments that are no longer suitable for use. The possibility that disposable or new instruments used for shaping, scouting, or glide path may contain inorganic residues, such as nickel chromium, and carbon residues should be noted between the spires of the instrument as a result of their working phase. Additionally, these instruments may present a certain degree

of bacterial contamination, such as cocci, depending on the type of instrument. As a result, the new or disposable instruments must necessarily go through a phase of decontamination and removal of debris before it can be used. Based on the findings of the literature review, it was determined that the ultrasonic tray or the washer disinfectant as well as the utilization of non-aggressive disinfectants for alloys is the most appropriate method for this particular situation

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