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Literature Review

Clinical Considerations for Elderly Patients Undergoing Root Canal Treatment

Dimitriu Bogdan Alexandru, Suciu Ioana, Chirilă Mihaela*, Gheorghe Georgiana Florentina* and Amza Oana Elena

Department of Endodontics, Faculty of Dental Medicine, University of Medicine and Pharmacy "Carol Davila" Bucharest, Romania

***Corresponding Authors:** Gheorghe Georgiana Florentina and Chirilă Mihaela, Department of Endodontics, Faculty of Dental Medicine, University of Medicine and Pharmacy "Carol Davila" Bucharest, Romania.

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Abstract

The evolution of healthcare system and the developments in medicine have increased the lifetime expectancy of people. Thus, many elderly patients are eager to maintain their natural dentition, preferring endodontic treatments rather than extractions. In order to manage this group of people, clinicians must have complex knowledge, skills and lot of patience. The purpose of this mini review is to present the anatomical changes and special challenges that a dental practitioner can encounter during root canal treatment in elderly patients.

Keywords: Endodontic Treatment; Elderly Patients; Knowledge

Introduction

Maintaining a healthy dentition improves quality of life, emotional well-being and is an important factor in overall health. The increasing number of elderly patients acquiring an endodontic treatment has determined the dental practitioners to have a better understanding of the pathologic and physiologic changes, effect of aging in oral soft tissues and changes to the dentition.

Elderly patients may have systemic diseases and special needs that increase the necessity of keeping healthy teeth. Some dental practitioners have a misconception regarding the endodontic treatment in this category of patients due to the myriad of general diseases encountered, technical difficulties, lack of patience, preferring extraction over conservative treatment.

The root canal treatment in elderly patients is similar with the one performed to younger patients but with many challenges like pulpal calcifications, attrition, abrasion, periodontal problems, postural problems, heavily restored teeth, communication differences and complex medical history [1]. In order to establish the best treatment plan, a collaboration with patients' physician is often required to minimise some complications that may interfere during sessions [2].

Preserving the teeth of an elderly patient has many advantages such as: maintenance of an intact dental arch, occlusion preservation, increased retention of removable dentures, preservation of alveolar bone in cases treated by overdentures, provision of abutments for fixed prostheses and of course, emotional well-being [3].

The success rate of endodontic treatment in an elderly patient is the same as for the younger patients because the main goals are to eliminate the source of infection, disinfect the root canal system and obturate, in order to allow healing of the peri-radicular tissues [4].

Age associated changes in dental tissues

Teeth microstructure changes with age, expressed by an increase in mineral content and a decrease in organic content, influencing the mechanical and chemical properties of enamel and dentin (becoming more brittle and prone to fracture) [5]. Enamel is deteriorating over time due to intensive brushing and masticatory cycles. This process takes place especially on the facial, proximal contacts, incisal and occlusal surfaces [6].

The dimension of the pulp space is reduced over time due to deposition of secondary and tertiary dentin. Secondary dentin formation is bigger in the incisor pulp of the anterior teeth and on the floor in the posterior teeth (locating pulp chamber and canal entrances is more difficult). Tertiary dentin appears under the stimulation function and irritation due to extensive restoration, caries and occlusal trauma. The dentin of elderly patients has less water content than younger teeth and is more prone to have cracks in the structure [7].

Dental pulp has more collagen fibers, fewer cells and a decreased reparative capacities than younger teeth. Calcification of the pulp chamber and root canals increases with age. The number of pulp's blood vessels is decreased, arteriosclerosis appears in arteries and calcification of pre capillaries and arterioles may be more often [2].

Another common age related change is the increased cementum deposition at the root apex. The increased thickness of cementum result in widening of the major apical foramen and increasing the distance between foramen and radiographic apex [8].

Endodontic therapy in elderly patients

Appointments

Even though, nowadays, an endodontic procedure is performed in a single visit, the time scheduled for an elderly patient is depending on his ability to sit in a dental chair and be reclined when is required. If he uses a cane or a wheelchair, adjustments should be made to the office in order to ease the access and the assistant should receive instructions to escorting him. Some patients may be accompanied by relatives so the appointment is made according to their free time. The clinician should take into consideration to schedule longer appointments, allowing time for explaining every step of the treatment, for questions and paying attention to the patient's needs [9].

Medical history

Elderly patients are suffering from chronic diseases and are taking more medications. A written letter from the patient's physician would be a greater help to identify the physical and mental problems and the list of prescribed medications that could affect the course of treatment [2].

Pathologic and physiologic changes in elderly patients could be: high blood pressure, coronary artery disease, degenerative conditions, osteoporosis, diabetes, urinary incontinence, increased urinary frequency, reduced renal function, malignancy, mild cognitive impairment, hearing problems, visual problems, reduction in liver metabolism, sometimes depression due to loneliness [10].

Diagnosis

One of the most important point is listening to the patient. The dental practitioner should have patience and pay attention to the chief complaint. If the patient has the inability to understand or explain his symptoms, the accompanying person could be a great help in identifying the cause.

Dental history. Most of the times, elderly patients have a long history of dental treatments, decays, periodontal problems, extensive fillings and multiple dental visits.

Subjective signs: usually it is uncommon to find significant signs and symptoms because these elderly patients have diminished dental sensitivity and pain perception

Objective signs: subgingival caries, periodontal involvement, attrition, abrasion, erosion, temporomandibular joint dysfunction and decreased vertical dimension, cracks, cuspal fractures.

In order to confirm diagnosis some helpful test are necessary;

- Pulp vitality tests (heat, cold and electric test) - cold testing is more reliable, but it must be emphasise that pulps with calcifications may offer a false negative response [11,12]. A test cavity is often not useful because of reduced dentin innervation and should be use when other test are suggestive but inconclusive [13].
- Palpation
- Percussion

Radiographic images show pulp calcifications, pulp recession, narrow canals or calcified canals, hypercementosis, periapical lesions [14].

CBCT images for identifying missing canals, the extent of periapical lesions, the volume of pulp chamber [15]. Even with the use of a microscope, creating a proper access cavity and identifying root canals can lead to an excessive tooth loss structure. But nowadays, a virtually planed and guided minimally access is a greater help [16].

Root canal treatment

- Informed consent must be obtained from the patient, explaining all the treatment options and their risks.
- To maximise comfort for the patient, appointment times can be split into stages.
- When needed, for his comfort, pillows should be used for back and neck.
- When the medical condition of the elderly patient requires, prophylactic antibiotics should be administered before treatment.
- To ensure comfortable jaw opening during the treatment, mouth props are recommended.
- Anesthesia - anatomic landmarks are more prominent in elderly patients; the epinephrine should be considered for routine use in endodontic treatment and injected slowly. The intraligamentary injections are more difficult, due to reduced width of the periodontal ligament and the intrapulpal anesthesia is often unsuccessful because of the reduced pulp space.
- Rubber dam isolation is mandatory for every endodontic procedure and it should be done preferably on a single tooth. If the patient is having trouble breathing, cut dam away from the nose.
- Access cavity is created under operating microscope, using all the information obtained from the preoperative radiograph or even CBCT images. If necessary, in cases of severe calcification, an intraoral scan for guided endodontics is the best choice in oder to avoid sacrificing a lot of tooth structure. To identify all canals orifices and access root canals, often is required the use of ultrasonic tips, micro-openers, micro-debriders and even dye to differentiate orifice surrounding dentin.
- Negotiation of the root canals is performed with no. 06/08/10 K-file and chelating agents.
- Working length determination is done using the electronic apex locator.
- Using a single file Ni-Ti system is a very good option for the preparation of root canals, providing an efficient shaping and decreasing the operating time, preferably with a crown-down technique. For these canals 0.04 taper it can be enough for cleaning and shaping.
- Sodium hypochlorite (NaOCl, 6%) at full strength and ethylenediaminetetraacetic acid (EDTA 17%) are the irritants of choice for calcified canals, used in alternating matter, with the last application being NaOCl.
- The ideal method for root canal filling can be hydraulic technique with bioceramic sealer and coated cones, because is less time consuming.
- For a successful endodontic treatment coronal sealing is mandatory, either with an adhesive direct restoration or an indirect restoration.

Searching the literature for studies regarding the endodontic treatment in elderly patients we found out that:

- More elderly patients had pulp necrosis and needed root canal treatment on teeth with full-coverage crowns/bridge abutments [17]
- Even though the presence of calcifications increases diagnosis and technical difficulties, the outcome of endodontic treatment is not influenced [18]

- The dental practitioner should revise the medical history of an elderly patient before prescribing any medication such as antibiotics or analgesics [19]
- The presence of narrow canals is a recommendation for the use of Ni-Ti file systems with a smaller core and taper and of course with greater flexibility [20]
- In case of severely calcified canals the use of guided endodontics is the best choice [21]

Conclusions

When performing an endodontic treatment to an elderly patient the dental practitioner must be aware of the systemic conditions and the drug interactions that may interfere during procedures. Due to age-related changes present, the root canal treatment is challenging enough, but with lot of patience and proper equipment can be successful.

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