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Long-term pain caused by obturation material pushed beyond the apex – a case report

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Abstract:

The article presents a case of pain sensation caused by obturation material, pushed beyond the radiological apex of maxillary premolar, as a iatrogenic error of endodontic treatment and not removing the material during tooth extraction.

Key words: iatrogenic error, dental surgery, long-term pain

Introduction

Dental caries is one of the most common reasons of pulp infection. When irreversible changes in the pulp or its necrosis occur, the endodontic treatment is a necessity (1). Poorly treated teeth may become a potential source of infection and cause incidents that may be life threatening, especially in the case of immune deficiency (2, 3). Sealing of the canals is essential for avoiding the reinfection.

In some cases, vigorous obturation may cause unplanned pushing of the material beyond the apex, into the apical area, such situation is classified as a iatrogenic error. The material becomes a foreign body and can negatively result in delaying the healing, and in some cases prevent the complete healing of tissue or have a toxic effect (4, 5). Negative influence of obturation material has a significant impact on the success of endodontic treatment.

The aim of the study was to describe a case of pain sensation caused by obturation material, pushed beyond the radiological apex of maxillary premolar, as a iatrogenic error of endodontic treatment and not removing the material during tooth extraction.

62 y.o. patient reported to the Department of Oral Surgery, Medical University of Lodz, due to chronic pain, that persisted for 3 years with varying intensity. The pain was located on the left side, in the area of alveolar process of the maxilla, anterior wall of the sinus and infraorbital area. 3 months before the patient was subjected to the extraction of tooth 25 due to escalating pain sensation in the vestibule, in the projection of apex, with radiation to infraorbital area and causing headaches. Endodontic treatment of the tooth was performed 3 years before, and according to the patient couple days after finishing the treatment; significant edema of vestibular mucosa was observed, in the projection of said tooth, which resolved after administering antibiotics. Since that day, the aforementioned pain sensation persisted.

The OPG (fig. 1) and extra oral rtgs (fig. 2) showed shading, corresponding to the residue obturation material after endodontic treatment of tooth 25. CT of the sinuses (fig.3) allowed the precise location of the residue, in the close proximity to the fundus of maxillary sinus.

The intra oral examination revealed tenderness to palpation in the vestibule, in the area of extracted tooth 25, and pain radiating to the left infraorbital area.

Many specialists, such as neurologist and laryngologist, who could not identify the cause of such pain, have consulted the patient.

After presenting the patient the possible intra and postoperative complications, the written consent for removal of the residue material was obtained. In local anesthesia of 2% Lidocaine, the mucoperiosteal flap was cut and prepared, the bone removed to reveal the area of the 25 apex and residue of obturation material, which was removed. Oroantral communication was

detected, and closed using the Wasmund-Borusiewicz method (fig. 4). The postoperative course was uneventful. The performed surgery resulted in resolving the pain, which lasted for 3 years.

Endodontic treatment consists in several stages and one of them is obturation, which is considered proper when reaching the radiological apex, or according to another theory it may be 1 to 2 mm shorter in adults or 0,5- to 1mm in adolescents and children (2, 9). Whereas obturation shorter or beyond the physiological apex is regarded incorrect (2, 6).

Any obturation material pushed into the apical area should be avoided; such a case is called overfilling, and may concern the main canal and also additional and lateral ones. Leaving voids during inhomogeneous and heterogenous obturation together with a gutta-percha cone is called overextension (3, 6). The material pushed beyond the apex is considered.

Overfilling of the canal can be a result of iatrogenic failure (8, 9) or due to reasons independent of the dentist, such as the stage of tooth' evolution (8), or chronic inflammation of the apical tissues (10) with bone resorption (11).

In some cases, not microbiological factors located beyond the canal system can support the inflammation. Such factors can be, but are not limited to alien body and reaction to the exogenous material (9). Histologic examinations considering endodontic materials show that the components of those materials may have a local impact. Biocompatibility of those materials is as important as their physical properties and evaluated by various parameters, such as tissue compatibility or microbiological effect, mutagenicity, cytotoxicity and carcinogenicity (12). Sealants can also include mutagenic ingredients, such as resin sealants for example AH Plus, materials based on Ca(OH)2 – Sealpaex or Apexit and zinc oxide and eugenol based – Endomethasone (12, 6).

Gutta-percha is the most common obturation material; it is a natural juice of the Palaquium trees (family Sapotaceae). From the chemical point of view it is a polymer of isoprene and can be present in three stages: α, β, γ. The stages α i β are used in dentistry. Gutta-percha is characterized by excellent biocompatibility. The cones used in endodontics contain 18 to 22 % of raw gutta-percha and other ingredients, such as 59 to 76% of zinc oxide and metal compounds, and resins. Due to release of zinc ions, gutta-percha cones are considered cytotoxic (6).

Overfilling of the canals with materials based on zinc oxide and eugenol are considered a cause for maxillary sinus aspergillosis (12), which is a highly rare case in patients without immunodeficiency, and its cause is considered Aspergillus fumigatus, which for growth and proliferation needs the presence of heavy metals ions, such as zinc. Iatrogenic obturation and overfilling with pushing the material into the sinus may cause apergillosis. Many species of

Aspergillus, belonging to the Ascomycetes group, are common in the environment. Out of 900 species only few are pathogens, constituting a risk to humans, for example Aspergillus fumigatus (13, 14). Overfilling with pushing material to the sinus accompanied with aspergillosis may cause orbital pain and headaches (15).

Guillain-Barré syndrome, described by Hellner et alia, is worth mentioning. Overfillng of upper molar in one of its canal with pushing material into the maxillary sinus, as a cause of chronic sinusitis. Sinus surgery followed by inflammation of the orbit, facial and limb paraesthesia, and in conclusion its paralysis. Acute Guillain-Barré syndrome is an inflammative disease of peripheral nervous system, involving an autoimmune disorder in which immune system attacks the peripheral nerves and damages their myelin sheaths. Usually its occurrence is preceded by infection. Furthermore, it was diagnosed after surgeries and vaccinations. In 70% cases, usually after 2 to 4 weeks after mild bacterial or viral infection of respiratory or digestive system, paresthesia of hands and feet fingers occur. Increasing paralysis, restricted usually to limbs, may also involve cranial nerves and respiratory muscles.

Neurological examination reveals weakness of muscles and reduced tendon reflexes. Paraplegia is also not unusual. The syndrome can be variously pronounced, from mild to life-threating symptoms (16).

Complications may also occur in case of pushing the sealant or obturative material into the mandibular canal, and its negative impact on nerve. The damage of the nerve is caused by the neurotoxicity of the materials and their chemical effect and mechanical compression. Such situation may be a cause of anesthesia, paresthesia, hyperesthesia, hypoesthesia and dysesthesia. Treatment consists of reendo, immediate or delayed decompression, through removing the excess from the canal, resection of the apex, extraction and administering antibiotics (17, 18). In case of small amount of material, clinical monitoring is indicated. The continuity of the nerve is usually not disrupted, and spontaneous regeneration may take place.

Irritation of the material delays or makes the periapical tissue healing impossible (6, 11, 19). Alien bodies in periapical lesion, especially sealant and gutta-percha, but also the cellulose fibers (from paper cones) may be a cause of inflammation (4).

Histopathological examinations performed in 24 hours, so in the early stage after obturation, infiltration of neutrophils, followed by macrophages occurs. In later stages, plasmocytes, lymphocytes and macrophages, in other words the inflammatory cells, cause the decrease of amount of pushed material. RTGs performed in longer periods of time allowed for observing reduction or even complete dissolving in case of small amount of material in periapical area (5, 9, 11, 20).

Results

1. It is essential to avoid the overfilling of the canal, because it may cause failure in endodontic treatment due to mechanical and chemical impact of the material on the periapical tissues and adverse influence on the healing.
2. Small overfilling without symptoms requires only observation. In such case there is a possibility of complete or partial resorbtion.
3. Material pushed beyond the apex may be a cause of chronic inflammation and leaving the material may cause the inflammation to spread.
4. Extraction of the endodontic treated tooth with overfill should be completed with thorough enucleation of the material pushed beyond the apex.

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Fig. 1. OPG showing shadowing, corresponding to the remnants of the obturation material.

Fig. 2. RTG showing the remnants of obturation material, left after the extraction of the tooth.

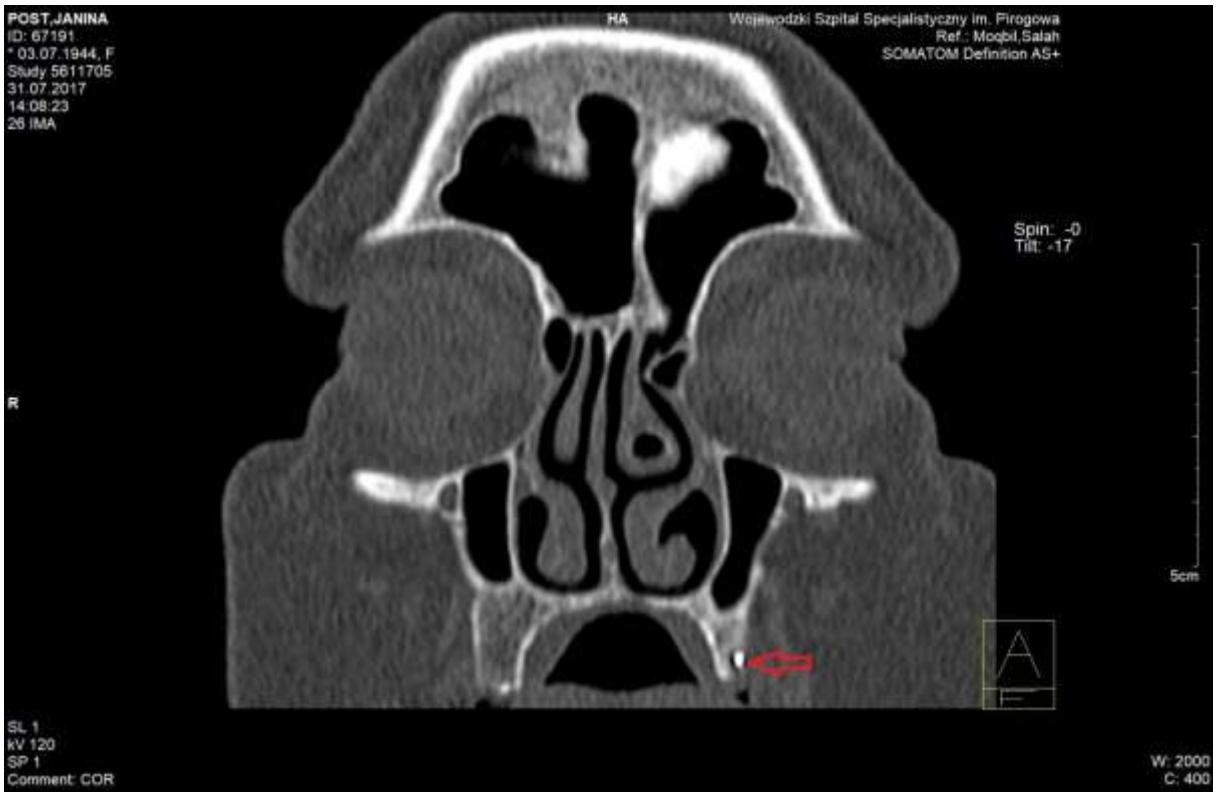

Fig. 3. CT of the sinuses with visible endodontic material, in the direct proximity of the sinus' fundus.

Fig. 4. RTG after the surgery, showing complete removal of obturation material from the 25-tooth area.