Introduction. So far, the most promising and most commonly used materials in endodontic treatment and retreatment were calcium silicate cements. However, due to the shortage of this material and treatment failures, a new bioactive material was introduced - Biodentine™. It is a calcium silicate based technology, with excellent handling characteristics and biocompatibility. It can be used in various indications, including dentine substitution and endodontic therapy.

Case reports. The clinical cases demonstrated excellent healing potential after the treatment with Biodentine™. Conclusion. The bio-silicate technology is highly promising, mostly due to its chemical properties and easy clinical manipulation. The short setting time and high mechanical strength makes Biodentine™ a material easy to handle, highly biocompatible, with a wide range of indications.

Key words: Biocompatible Materials; Root Canal Filling Materials; Root Canal Preparation; Furcation Defects; Endodontics; Silicates; Calcium Phosphates; Treatment Outcome

SAŽETAK

Uvod. Do sada, najčešće korišćeni materijali u endodonciji, i ujedno materijali koji najviše i obećavaju u endodontskom tretmanu i retretmanu su bili kalcijsilikatni cementi. Međutim, u skladu sa nedostacima ovog materijala i neuspešima tretmana, javio se novi materijal Biodentine™. On je napravljen na kalcijsilikatnoj tehnologiji sa odličnom biokompatibilnošću kao i karakteristikama u vezi sa aplikacijom materijala. Može da se koristi kod različitih indikacija, uključujući supstituciju dentina i endodontsku terapiju.


Kljucne reči: biokompatibilni materijali; materijali za punjenje zubnog kanala; preparacija zubnog kanala; defekti furkacije; endodoncija; silikati; kalcijum fosfati; ishod lečenja

Case reports

Case 1. Reparation of the pulp chamber floor perforation following inappropriate endodontic treatment. A 49-year-old male patient was referred to the Department of Restorative Dentistry and Endodontics due to a complication after a previous endodontic treatment. He complained of persistent pain on pressure in tooth 16, which started 2 weeks before. The tooth was treated for furcal perforation repaired with Biodentine™.

This paper aims to present several clinical cases treated for furcal perforation repaired with Biodentine™.
Apostolska S, et al. Biodentine™ as a Furcal Perforation Repair Material

Abbreviations
MTA – mineral trioxide aggregate

Figure 1. a. Preoperative radiographic view showing inadequate endodontic treatment and furcal perforation; b. Radiograph after the removal of the existing prosthetic crown and canal filling; c. Preoperative clinical view showing the furcation perforation; d. Obturation of root canals; e. Biodentine™ used to manage the perforation and as a dentine substitute; f. After 6 months, complete healing of the furcal region is visible

Figure 2. a. Inadequate endodontic treatment, furcal perforation; b. Calcium hydroxide canal filling, application of glass ionomer cement and distal closure of the periodontal communication; c. Definitive sealing of the root canals with gutta-percha and sealer; the cavity was restored with Biodentine™; d. Appearance of the prosthetic appliance after 2 years; e. Appearance of the prosthetic appliance after 7 years

A 32-year-old male patient presented to the Department of Conservative Dentistry and Endodontics with a complaint of pain to percussion in tooth 16. The preoperative radiograph showed inadequately sealed root canals, periapical lesions with iatrogenic lateral root perforation of tooth 16 (Figure 2a). Iatrogenic lateral root perforation with incomplete obturation was diagnosed, and with the patient’s consent an attempt was made to preserve the tooth by sealing the endo-perio communication. After removal of the existing restoration, the endodontic treatment was performed in two phases: after removal of the filling, the canals were instrumented using No 35 k file, calcium hydroxide was used as an intracanal medication and closure of the periodontal communication with glass ionomer cement for 2 weeks (Figure 2b). After 2 weeks, the tooth was asymptomatic and the canals were dry. After the remission of symptoms, apical seal with Biodentine™ and final root canal sealing was performed (Figure 2c). Then, the perforation and the entire cavity were restored with Biodentine™. The follow up at two months showed no clinical signs, and the X-ray confirmed complete healing of the apical and perforation site and the patient was referred to a prosthodontist. Two years after treatment, the tooth was painless and fully functional (Figure 2d), as well as 7 years after treatment (Figure 2e).

Discussion

Iatrogenic pulp floor perforation can occur if the operator becomes disorientated when trying to locate canal orifices. Perforation repair can be technically challenging, and offering referral if treatment is beyond the expertise of the operator [7]. Perforation is defined as...
the pathological or iatrogenic communication between the root canal space and the periodontal tissue. Fural perforation is usually an undesired complication that can occur during preparation of endodontic access cavities or exploring canal orifice of multirooted teeth [8]. These undesirable situations such as excess removal of tooth structure or perforation occur during attempts to locate canals or as a direct result of failing to achieve straight line access to the canals. In the process of searching for canal orifices, perforations of the crown can occur either peripherally through the sides of the crown, or through the floor of the chamber into the furcation [9]. The interval between perforation and repair is one of the critical factors for success. Immediate sealing of perforations enhances the repair process, by reducing the possibility of bacterial contamination of the defect. In the current cases, the perforation in the furcation and sufficient coronal structure was present, so we decided to repair the perforation with a biocompatible material, Biodontinetm. Biodontinetm is a calcium silicate-based bioactive material. It is a powder liquid system, powder composed of Tri-calcium silicate, Di-calcium silicate, Calcium carbonate and oxide, Iron oxide, Zirconium oxide. Liquid consists of Calcium chloride, Hydro soluble polymer [10, 11]. Biodontinetm contains tricalcium silicate with additives such as powder and a liquid, containing Calcium chloride to speed up setting. Calcium silicate materials have excellent biocompatibility and are able to induce calcium-phosphate precipitation at the periodontal ligament interface allowing bony healing (Tay, et al., 2007, Torabinejad and Parirokh, 2010). With a reduced setting time compared to mineral trioxide aggregate (MTA), Biodontinetm is perhaps more user-friendly for perforation repair [12]. It is easy to handle owing to its ease of manipulation and a short setting time - approximately 12 minutes, has high alkaline pH and is a biocompatible material that makes it a favorable material for perforation repair [13, 14]. In a study by Gunesar et al., Biodontinetm showed considerable performance as a perforation repair material even after being exposed to various endodontic irrigants as compared to MTA [15]. However, very few papers are available regarding the use of Biodontinetm as a perforation repair material. The use of Biodontinetm seems promising in the present cases. As the setting is faster, there is a lower risk of bacterial contamination than with MTA. Adding to its ability to be used as dentine substitute, Biodontinetm could safely be used for each indication where dentine is damaged [16]. Therefore, it is an advantage to the clinician and the patient.

**Conclusion**

The use of Biodontinetm for repair of fural perforations is associated with a good short-term clinical outcome. The new bio-silicate technology, represented by Biodontinetm is highly promising, mostly due to its chemical properties and easy clinical manipulation. The short setting time and high mechanical strength makes Biodentine a material easy to handle, highly biocompatible and with wide range of indications (such as endodontic procedures and as a dentin substitute in restorations).

**References**