Original article

UDC: 612.753:[616.31:615.46
doi: 10.5633/amm.2024.0302

HISTOLOGICAL EVALUATION OF BONE TISSUE RESPONSE TO SILICON-BASED ENDODONTIC MATERIAL

Marija Nikolić[1,2], Jelena Popović[1,2], Aleksandar Mitić[1,2], Aleksandar Petrović[3], Radomir Barac[1,2], Nenad Stošić[1,2], Antonije Stanković[4], Aleksandra Milovanović[4]

Successful endodontic treatment implies that the materials for obturation remain in the tissue, if possible forever. It is therefore essential to know the long-term effects of materials on tissue. This study aimed to evaluate the histological response of bone tissue to the implanted dimethylpolysiloxane-based material in the artificially prepared defect. The sample comprised 20 Wistar rats. The defect was formed in the mandible of rats by sterile stainless steel burs. Dimethylpolysiloxane-based sealer (Roeko Seal) was implanted in the defects of the experimental group while the defects of the control group were left to heal spontaneously. Half of the animals from both groups were put down after thirty days, whereas the other half was euthanized after ninety days. Microscopic preparations were analyzed by light microscope. A fibrous callus and a young bone were observed thirty days after the implantation. Ninety days after the implantation, the bone around the unabsorbed material was completely healed. Roeko Seal does not decelerate the healing of bone tissue, it enables complete healing of tissue around the material.

Acta Medica Medianae 2024;63(3):14–24.

Key words: *sealer, obturation, bone healing*

[1]University of Niš, Faculty of Medicine, Department of Dental Diseases and Endodontics, Niš, Serbia
[2]Dental Medicine Clinic, Department of Dental Diseases and Endodontics, Niš, Serbia
[3]University of Niš, Faculty of Medicine, Department of Histology and Embryology, Niš, Serbia
[4]University of Niš, Faculty of Medicine, doctoral studies, Niš, Serbia

Contact: Marija Nikolić
52 Dr Zoran Djindjić Blvd., 18000 Niš, Serbia
E-mail: makinis80@yahoo.com

Introduction

After the removal of canal contents and treatment of the complete canal system by irrigation, obturation follows as the final stage of endodontic treatment (1). The aim of hermetic obturation is to enable healing processes in the periapical region.

There are a lot of techniques for obturation of canal system, and the majority imply various ways of condensation of gutta-percha in combination with obturation paste (2). The role of the paste in this combination is to make suppressed gutta-percha fill the imperfections of the canal system, fill accessory canals if any, and be the bond between the gutta-percha and the wall of the root canal (3).

The border of canal filling can influence the outcome of endodontic treatment. It is considered that the material should not go over an apical foramen. However, some researchers think that a small amount of a sealer over the apical foramen may have a positive effect on healing processes (3, 4). Obturation material often goes over the apical foramen, given that despite modern achievements, the endodontic procedure is mostly "groping in the dark". Nevertheless, even in cases where the filling was done up to the wanted limit, sealer stays in contact with periapical tissue via apical foramen for a long period (for decades) (5, 6).

This fact stresses the importance of the biological characteristics of obturation materials (7). A great deal of research has shown that most materials in a freshly mixed state show a certain degree of toxicity and cause the reaction of surrounding tissue in which they have been implanted after a short period (1, 8, 9). Successful endodontic treatment means that the obturation material stays incorporated in the tissue, if possible, forever, and that the tooth is functional. It is important to understand how a specific material behaves in the tissue over time and its interaction with the tissue.

Roeko Seal sealer belongs to the group of silicon-based materials. According to the studies published on cell culture silicon-based obturation

materials showed good biological characteristics, which was not the case in sealers of different chemical compositions even in freshly-mixed state (5, 8). According to implantation tests, silicon-based sealers show satisfactory biocompatibility (9, 10, 11). Obturation materials are expected to stay in an organism for a long time, therefore it is of utmost importance to check tissue reaction to them after longer periods.

Aim

The aim of this paper was to investigate tissue reaction to bone implantation of endodontic material Roeko Seal in an artificially prepared defect in the mandible of rats after a long period (30 and 90 days).

Material and Methods

Twenty male Wistar rats with an average weight of 160−180 grams were used for the experimental procedure (the experiment was approved by the Ethic Committee of the Faculty of Medicine in Niš, No. 01 3797). The preparation of experimental animals involved the administration of an anesthetic, namely intraperitoneal injection of ketamine hydrochloride (0.1 ml/100 g). The experimental procedure involved the preparation of bone defect unilaterally (1.4 x 1.6 mm) (left side) between the medial line and the mental foramen using a sterile stainless steel dental burs.

Roeko Seal sealer (Roeko, Germany) was implanted in the formed defects of the experimental group (n = 12) according to the manufacturer's instructions (material composition is shown in Table 1). Prepared defects of the control group (n = 8) were left to heal spontaneously without any implants. One-half of the animals from the experimental (n = 6) and half of the animals from the control group (n = 4) were put down after 30 days, the other half after 90 days. The animals were put down by the excessive administration of the anaesthetic (ketamine hydrochloride).

Samples of tissue were collected by resection of the mandible and consisted of the area of the defect and the surrounding bone. Tissue samples were fixed in 10% buffered formalin, demineralized in 10% formic acid, dehydrated in alcohol and moulded in paraffin wax. Cutting was performed by microtome 2 mm glass knives (Historange). Staining was done by the H&E technique. Microscopic analysis was performed by the light microscope BX50 (Olympus, Japan).

The following parameters were examined: the degree of cell inflammatory response, the degree of fibrovascular proliferation and the reaction of the distal bone. Obtained data were classified according to a modified semiquantitative scale: 0—absence, 1—poorly, 2—moderate and 3—pronounced (12). The obtained results were added to a specially created data base, and were analysed afterwards (Friedman ANOVA and Kruskal−Wallis ANOVA).

Results

Experimental Group

The remainder of the used material for the obturation of the trepanation cavity was observed microscopically within the defects of all the samples of the experimental group. During the process of treating the sampled bone and making histological preparations in the majority of cases, the obturation material fell out or remained in traces, and the experimental defects appeared as empty spaces by the light microscope.

Thirty-Day Findings in the Experimental Group (Roeko Seal)

On the thirtieth day after the implantation, callus and newly formed bone tissue were noticeable. The replacement of fibrous callus with a young immature bone could be observed (Figure 1). The bone distal to the defect had the structure of basophilically prominent border lines of osteon and partially with a greater amount of extracellular matrix. The borders of the osteon were cracked, and partially widened due to the fine-grained or amorphous look of basophilic reaction.

Ninety-Day Findings in the Experimental Group (Roeko Seal)

Ninety days after the implantation a defect could be observed and partially retained material during the completion of preparations. The bone around the unabsorbed material was repaired and completely healed (Figure 2). The boundary of a newly deposited mature bone could be partially observed. Bone mineralization in the area was relatively even, osteons were of smaller diameters, with a small number of concentric lamellae, and cement lines were of prominent basophilic reaction.

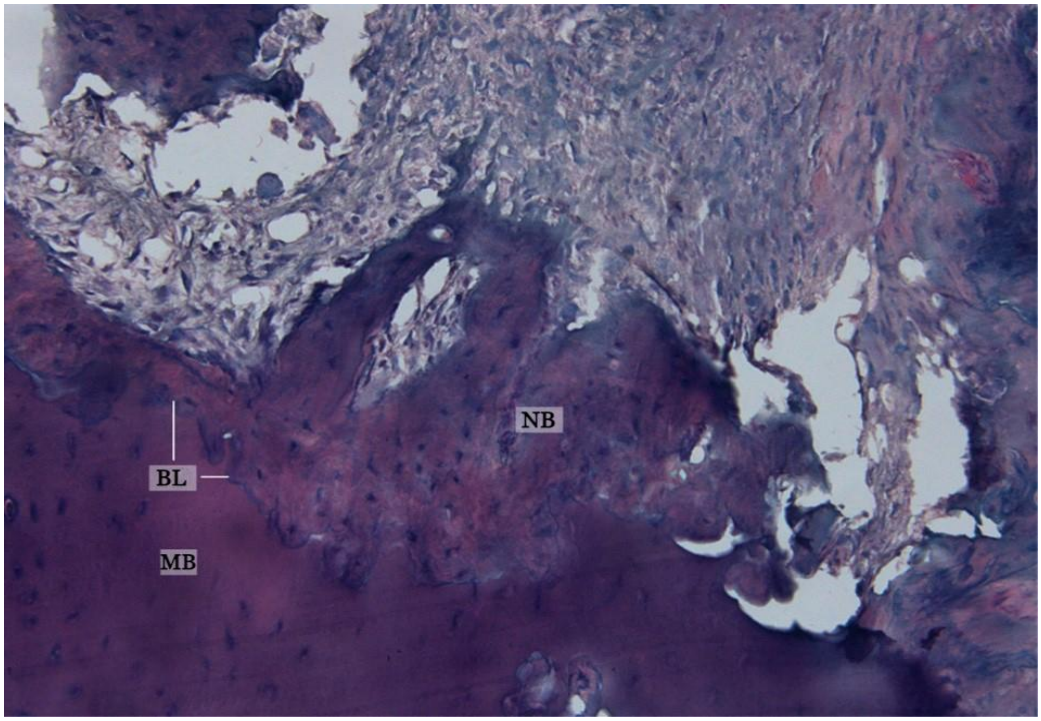

Figure 1. Indicated curved borderline (BL) newly formed hypercellular immature bones (NB) and mature bones (MB) (the degree of fibrovascular proliferation—moderate (2)) (HE, x200)

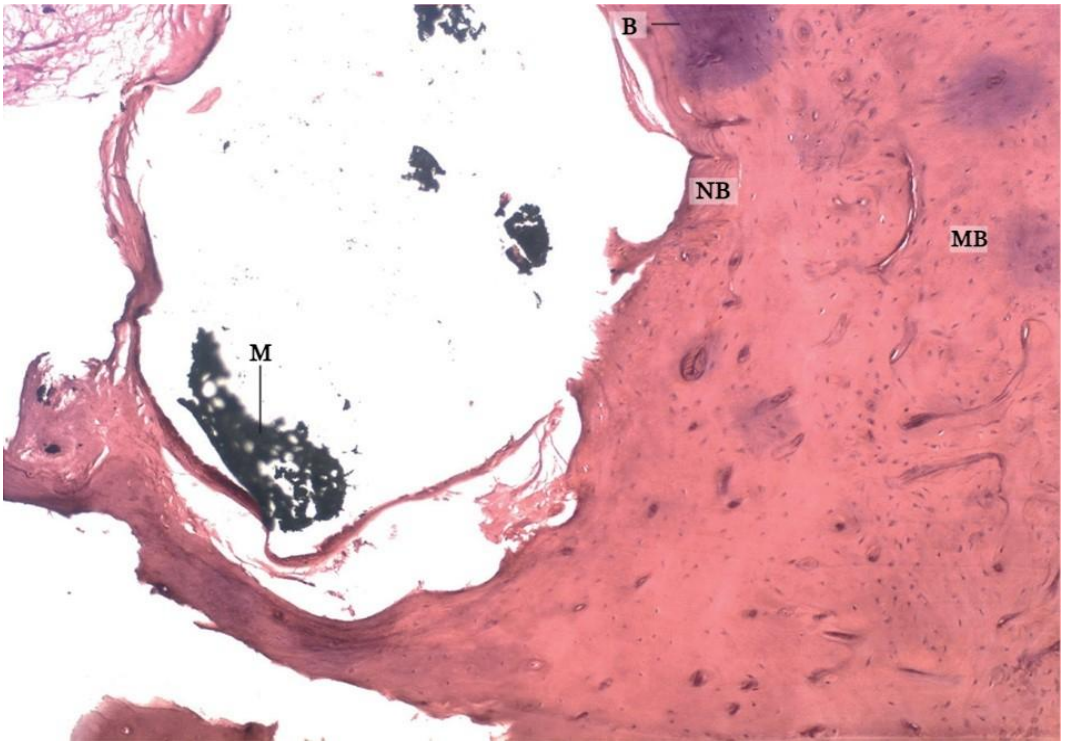

Figure 2. Lamellar bone with formed osteon, trapped scraps of unabsorbed material (M) and partially noticeable boundary (B) of newly formed bone tissue (NB) towards mature bone (MB) (fibrovascular proliferation—absent (0)) (HE, x100)

Control Group

Besides the recorded morphological characteristics of healing on experimental damage, a series of morphological changes could be observed at the maximal distance of 3 mm from the edge of the defect in the control group. These changes depended upon chronological stages of the experiment.

Thirty-Day Findings in the Control Group

On the thirtieth day after the preparation of the defect, the osteosynthetic activity of osteoblasts and the defect filled with newly formed bone tissue could be observed. Endosteal communications were highly developed based on Volkmann and Haversian canal types. Osteocytes were situated in the enlarged lacunae with the rims of intensified basophilia. Changes could be observed on the cement lines in the wider region of the experimental defect in the shape of lacunar enlargement of extracellular matrix between osteons and interstitial lamellae (Figure 3).

Ninety-Day Findings in the Control Group

Ninety days after the preparation of the defect *restitutio ad integrum* was observed, as well as the complete filling of the experimental cavity with bone tissue composed of numerous osteons of smaller diameter, with a certain number of concentric lamellae with the outer boundary characterized by the cement line of intensified basophilic reaction (Figure 4).

Statistical Analysis
(Tables 2—10)

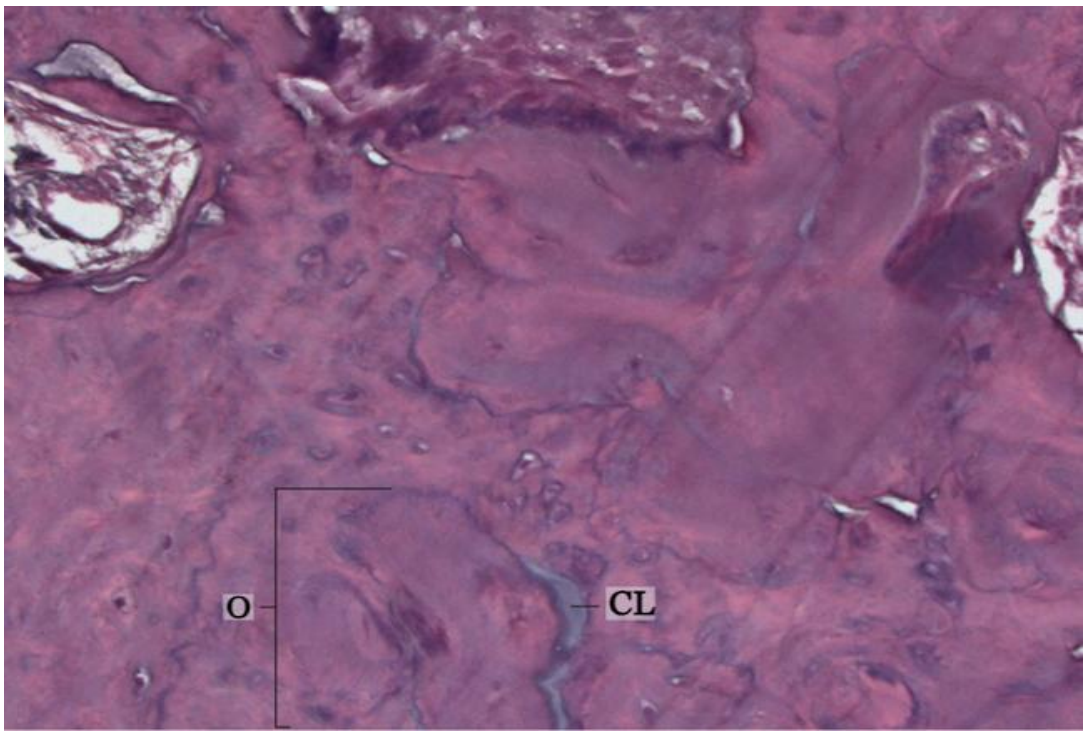

Figure 3. In the wider region relative to the edge of the defect, especially on the edges of osteons (O), cement lines are pronounced (CL), cracked to irregular polygon shape, filled with fine-grained to amorphous material (degree of distal bone reaction—moderate (2)) (HE, x200)

Table 1. Roeko Seal composition

Roeko Seal	
Component A	Component B
Dimethylpolysiloxane Paraffin oil Silicone oil	Zirconium dioxide Hexachloroplatinic acid

Table 2. Differences in INFLAMMATORY RESPONSE between the initial and final state

EXPERIMENTAL GROUP

Level of reaction	30 days		90 days	
	Frequency	%	Frequency	%
0	5	83.33	6	100.0
1	1	16.67	0	0
2	0	0	0	0
3	0	0	0	0

Friedman ANOVA (N = 6, df = 1)

Chi Sqr. = 1.00; p = .317

Table 3. Differences in INFLAMMATORY RESPONSE between the initial and final state

CONTROL GROUP

Level of reaction	30 days		90 days	
	Frequency	%	Frequency	%
0	3	75.0	4	100.0
1	1	25.0	0	0
2	0	0	0	0
3	0	0	0	0

Friedman ANOVA (N = 4, df = 1)

Chi Sqr. = 1.00; p = .317

Table 4. Differences in INFLAMMATORY RESPONSE between the groups (Kruskal—Wallis and ANOVA tests)

Measurings		**Experimental group**	**Control grop**	**H**	**p**
30 days	Σ ranks	32	23	0.09	.760
90 days	Σ ranks	33	22	0.00	1.000

H—values of Kruskal—Wallis and ANOVA tests; p—p-value of probability

Table 5. Differences in the degree of FIBROVASCULAR PROLIFERATION between the initial and final state

EXPERIMENTAL GROUP

Level of reaction	30 days		90 days	
	Frequency	%	Frequency	%
0	0	0	6	100.0
1	0	0	0	0
2	6	100.0	0	0
3	0	0	0	0

Friedman ANOVA (N = 6, df = 3)

Chi Sqr. = 6.00; p = **.014***

* significance at the level of p < 0.05

Table 6. Differences in the degree of FIBROVASCULAR PROLIFERATION between the initial and final state

CONTROL GROUP

Level of reaction	30 days		90 days	
	Frequency	%	Frequency	%
0	0	0	4	100.0
1	1	25.0	0	0
2	3	75.0	0	0
3	0	0	0	0

Friedman ANOVA (N = 4, df = 1)

Chi Sqr. = 4.00; p = **.046***

* significance at the level of p < 0.05

Table 7. Differences in FIBROVASCULAR PROLIFERATION between the groups (Kruskal—Wallis and ANOVA tests)

Measurings		**Experimental group**	**Control group**	**H**	**p**
30 days	Σ ranks	36	19	1.50	.221
90 days	Σ ranks	33	22	0.00	1.000

H—values of Kruskal—Wallis and ANOVA tests; p—p-value of probability

Table 8. Differences in the degree of REMOTE BONE REACTION between the initial and final state

EXPERIMENTAL GROUP

Level of reaction	30 days		90 days	
	Frequency	%	Frequency	%
0	0	0	6	100.0
1	0	0	0	0
2	6	100.0	0	0
3	0	0	0	0

Friedman ANOVA (N = 6, df = 3)

Chi Sqr. = 6.00; p = **.014***

* significance at the level of p < 0.05

Table 9. Differences in the degree of REMOTE BONE REACTION between the initial and final state

CONTROL GROUP

Level of reaction	30 days		90 days	
	Frequency	%	Frequency	%
0	0	0	4	100.0
1	1	25.0	0	0
2	3	75.0	0	0
3	0	0	0	0

Friedman ANOVA (N = 4, df = 1)

Chi Sqr. = 4.00; p = **.046***

* significance at the level of p < 0.05

Table 10. Differences in REMOTE BONE REACTION between the groups (Kruskal—Wallis and ANOVA tests)

Measurings		**Experimental group**	**Control group**	**H**	**p**
30 days	Σ ranks	36	19	1.50	.221
90 days	Σ ranks	33	22	0.00	1.000

H—values of Kruskal—Wallis and ANOVA tests; p—p-value of probability

Discussion

For the investigation into biocompatibility of endodontic materials both *in vitro* (on cell culture) and *in vivo* tests (subcutaneous, intramuscular and intraosseous implantation) can be used (13). Implantation techniques are considered to be superior because of the greater similarity to clinical conditions and the possibility of monitoring the healing process. Materials can be directly injected or implanted via Teflon, silicone or polyethylene tubes into tissues of rats, rabbits, guinea pigs and other experimental animals (14, 15, 16). Subcutaneous implantation is simpler and widely used (17), however, intraosseous implantation can imitate a clinical situation of close contact between an endodontic material and a bone. The implantation test is an unspecific in vivo test of tissue response to materials and as such implies pathohystological analysis after the implantation of tested materials in tissues of different animals. Complete healing of moderate size defect in rats is expected to be completed within 35 days (18), which is why similar time frame was chosen for the first stage of euthanasia.

Inflammatory response of low intensity could be observed in only one experimental animal thirty days after the implantation while it was absent from other animals. Roeko Seal cannot be considered the cause of inflammation in observation periods. The degree of fibrovascular proliferation also decreased in the course of time, which was expected during the process of healing. Thirty days after the implantation of the material, a callus and newly formed bone tissue could be observed. Young bone tissue of lamellar structure filled the space between the material and the unaffected bone tissue until the ninetieth day.

Prepared defect is an extreme stimulus which requires bone remodelling, whereby the bone can repair itself, which leads to the reaction of bone tissue 3 mm from the edge of the defect. Besides the established morphological healing characteristics, a series of morphological changes were observed in osteocytes and their lacunae, cement lines and the existing endosteal canal system, Volkmann and Haversian canals in all the experimental animal groups as well as the control group. Morphological changes in cement lines and endosteal canal system were observed in the thirty-day group, however, their disappearance and return to normal bone morphology were observed later in the ninety-day group.

Roeko Seal did not lead to the extension of the reparation period, nor did it lead to alterations of bone tissue. Discrepancies in histomorphological characteristics in the implanted tissue were slight in comparison to the control group for all the observed parameters (the degree of inflammatory cell response, the degree of fibrovascular proliferation and the reaction of distal bone) for both periods. Roeko Seal proved to be non-biodegradable until the ninetieth day, therefore the defect was not closed as in the control group, however, the bone was repaired and completely healed with the aid of Roeko Seal.

Dimethylpolysiloxane-based material, Roeko Seal can initially cause inflammation after subcutaneous implantation, which is reduced in the course of time and then completely disappears (9, 19). Subcutaneous injection of Roeko Seal into the rat tissue causes a mild to moderate inflammatory reaction within 24 hours and 7 days, but the reaction slows down and becomes chronic by the 30th day with the implant being covered by a fibrous capsule (19).

The reduction in inflammation intensity was also described by Derakhshan et al. who analyzed biocompatibility of Roeko Seal in subcutaneous implantation, in rats that were put down after 7, 14 and 60 days. Roeko Seal showed biocompatibility despite the inflammatory reaction after 7 and 14 days since fibrous capsule was formed which the authors considered to be a good sign because the inflammation was not strong enough to prevent fibroblasts from forming the capsule (9).

The tendency of the degree of inflammatory response to drop was observed in the present study, with a weak inflammatory response present in only one animal on the thirtieth day and absent in other cases.

Other authors have observed that there is a lack of inflammatory response on the fourteenth day after the implantation. Silva-Herzog et al. concluded that Roeko Seal is biocompatible when implanted subcutaneously into the tissue. Fibrous scar tissue with no inflammation was observed on the 14^{th} day (20). In the same study, the spectrophotometric analysis showed that Roeko Seal caused the smallest amount of inflammatory exudate that was significantly different from other investigated materials (AH Plus and Sealapex) and control group (20).

On the other hand, some authors observed inflammation even 30 and 90 days after the implantation with Roeko Seal. Dammaschke et al. noticed the persistence of previously caused inflammation 30 days after the molar filling in rats. They explained the results by the fact that persistent inflammation could be the consequence of the irritable nature of the used sealer (21). Low/moderate inflammatory infiltrate could be detected in Roeko Seal even 90 days after the tooth filling which was regarded as favorable by Tanomaru-Filho et al. Roeko Seal induced periapical reparation with results similar to AH Plus and Resilon/Epiphany which were also tested in this experiment. Positive results were also obtained in the case of the reparation-deposition of mineralized tissue on the apical foramen which covered at least half the surface of the apical aperture (22).

Results obtained in this research do not correspond to the described results since there were no signs of inflammation after 90 days. Roeko Seal showed the qualities of a biocompatible material and therefore the tissue around it gradually recovered and regenerated in

the course of time. Experimental procedure in which teeth of animals were filled was significantly different from bone implantation applied in this experiment which could be the reason why there was a discrepancy between the results.

Ghanaati et al. subcutaneously implanted dimethylpolysiloxane-based material Gutta Flow in rats. Sixty days after the implantation, microscopic analysis showed that the material was well integrated in subcutaneous tissue. Unlike AH Plus based on plastic resin, which was also tested in this research, Gutta Flow did not succumb to biodegradation. Gutta Flow remained encapsulated in subcutaneous tissue as a foreign body. The given data showed that this material induced an inflammatory response which led to its isolation by fibrous capsule within a living organism since the inflammatory cells of a host could not decompose. This may result in the retention of this material in periapical tissue as a foreign body in cases of overfilling. In conclusion, the authors stressed the fact that the use of biodegradable materials reduced the risk of infection and accelerated periapical healing (23). These results are concordant with the results of the present study where silicon-based material was not absorbed within 90 days, even though it did not cause chronic inflammation. The discrepancies in results could be attributed to different experimental models and tissue in which material was implanted.

Roeko Seal is most commonly defined as a nontoxic or low-level toxic sealer even when it comes to in vivo research. It showed high compatibility with L929 and HeLa cells (24). Silicon is considered to be a biocompatible material, therefore these results are expected. Oztan et al. noted the low toxic effect of AH Plus and Roeko Seal sealers on fibroblasts of rats (L929 cells) after experimental periods of 24, 48 and 72 hours (25).

Conclusion

Roeko Seal does not hinder reparatory mechanisms, nor does it impair morphofunctional relationships in bone tissue.

References

1. Fonseca DA, Paula AB, Marto CM, Coelho A, Paulo S, Martinho JP, et al. Biocompatibility of Root Canal Sealers: A Systematic Review of In Vitro and In Vivo Studies. Materials (Basel) 2019; 12(24):4113. [CrossRef] [PubMed]
2. Ashraf H, Shafagh P, Mashhadi Abbas F, Heidari S, Shahoon H, Zandian A, et al. Biocompatibility of an experimental endodontic sealer (Resil) in comparison with AH26 and AH-Plus in rats: An animal study. J Dent Res Dent Clin Dent Prospects 2022;16(2):112-17. [CrossRef] [PubMed]
3. Vujašković M, Bacetić D. Reakcija tkiva na materijale za trajno punjenje kanala korena zuba Tissue Toxicity of Root Canal Sealers. serbian Dent J. 2004;51:136–41. [CrossRef]
4. Suzuki P, Souza V De, Holland R, Gomes-Filho JE, Murata SS, Dezan Junior E, et al. Tissue reaction to Endométhasone sealer in root canal fillings short of or beyond the apical foramen. J Appl Oral Sci 2011; 19(5):511–6. [CrossRef] [PubMed]
5. Silva EJ, Santos CC, Zaia AA. Long-term cytotoxic effects of contemporary root canal sealers. J Appl Oral Sci 2013; 21(1):43-7. [CrossRef] [PubMed]
6. Washio A, Morotomi T, Yoshii S, Kitamura C. Bioactive Glass-Based Endodontic Sealer as a Promising Root Canal Filling Material without Semisolid Core Materials. Materials (Basel) 2019; 12(23):3967. [CrossRef] [PubMed]
7. Santos GSBD, Carvalho CN, Tavares RRDJ, Silva PGDB, Candeiro GTDM, Maia Filho EM. Tissue repair capacity of bioceramic endodontic sealers in rat subcutaneous tissue. Braz Dent J 2023; 34(3): 25-32. [CrossRef] [PubMed]
8. Lodiene G, Morisbak E, Bruzell E, Ørstavik D. Toxicity evaluation of root canal sealers in vitro. Int Endod J 2008; 41(1): 72–7. [CrossRef] [PubMed]
9. Derakhshan S, Adl A, Parirokh M, Mashadiabbas F. Comparing subcutaneous tissue responses to freshly mixed and set root canal sealers. Int Endod J 2009; 4(4):152–7. [PubMed]
10. Santos J, Pereira S, Sequeira D, Messias A, Martins J, Cunha H, et al. Biocompatibility of a bioceramic silicone-based sealer in subcutaneous tissue. J Oral Sci 2018; 61(1): 171-7. [CrossRef] [PubMed]
11. Da Silva LAB, Bertasso AS, Pucinelli CM, da Silva RAB, de Oliveira KMH, Sousa-Neto MD, et al. Novel endodontic sealers induced satisfactory tissue response in mice. Biomed Pharmacother 2018; 106:1506-12. [CrossRef] [PubMed]
12. Trichês KM, Júnior JS, Calixto JB, Machado R, Rosa TP, Silva EJNL, et al. Connective tissue reaction of rats to a new zinc-oxide-eugenol endodontic sealer. Microsc Res Tech 2013;76(12):1292–6. [CrossRef] [PubMed]
13. Olsson B, Sliwkowski A, Langeland K. Subcutaneous implantation for the biological evaluation of endodontic materials. J Endod 1981; 7(8):355–69. [CrossRef] [PubMed]
14. Hauman CHJ, Love RM. Biocompatibility of dental materials used in contemporary endodontic therapy: A review. Part 2. Root-canal-filling materials. Int Endod J 2003; 36(3):147–60. [CrossRef] [PubMed]
15. Zafalon EJ, Versiani MA, de Souza CJ, Moura CC, Dechichi P. In vivo comparison of the biocompatibility of two root canal sealers implanted into the subcutaneous connective tissue of rats. Oral Surgery Oral Med Oral Pathol Oral Radiol Endodontology 2007; 103(5):88–94. [CrossRef] [PubMed]
16. Ogasawara T, Yoshimine Y, Yamamoto M, Akamine A. Biocompatibility of an experimental glass-ionomer cement sealer in rat mandibular bone. Oral Surg Oral Med Oral Pathol Oral Radiol Endod 2003; 96(4):458–65. [CrossRef] [PubMed]
17. Leonardo MR, Silveira FF, Silva LAB Da, Tanomaru Filho M, Utrilla LS. Calcium hydroxide root canal dressing. Histopathological evaluation of periapical repair at different time periods. Braz Dent J 2002;13(1):17–22. [PubMed]
18. Garcia P, Histing T, Holstein JH, Klein M, Laschke MW, Matthys R, et al. Rodent animal models of delayed bone healing and non-union formation: a comprehensive review. Eur Cell Mater 2013; 26: 1-12; discussion 12-4. [CrossRef] [PubMed]
19. Gençoglu N, Türkmen C, Ahiskali R. A new silicon-based root canal sealer (Roekoseal®-Automix). J Oral Rehabil 2003;30(7):753–7. [CrossRef] [PubMed]
20. Silva-Herzog D, Ramírez T, Mora J, Pozos AJ, Silva LAB, Silva RAB, et al. Preliminary study of the inflammatory response to subcutaneous implantation of three root canal sealers. Int Endod J 2011;44(5):440–6. [CrossRef] [PubMed]
21. Dammaschke T, Schneider U, Stratmann U, Yoo JM, Schäfer E. Reaktionen des entzündeten periapikalen Gewebes auf drei unterschiedliche Wurzelkanalsealer. J Oral Rehabil. 2013; 17:264–8.
22. Tanomaru-Filho M, Tanomaru JMG, Leonardo MR, da Silva LAB. Periapical repair after root canal filling with different root canal sealers. Braz Dent J 2009;20(5):389–95. [CrossRef] [PubMed]
23. Ghanaati S, Willershausen I, Barbeck M, Unger RE, Joergens M, Sader R A, et al. Tissue reaction to sealing materials: different view at biocompatibility. Eur J Med Res 2010;15(11):483–92. [CrossRef] [PubMed]
24. Miletić I, Devcić N, Anić I, Borciić J, Karlović Z, Osmak M. The cytotoxicity of RoekoSeal and AH Plus compared during different setting periods. J Endod 2005;31(4):307–9. [CrossRef] [PubMed]
25. Oztan MD, Yilmaz S, Kalayci A, Zaimoğlu L.A comparison of the in vitro cytotoxicity of two root canal sealers. J Oral Rehabil 2003;30(4):426-9. [CrossRef] [PubMed]

Originalni rad **UDC: 612.753:[616.31:615.46**
doi: 10.5633/amm.2024.0302

HISTOLOŠKA PROCENA ODGOVORA KOŠTANOG TKIVA NA ENDODONTSKI MATERIJAL NA BAZI SILIKONA

Marija Nikolić[1,2], Jelena Popović[1,2], Aleksandar Mitić[1,2], Aleksandar Petrović[3], Radomir Barac[1,2], Nenad Stošić[1,2], Antonije Stanković[4], Aleksandra Milovanović[4]

[1]Univerzitet u Nišu, Medicinski fakultet, Katedra za bolesti zuba i endodonciju, Niš, Srbija
[2]Klinika za dentalnu medicinu Niš, Odeljenje za bolesti zuba i endodonciju, Niš, Srbija
[3]Univerzitet u Nišu, Medicinski fakultet, Katedra za histologiju i embriologiju, Niš, Srbija
[4]Univerzitet u Nišu, Medicinski fakultet, student doktorskih studija, Niš, Srbija

Kontakt: Marija Nikolić
Bulevar dr Zorana Đinđića 52, 18000 Niš
E-mail: makinis80@yahoo.com

Uspešan endodontski tretman podrazumeva da materijal za opturaciju ostane u tkivu, zauvek ako je to moguće. Stoga, neophodno je poznavati dugoročne efekte materijala na okolno tkivo. Cilj ove studije bila je histološka procena odgovora koštanog tkiva na materijal na bazi dimetil-polisiloksana implantiran u artificijelni preparirani defekt. Uzorak je obuhvatio 20 *Wistar* pacova. Defekt je formiran u mandibulama pacova sterilnim svrdilima od nerđajućeg čelika. Siler na bazi dimetil--polisiloksana (*Roeko Seal*) implantiran je u defekte pacova iz eksperimentalne grupe, dok su defekti pacova iz kontrolne grupe ostavljeni da spontano zarastu. Jedna polovina životinja iz obeju grupa žrtvovana je nakon 30 dana, a druga nakon 90 dana. Mikroskopski preparati su analizirani na svetlosnom mikroskopu. Fibrozni kalus i mlada kost uočeni su trideset dana nakon implantacije. Devedeset dana nakon implantacije, kost oko neresorbovanog materijala u potpunosti je zacelila. *Roeko Seal* ne usporava zarastanje koštanog tkiva i omogućava potpuno zaceljenje tkiva oko materijala.

Acta Medica Medianae 2024; 63(3):14–24.

***Ključne reči**: siler, opturacija, zarastanje kosti*