AMERICAN ACADEMIC PUBLISHER

INTERNATIONAL JOURNAL OF MEDICAL SCIENCES

ISSN NUMBER: 2692 - 5206 Volume 6. No 02. February ,2026

EVALUATION OF THE EFFICACY OF CERAMIC POSTS USED IN THE RESTORATION OF CORONAL PORTION DEFECTS OF TEETH

Bobojonova Shaxnoza Xalimjonovna

Assistant, Department of Propaedeutics of Orthopedic Dentistry,

Tashkent State Medical University

Abstract. This article investigates the clinical, biomechanical, and economic aspects of using milled ceramic post-and-cores in the orthopedic restoration of teeth with substantial hard tissue loss resulting from caries complications. The study provides a comparative analysis of ceramic and metal post-and-cores concerning biocompatibility, aesthetic parameters, load distribution, and labor intensity. The obtained results indicate that milled ceramic post-and-cores are a promising option for clinical practice.

Keywords: post, ceramics, CAD/CAM, biomechanics.

Introduction. Caries is one of the most prevalent pathologies in dentistry, and when left untreated in a timely manner, it leads to complications such as pulpitis and periodontitis. This necessitates endodontic treatment. In teeth with significant loss of hard tissue after endodontic treatment, restoration using only filling materials may be clinically ineffective. Particularly when there are extensive defects in the coronal portion of the tooth, the need arises to employ orthopedic restoration methods. From this perspective, post-and-core systems serve as a reliable foundation for artificial crowns, holding significant importance.

Research Objective. To evaluate the clinical efficacy, biomechanical characteristics, and economic feasibility of milled ceramic post-and-cores, and to compare them with traditional metal post-and-cores.

Materials and Methods. In endodontically treated teeth, the substantial loss of hard tissue reduces the mechanical stability of the tooth. In such situations, the primary function of a post-and-core is to distribute occlusal loads evenly along the tooth root and the remaining dentin tissue. Ceramic post-and-cores possess high hardness and dimensional stability, making them resistant to occlusal forces. Ceramic posts, fabricated in an individual anatomical shape using modern CAD/CAM technologies, precisely match the geometry of the root canal, which maximizes the contact surface area. In ceramic post-and-cores, stress concentration primarily accumulates within the post itself, while it is relatively reduced in the dentin tissue. This positively contributes to the preservation of the tooth root from fracture. However, the higher elastic modulus of ceramics compared to dentin can, in some cases, lead to uneven load distribution. Due to the low plastic deformation capacity of ceramic materials, there is a risk of brittle fracture under sudden or angular loads. Therefore, careful planning of occlusal relationships is recommended, and caution is advised when using them in patients with parafunctional habits (bruxism).

Clinical Aspects. In clinical practice, ceramic post-and-cores are widely used in situations with high aesthetic demands, particularly in the restoration of anterior teeth. The absence of a metal component prevents the formation of a "grey shadow" in the gingival margin area and ensures the natural appearance of the artificial crown. Ceramic posts exhibit high biocompatibility, causing no inflammatory, allergic, or toxic reactions in periapical and

AMERICAN ACADEMIC PUBLISHER
INTERNATIONAL JOURNAL OF MEDICAL SCIENCES
ISSN NUMBER: 2692 - 5206 Volume 6. No 02. February ,2026

periodontal tissues. Clinical observations confirm the long-term functional stability of restorations with ceramic post-and-cores. The adhesive fixation method is considered one of the significant clinical advantages of ceramic post-and-cores. Using modern resin cements, a strong and hermetic bond is formed within the dentin–cement–ceramic system, which reduces the risk of microleakage and secondary caries. However, certain clinical limitations exist. The complexity of the manufacturing process, the number of laboratory steps involved, and the requirement for high precision increase both time and costs. Furthermore, the possibility of rework is limited if clinical or laboratory errors occur.

Recommendations for Practice. · Ceramic post-and-cores are preferable for anterior teeth and in cases with high aesthetic demands.

· Caution is required when selecting posts for posterior teeth subjected to high occlusal loads and for patients with bruxism.

· The compatibility between the post and crown materials is a key factor for clinical success.

· Strict adherence to adhesive cementation protocols ensures the longevity of the restoration.

Methods Used:

· Clinical examination and functional assessment

· Radiographic analysis

· Milling of ceramic post-and-cores using a CAD/CAM system

· Mathematical modeling and biomechanical analysis

· Timekeeping and cost calculation

· Statistical data analysis

Results. According to the results of clinical and laboratory studies, ceramic post-and-cores were found to possess the following advantages:

· High biocompatibility, good adaptation to tissues;

· Absence of allergic and toxic reactions;

· High aesthetic performance, no "grey shadow" formation in the gingival area;

· Chemical stability and corrosion resistance;

· Clearly visible structure on radiographs;

· Electrical and thermal non-conductivity;

· Possibility of creating a strong bond using adhesive cements.

At the same time, mechanical brittleness, the complexity of the manufacturing process, and high cost were noted as disadvantages of ceramic post-and-cores.

AMERICAN ACADEMIC PUBLISHER
INTERNATIONAL JOURNAL OF MEDICAL SCIENCES
ISSN NUMBER: 2692 - 5206 Volume 6. No 02. February ,2026

Discussion. Although metal post-and-cores have been used in orthopedic dentistry for many years, they have limitations in cases with high aesthetic requirements. Ceramic post-and-cores, however, meet modern demands and offer advantages, especially in restoring anterior teeth. Nevertheless, the higher elastic modulus of ceramics compared to dentin necessitates careful planning of load distribution. Therefore, the choice of post type should be based on the individual clinical situation.

Conclusion. Milled ceramic post-and-cores and all-ceramic artificial crowns are effective orthopedic restorations in clinical practice. They provide high aesthetic outcomes, biocompatibility, and functional stability. The obtained results facilitate clinical decision-making when selecting post materials.

References

1. Ferrari M., Vichi A., Goracci C. Zirconia and glass-ceramic post-core systems: clinical considerations. *J Prosthodont Res*. 2020;64(3):247–256.

2. Silva N.R.F.A., Coelho P.G., Fernandes C.A.O., et al. Biomechanical behavior of endodontically treated teeth restored with ceramic posts: A systematic review. *Dent Mater*. 2020;36(4):e151–e164.

3. Zhang Y., Sailer I., Lawn B.R. Fatigue and fracture resistance of zirconia restorations. *J Dent Res*. 2020;99(11):1238–1245.

4. Guess P.C., Schultheis S., Wolkewitz M., et al. Influence of post material on survival of endodontically treated teeth restored with ceramic crowns. *Clin Oral Investig*. 2021;25(4):1997–2006.

5. Zarone F., Ferrari M., Mangano F., et al. “Digitally oriented materials”: focus on CAD/CAM zirconia. *Dent Mater*. 2021;37(3):e67–e80.

6. Rekow E.D., Silva N.R.F.A., Coelho P.G., Thompson V.P. Performance of CAD/CAM ceramic systems in dentistry. *J Prosthet Dent*. 2021;125(4):622–631.

7. Sorrentino R., Apicella D., Riccio C., et al. Biomechanical evaluation of post-core restorations using finite element analysis. *Materials*. 2021;14(9):2356.

8. Mangano F., Gandolfi A., Luongo G., Logozzo S. Intraoral scanners and CAD/CAM post-core fabrication. *BMC Oral Health*. 2022;22:38.

9. Denry I., Kelly J.R. Emerging ceramic-based materials for dentistry. *J Dent Res*. 2022;101(7):747–755.

10. Fonzar R.F., Carrabba M., Sedda M., Ferrari M. Zirconia post-core restorations: A clinical follow-up study. *Int J Prosthodont*. 2022;35(6):701–709.

11. Skupien J.A., Opdam N.J.M., Kreulen C.M. Longevity of restorations on endodontically treated teeth. *J Dent*. 2023;130:104420.

12. Sailer I., Makarov N.A., Thoma D.S., et al. All-ceramic restorations: current clinical performance. *Int J Oral Sci*. 2023;15(1):12.

AMERICAN ACADEMIC PUBLISHER

INTERNATIONAL JOURNAL OF MEDICAL SCIENCES

ISSN NUMBER: 2692 - 5206 Volume 6. No 02. February ,2026

13. Alshiddi I.F., Richards L.C. Fracture resistance of ceramic versus metal post-core systems: systematic review. *J Prosthet Dent*. 2023;130(2):250–258.

14. Zoidis P., Papathanasiou I., Polyzois G. Clinical performance of zirconia post and core systems fabricated with CAD/CAM. *Eur J Prosthodont Restor Dent*. 2024;32(1):15–22.

15. ISO 6872:2024. *Dentistry — Ceramic materials*. International Organization for Standardization.

16.Xalimjonovna, B. S. (2025). ADVANTAGES OF USING LOCALLY PRODUCED GLASS IONOMER CEMENT IN THE CEMENTATION OF FIXED PROSTHODONTIC CONSTRUCTIONS. *Лучшие интеллектуальные исследования*, *58*(4), 139-143.

17.Halimjonovna, B. S. (2025). ADVANTAGES OF DIGITAL TECHNOLOGY IN THE USE OF THE DENTAL COLOR COMPARATOR (DENTAL COLORIMETER) IN MODERN DENTISTRY AND ITS APPLICATION IN DIAGNOSIS AND TREATMENT. *Лучшие интеллектуальные исследования*, *58*(4), 135-138.

18.Khalimjonovna, B. S. (2025). POST-COVID-19 CLINICAL AND AUDIOLOGICAL CHARACTERISTICS OF TEMPOROMANDIBULAR JOINT (TMJ) DYSFUNCTIONS. *Лучшие интеллектуальные исследования*, *58*(4), 144-149.

19. Бобожонова, Ш. Х. (2025). ЧАККА ПАСТКИ ЖАҒ БЎҒИМИ ДИСФУНКЦИЯЛАРИДА ОҒРИҚ СИНДРОМИНИНГ КЛИНИК ХУСУСИЯТЛАРИ. *TADQIQOTLAR*, *76*(4), 126-130.

20. Алиева, Н. М., & Бобожонова, Ш. Х. (2026). ОЛИНМАЙДИГАН ОРТОПЕДИК ПРОТЕЗЛАР БИЛАН ПРОТЕЗЛАШДА ҚЎЛЛАНИЛАДИГАН ЎЗАКЛИ КОНСТРУКЦИЯЛАРНИНГ КЛИНИК САМАРАДОРЛИГИНИ ҚИЁСИЙ БАҲОЛАШ. *PORTUGAL-SCIENTIFIC REVIEW OF THE PROBLEMS AND PROSPECTS OF MODERN SCIENCE AND EDUCATION*, *1*(11), 14-21.

21. Алиева, Н. М., & Бобожонова, Ш. Х. (2025). ОЛИНМАЙДИГАН ОРТОПЕДИК ПРОТЕЗЛАР БИЛАН ПРОТЕЗЛАШДА ҚЎЛЛАНИЛАДИГАН ЎЗАКЛИ КОНСТРУКЦИЯЛАРНИНГ КЛИНИК САМАРАДОРЛИГИНИ ҚИЁСИЙ БАҲОЛАШ. *UNIVERSAL JOURNAL OF MEDICAL AND NATURAL SCIENCES*, *4*(32), 121-126.

22. Очилова, М. У., Бобожонова, Ш. Х., & Усмонова, Х. Т. (2025). ЭКСПЕРИМЕНТАЛЬНАЯ ОЦЕНКА МИКРОБНОЙ АДГЕЗИИ И ФОРМИРОВАНИЯ БИОПЛЁНОК НА СТОМАТОЛОГИЧЕСКИХ ПОЛИМЕРАХ РАЗЛИЧНОГО ХИМИЧЕСКОГО СОСТАВА. *KELAJAK SARI YANGI O'ZBEKISTON: ILM-FAN, TEXNOLOGIYA VA TA'LIM*, *2*(1), 194-204.

23. Xalimjonovna, B. S., & Ulmasovna, O. M. (2025). A MODERN APPROACH TO THE STABILIZATION OF THE DENTAL ARCH IN PERIODONTITIS USING THERMOPLASTIC MATERIALS. *Eureka Journal of Physical and Chemical Research*, *1*(2), 43-53.

AMERICAN ACADEMIC PUBLISHER

INTERNATIONAL JOURNAL OF MEDICAL SCIENCES

ISSN NUMBER: 2692 - 5206 Volume 6. No 02. February ,2026

24. Xalimjonovna, B. S. (2025). ZAMONAVIY STOMATOLOGIYADA QOLLANILADIGAN (DENTAL COLORIMETR) RAQAMLI TEXNOLOGIYASINING AFZALLIKLARI VA DIAGNOSTIKA DAVOLASHDA QOLLANIISHI. *Ustozlar uchun*, *86*(3), 347-351.

25. Алиева, Н. М., & Бобожонова, Ш. Х. (2025). ОЛИНМАЙДИГАН ОРТОПЕДИК ПРОТЕЗЛАР БИЛАН ПРОТЕЗЛАШДА ҚЎЛЛАНИЛАДИГАН ЎЗАКЛИ КОНСТРУКЦИЯЛАРНИНГ КЛИНИК САМАРАДОРЛИГИНИ ҚИЁСИЙ БАҲОЛАШ. *UNIVERSAL JOURNAL OF MEDICAL AND NATURAL SCIENCES*, *4*(32), 121-126.

26. Ulmasovna, O. M., Xalimjonovna, B. S., & Taxirdjanovna, U. X. Influence OF Chemical Composition OF Dental Polymers on Microbial Adhesion AND Biofilm Development. *European Journal of Humanities and Educational Advancements*, *6*(12), 34-38.