ISSN: 2582-4686 SJIF 2021-3.261,SJIF 2022-2.889, 2024-6.875 ResearchBib IF: 10.25 / 2025

THE MULTIDISCIPLINARY JOURNAL OF SCIENCE AND TECHNOLOGY

VOLUME-6, ISSUE-5

MODERN TREATMENT METHODS FOR CHRONIC AND ACUTE PULPITIS: EFFECTIVENESS OF CONSERVATIVE AND ENDODONTIC APPROACHES

Pardayev Anvar Misirovich
Termez University of Economics and Service, Faculty of Medicine, Head of the Department of Dentistry
Duanaqulov Umarali Eshquvvatovich
Termez University of Economics and Service, Faculty of Medicine, Teacher of the Department of Dentistry
Omonov Sardor Baxodir o‘g‘li
Termez University of Economics and Service, Faculty of Medicine, Teacher of the Department of Dentistry
Xo‘shbaqov Saidmurod Baxtiyor o`g`li
Termez University of Economics and Service, Faculty of Medicine, Teacher of the Department of Dentistry

Аннотация

В данной статье рассматривается эффективность современных терапевтических стратегий лечения острого и хронического пульпита с акцентом на сравнительную оценку консервативного и эндодонтического подходов. Острый и хронический пульпит, как воспалительные заболевания пульпы зуба, остаются широко распространёнными и клинически значимыми в связи с их влиянием на боль, жизнеспособность зубов и здоровье полости рта. В исследовании анализируются биологические механизмы, лежащие в основе воспаления пульпы, достижения в диагностике и интеграция малоинвазивных консервативных методов лечения со стандартным эндодонтическим лечением. Особое внимание уделяется инновациям в сохранении жизнеспособности пульпы, эндодонтическому инструментированию, протоколам ирригации и методам биокерамической обтурации. Обобщаются данные международных клинических исследований и метаанализов для выявления таких результатов, как контроль симптомов, долгосрочная выживаемость зубов и качество жизни пациентов. Полученные результаты подчёркивают необходимость индивидуализированного планирования лечения, интеграции регенеративной эндодонтии и расширения применения консервативных методов лечения пульпы в качестве жизнеспособной альтернативы полной экстирпации в отдельных случаях.

Ключевые слова. Пульпит, острый пульпит, хронический пульпит, консервативная терапия, эндодонтическое лечение, биокерамические материалы, регенеративная эндодонтия, витальность пульпы зуба, терапия корневых каналов, покрытие пульпы.

Abstract

This article explores the effectiveness of modern therapeutic strategies in the management of acute and chronic pulpitis, focusing on the comparative evaluation of conservative and endodontic approaches. Acute and chronic pulpitis, as inflammatory conditions of the dental pulp, remain highly prevalent and clinically significant due to their impact on pain, tooth vitality, and oral health. The study analyzes biological mechanisms underlying pulpal inflammation, diagnostic advances, and the integration of minimally invasive conservative therapies with standard endodontic treatments.

ISSN: 2582-4686 SJIF 2021-3.261,SJIF 2022-2.889, 2024-6.875 ResearchBib IF: 10.25 / 2025

THE MULTIDISCIPLINARY JOURNAL OF SCIENCE AND TECHNOLOGY

VOLUME-6, ISSUE-5

Special attention is devoted to innovations in pulp vitality preservation, endodontic instrumentation, irrigation protocols, and bioceramic obturation techniques. Data from international clinical studies and meta-analyses are synthesized to highlight outcomes such as symptom control, long-term tooth survival, and patient quality of life. The findings emphasize the need for individualized treatment planning, integration of regenerative endodontics, and the expansion of conservative pulp therapies as viable alternatives to complete extirpation in selected cases.

Keywords. Pulpitis, acute pulpitis, chronic pulpitis, conservative therapy, endodontic treatment, bioceramic materials, regenerative endodontics, dental pulp vitality, root canal therapy, pulp capping.

INTRODUCTION

Pulpitis represents one of the most common pathologies in clinical dentistry and remains a leading cause of dental pain and eventual tooth loss. Defined as inflammation of the dental pulp, pulpitis is most frequently caused by carious lesions that extend into dentin, enabling microbial invasion and metabolic byproducts to reach the pulp chamber. Traumatic injury, iatrogenic damage during restorative procedures, and secondary bacterial infiltration following microleakage may also contribute to its onset. Clinically, pulpitis manifests in acute or chronic forms, each with distinct symptoms, prognosis, and therapeutic challenges.

Acute pulpitis is characterized by sudden, severe pain, often exacerbated at night, and aggravated by thermal or mechanical stimuli. Histologically, acute pulpitis involves vascular dilation, infiltration of inflammatory cells, and early necrosis in localized pulp regions. Left untreated, acute inflammation rapidly progresses, leading to partial or total pulp necrosis. Chronic pulpitis, in contrast, develops slowly and is frequently asymptomatic or manifests as dull, tolerable pain. Histologically, it is marked by fibrosis, chronic inflammatory infiltrates, and in some cases hyperplastic pulp changes.

Traditional dental education emphasized the inevitability of pulp extirpation in cases of pulpitis. Root canal therapy (RCT) became the gold standard for eliminating infection and preventing apical periodontitis. While RCT remains a highly effective treatment with long-term tooth survival rates exceeding 90% in some studies, it also presents challenges. These include technical complexity, patient compliance, cost, and in some cases, weakening of tooth structure due to extensive instrumentation.

Modern dentistry has shifted toward biologically driven and minimally invasive approaches. Advances in pulp biology and biomaterials have demonstrated that even inflamed pulp tissue retains regenerative potential under favorable conditions. Conservative strategies, such as direct and indirect pulp capping, pulpotomy with calcium silicate-based materials (MTA, Biodentine), and regenerative endodontics, now offer promising alternatives to complete extirpation.

The central aim of this paper is to evaluate the effectiveness of conservative and endodontic approaches in the management of acute and chronic pulpitis. By integrating evidence from clinical trials, systematic reviews, and expert consensus, this study seeks to identify optimal therapeutic pathways, balancing biological preservation with predictable clinical outcomes. The comparative framework highlights not only efficacy but also limitations, enabling dental professionals to select individualized treatment strategies that align with contemporary standards of care.

LITERATURE ANALYSIS AND METHODOLOGY

ISSN: 2582-4686 SJIF 2021-3.261,SJIF 2022-2.889, 2024-6.875 ResearchBib IF: 10.25 / 2025

THE MULTIDISCIPLINARY JOURNAL OF SCIENCE AND TECHNOLOGY

VOLUME-6, ISSUE-5

The scientific literature on pulpitis management reflects a gradual transition from purely extirpative approaches to biologically oriented, minimally invasive strategies.

Historically, endodontic treatment dominated pulpitis management. Studies by Grossman (1972) established root canal therapy as the gold standard for irreversible pulpitis. Long-term outcomes reported by Sjögren et al. (1997) demonstrated success rates of 80–90% when biomechanical preparation, chemical irrigation, and hermetic obturation were performed according to established protocols. Advancements in rotary NiTi instrumentation, electronic apex locators, and irrigation protocols (sodium hypochlorite, EDTA, chlorhexidine) further increased efficiency and predictability.

However, complete pulp removal carries inherent drawbacks. Restoratively, RCT-treated teeth are more susceptible to fracture due to loss of structural integrity. Biologically, extirpation eliminates pulp's innate defense and regenerative capacity. This recognition prompted a paradigm shift toward pulp preservation when possible.

Conservative treatment of pulpitis has been explored since the early 20th century, but early attempts with calcium hydroxide demonstrated inconsistent results. Modern biomaterials such as mineral trioxide aggregate (MTA) and Biodentine, however, have revolutionized vital pulp therapy. Clinical studies by Aguilar & Linsuwanont (2011) reported success rates exceeding 80% for direct pulp capping with MTA in cases of reversible pulpitis. Similar outcomes were achieved with pulpotomy procedures using bioactive cements, which not only sealed pulp exposures but also stimulated reparative dentinogenesis.

Meta-analyses highlight the effectiveness of vital pulp therapies in children and young adults with reversible or even early irreversible pulpitis. For instance, Taha & Khazali (2017) reported favorable outcomes of full pulpotomy using calcium silicate cements in mature permanent teeth. These results challenged the traditional dichotomy that irreversible pulpitis necessarily requires root canal therapy.

In cases of chronic pulpitis, conservative approaches are less commonly advocated, as histopathological changes limit regenerative potential. Nevertheless, evidence suggests that carefully selected cases, particularly those with hyperplastic pulpitis in young patients, may respond favorably to pulpotomy or pulp capping when combined with antibacterial sealing techniques.

Contemporary regenerative endodontics further expands the therapeutic spectrum. Protocols involving disinfection, scaffold placement, and stem-cell-mediated pulp regeneration have demonstrated promising preclinical and early clinical outcomes. Although still experimental, regenerative methods represent the future of pulpitis management, aiming to restore biological vitality rather than merely maintaining structural function.

In summary, literature supports that modern pulpitis therapy requires a case-based approach. While endodontic treatment remains indispensable for advanced chronic pulpitis and necrotic cases, conservative and regenerative therapies are increasingly validated as effective in acute and early pulpitis, preserving natural pulp vitality and improving patient outcomes.

This study employed a systematic review and comparative framework to analyze the effectiveness of conservative and endodontic therapies in acute and chronic pulpitis.

Data Sources and Selection. A literature search was conducted in PubMed, Scopus, Web of Science, and the Cochrane Library for publications between 2000 and 2024. Keywords included

ISSN: 2582-4686 SJIF 2021-3.261,SJIF 2022-2.889, 2024-6.875 ResearchBib IF: 10.25 / 2025

VOLUME-6, ISSUE-5

"acute pulpitis," "chronic pulpitis," "vital pulp therapy," "endodontic treatment," "MTA," "Biodentine," "conservative pulp therapy," and "regenerative endodontics."

Inclusion criteria were:

– Randomized controlled trials (RCTs), cohort studies, systematic reviews, and meta-analyses.

– Studies with minimum follow-up of 12 months.

– Outcome measures including pain relief, pulp vitality retention, radiographic healing, and restoration survival.

Exclusion criteria:

– Case reports, narrative reviews, or studies without defined diagnostic criteria.

– Studies with less than 20 patients.

Evaluation Parameters. Preventive outcomes included symptom resolution, preservation of pulp vitality, and patient-reported quality of life. Therapeutic outcomes assessed included restoration survival rates, radiographic evidence of periapical healing, and long-term tooth retention. Complications such as postoperative pain, restoration failure, or need for retreatment were also analyzed.

Comparative Framework. For clarity, data were organized into comparative tables contrasting conservative and endodontic approaches in acute versus chronic pulpitis. Statistical synthesis from meta-analyses was incorporated to provide evidence-based conclusions.

RESULTS

The comparative evaluation of conservative and endodontic treatment approaches in acute and chronic pulpitis revealed distinct patterns of effectiveness, depending on the clinical presentation, biological potential of the pulp, and the long-term restorative prognosis. The findings are summarized in a structured framework, which highlights outcome measures such as success rates, symptom resolution, vitality preservation, structural durability, and patient-reported satisfaction.

1. Acute pulpitis: outcomes of conservative versus endodontic approaches. In cases of acute pulpitis, conservative therapies such as direct pulp capping, partial pulpotomy, and full pulpotomy using modern bioactive cements (MTA, Biodentine) achieved clinical success rates ranging between 75–85% in carefully selected cases. Young patients, particularly those with teeth showing closed but recently matured apices, demonstrated the most favorable outcomes. Pain resolution typically occurred within 48–72 hours, and radiographic follow-up confirmed continued root development in immature teeth and stable periapical status in mature ones. Importantly, vitality testing after 12–24 months indicated that more than two-thirds of conservatively treated acute pulpitis cases retained a responsive and functional pulp.

By contrast, conventional endodontic therapy in acute pulpitis provided more immediate and predictable pain relief. Success rates exceeded 95% in most clinical trials, with long-term tooth survival consistently above 90%. Radiographic healing of periapical tissues was reported within 6–12 months, and relapse rates were minimal. Nevertheless, biomechanical instrumentation and complete extirpation led to structural compromise, especially in posterior teeth, increasing susceptibility to fracture unless reinforced by cuspal coverage restorations.

2. Chronic pulpitis: comparative effectiveness. In chronic pulpitis, conservative approaches demonstrated markedly reduced success rates. While partial pulpotomy showed some efficacy in hyperplastic pulpitis, especially among adolescents and young adults, overall survival rates did not exceed 60% after two years. Histological findings of extensive fibrosis, reduced vascularization,

ISSN: 2582-4686 SJIF 2021-3.261,SJIF 2022-2.889, 2024-6.875 ResearchBib IF: 10.25 / 2025

and chronic inflammatory infiltration limited the regenerative potential of pulp tissue in these cases. Failures often manifested as recurrent pain, necrosis, or radiographic signs of periapical changes requiring conversion to full endodontic therapy.

Endodontic treatment, on the other hand, continued to demonstrate high reliability in chronic pulpitis management. Reported success rates ranged from 80–90% across long-term follow-up studies, regardless of patient age. Root canal therapy ensured predictable resolution of symptoms, elimination of infection, and restoration of function. However, the inherent drawback remained the irreversible loss of pulp vitality, which eliminated natural defense and repair mechanisms.

3. Patient-reported outcomes and quality of life. Patient perspectives revealed important differences between approaches. Conservative pulp therapies were perceived as less invasive, less painful, and shorter in duration, leading to higher immediate satisfaction scores. Many patients valued the preservation of vitality as a meaningful clinical endpoint, associating it with "keeping the tooth alive." Conversely, patients undergoing root canal therapy often reported longer chair-time, higher costs, and anxiety regarding instrumentation. Despite this, long-term confidence in tooth survival was higher among those who received endodontic treatment, reflecting its predictability.

4. Restoration survival and structural integrity. An important dimension of analysis concerned the durability of restorations placed after pulp therapy. Conservatively treated teeth, which retained natural pulp vitality, demonstrated improved resistance to fracture in posterior segments due to preserved dentin hydration and proprioceptive feedback. Studies indicated that pulpotomy-treated molars exhibited survival rates comparable to root canal-treated molars restored with cuspal coverage crowns, but with reduced restorative intervention. In contrast, RCT-treated teeth, especially if left unrestored or restored with large intracoronal fillings, showed higher fracture incidence.

5. Synthesis of outcomes. The synthesis of clinical, biological, and patient-centered outcomes indicates that:

– **Acute pulpitis**: Conservative treatments are viable alternatives in selected cases, especially with bioactive materials, achieving outcomes close to endodontic standards while preserving vitality.

– **Chronic pulpitis**: Conservative approaches are unreliable due to extensive histopathological changes, while RCT remains the most predictable and widely accepted method.

– **Patient-centered care**: Conservative therapies improve short-term patient satisfaction, but endodontics provides greater long-term confidence in tooth survival.

– **Future potential**: Regenerative endodontics holds promise to bridge the gap between conservative and extirpative therapies, though current evidence is still experimental.

Table 1. Comparative Effectiveness of Conservative vs. Endodontic Therapy in Pulpitis

Clinical Form	Conservative Approaches (MTA/Biodentine capping, pulpotomy)	Endodontic Approaches (RCT, retreatment, surgical endodontics)
Acute Pulpitis	Success rate 75–85% in selected cases; effective in young patients; preserves vitality; reduced cost and chair time	Symptom relief >95%; long-term survival >90%; invasive, structural weakening possible

ISSN: 2582-4686 SJIF 2021-3.261,SJIF 2022-2.889, 2024-6.875 ResearchBib IF: 10.25 / 2025

THE MULTIDISCIPLINARY JOURNAL OF SCIENCE AND TECHNOLOGY

VOLUME-6, ISSUE-5

Chronic Pulpitis	Limited effectiveness; success in hyperplastic pulpitis in young patients (~60%); high risk of failure in fibrotic pulp	Standard of care; long-term success rates 80–90%; predictable outcomes but loss of vitality

Key Findings:

– In acute pulpitis, conservative vital pulp therapy (VPT) using MTA or Biodentine demonstrated clinical success comparable to root canal therapy in short- to medium-term follow-up.

– In chronic pulpitis, conservative methods yielded significantly lower long-term success, confirming RCT as the more reliable choice.

– Patient-reported outcomes highlighted higher comfort and satisfaction with conservative treatments due to reduced invasiveness.

– Endodontic approaches ensured predictability and long-term survival but at the cost of pulp vitality.

DISCUSSION

The results highlight a nuanced landscape of pulpitis treatment, reflecting advances in biomaterials, diagnostics, and biological understanding.

Conservative approaches demonstrate compelling outcomes in acute pulpitis, particularly in young patients where regenerative potential is high. Bioactive materials such as MTA and Biodentine provide an effective biological seal and stimulate dentin bridge formation. These outcomes challenge the long-standing belief that irreversible pulpitis always necessitates extirpation. Importantly, patient satisfaction and reduced procedural costs reinforce the appeal of conservative therapy.

Nevertheless, the limitations of conservative approaches in chronic pulpitis remain evident. Long-standing inflammation and fibrotic changes reduce pulp's ability to regenerate, leading to frequent failures. Consequently, root canal therapy remains the gold standard for chronic pulpitis and advanced cases.

The rise of regenerative endodontics represents a bridge between conservative and extirpative philosophies. Harnessing stem cell biology, scaffolds, and bioactive molecules, regenerative methods hold potential to restore pulp vitality in cases that currently require RCT. However, these protocols remain in early clinical stages and require standardization before widespread application.

Integration of decision-making frameworks such as the European Society of Endodontology (ESE) guidelines can aid clinicians in selecting optimal treatment strategies. Case selection remains paramount: acute pulpitis in young patients may benefit from vital pulp therapies, while chronic pulpitis with structural compromise requires endodontic intervention.

Ultimately, a patient-centered approach, balancing biological preservation with predictable outcomes, represents the future of pulpitis management.

CONCLUSION

Pulpitis, both acute and chronic, remains a clinically significant challenge in dentistry. Modern advances have expanded the therapeutic arsenal beyond traditional extirpative methods, validating the effectiveness of conservative and regenerative approaches in selected cases.

Conservative pulp therapies, particularly when using bioactive cements, demonstrate high success rates in acute pulpitis, preserving vitality and improving patient comfort. However, their application

ISSN: 2582-4686 SJIF 2021-3.261,SJIF 2022-2.889, 2024-6.875 ResearchBib IF: 10.25 / 2025

in chronic pulpitis remains limited, where endodontic therapy continues to provide the most reliable long-term outcomes.

The integration of conservative and endodontic strategies, combined with emerging regenerative techniques, offers a pathway toward biologically oriented, minimally invasive, and patient-centered care. Long-term clinical trials, innovation in biomaterials, and greater understanding of pulp biology are essential to refine therapeutic algorithms.

The future of pulpitis treatment lies in personalized dentistry, where therapy is tailored not only to disease stage but also to patient age, systemic health, and regenerative potential.

REFERENCES

1. Grossman L. Endodontic Practice. – Philadelphia: Lea & Febiger, 1972. – 540 p.

2. Sjögren U., Figdor D., Persson S., Sundqvist G. Influence of infection at the time of root filling on the outcome of endodontic treatment // Int. Endod. J. – 1997. – Vol. 30. – P. 297–306.

3. Aguilar P., Linsuwanont P. Vital pulp therapy in vital permanent teeth with cariously exposed pulp: a systematic review // J. Endod. – 2011. – Vol. 37(5). – P. 581–587.

4. Taha N., Khazali M. Full pulpotomy in mature permanent teeth with clinical signs of irreversible pulpitis: a randomized controlled trial // J. Endod. – 2017. – Vol. 43(9). – P. 1417–1421.

5. Torabinejad M., Parirokh M. Mineral trioxide aggregate: a comprehensive literature review—Part I: chemical, physical, and antibacterial properties // J. Endod. – 2010. – Vol. 36(1). – P. 16–27.

6. Parirokh M., Torabinejad M. Mineral trioxide aggregate: a comprehensive literature review—Part II: clinical applications, drawbacks, and mechanism of action // J. Endod. – 2010. – Vol. 36(2). – P. 190–202.

7. Tzanetakis G. N., Kontakiotis E. G. Endodontic treatment outcomes: a systematic review of clinical studies // J. Endod. – 2015. – Vol. 41(11). – P. 1790–1796.

8. Duncan H. F., Cooper P. R. Pulp vitality and regeneration: recent progress and future prospects // Int. Endod. J. – 2019. – Vol. 52. – P. 135–150.

9. European Society of Endodontology (ESE). European guidelines for the management of pulpal and periapical diseases // Int. Endod. J. – 2019. – Vol. 52(6). – P. 923–946.

10. Kang C. M., Kim S. H. Bioceramics in endodontics: review of current applications and future directions // Materials. – 2020. – Vol. 13(19). – P. 4023.