

## Review

# Orthodontic Relapse: Causes, Prevention, and Management Strategies

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### Abstract

Orthodontic treatment, a specialized field within dentistry, focuses on diagnosing and correcting misaligned teeth and jaws to enhance oral health, function, and self-esteem. However, orthodontic relapse, where teeth gradually revert to their original positions post-treatment, can significantly impact oral health, appearance, and overall well-being. This article reviews the causes, prevention and management of orthodontic relapse, driven by the understanding of its complex nature and implications for patients and practitioners. Exploring genetic, age-related, retention-related and treatment-related factors influencing relapse aims to deepen comprehension of this phenomenon. Preventive strategies play a crucial role in maintaining treatment outcomes and reducing relapse risks. These encompass retention protocols, patient education, lifestyle modifications and ongoing monitoring. Retention protocols, emphasizing proper retainer wear post-treatment, are vital to sustaining corrected tooth positions. Educating patients on relapse factors and the significance of adherence to post-treatment care fosters better compliance and outcomes. Lifestyle modifications address habits like tongue thrusting or nail-biting, minimizing forces that contribute to relapse. Long-term monitoring ensures timely intervention if relapse signs emerge, safeguarding treatment results. Management strategies for orthodontic relapse are diverse and tailored to individual needs. Retreatment with orthodontic appliances, such as braces or aligners, aims to realign teeth and restore treatment outcomes. Adjusting retention protocols optimizes stability, while interdisciplinary collaboration with dental specialists addresses underlying issues like periodontal concerns or skeletal discrepancies. Surgical intervention, particularly for severe cases, corrects skeletal imbalances to provide a stable foundation for orthodontic treatment. Behavioral modification techniques mitigate habits contributing to relapse, enhancing treatment outcomes and patient satisfaction. In conclusion, orthodontic relapse necessitates a comprehensive, multifaceted management approach to mitigate its impact on patients' oral health and quality of life. By understanding its causes, implementing preventive strategies, and utilizing diverse management modalities, practitioners can optimize treatment outcomes and minimize relapse risks, ensuring sustained oral health and patient satisfaction.

**Keywords:** *Orthodontic treatment, relapse, causes, prevention, treatment, outcomes, oral health*

**Introduction**

Orthodontic treatment is a specialized branch of dentistry focused on diagnosing, preventing and correcting misaligned teeth and jaws. Its significance extends far beyond simply enhancing the appearance of the smile; rather, it plays a crucial role in improving overall oral health, function, and self-confidence (1). One of the primary goals of orthodontic treatment is to correct malocclusions, which are deviations from the ideal alignment of teeth and jaws. Malocclusions can lead to various issues, including difficulty chewing, speaking, and maintaining proper oral hygiene. By aligning the teeth and jaws properly, orthodontic treatment can improve bite function, reducing the risk of temporomandibular joint disorders (TMJ), tooth wear and gum disease (2). Furthermore, orthodontic treatment can have significant psychological benefits. A straight and healthy smile can boost self-esteem and confidence, leading to improved social interactions and overall well-being. For many individuals, addressing dental concerns through orthodontic treatment can be transformative, enhancing both their appearance and quality of life (3).

Beyond aesthetics and function, orthodontic treatment also contributes to long-term oral health. Properly aligned teeth are easier to clean and maintain, reducing the risk of dental decay, gum disease, and other oral health issues. By improving oral hygiene and reducing the accumulation of plaque and tartar, orthodontic treatment helps preserve the health and integrity of the teeth and supporting structures (4). Orthodontic treatment is not limited to a particular age group; it can benefit children, teenagers, and adults alike. Early intervention in childhood can prevent developing orthodontic problems, potentially reducing the complexity and duration of treatment later in life. Additionally, advancements in orthodontic technology, such as clear aligners and self-ligating braces, have made treatment more accessible and comfortable for individuals of all ages (5).

Orthodontic relapse, the gradual shifting of teeth back toward their original positions after

orthodontic treatment, can have significant impacts on an individual's oral health, appearance, and overall quality of life. While orthodontic treatment aims to correct misalignments and improve dental function and aesthetics, relapse undermines these achievements, leading to a range of physical, emotional, and social consequences (6).

From a physical perspective, orthodontic relapse can result in functional issues such as difficulty chewing and speaking, as well as discomfort or pain associated with misaligned teeth or jaws. This may lead to increased wear and tear on the teeth, temporomandibular joint (TMJ) problems, and an elevated risk of oral health issues like tooth decay and gum disease (7, 8). Additionally, the recurrence of orthodontic problems may necessitate further treatment, including retreatment with braces or aligners, which can be time-consuming, costly, and inconvenient for the individual (9). Orthodontic relapse can also have a profound impact on an individual's self-esteem and confidence. Many people undergo orthodontic treatment to improve the appearance of their smile and enhance their overall facial aesthetics. Experiencing relapse can undo these improvements, leading to feelings of self-consciousness, embarrassment and dissatisfaction with one's appearance. This can erode self-esteem and negatively affect mental well-being, leading to anxiety, depression, or social withdrawal (10).

Furthermore, orthodontic relapse can disrupt social interactions and relationships. Individuals may become hesitant to smile or speak openly, fearing judgment or scrutiny from others. This can hinder their ability to communicate effectively and participate in social activities, impacting their personal and professional lives (9). In severe cases, orthodontic relapse may even contribute to social isolation or avoidance behavior, further compromising an individual's quality of life (6). The financial burden of managing orthodontic relapse can also be significant. Treatment costs, including consultations, orthodontic appliances, and associated dental care, can strain budgets and financial resources. Moreover, the time and effort required to undergo retreatment can disrupt work,

school, or other responsibilities, adding stress and inconvenience to an already challenging situation (11, 12).

Despite advancements in orthodontic techniques and materials, relapse remains a significant concern, impacting treatment outcomes and patient satisfaction. This review article aims to provide a comprehensive overview of the causes, prevention strategies, and management approaches for orthodontic relapse. The rationale for this study stems from the recognition of the multifactorial nature of orthodontic relapse and its implications for both patients and practitioners. By exploring the underlying causes of relapse this review seeks to enhance our understanding of the factors contributing to this phenomenon. Understanding the root causes of relapse is essential for developing targeted prevention strategies and effective management approaches. Moreover, this review aims to consolidate existing knowledge on the management of orthodontic relapse, including retreatment options, retention protocols, interdisciplinary collaboration, and behavioral modification strategies, as well as preventive strategies. By synthesizing the current evidence and best practices in relapse prevention and management, this study seeks to provide clinicians with practical guidance for addressing relapse cases in their practice.

## **Methods**

The investigation, which commenced on May 13th, 2024, was prompted by an extensive review of existing literature. Various databases, including PubMed, Web of Science, and Cochrane, were utilized to conduct this literature survey. The search process involved employing a diverse range of medical terms in combination. Additionally, manual searches on Google Scholar were conducted to identify relevant research terminology. The primary objective of this literature review is centered on identifying the origins of orthodontic relapse documented in the literature, alongside their preventative measures and management. Keywords about the repercussions of orthodontic relapse on individuals were also incorporated into the search.

It is important to note that the selection of articles for inclusion in this study was guided by multiple criteria, ensuring a thorough and rigorous review process.

## **Discussion**

Orthodontic relapse stems from various factors like genetics, age-related changes, inadequate retention, and poor oral habits. Prevention involves robust retention protocols, patient education, and lifestyle modifications. Management includes retreatment with orthodontic appliances, adjustment of retention protocols, interdisciplinary collaboration, surgical intervention and behavioral modification techniques. Understanding and addressing these factors comprehensively are crucial to optimizing treatment outcomes and minimizing relapse risks.

### ***Causes of orthodontic relapse***

Orthodontic relapse is influenced by various factors, including genetics, age-related changes, inadequate retention, poor oral habits and aspects of the orthodontic treatment itself (13). Genetics plays a significant role in determining an individual's susceptibility to orthodontic relapse. Genetic factors influence the size and shape of the jaws, as well as the position of the teeth within the jaws. These inherited traits can affect the stability of orthodontic outcomes, with some individuals exhibiting a greater predisposition to relapse due to genetic factors (14). Studies have identified specific genetic markers associated with orthodontic relapse, highlighting the complex interplay between genetic predisposition and environmental factors in determining treatment outcomes (15, 16).

Age-related changes in the supportive structures of the teeth and jaws can also contribute to orthodontic relapse. As individuals age, changes occur in the bone and gum tissue surrounding the teeth, potentially altering their position and stability (13). Additionally, factors such as tooth eruption patterns and changes in facial musculature can influence the alignment of the teeth over time. These age-related changes may compromise the long-term stability of orthodontic treatment outcomes, leading to relapse in some cases (17). Inadequate retention following

orthodontic treatment is a common cause of relapse. Retention is essential for maintaining the corrected tooth position and preventing relapse, yet compliance with retention protocols can vary among patients. Failure to wear retainers as directed by the orthodontist or discontinuing retainer use prematurely can result in the gradual shifting of teeth back toward their original positions (18). Additionally, the type and duration of retention may influence the risk of relapse, with removable retainers typically requiring more diligent compliance than fixed retainers (19). Moreover, poor oral habits, such as tongue thrusting, mouth breathing, or nail biting, can exert forces on the teeth that contribute to orthodontic relapse. These habits create imbalances in the forces acting on the teeth and surrounding structures, leading to unwanted tooth movement over time (13, 20).

Furthermore, factors related to the orthodontic treatment itself can also influence the risk of relapse. The type of orthodontic appliance used, treatment duration, and stability of the treatment outcome all play a role in determining the likelihood of relapse (13). Research indicates that orthodontic treatment involving significant tooth movement or skeletal changes may be associated with a higher risk of relapse compared to more conservative treatment approaches (21, 22). Additionally, inadequate treatment planning or execution can compromise the long-term stability of orthodontic outcomes, increasing the likelihood of relapse (23).

### ***Preventive strategies***

Preventive strategies for orthodontic relapse are essential components of comprehensive orthodontic treatment plans, aimed at maintaining the corrected tooth position and minimizing the risk of relapse over time. These strategies encompass various approaches, including retention protocols, patient education, lifestyle modifications and long-term monitoring (24). Retention protocols play a central role in preventing orthodontic relapse by maintaining the stability of treatment outcomes. Following active orthodontic treatment, patients are typically provided with retainers to wear as directed by their orthodontist. Retainers may be removable or fixed, with the choice of retainer influenced by

factors such as treatment objectives, patient compliance, and orthodontic considerations (25). Compliance with retention protocols is crucial for preventing relapse, and patients must understand the importance of wearing retainers as prescribed to maintain the corrected tooth position effectively (26). Patient education is another key aspect of preventive strategies for orthodontic relapse. Orthodontic patients should receive comprehensive education on the factors that contribute to relapse and the importance of compliance with retention protocols. This includes instruction on proper retainer wear, oral hygiene practices and lifestyle modifications to minimize the risk of relapse. Empowering patients with knowledge and understanding of their treatment and the factors that influence its long-term stability can enhance their compliance and reduce the likelihood of relapse (27).

Lifestyle modifications can also help prevent orthodontic relapse by addressing habits and behaviors that contribute to tooth movement. Patients should be counseled to avoid habits such as tongue thrusting, mouth breathing, or nail biting, which can exert force on the teeth and compromise treatment outcomes (13). Additionally, maintaining good oral hygiene practices, including regular brushing, flossing, and dental check-ups, is essential for preserving the health and stability of the teeth and supporting structures (28). Long-term monitoring is critical for detecting and addressing any signs of relapse early on. Orthodontic patients should undergo regular follow-up appointments with their orthodontist to assess tooth alignment and retainer fit and make any necessary adjustments to the retention protocol. Monitoring allows orthodontists to intervene promptly if relapse is detected, potentially preventing further progression and minimizing the need for extensive retreatment (22). Furthermore, interdisciplinary collaboration among dental professionals can enhance preventive strategies for orthodontic relapse. Orthodontists may work closely with general dentists, periodontists, or oral surgeons to address underlying factors contributing to relapse, such as periodontal disease or skeletal discrepancies. This collaborative

approach ensures comprehensive care and improves the likelihood of long-term treatment success (29, 30).

### ***Management of orthodontic relapse***

Management for orthodontic relapse involves a comprehensive approach aimed at addressing the underlying causes of relapse, restoring tooth alignment, and optimizing treatment outcomes. The management strategies for orthodontic relapse encompass various modalities, including retreatment with orthodontic appliances, adjustment of retention protocols, interdisciplinary collaboration, surgical intervention, and behavioral modification techniques (31, 32). Retreatment with orthodontic appliances is often necessary to correct misalignments and restore optimal tooth position in cases of significant relapse. This may involve reapplying braces or clear aligners to gradually move the teeth back into their corrected positions (21). The specific type and duration of retreatment depend on the severity of relapse, the patient's treatment history, and their individual orthodontic needs. Orthodontic retreatment aims to address both aesthetic concerns and functional issues associated with relapse, restoring a healthy and harmonious smile (33). Adjustment of retention protocols is often crucial for managing orthodontic relapse and preventing further tooth movement. Orthodontists may modify the type or duration of retainers worn by the patient to better maintain the corrected tooth position and minimize the risk of relapse. This may involve switching from removable retainers to fixed retainers or increasing the frequency of retainer wear. Additionally, orthodontic patients may require long-term retention to support the stability of treatment outcomes and prevent relapse over time (6, 13).

Interdisciplinary collaboration among dental specialists can enhance the management of orthodontic relapse, particularly in cases involving complex underlying issues. Orthodontists may work closely with periodontists, oral surgeons, or prosthodontists to address contributing factors such as periodontal disease, skeletal discrepancies, or compromised dental restorations. This collaborative approach ensures comprehensive evaluation and

treatment planning, leading to more successful outcomes for patients with orthodontic relapse (29, 30). Surgical intervention may be indicated in certain cases of orthodontic relapse, particularly when skeletal discrepancies contribute to tooth misalignment. Orthognathic surgery, also known as corrective jaw surgery, can correct underlying skeletal issues and improve facial balance and function. By addressing the root cause of relapse, orthognathic surgery provides a stable foundation for orthodontic treatment, minimizing the risk of recurrence and optimizing treatment outcomes. Surgical intervention is typically performed in conjunction with orthodontic treatment to achieve optimal results (34, 35). Behavioral modification techniques are essential for managing orthodontic relapse by addressing habits and behaviors that contribute to tooth movement. Patients may receive counseling and guidance on avoiding habits such as tongue thrusting, mouth breathing, or nail biting, which can exert force on the teeth and compromise treatment outcomes (36). Additionally, orthodontic patients may benefit from education on proper oral hygiene practices and lifestyle modifications to support the stability of treatment results and minimize the risk of relapse (13). Ongoing monitoring and follow-up are critical components of orthodontic relapse management, allowing orthodontists to assess treatment progress, detect any signs of relapse and make timely interventions as needed. Patients should attend regular follow-up appointments to ensure the stability of treatment outcomes and address any emerging concerns promptly (22, 28). Orthodontists may use various diagnostic tools, such as dental models, photographs, and radiographs, to evaluate tooth alignment and retention status accurately. By monitoring patients closely throughout the post-treatment period, orthodontists can optimize treatment outcomes and minimize the risk of relapse over time (24).

### **Conclusion**

In conclusion, orthodontic relapse poses challenges to both patients and practitioners, necessitating a multifaceted approach to management. By addressing the root causes of relapse, implementing

targeted prevention strategies, and utilizing a combination of orthodontic, surgical, and behavioral interventions, practitioners can optimize treatment outcomes and minimize the risk of relapse over time. Through comprehensive management strategies, orthodontic relapse can be effectively addressed, leading to improved oral health and aesthetic outcomes for patients.

## Disclosure

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There is no conflict of interest.

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### *Ethical consideration*

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### *Data availability*

Data that support the findings of this study are embedded within the manuscript.

### *Author contribution*

All authors contributed to conceptualizing, data drafting, collection and final writing of the manuscript.

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