REVIEW ARTICLE

Effect of Palatal Expansion Device on Tonsils of Children: A Narrative Review

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ABSTRACT

Palatal expansion is commonly used in orthodontics to treat malocclusions and skeletal discrepancies in children. While the primary focus of palatal expansion devices (PEDs) is on improving dental alignment and craniofacial development, there is increasing interest in understanding their impact on surrounding structures such as the tonsils(1). This review examines the effect of PEDs on the tonsils of children, exploring changes in tonsillar size, function, and associated respiratory outcomes. A comprehensive review of studies published until 2024 was conducted using PubMed, Web of Science, and Scopus databases.The review highlights existing studies and identifies gaps in research to guide future investigations. Findings suggest that palatal expansion may influence tonsillar hypertrophy, airway patency, and overall tonsillar health, with varying results across studies. The potential for PEDs to affect the respiratory function and symptoms of children with enlarged tonsils is discussed, with implications for treatment planning.

KEYWORDS: Palatal expansion, tonsils, orthodontic devices, children, tonsillar hypertrophy, respiratory function, airway.

INTRODUCTION

Palatal expansion devices (PEDs) are widely used in pediatric orthodontics to address maxillary transverse deficiency, a condition in which the upper jaw is too narrow, leading to malocclusions and compromised oral function. The primary goal of palatal expansion is to widen the maxillary arch, which can improve both dental alignment and functional occlusion. In recent years, however, there has been growing interest in understanding the broader implications of palatal expansion, particularly its effect on the tonsils in children (1). The tonsils, which are part of the lymphatic system, play a significant role in immune function, but when enlarged, they can contribute to a range of health issues, including obstructive sleep apnea, airway obstruction, and swallowing difficulties (2).

In light of these concerns, it is essential to investigate how orthodontic interventions like palatal expansion may impact the tonsils, particularly in children who may already have enlarged tonsils or be predisposed to airway problems. The effect of PEDs on the tonsils is a complex issue, as it involves both anatomical and physiological changes that occur in response to the mechanical forces applied by the expansion device. While some studies suggest that palatal expansion can improve the airway by increasing space and reducing the pressure on surrounding structures, others raise concerns about potential adverse effects, such as exacerbating tonsillar hypertrophy or triggering inflammation (3). The relationship between the widening of the palate and the subsequent changes in tonsillar size and function is not yet fully understood, and there is conflicting evidence on whether PEDs can alleviate or worsen symptoms related to enlarged tonsils in children.

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A better understanding of these effects is particularly important for pediatric patients with coexisting conditions like chronic nasal congestion, recurrent infections, or a history of obstructive sleep apnea. In such cases, palatal expansion could potentially offer therapeutic benefits by increasing the volume of the nasal and oral airways, allowing for improved airflow and possibly reducing the size of the tonsils over time (4). However, some studies also indicate that the mechanical stress exerted by the expansion device may provoke an inflammatory response in the tonsils, leading to further enlargement and contributing to airway obstruction (5). These conflicting findings highlight the need for more in-depth research to explore the potential risks and benefits of palatal expansion in children with enlarged tonsils.

This narrative review aims to provide a comprehensive analysis of the existing literature on the effects of palatal expansion devices on the tonsils in children. By synthesizing clinical studies, case reports, and experimental data, this review seeks to clarify whether palatal expansion can have a positive or negative impact on tonsillar size and function. Furthermore, it will examine the implications of these findings for clinical practice, particularly for orthodontists and pediatric specialists who manage patients with both dental and respiratory health concerns. Ultimately, this review aims to contribute valuable insights that will help optimize treatment strategies for children undergoing palatal expansion therapy, with the goal of improving both their orthodontic and overall health outcomes.

MATERIALS AND METHODS

A comprehensive review of studies published until 2024 was conducted using PubMed, Web of Science, and Scopus databases.

The inclusion criteria for studies were:

(1) original research articles published in English,
(2) studies focusing on children who underwent palatal expansion,
(3) assessment of tonsillar size or function before and after treatment, and
(4) studies that explored respiratory outcomes related to palatal expansion. Both clinical trials and observational studies were included.

The exclusion criteria were:

(1) studies not involving palatal expansion devices,
(2) studies focusing on adults, and
(3) studies without measurable outcomes on tonsillar health or respiratory function.

The search terms used included "palatal expansion," "tonsils," "tonsillar hypertrophy," "children," and "respiratory function." The reference lists of selected articles were also reviewed for additional relevant studies. A total of 20 articles were selected for analysis, which included clinical trials, case studies, and systematic reviews published between 2000 and 2023.

DISCUSSION

The relationship between palatal expansion and tonsillar health in children has become an area of increasing clinical interest. While palatal expansion is predominantly utilized in orthodontics to address maxillary constriction and malocclusions, its potential to influence adjacent structures such as the tonsils is not yet fully understood. The following sections discuss the effects of palatal expansion devices (PEDs) on tonsillar size, tonsillar function, respiratory health, and associated clinical outcomes.

Effect of Palatal Expansion on Tonsillar Size

One of the key concerns in children who are candidates for palatal expansion is tonsillar hypertrophy. Tonsillar enlargement, especially in children, can lead to obstructive symptoms such as snoring, mouth breathing, and sleep disturbances, and is often associated with conditions like obstructive sleep apnea (OSA). Research has shown that palatal expansion may have a direct or indirect effect on tonsillar size by altering the volume and configuration of the upper airway.

A significant body of research has suggested that palatal expansion, particularly rapid maxillary expansion (RME), can lead to a reduction in tonsillar size. This is likely because the expansion of the maxilla creates more space in the oral cavity and nasopharynx, which may relieve pressure on the tonsils, potentially reducing their hypertrophy. Several studies, such as those by Hoff et al. (2012) and Cestari et al. (2015), have reported a decrease in the size of the tonsils following palatal expansion (6,7). These findings suggest that the increased airway space resulting from RME might reduce the obstruction caused by enlarged tonsils, offering symptomatic relief to children with enlarged tonsils and related breathing problems (8,9).

However, other studies have shown conflicting results, with no significant changes in tonsillar size following palatal expansion (10,11). The lack of a consistent response to palatal expansion may be due to various factors, including the individual variability in the degree of tonsillar hypertrophy, the timing of treatment, or the specific type of palatal expander used. For instance, in children with very large tonsils or other anatomical obstructions, palatal expansion may not be sufficient to reduce tonsillar size. Additionally, some studies have suggested that while palatal expansion can influence the position of the tonsils, it may not be a direct factor in reducing their size, highlighting the complexity of the interaction between maxillary development and tonsillar health (12).

Tonsillar Function and Respiratory Health

Beyond the physical size of the tonsils, another important consideration is their function, particularly in terms of respiratory health. Tonsillar hypertrophy can significantly obstruct the airway, leading to breathing difficulties, particularly during sleep. Obstructive sleep apnea (OSA), snoring, and chronic mouth breathing are often associated with enlarged tonsils in children. Given that palatal expansion can increase the volume of the nasopharyngeal and oropharyngeal airway, it is hypothesized that it may improve airway patency and, in turn, alleviate symptoms related to tonsillar hypertrophy (3).

Research supports this hypothesis, with studies by Tufik et al. (2008) and, Viana et al. (2019), indicating that palatal expansion can improve the airflow in the upper respiratory tract, leading to better sleep quality and reduced symptoms of OSA (13,14). These improvements are thought to be due to the widening of the palate and the associated increase in nasal and pharyngeal space, which reduces airway obstruction and the mechanical pressure on the tonsils. By facilitating nasal breathing, palatal expansion may prevent the need for children to breathe through their mouths, which could alleviate the chronic irritation and inflammation that contribute to tonsillar hypertrophy.

Several studies have shown improvements in clinical symptoms such as snoring, daytime sleepiness, and mouth breathing following palatal expansion treatment (15,16). This is particularly significant in children with enlarged tonsils, where improved airway function can reduce the severity of sleep-disordered breathing and potentially mitigate the need for surgical interventions like tonsillectomy (17).

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However, the impact of palatal expansion on tonsillar function remains variable across studies. While some children experience substantial improvements in airway function and respiratory symptoms following treatment, others may not show significant changes. This variability may be influenced by factors such as the degree of tonsillar hypertrophy, the presence of additional anatomical abnormalities (e.g., adenoid hypertrophy), and the timing of treatment relative to the child's developmental stage (18). Additionally, children with severe obstructive symptoms may require more than just palatal expansion, and a multidisciplinary approach that includes both orthodontic and ENT evaluations may be necessary for optimal management.

Long-Term Effects and Clinical Considerations

A key aspect of the clinical management of children with palatal expansion devices is understanding the long-term effects on both the tonsils and the overall respiratory health. While short-term studies provide valuable insights, the lack of long-term follow-up in many studies limits the ability to draw definitive conclusions about the sustainability of the benefits observed. Some studies have suggested that the effects of palatal expansion on the airway and tonsils may diminish over time as the maxillary arch stabilizes, with some children experiencing a relapse in their symptoms (19). Therefore, it is crucial for clinicians to monitor the progress of their patients over an extended period to determine whether the benefits of palatal expansion are sustained or if further interventions, such as tonsillectomy, may be necessary.

Additionally, palatal expansion is not a one-size-fits-all treatment. The success of palatal expansion in children with enlarged tonsils may depend on several factors, including the severity of the tonsillar hypertrophy, the type of palatal expander used, and the age of the child. For example, the timing of treatment may be critical, as children who undergo palatal expansion during periods of active craniofacial growth may experience more significant improvements than those treated at later stages. Moreover, children with other underlying conditions, such as allergic rhinitis or adenoid hypertrophy, may require additional treatments alongside palatal expansion to achieve the desired respiratory outcomes (20).

Given the complexity of the issue, it is important for clinicians to adopt a personalized approach to treatment. This may involve a comprehensive assessment that includes evaluating tonsillar size, function, and associated airway health before considering palatal expansion.

In some cases, other interventions such as nasal steroids, continuous positive airway pressure (CPAP) therapy, or tonsillectomy may be needed to address the full spectrum of respiratory issues.

Future Research Directions

Despite the growing body of research on palatal expansion and its effects on tonsils, several questions remain unanswered. Future studies should focus on establishing clearer cause-and-effect relationships between palatal expansion and tonsillar size/function. Randomized controlled trials (RCTs) with larger sample sizes and longer follow-up periods are necessary to provide more reliable evidence regarding the long-term impact of palatal expansion on tonsillar health. Furthermore, future research should explore the mechanisms underlying the observed changes in tonsillar size and function, particularly focusing on how palatal expansion influences the surrounding musculature and soft tissues, in addition to the bony structures of the maxilla.

Moreover, the role of different types of palatal expanders in affecting tonsillar health warrants further investigation. Variations in the design of PEDs, such as the use of slow versus rapid expanders, may yield different outcomes in terms of tonsillar response and airway improvement. Additionally, investigating the combined effect of palatal expansion with other treatments for respiratory health, such as allergy management or surgical interventions, could provide a more comprehensive approach to managing children with tonsillar hypertrophy and obstructive sleep apnea.

CONCLUSION

Palatal expansion is an effective treatment for addressing maxillary constriction and related malocclusions in children. While its impact on tonsillar size and function is not fully understood, there is evidence suggesting that palatal expansion may influence tonsillar hypertrophy and improve respiratory outcomes, particularly in children with airway obstruction. However, the results across studies are inconsistent, and more research is required to clarify the relationship between palatal expansion and tonsillar health. Future studies should focus on long-term follow-up, as well as the influence of different expander types and treatment protocols. Clinicians should consider the potential benefits and limitations of palatal expansion in children with enlarged tonsils and assess each case individually to provide the best treatment approach.

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