



# The Efficacy of Radiofrequency in Tonsillectomy Procedures: A Comprehensive Systematic Review

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## ABSTRACT

**Background:** Tonsillectomy, a common surgical procedure, has seen advancements in radiofrequency (RF) technology, aiming to improve postoperative outcomes by reducing intraoperative bleeding, postoperative pain, and recovery time. However, the efficacy of RF in tonsillectomy remains a topic of ongoing research, requiring further evaluation for optimal patient care. **Methods:** This systematic review adhered to PRISMA 2020 principles and focused exclusively on full-text papers published in English between 2015 and 2025. Editorials and review articles without a DOI were omitted to preserve the integrity of high-quality sources. A literature review was conducted utilizing esteemed databases like ScienceDirect, PubMed, and SagePub to discover relevant studies. **Result:** The preliminary database search yielded over 500 relevant publications on the topic. Following a comprehensive three-stage screening process, eight papers met the specified inclusion criteria and were selected for in-depth analysis. Each study underwent a comprehensive critical assessment, enabling a thorough understanding of the efficacy of radiofrequency in tonsillectomy procedures. This methodical method guaranteed that the analysis relied on high-quality evidence, corresponded with the study's aims, and was capable of producing substantial insights into this intricate relationship. **Conclusion:** Radiofrequency tonsillectomy is a surgical technique that enhances postoperative comfort, reduces risks, and supports faster return to normal activity. However, long-term outcomes and recurrence rates require further exploration. Standardized protocols for radiofrequency tonsillectomy are essential for improving patient outcomes and redefining otolaryngologic surgery standards.

**Keywords:** Radiofrequency tonsillectomy, postoperative outcomes, surgical efficacy

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## INTRODUCTION

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Tonsillectomy remains one of the most frequently performed surgical procedures in otolaryngology, particularly among pediatric populations.<sup>1</sup> Traditionally utilized to manage chronic or recurrent tonsillitis and obstructive sleep-disordered breathing, the procedure has undergone significant advancements in both technique and instrumentation.<sup>2</sup> Among these innovations, radiofrequency (RF) tonsillectomy has emerged as a minimally invasive alternative to conventional methods such as cold steel dissection and electrocautery.<sup>3</sup> By delivering controlled energy to targeted tissues, RF aims to reduce intraoperative bleeding, postoperative pain, and recovery time—factors that have long been challenges in tonsillectomy outcomes.<sup>3,4</sup>

The mechanism behind radiofrequency tonsillectomy is grounded in its ability to induce thermal coagulation while preserving surrounding tissue integrity. Unlike traditional approaches that rely on cutting or high-temperature cauterization, RF energy operates at lower temperatures, promoting cellular disruption through ionic agitation rather than direct heat.<sup>5</sup> This theoretically leads to less collateral damage, minimized inflammatory response, and improved postoperative healing. Despite these proposed benefits, clinical outcomes across studies have varied, with discrepancies in pain scores, operative time, and complication rates prompting continued investigation into its overall efficacy and safety profile.<sup>6,7</sup>

As the healthcare landscape shifts toward evidence-based practices and enhanced patient-centered care, evaluating the efficacy of radiofrequency in tonsillectomy is essential for guiding clinical decisions and refining surgical protocols.<sup>8,9</sup> Existing literature presents a growing but heterogeneous body of evidence, with variability in study design, patient populations, and outcome measures. Therefore, a systematic review is warranted to consolidate current findings, identify consistent trends, and assess the reliability of RF tonsillectomy as a standard intervention. Such a review can inform clinical guidelines, optimize surgical outcomes, and contribute to the broader advancement of minimally invasive techniques in otolaryngologic surgery.

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## METHODS

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## **Protocol**

This review was thoroughly designed and implemented following the PRISMA 2020 guidelines to ensure methodological accuracy and uphold the integrity of the research. By strictly observing these established standards, the study promotes transparency, supports reproducibility, and reinforces scientific rigor. Every stage—from the extensive literature search to the precise extraction and synthesis of data—was carried out with careful attention to detail to reduce bias and strengthen the reliability of the findings. This rigorous approach not only boosts the study’s credibility but also provides a meaningful contribution to the body of evidence-based research.

## **Criteria for Eligibility**

This systematic review is designed to thoroughly assess the effectiveness of radiofrequency in tonsillectomy by examining and integrating findings from a broad spectrum of relevant studies. Through the identification of recurring themes, emerging patterns, and existing research gaps, the review aims to offer valuable insights that can inform the refinement of clinical techniques. The overarching goal is to deepen the current understanding of radiofrequency’s role in tonsillectomy and to build a solid evidence base that supports better clinical outcomes and informed decision-making.

To uphold methodological integrity, the review employed well-defined inclusion and exclusion criteria. Only peer-reviewed studies published in English between 2015 and 2025 were considered, with each article’s authenticity verified using DOI identification. To ensure relevance and data quality, non-primary sources such as reviews, editorials, and duplicate records were excluded. This careful selection process ensures that the analysis draws exclusively from credible, high-quality research, thereby reinforcing the reliability and validity of the conclusions.

By utilizing a structured and thorough research strategy, this review guarantees that its findings rest on a strong foundation of empirical evidence. The expected outcomes are intended to clarify and enhance current approaches to the use of radiofrequency in tonsillectomy. Ultimately, this study aspires to contribute to the advancement of therapeutic techniques, foster improvements in clinical practice, and promote better quality of life for patients undergoing this procedure.

## Search Strategy

An extensive and methodical search strategy was implemented to identify pertinent studies for this review, using targeted keywords such as "tonsillectomy," "radiofrequency," "procedure," and "efficacy." To capture a broad and balanced range of scholarly perspectives, searches were conducted across three leading academic databases: PubMed, SagePub, and ScienceDirect. This approach ensured access to a diverse selection of peer-reviewed literature, enhancing both the depth and quality of the evidence considered. By applying a structured and academically rigorous search process, the review reinforces the credibility and robustness of its findings, ultimately supporting a deeper and more accurate understanding of the efficacy of radiofrequency in tonsillectomy procedures.

**Table 1. Search Strategy**

<i>Database</i>	<i>Search Strategy</i>	<i>Hits</i>
Pubmed	<i>("tonsillectomy" AND "radiofrequency " AND "procedure" AND "efficacy")</i>	9
Science Direct	<i>("tonsillectomy" AND "radiofrequency " AND "procedure" AND "efficacy")</i>	375
Sagepub	<i>("tonsillectomy" AND "radiofrequency " AND "procedure" AND "efficacy")</i>	165

## Data retrieval

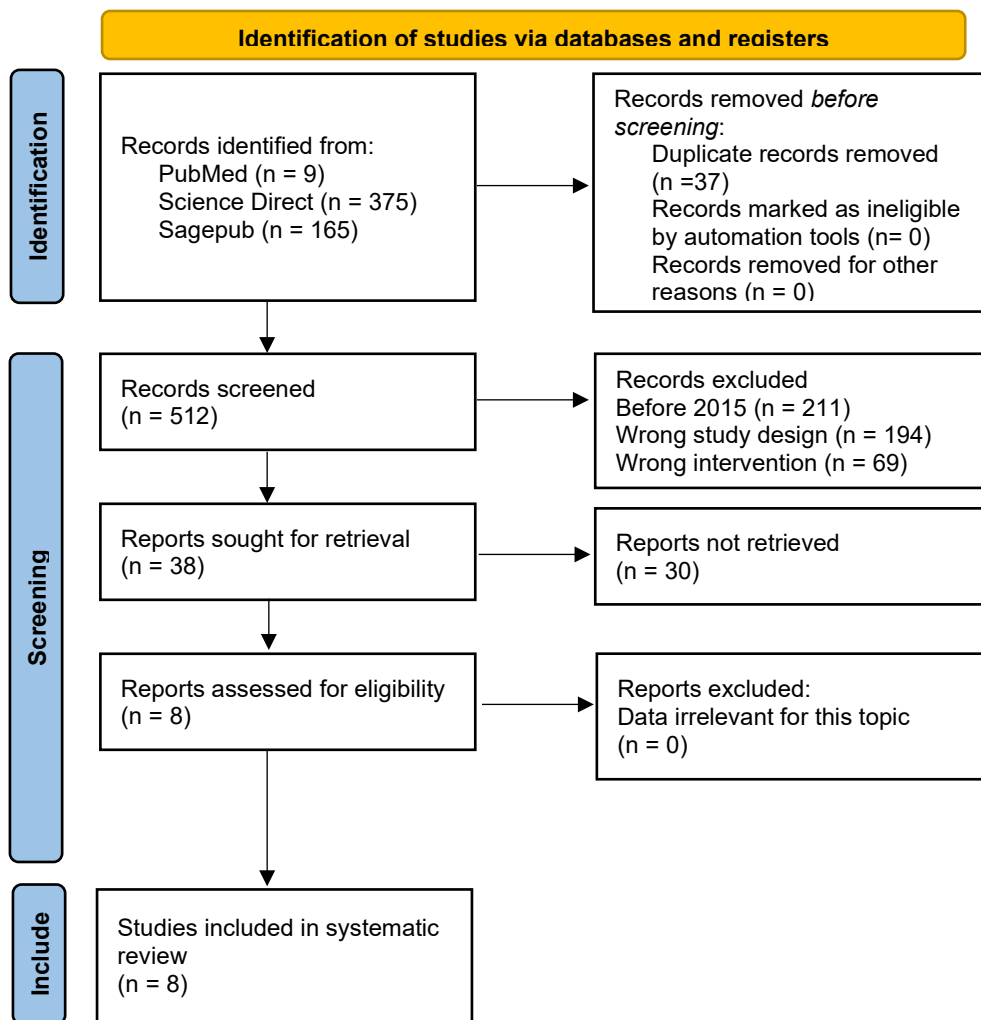
The authors carried out a thorough initial screening process by carefully reviewing the titles and abstracts of each study to determine their relevance to the research objectives. Only those articles that met the established inclusion criteria and aligned closely with the study's aims were selected for full-text review and detailed analysis. This structured and systematic approach allowed for the identification of recurring themes and meaningful patterns within the literature, ensuring the analysis remained focused on evidence directly pertinent to the research question. By adhering to a consistent and transparent selection process, the review was able to synthesize high-quality evidence to support its conclusions effectively.

To maintain uniformity and facilitate comparison across studies, only full-text articles published in English were included in the final review. A strict screening protocol was applied to confirm that all selected studies adhered to the predefined criteria and directly addressed the core objectives of the research. Any article that failed to meet these standards was excluded, resulting in a highly focused and relevant dataset. This meticulous selection process played a crucial role in enhancing the validity of the findings and minimizing the risk of bias, ensuring the conclusions were grounded in reliable, peer-reviewed sources.

The evaluation phase also involved a comprehensive analysis of various study attributes, including titles, authorship, publication year, geographic context, and research design. By systematically examining these elements, the authors ensured that only the most methodologically sound and contextually relevant studies were included. This rigorous and well-structured selection strategy significantly bolstered the credibility of the review's findings, laying a solid foundation for meaningful insights that contribute to advancing clinical understanding of radiofrequency's role in tonsillectomy procedures.

### **Quality Assessment and Data Synthesis**

A detailed and systematic screening process was implemented by the authors, beginning with the careful evaluation of titles and abstracts to identify studies that fulfilled specific relevance and quality benchmarks. Only research that clearly aligned with the study's objectives and exhibited strong methodological soundness was advanced to the full-text analysis stage. This strategic and selective approach ensured the incorporation of high-quality, impactful studies that added substantial value to the review. By narrowing the dataset to include only scientifically credible and contextually relevant sources, the authors enhanced the clarity, focus, and analytical depth of their work. This rigorous methodology significantly reinforced the review's validity, reliability, and overall academic integrity.



**Figure 1. Article search flow chart**

**Table 2. Critical appraisal of Study**

Parameters	(Kucur et al., 2015)	(Ozkullu et al., 2015)	(Kumar et al., 2018)	(Elshearif et al., 2020)	(Prussin et al., 2021)	(Cai et al., 2022)	(Kartihkeyan et al., 2022)	(Virkkunen et al., 2024)
<b>1. Bias related to temporal precedence</b>								
Is it clear in the study what is the “cause” and what is the “effect” (ie, there is no confusion about which variable comes first)?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
<b>2. Bias related to selection and allocation</b>								
Was there a control group?	No	Yes	No	No	Yes	No	No	No
<b>3. Bias related to confounding factors</b>								
Were participants included in any comparisons similar?	No	Yes	Yes	Yes	Yes	Yes	No	Yes
<b>4. Bias related to administration of intervention/exposure</b>								
Were the participants included in any comparisons receiving similar treatment/care, other than the exposure or intervention of interest?	No.	Yes.	Yes.	Yes.	Yes.	Yes.	No.	Yes.
<b>5. Bias related to assessment, detection, and measurement of the outcome</b>								
Were there multiple measurements of the outcome, both pre and post the intervention/exposure?	No	No	No	No	No	No	No	No
Were the outcomes of participants included in any comparisons measured in the same way?	No	Yes	Yes	Yes	Yes	No	No	Yes
Were outcomes measured in a reliable way?	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes
<b>6. Bias related to participant retention</b>								
Was follow-up complete and, if not, were differences between groups in terms of their follow-up adequately described and analyzed?	Yes	Yes	Yes	Yes	Yes	No	No	Yes
<b>7. Statistical conclusion validity</b>								
Was appropriate statistical analysis used?	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes

## RESULT

The research commenced with a structured search of reputable academic databases—namely ScienceDirect, PubMed, and SagePub—to locate studies pertinent to the review’s focus. A thorough three-phase screening protocol was implemented to carefully evaluate and narrow down the literature, resulting in the selection of eight studies that satisfied the established inclusion criteria. These selected studies were then subjected to an in-depth analysis, during which key themes and significant findings were systematically identified and assessed. For enhanced clarity and organization, the synthesized data are succinctly presented in Table 3, providing a clear and accessible summary that facilitates easy comparison and interpretation of the reviewed literature.

**Table 3. The literature included in this study**

Author	Origin	Method	Sample	Result
<b>Kucur et al.<sup>10</sup> (2015)</b>	Turkey	Case Report	2 cases	Chronic tonsillitis is a common condition requiring various surgical techniques, including radiofrequency ablation and coblation. Two pediatric patients developed ptosis, miosis, and enophthalmos after radiofrequency ablation for tonsil reduction. Treatment with methylprednisolone improved these symptoms. The effectiveness and complications of radiofrequency ablation can help ENT physicians make informed decisions, as limited data is available on possible complications. This report contributes to the literature on this topic.
<b>Ozkull et al.<sup>11</sup> (2015)</b>	Turkey	RCT	114 participants	The Radiofrequency (RF) technique is superior in terms of intraoperative bleeding compared to the cold dissection (CD) technique, with lower postoperative bleeding. However, the RF technique is more effective in terms of operation time and time to return to a painless dietary regimen.
<b>Kumar et al.<sup>12</sup> (2018)</b>	India	Prospective Study	60 participants	The radiofrequency technique, after proper training, significantly reduces intraoperative bleeding and postoperative morbidity compared to cold dissection tonsillectomy. This technique allows for the same device to excise tissue and coagulate bleeding vessels,

				resulting in a shorter surgery duration and reduced complications.
<b>Elsherif et al.<sup>13</sup> (2020)</b>	Egypt	Prospective Study	200 participants	Bipolar radiofrequency is an effective and safe technique for total tonsillectomy, providing acceptable intra-operative and post-operative results in pain and bleeding, and is suitable for pediatric populations with no major morbidities.
<b>Prussin et al.<sup>14</sup> (2021)</b>	USA	RCT	236 participants	The study found no significant difference between radiofrequency ablation and monopolar electrocautery in postoperative recovery time, daily pain scores, total postoperative narcotic use, or adverse events between the two groups, despite being one of the largest randomized controlled trials examining instrumentation in tonsillectomy.
<b>Cai et al.<sup>15</sup> (2022)</b>	China	Meta Analysis	10 studies	The meta-analysis of 10 articles found no significant difference in operation time between CT and ET, with CT resulting in less intraoperative blood loss and less postoperative pain score. However, CT resulted in less time to return to normal diet after surgery, with a statistically significant difference.
<b>Karthikeyan et al.<sup>16</sup> (2022)</b>	India	Review	-	Radiofrequency ablation is a new surgical technique for treating chronic tonsillitis, overcoming the limitations of conventional dissection tonsillectomy. It can be used in both monopolar and bipolar techniques, with monopolar radiofrequency ablation showing effectiveness in various fields of medicine.
<b>Virkkunen et al.<sup>17</sup> (2024)</b>	Finland	Cohort	189 participants	The majority of 189 participants underwent tonsilotomy (TT) and tonsillectomy (TE) surgeries, with TT achieving equal disease-specific quality of life (QOL) compared to TE. Throat infections were not an issue for most patients, and TT and TE showed no significant differences in reoperation rates. Long-term clinical effectiveness is excellent.

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## DISCUSSION

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### **Radiofrequency Tonsillectomy Procedure**

Radiofrequency tonsillectomy (RFT) represents a significant shift in surgical strategies for treating tonsillar hypertrophy and chronic tonsillitis, particularly in pediatric and select adult populations.<sup>18</sup> The procedure involves delivering controlled radiofrequency energy to the tonsillar tissue using a specialized probe, generating ionic agitation and localized heat that induces coagulative necrosis. Unlike traditional excision methods, which rely on mechanical dissection or high-temperature cauterization, RFT operates at lower thermal ranges, typically between 60°C and 90°C.<sup>19</sup> This minimizes the collateral damage to adjacent structures such as the palatal muscles and mucosa, preserving the anatomical integrity of the oropharynx. Moreover, RFT can be utilized for both intracapsular (partial) and extracapsular (total) tonsillectomy, allowing the surgeon to tailor the procedure based on the patient's clinical profile and surgical objectives.<sup>20</sup>

### **Benefits of Radiofrequency Tonsillectomy**

The clinical benefits of RFT are substantial and have been consistently highlighted across the literature. Most notably, patients undergoing RFT experience significantly reduced postoperative pain, a benefit attributed to the preservation of the tonsillar capsule and reduced nerve fiber exposure. This reduction in pain leads to earlier resumption of oral intake and fewer postoperative complications related to dehydration and secondary hemorrhage.<sup>21</sup> Additionally, intraoperative parameters such as blood loss and operative time are often improved with RFT, contributing to a more efficient surgical process and shorter anesthetic duration.<sup>22</sup> These advantages are significant in pediatric cases, where postoperative pain management and rapid recovery are critical to minimizing hospital readmissions and caregiver burden.

### **Advantages Compared to Conventional Techniques**

When compared to traditional tonsillectomy techniques—such as cold dissection, electrocautery, and harmonic scalpel—RFT offers several distinct clinical and procedural advantages. Cold dissection, while still considered a gold standard in some institutions, is associated with increased intraoperative bleeding and prolonged recovery.<sup>23</sup> Electrocautery, though effective in hemostasis, often results in greater tissue damage due to higher temperatures, contributing to delayed mucosal healing and increased postoperative discomfort.<sup>24</sup> In contrast, RFT provides a balance between efficacy and tissue preservation. The ability to precisely target tonsillar tissue with minimal surrounding damage is particularly advantageous in patients with high anesthetic or bleeding risk.<sup>21,22</sup> Furthermore, the technique’s adaptability for partial tonsillectomy allows for the reduction of obstructive symptoms while preserving immunological function—an emerging consideration in modern otolaryngologic surgery.

### **Disadvantages and Potential Limitations**

Despite its favorable profile, RFT is not without drawbacks. One of the most debated concerns is the potential for residual lymphoid tissue, particularly following intracapsular tonsillectomy, which may predispose patients to recurrent symptoms or necessitate revision surgery.<sup>25</sup> Although the risk of regrowth is relatively low in well-selected cases, it remains a key consideration in patients with a history of recurrent infections or chronic tonsillitis. Additionally, outcomes can be operator-dependent, with variations in technique, power settings, and probe design influencing procedural consistency.<sup>26</sup> Cost is another factor that may limit widespread adoption, especially in low-resource settings. The initial investment in radiofrequency generators and the need for disposable handpieces may be prohibitive for some healthcare facilities, despite the potential for long-term savings through reduced complications and faster recovery.

### **Clinical Implications**

The decision to utilize radiofrequency in tonsillectomy must be informed by a comprehensive assessment of individual patient factors, surgical objectives, and institutional resources.<sup>27</sup> RFT is especially advantageous for patients undergoing tonsillectomy for obstructive sleep-disordered

breathing, in whom pain control and rapid recovery are critical. Conversely, patients with a history of recurrent tonsillar infections may be better served by a traditional extracapsular approach to ensure complete removal of infected tissue. Surgeon expertise also plays a vital role, as proficiency with the RF device and familiarity with technique-specific nuances are essential for optimizing outcomes.<sup>27,28</sup> As with any surgical innovation, RFT should not be seen as a replacement for conventional methods but rather as a valuable addition to the otolaryngologist's armamentarium, to be used judiciously based on clinical context.

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### CONCLUSION

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Radiofrequency tonsillectomy reflects the broader evolution of surgical practice toward minimally invasive, patient-centered techniques. The collective evidence presented in this review affirms its value in enhancing postoperative comfort, reducing intraoperative risks, and supporting a faster return to normal activity—particularly in pediatric and high-risk populations. However, long-term outcomes, recurrence rates, and cost-effectiveness remain areas that require further exploration through well-designed randomized controlled trials and multi-center studies. As surgical technologies continue to advance, establishing standardized protocols for RFT, including energy settings, procedural endpoints, and follow-up care, will be essential. Ultimately, the integration of radiofrequency technology into routine tonsillectomy practice holds the promise of improving patient outcomes and redefining standards of care in otolaryngologic surgery.

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