COMPARISON BETWEEN VAGAL MANEUVERS AND ADENOSINE IN PAROXYSMAL SUPRAVENTRICULAR TACHYCARDIA

COMPARAÇÃO ENTRE MANOBRAS VAGAIS E ADENOSINA NA TAQUICARDIA SUPRAVENTRICULAR PAROXÍSTICA

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ABSTRACT

Paroxysmal supraventricular tachycardia (PSVT) is one of the most common arrhythmias in clinical practice, characterized by sudden episodes of supraventricular tachycardia. The management of this condition in hemodynamically stable patients is initially based on the use of vagal maneuvers, followed by adenosine administration in cases of failure. This study aimed to compare the effectiveness, safety, and clinical applicability of vagal maneuvers and adenosine in the treatment of PSVT through an integrative literature review. The search was conducted in the PubMed/MEDLINE, SciELO, and ScienceDirect databases, considering studies published between 2015 and 2025, using controlled descriptors and free terms in combination. Randomized clinical trials, systematic reviews, meta-analyses, and clinical guidelines addressing the management of PSVT were included. The results demonstrated that vagal maneuvers present variable efficacy, generally with success rates below 50%, whereas adenosine showed reversal rates above 80–90%. The modified Valsalva maneuver showed higher effectiveness compared to the standard technique, although still inferior to adenosine. It is concluded that, although vagal maneuvers are recommended as first-line therapy due to their safety and ease of application, adenosine stands out as the most effective strategy for restoring sinus rhythm and should be used after the failure of non-pharmacological interventions.

Keywords: Paroxysmal Supraventricular Tachycardia. Vagal Maneuvers. Valsalva Maneuver. Adenosine. Cardiac Arrhythmias.

RESUMO

A taquicardia supraventricular paroxística (TSVP) é uma das arritmias mais frequentes na prática clínica, caracterizada por episódios súbitos de taquicardia de origem supraventricular. O manejo dessa condição em pacientes hemodinamicamente estáveis baseia-se, inicialmente, na realização de manobras vagais, seguidas do uso de adenosina nos casos de insucesso. Este estudo teve como objetivo comparar a eficácia, segurança e aplicabilidade clínica das manobras vagais e da adenosina no tratamento da TSVP, por meio de uma revisão integrativa da literatura. A busca foi realizada nas bases de dados PubMed/MEDLINE, SciELO e ScienceDirect, considerando estudos publicados entre 2015 e 2025, com utilização de descritores controlados e termos livres combinados. Foram incluídos ensaios clínicos randomizados, revisões sistemáticas, metanálises e diretrizes clínicas que abordassem diretamente o manejo da TSVP. Os resultados evidenciaram que as manobras vagais apresentam eficácia variável, com taxas de sucesso geralmente inferiores a 50%, enquanto a adenosina demonstrou taxas de reversão superiores a 80–90%. A manobra de Valsalva modificada apresentou maior eficácia em relação à técnica padrão, embora ainda inferior à adenosina. Conclui-se que, apesar das manobras vagais serem recomendadas como primeira linha devido à sua segurança e facilidade de aplicação, a adenosina se destaca como a estratégia mais eficaz na reversão do ritmo sinusal, sendo fundamental sua utilização após falha das intervenções não farmacológicas.

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Palavras-chave: Taquicardia Supraventricular Paroxística. Manobras Vagais. Manobra de Valsalva. Adenosina. Arritmias Cardíacas.

RESUMEN

La taquicardia supraventricular paroxística (TSVP) es una de las arritmias más frecuentes en la práctica clínica, caracterizada por episodios súbitos de taquicardia de origen supraventricular. El tratamiento de esta afección en pacientes hemodinámicamente estables se basa inicialmente en maniobras vagales, seguidas del uso de adenosina en caso de fracaso. Este estudio tuvo como objetivo comparar la eficacia, seguridad y aplicabilidad clínica de las maniobras vagales y la adenosina en el tratamiento de la TSVP mediante una revisión integradora de la literatura. La búsqueda se realizó en las bases de datos PubMed/MEDLINE, SciELO y ScienceDirect, considerando estudios publicados entre 2015 y 2025, utilizando descriptores controlados y términos libres combinados. Se incluyeron ensayos clínicos aleatorizados, revisiones sistemáticas, metaanálisis y guías clínicas que abordaran directamente el tratamiento de la TSVP. Los resultados mostraron que las maniobras vagales tienen una eficacia variable, con tasas de éxito generalmente inferiores al 50%, mientras que la adenosina demostró tasas de reversión superiores al 80-90%. La maniobra de Valsalva modificada mostró mayor eficacia que la técnica estándar, aunque inferior a la adenosina. Se concluye que, si bien las maniobras vagales se recomiendan como tratamiento de primera línea por su seguridad y facilidad de aplicación, la adenosina se destaca como la estrategia más eficaz para revertir el ritmo sinusal, y su uso es fundamental tras el fracaso de las intervenciones no farmacológicas.

Palabras clave: Taquicardia Supraventricular Paroxística. Maniobras Vagales. Maniobra de Valsalva. Adenosina. Arritmias Cardíacas.

1 INTRODUCTION

Paroxysmal supraventricular tachycardia (PVST) is one of the most frequent arrhythmias in clinical practice, and is characterized by sudden episodes of tachycardia of supraventricular origin, usually with narrow QRS complexes and abrupt onset and termination. This condition can affect individuals of different age groups, presenting clinical manifestations such as palpitations, dyspnea, dizziness, and, in more severe cases, hemodynamic instability (BRUGADA et al., 2019; PAGE et al., 2016). Due to its high incidence in emergency services, PVRT represents an important diagnostic and therapeutic challenge, requiring rapid and effective interventions.

The management of PVRT depends mainly on the hemodynamic stability of the patient, and in stable individuals, international guidelines initially recommend the use of vagal maneuvers as a first-line therapeutic strategy (BRUGADA et al., 2019; LATIȘ et al., 2023). These maneuvers act by increasing parasympathetic tone, promoting the reduction of atrioventricular nodal conduction and enabling the reversal of sinus rhythm. Among the most used techniques are the Valsalva maneuver and carotid sinus massage, which have advantages such as low cost, easy execution, and reduced risk of adverse events.

However, despite their safety and broad recommendation, the efficacy of vagal maneuvers is variable, with success rates ranging from 19% to 54%, often lower in real clinical scenarios (APPELBOAM et al., 2015; LATIȘ et al., 2023). In this context, modifications to the traditional technique, such as the modified Valsalva maneuver, have been proposed with the aim of increasing the rate of rhythm reversal, presenting significantly superior results compared to the standard technique (HUANG et al., 2022; ABDULHAMID et al., 2021).

When vagal maneuvers are not effective, intravenous adenosine is recommended as the pharmacological therapy of choice, due to its high success rate and rapid action in blocking atrioventricular conduction. Clinical studies show that adenosine has reversal rates greater than 80–90%, and is considered safe, despite being associated with transient adverse effects, such as flushing, dyspnea, and feelings of chest discomfort (ALABED et al., 2017; BICILIOĞLU et al., 2020). Thus, adenosine is consolidated as the main pharmacological therapeutic resource in the management of PVRT.

In view of this scenario, it is essential to analyze the comparative effectiveness between vagal maneuvers and adenosine in the treatment of PVT, considering aspects such as efficacy, safety, and clinical applicability. Recent studies indicate that, although vagal maneuvers are recommended as an initial approach, adenosine has a higher success rate in reversing sinus rhythm, and is often necessary after failure of non-pharmacological interventions (XIAO et al., 2024; HUANG et al., 2022). Thus, this integrative review aims to

critically analyze the evidence available in the literature about these two therapeutic strategies, contributing to the improvement of evidence-based clinical decision-making.

2 METHODOLOGY

The present study is characterized as an integrative literature review, with a qualitative and descriptive approach, with the objective of gathering, analyzing and synthesizing scientific evidence regarding the comparison between vagal maneuvers and the use of adenosine in the treatment of paroxysmal supraventricular tachycardia (PSRT).

The identification of studies was carried out in recognized databases in the health area, including PubMed/MEDLINE, SciELO and ScienceDirect, including studies published in the last ten years (2015–2025). Descriptors in English and Portuguese related to the theme were used, such as: "supraventricular tachycardia", "vagal maneuvers", "Valsalva maneuver", "adenosine" and "paroxysmal supraventricular tachycardia", as well as their counterparts in Portuguese, used in combination to identify relevant studies.

The following inclusion criteria were adopted: original articles, randomized clinical trials, systematic reviews, meta-analyses, and clinical guidelines that directly addressed the management of PVRT with vagal and/or adenosine maneuvers; studies published in the delimited period; and articles available in full. Exclusion criteria included duplicate studies, isolated case reports, and articles with non-representative samples, or articles that were not directly related to the research objective.

The selection of studies was carried out intentionally and non-probabilistically, prioritizing evidence with a higher methodological level and scientific relevance to the proposed theme. Studies considered classic and international guidelines were included, due to their importance in consolidating current clinical recommendations.

After selection, the studies were read in full and the relevant data were extracted and organized for comparative analysis. The data analysis was conducted critically, allowing the identification of the main evidence related to the efficacy, safety, and applicability of vagal maneuvers in comparison with adenosine in the context of PVRT.

Finally, the selected studies were organized, analyzed, and synthesized in a descriptive manner, enabling the construction of a comprehensive and grounded view on the subject, contributing to evidence-based clinical practice.

3 RESULTS

The selected studies were analyzed for the efficacy, safety, and applicability of vagal maneuvers and adenosine in the management of paroxysmal supraventricular tachycardia (PVRT). Randomized clinical trials, systematic reviews, meta-analyses, and clinical guidelines were included, which showed relevant differences between therapeutic strategies.

Vagal maneuvers have been consistently described as the first therapeutic approach in hemodynamically stable patients, as recommended by international guidelines (BRUGADA et al., 2019; PAGE et al., 2016). However, its efficacy was variable among the studies analyzed, with sinus rhythm reversal rates generally lower than 50% (APPELBOAM et al., 2015; IMMANUEL et al., 2025). In addition, evidence shows that the effectiveness of vagal maneuvers may be even lower in everyday clinical practice, reinforcing their limitations as an isolated strategy (LATIȘ et al., 2023).

The REVERT study demonstrated a success rate of 17% with the standard Valsalva maneuver, compared to 43% with the modified Valsalva (APPELBOAM et al., 2015). Similarly, recent meta-analyses have indicated that modified Valsalva is more effective compared to the traditional technique, and can significantly increase the rate of cardioversion and reduce the need for pharmacological interventions (HUANG et al., 2022; ABDULHAMID et al., 2021). Additional studies reinforce that this technique has better performance among the available vagal maneuvers, maintaining a similar safety profile (IMMANUEL et al., 2025).

With regard to adenosine, the studies analyzed demonstrated high efficacy in reversing PVRT, with success rates ranging from 80% to 95% (ALABED et al., 2017; BICILIOĞLU et al., 2020). In a clinical study, a positive response was observed in approximately 95.8% of patients treated with adenosine, while about 38% responded to vagal maneuvers (BICILIOĞLU et al., 2020). Additional clinical trials have demonstrated success rates of over 90%, reinforcing the high effectiveness of this pharmacological intervention (KOTRUCHIN et al., 2022).

Direct comparative studies reinforce the superiority of adenosine over vagal maneuvers. In a recent study, the success rate was 42.11% for the modified Valsalva maneuver, 75% for adenosine, and 86.11% for combination therapy (XIAO et al., 2024). Although the combination of strategies showed a higher reversal rate, there was no statistically significant difference in relation to the use of adenosine alone, indicating that it remains the most effective intervention in clinical practice.

In addition, studies comparing different vagal techniques have shown that the modified Valsalva maneuver is superior to standard Valsalva and carotid sinus massage, with a higher success rate and less need for medication (HUANG et al., 2022; IMMANUEL et al., 2025).

Other techniques, such as deep breathing in a declined position, showed similar efficacy, but without superiority over modified Valsalva (LIM et al., 2021).

In general, the results show that, although vagal maneuvers are recommended as the first line due to their safety and ease of application, their efficacy is limited. Adenosine, in turn, has a higher success rate in reversing sinus rhythm, consolidating itself as the most effective pharmacological treatment after failure of vagal maneuvers (ALABED et al., 2017; PAGE et al., 2016).

Table 1

Synthesis of the studies included in the integrative review on vagal maneuvers and adenosine in paroxysmal supraventricular tachycardia (PVRT)

Author/Year	Type of study	Sample	Intervention	Main results	Conclusion
BRUGADA et al. (2019)	Clinical guideline (ESC)	—	Management of PVT	Recommends vagal maneuvers such as first line and adenosine after failure	International standard of management
PAGE et al. (2016)	Clinical Guideline (AHA)	—	Management of PVT	Vagal maneuvers as an initial approach; adenosine as primary pharmacologic therapy	Basis of clinical management
APPELBOAM et al. (2015)	Randomized controlled trial	n = 433	Standard versus modified Valsalva	17% versus 43% (p < 0.001)	Most effective modified Valsalva
HUANG et al. (2022)	Meta-analysis	19 studies	Vagal maneuvers	Upper modified Valsalva (RR up to 5.47)	Best vagal technique
ABDULHAMID et al. (2021)	Systematic review	4 RCTs	Modified versus standard Valsalva	2.5 times more effective	Reduces adenosine use
IMMANUEL et al. (2025)	Network Analysis	n = 2545	Vagal techniques	Higher success rate	Best non-pharmacological strategy
LATIȘ et al. (2023)	Narrative review	—	Vagal maneuvers	Efficacy 19%–54%	Clinical limitations
LIM et al. (2021)	Randomized controlled trial	n = 41	Deep Breathing vs Modified Valsalva	31.6% vs 36.8%	No superiority
SMITH et al. (2015)	Cochrane review	n = 316	Vagal maneuvers	~19% Successful	Limited evidence
ALABED et al. (2017)	Cochrane review	n = 622	Adenosine vs BCC	~90% Successful	Standard therapy
BICILIOĞLU et al. (2020)	Clinical study	n = 30	Adenosine vs vagal	95.8% vs 38%	Adenosine Superior
KOTRUCHIN et al. (2022)	Clinical trial	—	Administration of adenosine	93–100%	High efficacy
DAENGBUBPHA et al. (2022)	Clinical trial	—	Adenosine Techniques	80–86,7%	Effective

ZOU et al. (2025)	Observational	—	Use of adenosine	80–90%	Underutilizatio n
XIAO et al. (2024)	Comparison	—	Valsalva versus adenosine versus combination	42% vs 75% vs 86%	Adenosine Superior
BRADY et al. (1996)	Clinical study	—	Vagal maneuvers versus adenosine	7–11% vs 69%	Adenosine Superior
PAN et al. (2024)	Clinical study	n = 15	Management of PVRT in pregnant women	Low response to vagal maneuvers	Need for pharmacologic therapy
LU et al. (2024)	Meta-analysis	n = 2527	Modified Valsalva	RR 1.8–2.0	High efficacy
LODEWYCKX; BERGS (2021)	Meta-analysis	—	Modified Valsalva	Higher success rate over standard technique	Confirms superiority

Source: Prepared by the authors (2026).

4 DISCUSSION

The findings of this integrative review show that, although vagal maneuvers are widely recommended as the first line in the management of paroxysmal supraventricular tachycardia (PVRT), their clinical effectiveness has important limitations when compared to adenosine. International guidelines consistently establish the initial use of these maneuvers in hemodynamically stable patients, mainly due to their safety profile, low cost, and easy applicability (BRUGADA et al., 2019; PAGE et al., 2016). However, the literature shows that this recommendation is more related to the safety of the method than to its therapeutic effectiveness, especially in real clinical scenarios (LATIȘ et al., 2023; SMITH et al., 2015).

The variability in the response to vagal maneuvers is one of the main points of discussion. Clinical studies and systematic reviews have shown relatively low success rates, often below 50%, and can reach even lower values in daily clinical practice (APPELBOAM et al., 2015; LATIȘ et al., 2023; SMITH et al., 2015). In this context, the introduction of the modified Valsalva maneuver represents a relevant advance, since studies such as REVERT have shown a significant increase in sinus rhythm reversal rates when compared to the traditional technique (APPELBOAM et al., 2015). Recent meta-analyses corroborate these findings, indicating that modified Valsalva is significantly more effective than other vagal maneuvers, in addition to reducing the need for pharmacological interventions (HUANG et al., 2022; ABDULHAMID et al., 2021; LU et al., 2024; IMMANUEL et al., 2025).

Despite these advances, the performance of vagal maneuvers remains inferior to that of adenosine. Comparative studies show that even with the use of modified Valsalva, success rates do not reach the levels observed with pharmacological therapies (XIAO et al., 2024). In

addition, other vagal techniques, such as deep breathing in a declined position, did not show significant superiority, reinforcing the global limitation of these strategies (LIM et al., 2021). Thus, although vagal maneuvers are useful as an initial approach, their effectiveness alone is restricted.

On the other hand, adenosine demonstrated consistently high efficacy among the different types of studies analyzed. Clinical trials, systematic reviews, and meta-analyses indicate reversal rates above 80–90%, and can reach values close to 100% in certain clinical contexts (ALABED et al., 2017; BICILIOĞLU et al., 2020; KOTRUCHIN et al., 2022; DAENGBUBPHA et al., 2022; ZOU et al., 2025). These findings are reinforced by clinical studies that demonstrate clear superiority of adenosine over vagal maneuvers, with significant differences in therapeutic success rates (BICILIOĞLU et al., 2020; BRADY et al., 1996).

Direct comparison between therapeutic strategies confirms this superiority. Recent studies have shown that adenosine has significantly higher rates of sinus rhythm reversal when compared to vagal maneuvers, even when the latter are performed in an optimized way (XIAO et al., 2024). Although the combination of vagal maneuvers and adenosine has demonstrated even higher success rates, there is no consistent evidence of statistically significant superiority over the use of adenosine alone, which reinforces its role as the main therapeutic intervention after failure of non-pharmacological strategies.

Another relevant aspect refers to the clinical applicability of the interventions. Vagal maneuvers have clear advantages, such as lack of costs, easy execution, and low risk of complications, being particularly useful in environments with limited resources (BRUGADA et al., 2019; PAGE et al., 2016). However, their reduced clinical performance may result in delayed sinus rhythm reversal, prolonging symptoms and potentially impacting the patient's prognosis. On the other hand, adenosine, despite its high efficacy, can cause transient adverse effects, such as feelings of imminent death, dyspnea, and chest discomfort, in addition to requiring monitoring during its administration (ALABED et al., 2017; ZOU et al., 2025). Still, such effects are generally self-limiting, not compromising its overall security profile.

Thus, the findings of this review indicate that vagal maneuvers should be maintained as the initial approach in the management of PVT, as recommended by international guidelines, especially due to their safety and ease of application. However, its limited effectiveness reinforces the need for rapid progression to pharmacological therapy in cases of failure. Adenosine, in turn, has consistent superiority in terms of efficacy, consolidating itself as the treatment of choice in clinical practice. The modified Valsalva maneuver

represents a relevant advance in the context of non-pharmacological interventions; however, it has not yet been shown to be effective enough to replace adenosine in reversing sinus rhythm.

5 CONCLUSION

The present integrative review showed that vagal maneuvers, although recommended as the first line in the management of paroxysmal supraventricular tachycardia (PSRT) due to their safety, low cost, and easy applicability, have limited efficacy in reversing sinus rhythm. The introduction of the modified Valsalva maneuver represents a relevant advance, with a significant increase in success rates, but still lower than that observed with pharmacological interventions.

Adenosine has demonstrated high efficacy and rapid action, consolidating itself as the main therapeutic strategy after failure of vagal maneuvers, with consistently higher reversal rates and an adequate safety profile. The comparison between the approaches confirms the superiority of adenosine, although vagal maneuvers maintain an important role as an initial intervention.

Thus, it is concluded that the management of PVRT should follow a staggered approach, starting with vagal maneuvers, preferably modified Valsalva, and progressing to the use of adenosine in cases of failure. The integration of these strategies contributes to treatment optimization and evidence-based clinical practice.

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