RCMOS – Revista Científica Multidisciplinar O Saber.
ISSN: 2675-9128. São Paulo - SP.
Ano VII, v.1 2026 | submissão: 20/06/2026 | aceito: 23/06/2026 | publicação: 26/06/2026

Early Tracheostomy in the Severely Burned Patient: A Systematic Review

Traqueostomia precoce em pacientes com queimaduras graves: uma revisão sistemática
Traqueostomía temprana en pacientes con quemaduras graves: una revisión sistemática

Douglas da Silva Fernandes – Secretary of Health of the Federal District Government, douglasmedescs@gmail.com - https://orcid.org/0009-0006-0498-7254
Alexandre de Almeida Lima – Secretary of Health of the Federal District Government, https://orcid.org/0000-0002-5794-7137

Abstract:
Introduction: The treatment of patients with extensive burns remains a major challenge in intensive care medicine, requiring specific strategies due to the clinical severity and high risk of complications. Among the possible interventions, early tracheostomy has been discussed as an alternative to optimize ventilatory support in such cases. Objective: To review the published literature on clinical studies of early tracheostomy in severely burned patients, assessing its impact on the duration of mechanical ventilation, incidence of ventilator-associated pneumonia, length of ICU stay and mortality. Methodology: A systematic literature review was conducted according to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines. The search was performed in the PubMed, Embase, and Web of Science databases, covering publications from the last 10 years. Data extraction was carried out independently by two reviewers, with disagreements resolved by consensus. The findings were organized and presented in a descriptive and comparative manner to synthesize the available evidence on the clinical impacts of early tracheostomy in burn patients. Results: The initial search yielded 99 articles in PubMed, 30 in Embase, and 329 in Web of Science. After applying the inclusion and exclusion criteria, 11 articles were selected from the databases. To increase the robustness of the sample, the bibliographic references of the included studies were also examined, which allowed the identification and inclusion of five additional articles relevant to the topic, totaling 16 studies selected for the systematic review. Most studies indicated that early tracheostomy is more common in patients with greater clinical severity, but is not associated with increased mortality. Findings regarding the duration of mechanical ventilation are contradictory. Regarding ventilator-associated pneumonia, the results remain inconclusive. The impact on length of stay in the Intensive Care Unit also varied, with some studies suggesting earlier discharge. Conclusion: Early tracheostomy may be safe and potentially beneficial under certain clinical conditions, but its indication should be individualized and based on objective criteria such as burn extent, presence of inhalation injury, and anticipated need for prolonged mechanical ventilation.

Keywords:
Tracheostomy. Burns. Respiratory Insufficiency. Respiration, Artificial. Critical Care.

Resumo:
Introdução: O tratamento de pacientes com queimaduras extensas permanece um grande desafio na medicina intensiva, exigindo estratégias específicas devido à gravidade clínica e ao elevado risco de complicações. Entre as possíveis intervenções, a traqueostomia precoce tem sido discutida como uma alternativa para otimizar o suporte ventilatório nesses casos. Objetivo: Revisar a literatura publicada sobre estudos clínicos de traqueostomia precoce em pacientes com queimaduras graves, avaliando seu impacto na duração da ventilação mecânica, incidência de pneumonia associada à ventilação mecânica, tempo de permanência na unidade de terapia intensiva e mortalidade. Metodologia: Foi realizada uma revisão sistemática da literatura de acordo com as diretrizes PRISMA. A busca foi realizada nas bases de dados PubMed, Embase

e Web of Science, abrangendo publicações dos últimos 10 anos. A extração dos dados foi realizada independentemente por dois revisores, com divergências resolvidas por consenso. Os achados foram organizados e apresentados de forma descritiva e comparativa para sintetizar as evidências disponíveis sobre os impactos clínicos da traqueostomia precoce em pacientes queimados. Resultados: A busca inicial identificou 99 artigos na PubMed, 30 na Embase e 329 na Web of Science. Após a aplicação dos critérios de inclusão e exclusão, 11 artigos foram selecionados nas bases de dados. Para aumentar a robustez da amostra, as referências bibliográficas dos estudos incluídos também foram examinadas, permitindo a identificação e inclusão de cinco artigos adicionais relevantes, totalizando 16 estudos selecionados para a revisão sistemática. A maioria dos estudos indicou que a traqueostomia precoce é mais comum em pacientes com maior gravidade clínica, mas não está associada ao aumento da mortalidade. Os achados sobre a duração da ventilação mecânica são contraditórios. Em relação à pneumonia associada à ventilação mecânica, os resultados permanecem inconclusivos. O impacto sobre o tempo de permanência na unidade de terapia intensiva também variou, com alguns estudos sugerindo alta mais precoce. Conclusão: A traqueostomia precoce pode ser segura e potencialmente benéfica em determinadas condições clínicas, mas sua indicação deve ser individualizada e baseada em critérios objetivos, como extensão da queimadura, presença de lesão por inalação e necessidade prevista de ventilação mecânica prolongada.

Palavras-chave:
Traqueostomia. Queimaduras. Insuficiência Respiratória. Respiração Artificial. Cuidados Intensivos.

Resumen:
Introducción: El tratamiento de los pacientes con quemaduras extensas sigue siendo un gran desafío en la medicina intensiva, requiriendo estrategias específicas debido a la gravedad clínica y al alto riesgo de complicaciones. Entre las posibles intervenciones, la traqueostomía temprana ha sido discutida como una alternativa para optimizar el soporte ventilatorio en estos casos. Objetivo: Revisar la literatura publicada sobre estudios clínicos de traqueostomía temprana en pacientes con quemaduras graves, evaluando su impacto en la duración de la ventilación mecánica, la incidencia de neumonía asociada al ventilador, la estancia en la unidad de cuidados intensivos y la mortalidad. Metodología: Se realizó una revisión sistemática de la literatura de acuerdo con las directrices PRISMA. La búsqueda se llevó a cabo en las bases de datos PubMed, Embase y Web of Science, abarcando publicaciones de los últimos diez años. La extracción de datos fue realizada de forma independiente por dos revisores, resolviendo las discrepancias por consenso. Los hallazgos fueron organizados y presentados de forma descriptiva y comparativa para sintetizar la evidencia disponible sobre los impactos clínicos de la traqueostomía temprana en pacientes con quemaduras. Resultados: La búsqueda inicial identificó 99 artículos en PubMed, 30 en Embase y 329 en Web of Science. Tras aplicar los criterios de inclusión y exclusión, se seleccionaron 11 artículos de las bases de datos. Para aumentar la solidez de la muestra, también se examinaron las referencias bibliográficas de los estudios incluidos, lo que permitió identificar e incorporar cinco artículos adicionales relevantes, totalizando 16 estudios seleccionados para la revisión sistemática. La mayoría de los estudios indicó que la traqueostomía temprana es más frecuente en pacientes con mayor gravedad clínica, pero no se asocia con un aumento de la mortalidad. Los hallazgos sobre la duración de la ventilación mecánica son contradictorios. En cuanto a la neumonía asociada al ventilador, los resultados siguen siendo inconclusos. El impacto sobre la estancia en la unidad de cuidados intensivos también fue variable, con algunos estudios que sugieren un alta más temprana. Conclusión: La traqueostomía temprana puede ser segura y potencialmente beneficiosa en determinadas condiciones clínicas, pero su indicación debe individualizarse y basarse en criterios objetivos,

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como la extensión de la quemadura, la presencia de lesión por inhalación y la necesidad prevista de ventilación mecánica prolongada.

Palabras clave:
Traqueostomía. Quemaduras. Insuficiencia Respiratoria. Respiración Artificial. Cuidados Intensivos.

Introduction

The treatment of patients with extensive burn injuries remains one of the greatest challenges faced in intensive medicine, requiring multidisciplinary approaches to manage the various complications that arise during hospitalization. Cheng et al.[1] emphasize that although modern advances in burn care have significantly reduced mortality, treating patients with extensive burns continues to be a major global challenge, especially due to the scarcity of autologous skin and the high risk of complications. Patients with burns affecting 30% or more of the total body surface area represent about 10% of cases but show considerably higher mortality rates.

According to Dolp et al.[2], prolonged hospital stay in burn patients is a poor prognostic factor for patient well-being and overall outcomes. In this regard, Cheng et al.[1] emphasize the importance of understanding the epidemiological characteristics and risk factors that influence the prognosis of severely burned patients, focusing in this study on the clinical outcomes of early tracheostomy. It is noted that these patients often require prolonged ventilatory support due to smoke inhalation, upper airway obstruction, and an exacerbated systemic inflammatory response.[3] In this context, the indication and optimal timing for performing a tracheostomy become critical aspects of clinical management.

Smailes et al.[3] state that early tracheostomy, performed within the first 10 days of hospitalization in critically ill patients in general, is associated with reduced sedation time, more ventilator-free days, shorter ICU length of stay, and lower mortality, although the level of evidence is still considered moderate. However, in severely burned patients, the benefits of early tracheostomy are not yet fully understood. In this sense, the study is relevant because it addresses an important gap in the literature regarding the management of severely burned patients, specifically with respect to the impact of early tracheostomy on clinical outcomes, allowing this review to gather what different researchers have found on the subject.

In this context, the study aims to review the published literature on the clinical outcomes of early tracheostomy in severely burned patients, assessing its impact on the duration of

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mechanical ventilation, the incidence of ventilator-associated pneumonia, ICU length of stay, and mortality.

Methodology

A systematic literature review was conducted following the *Preferred Reporting Items for Systematic Reviews and Meta-Analyses* (PRISMA) guidelines. This systematic review was prospectively registered in the PROSPERO database under the registration number CRD420251252183.

The search for articles was performed in the PubMed, Embase, and Web of Science databases, covering publications from the past 10 years. The following controlled descriptors, based on the MeSH and DeCS vocabularies, were used: Tracheostomy, Burns, Respiratory Insufficiency, Respiration, Artificial, and Critical Care, combined using Boolean operators to refine the results and ensure the thematic breadth of the research. In addition to the automated search, a manual review of the reference lists of the selected articles was carried out, allowing the inclusion of additional relevant studies.

The inclusion criteria consisted of studies published between 2014 and 2024, in English, Portuguese, or Spanish, involving adult patients (18 years or older) classified as severely burned, defined as those with burns affecting 20% or more of the total body surface area. Regarding the type of publication, clinical trials, cohort studies (prospective and retrospective), and meta-analyses were included.

Studies conducted with pediatric populations were excluded, as well as those that did not distinguish between the effects of early and late tracheostomy, those that did not present clinical outcomes relevant to the research, and those classified as narrative reviews, letters to the editor, case reports, or that were not available in full-text format. The selection of studies followed the PICOS strategy presented in Table 1:

Table 1. PICOS Strategy

P (Population)	Adult patients (>18 years) with severe burns (≥20% of total body surface area burned).
I (Intervention)	Early tracheostomy performed within the first 7 days of mechanical ventilation.
C (Comparison)	Late tracheostomy (>7 days) or prolonged intubation.

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O (Outcome)	Duration of mechanical ventilation, incidence of ventilator-associated pneumonia, ICU length of stay, and mortality.
S (Study Type)	Clinical trials, cohort studies, retrospective studies, and meta-analyses.

As shown, the intervention of interest was early tracheostomy, performed within the first 7 days of mechanical ventilation, and it was compared with late tracheostomy (after 7 days) or prolonged intubation. The clinical outcomes analyzed included the duration of mechanical ventilation, the incidence of ventilator-associated pneumonia (VAP), ICU length of stay, and mortality.

Data extraction was carried out independently by two reviewers, with disagreements resolved by consensus. Information was collected on authors, year of publication, study design, population characteristics, type and timing of tracheostomy, clinical outcomes evaluated, and main results. The data were organized and presented in a descriptive and comparative manner in order to synthesize the existing evidence on the clinical impacts of early tracheostomy in severely burned patients.

Results and Discussion

The initial search resulted in 99 articles in the PubMed database, 30 in Embase, and 329 in Web of Science (Figure 1).

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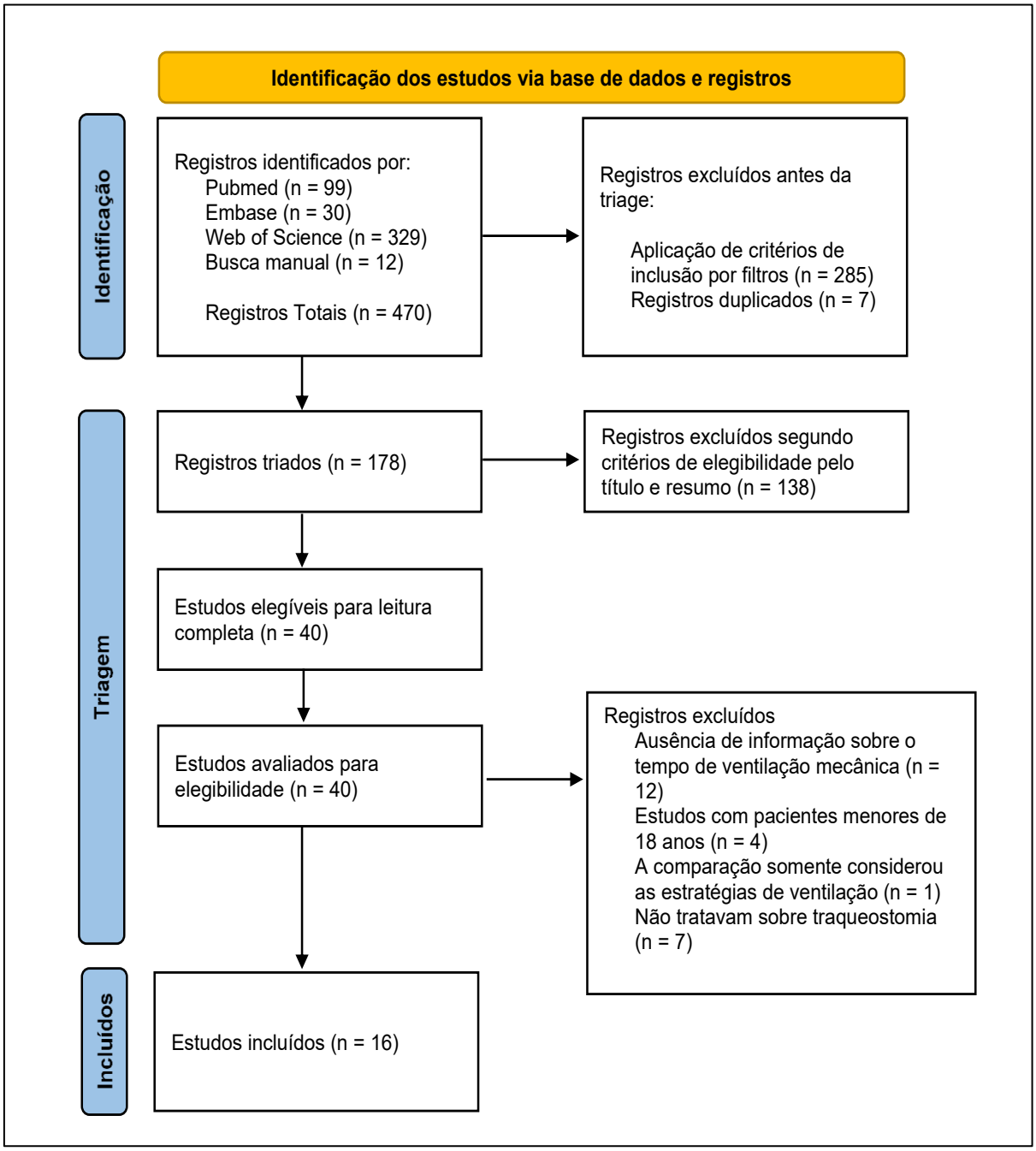
Figure 1. PRISMA Flowchart[4]



After applying the filters and eligibility criteria, 33 articles remained in PubMed, of which 7 were selected for full-text reading, resulting in 4 included studies. In Embase, 13 studies were initially considered, with 6 selected for full reading; after exclusions due to duplication, pediatric populations, and lack of full-text access, 2 studies were included. In Web of Science, 127 articles met the initial criteria, 12 were selected for full-text review, and

ultimately 5 studies were included. To increase the robustness of the sample, the reference lists of the included studies were also examined, which allowed the identification and inclusion of 5 additional relevant articles, totaling 16 studies selected for the systematic review.

Early Tracheostomy in Severely Burned Patients

Wang et al.[5] described the epidemiology of patients with severe burns admitted to a burn intensive care unit, identified risk factors associated with patient outcomes, and evaluated the effectiveness of different prognostic scoring systems in predicting mortality. The authors addressed tracheostomy in their study, highlighting that 95 of the 243 patients analyzed, that is, 39,1%, underwent the procedure. Among patients with inhalation injury, totaling 168 individuals, the percentage who underwent tracheostomy was even higher, reaching 53,89%. Furthermore, the authors observed a growing trend in the number of tracheostomies performed from 2015 to 2019, with rates increasing from 21,6% in 2015 to 60,4% in 2019. This rise suggests a greater adoption of the procedure as part of the management of patients with severe burns and inhalation injury.

Mourelo et al.[6] conducted a retrospective study to evaluate the use and clinical impact of tracheostomy in burn patients. They analyzed 20 patients who underwent tracheostomy in a burn unit between 1995 and 2013, comparing them with a control group that received orotracheal intubation. The main indication for tracheostomy was the need for prolonged mechanical ventilation, with the procedure performed on average 24,6 days after admission. Thirteen patients were successfully decannulated, and one fatal complication occurred. Patients with tracheostomy had significantly longer durations of mechanical ventilation (43,2 vs. 20,4 days), longer weaning times from the ventilator (15,7 vs. 3,3 days), and longer hospital stays (99,1 vs. 53,1 days), with no differences in sedation time. There was no significant difference in respiratory infection rates (30,0% vs. 31,6%) or mortality (30,0% vs. 42,1%) between the groups.

The study by Ziegler et al.[7] evaluated initial clinical practice in the management of patients with severe burns in major specialized centers in Germany, Austria, and Switzerland, given the absence of standardized guidelines. To do so, the authors sent a questionnaire with 57 questions to 22 burn treatment centers, of which 17 (77%) responded. Regarding tracheostomy, the study identified it as one of the most controversial topics in the initial management of burn injuries. Equipment and staff to perform primary tracheostomy were available in 94% of the centers. The most frequent indications for primary tracheostomy

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included: inadequate oral intubation (88%); anticipated need for prolonged ventilation (29%); and deep scald burns to the neck with expected edema (5%). In addition, bronchoscopy in cases of suspected inhalation injury was routinely performed in 82% of the centers, and 76% had defined criteria for the safe management of the airway (such as decreased level of consciousness, visible airway edema, and suspected inhalation injury).

The study by Chung et al.[8] analyzed the management of tracheostomy in burn patients in specialized centers across North America. Their results indicated that 55% of the centers performed tracheostomy after two weeks of mechanical ventilation, demonstrating a tendency toward late tracheostomy. However, all centers (46/46) reported performing early tracheostomy in specific clinical situations, such as in cases of severe traumatic brain injury and when prolonged mechanical ventilation was anticipated. Additional criteria for indicating tracheostomy included burn extent (%TBSA), involvement of the face and neck, number of extubation attempts, and fluid resuscitation status. Furthermore, 90% of the centers (41/46) consulted burn surgeons for tracheostomy indication, and 78% (36/46) performed the procedure in the operating room rather than at the bedside, demonstrating technical and organizational care in the management of these patients.

Saquib et al.[9] described United States practice patterns for tracheostomy in critically burned patients, highlighting the influence of %TBSA and the presence of inhalation injury on the timing of tracheostomy. The main indication for tracheostomy was the need for prolonged mechanical ventilation. Patients with burns involving more than 20% of the body were more likely to receive early tracheostomy (0–7 days) (40%), whereas those with smaller burns (<20% TBSA) and inhalation injury more frequently received late tracheostomy (49% after 8 days or more). However, 35% of surgeons did not adopt a standard timing for performing the procedure, regardless of TBSA.

Galicia et al.[10] analyzed data from 714 burn patients, of whom 5,5% underwent tracheostomy. The objective was to compare long-term self-reported outcomes between patients with and without tracheostomy, using information collected at 6, 12, and 24 months after discharge. Variables assessed included quality of life (VR-12), life satisfaction, community integration, employment status, and time to return to work. The authors applied regression models and propensity-score matching analyses. The results showed that, among all evaluated outcomes, only the physical VR-12 score at 24 months was significantly worse among patients who had undergone tracheostomy. For the remaining indicators, including psychological, social, and work-related aspects, no significant differences were found between the groups.

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The study by Tsuchiya et al.[11] analyzed 680 adult patients with severe burns who began mechanical ventilation within the first three days of hospitalization. Among the patients who underwent tracheostomy, only 36,2% received the procedure early, that is, between days 5 and 10 of hospitalization. The median time to tracheostomy was 13 days (interquartile range 9 to 18 days), indicating that most procedures were performed late. Patients who underwent early tracheostomy were generally those with greater clinical severity, particularly those with inhalation injury and hemodynamic instability, suggesting that the decision was guided by the anticipated need for prolonged mechanical ventilation, difficulty in maintaining prolonged oral intubation, and the need for secure airway control.

In the study by Smailes et al.,[3] 41 severely burned patients were divided into two groups: early tracheostomy (≤ 10 days, n=19) and late tracheostomy (> 10 days, n=22). The decision for early tracheostomy involved patients with deep full-thickness burns affecting more than 30% of the total body surface area, or patients with significant comorbidities indicating a likelihood of prolonged mechanical ventilation. The early group had a higher frequency of smoke inhalation injury (73,7% vs 36,3%, p=0.018).

In the study by Ruiz et al.,[12] 33 burn patients with inhalation injury were analyzed, of whom 10 underwent early tracheostomy, performed within the first two weeks after the injury, with a median of 7,5 days to the procedure. No statistically significant difference was observed in the extent of total body surface area burned between the groups with and without tracheostomy. The authors also state that tracheostomy is generally indicated when prolonged mechanical ventilation is expected in patients with respiratory failure. In the case of patients with smoke inhalation injury, early tracheostomy aims to facilitate ventilator weaning, reduce respiratory dead space, airway resistance, respiratory workload, and the need for sedation, as well as improve patient comfort and safety.

In the study by Janik et al.,[13] 433 patients with second- and third-degree burns were analyzed, of whom 134 (30,9%) underwent tracheostomy, generally performed early, with a mean of 1,4 ± 3,8 days after hospital admission. Early tracheostomy was more common among patients with greater burn severity, with a mean ABSI score of 8,9 compared to 6,0 in the others, greater total body surface area burned (TBSA of 41,4% versus 18,6%), and a higher incidence of inhalation injury (26,1% versus 7%). Even among high-risk patients, tracheostomy was considered a safe practice. In addition, the authors developed a predictive nomogram to assist in decision-making regarding tracheostomy, based on variables such as age, TBSA, and the presence of inhalation injury.

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Smailes et al.[14] recommend early tracheostomy (< 7 days) for major burn patients without cervical burns, as a strategy to reduce the risk of dysphagia and facilitate ventilator weaning. For patients with neck burns, they indicate that tracheostomy should be performed only after complete graft adherence (at least 10 days after the autologous graft), to prevent infection at the stoma site.

A similar result was also reported by Andriolo et al.[15], who emphasized that early tracheostomy, performed within 10 days after endotracheal intubation, provides important benefits for critically ill patients requiring prolonged mechanical ventilation. In contrast, Cheung and Napolitano[16] recommend waiting at least 10 days after intubation to confirm the ongoing need for mechanical ventilation before performing tracheostomy, suggesting a more cautious approach regarding its timing.

The study by Diaz-Prieto et al.[17] investigated the potential benefits of early tracheostomy (performed before the eighth day of mechanical ventilation) compared with late tracheostomy (from the 14th day onward, if still indicated). This was a randomized clinical trial including 489 ICU patients who required mechanical ventilation for seven days or more. The main results showed no significant difference in 90-day mortality between the early and late groups. However, patients who underwent early tracheostomy demonstrated a reduction in sedation time (median of 11 days in the early group versus 14 days in the late group). The authors observed that the early tracheostomy group had more ventilator-free days, shorter sedation duration, and shorter ICU length of stay compared with the late group. Based on these findings, they concluded that early tracheostomy may reduce sedation time and, in carefully selected patients, may also decrease the duration of mechanical ventilation and hospitalization. Nonetheless, they emphasize the difficulty clinicians face in predicting which patients will truly require prolonged ventilation, which may limit the benefits of early indication.

Impacts of early tracheostomy on mechanical ventilation duration

Early tracheostomy may facilitate ventilator weaning and allow for reduced sedation requirements, in addition to supporting early rehabilitation.[14] Tsuchiya et al.[11] observed that liberation from mechanical ventilation by the 28th day of hospitalization was significantly lower among tracheostomized patients (38,3%) compared with those who did not undergo the procedure (62,5%). Ruiz et al.[12] also reported that patients who underwent tracheostomy had a significantly longer duration of ventilator use, with a mean of 20,8 days, in contrast to the 2,5 days recorded in the group without tracheostomy.

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These results, at first glance, suggest a negative impact of tracheostomy on ventilation duration. However, when considering the clinical profile of the patients, it becomes clear that the group that underwent tracheostomy presented greater severity, including a higher incidence of inhalation injury, need for vasopressors, and blood transfusion. These factors may have contributed both to the indication for tracheostomy and to the prolonged duration of ventilation, making it difficult to establish a direct causal relationship.

Smailes et al.[3] found that early tracheostomy was associated with a significant reduction in mechanical ventilation time: a median of 16 days (95% CI: 11.8 – 28.7) in the early group versus 33 days (27 – 45.1) in the late group (p=0.001). This demonstrates that early tracheostomy may accelerate the discontinuation of ventilatory support in severely burned patients.

In the study by Mourelo et al.[6], it was found that tracheostomized patients required mechanical ventilation for a significantly longer period compared to the control group (43.2 days versus 20.4 days). They also had a longer ventilator weaning time (15.7 days versus 3.3 days) and a longer hospital stay (99.1 days versus 53.1 days). The authors concluded that tracheostomy can be considered a safe procedure in severely burned patients, as it was not associated with increased mortality or respiratory infections, despite being linked to longer durations of mechanical ventilation and hospitalization, factors that likely reflect the severity of the patients' clinical condition rather than a direct effect of the tracheostomy.

Impacts of early tracheostomy on the incidence of ventilator-associated pneumonia

Regarding the incidence of ventilator-associated pneumonia, the findings of Andrioli et al.[18] were varied, with a general trend toward a lower occurrence of pneumonia in patients who underwent early tracheostomy. However, the heterogeneity of the data and the divergent results of some studies indicate that this reduction is not conclusive for all groups analyzed.

In the study by Ruiz et al.[12], the incidence of ventilator-associated pneumonia (VAP) was significantly higher in the group of patients who underwent tracheostomy compared with the group that did not undergo the procedure. Specifically, 6 cases of VAP were recorded in the tracheostomy group (group 1), while no cases were observed in the non-tracheostomy group (group 2). This difference was statistically significant, with a p-value of 0,0001 (chi-square test), indicating a clear association between tracheostomy and increased pneumonia incidence in this study.

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A different result was found by Szakmany et al.[19], who did not identify a significant difference in the incidence of pneumonia between the early and late tracheostomy groups. This means that, according to the data analyzed, performing tracheostomy before or after 10 days did not influence the occurrence of VAP.

Impacts of early tracheostomy on ICU length of stay

Regarding ICU length of stay, early tracheostomy has been associated with a higher discharge rate from the unit by the 28th day, indicating that these patients have a greater likelihood of earlier ICU discharge, which may reflect better clinical progression and a shorter ICU stay.[15]

Ruiz et al.[12] found that both hospital length of stay and ICU length of stay were significantly greater in patients who underwent tracheostomy compared with those who did not. The tracheostomy group had a mean hospital stay of 28,4 days, while the non-tracheostomy group had a mean of 5,26 days, with this difference being statistically significant (p = 0,0001, chi-square test). Regarding ICU stay, the tracheostomy group remained for an average of 23,8 days, significantly longer than the 3,16 days observed in the non-tracheostomy group (p = 0,0001, chi-square test).

According to the study conducted by Smailes et al.,3 there was a trend toward shorter ICU stay in the early tracheostomy group, with a median of 40 days (31 – 62.9) versus 53 days (40 – 80.1) in the late group, although this difference did not reach statistical significance (p=0.087). Regarding total hospital length of stay, the authors found that it was significantly shorter in the early group, with a median of 65 days (47.7 – 87.9) compared to 88 days (70 – 103.2) in the late group (p=0.018). This suggests a benefit of early tracheostomy in reducing hospitalization duration.

Impacts of early tracheostomy on patient mortality

The results of Andriolo et al.[15] showed a significant reduction in death rates in the group that received early tracheostomy, indicating that this strategy may be associated with better clinical outcomes in critically ill patients who require prolonged ventilation.

Tsuchiya et al.[11] compared person-day–adjusted mortality between patients who underwent early tracheostomy (performed between the 5th and 10th day of hospitalization) and those who did not undergo tracheostomy or received it later. The group that underwent early

tracheostomy presented a hazard ratio of 0.71 (95% CI: 0,40–1,26) when compared to the group without early tracheostomy. Although mortality was numerically lower in the early tracheostomy group, the difference was not statistically significant (p = 0,24).

According to Janik et al.[13], the results observed in their study, although showing that tracheostomized patients had a slightly higher crude mortality (24,4% versus 16,3%), did not reach statistical significance (p = 0,073). Thus, it was concluded that tracheostomy did not significantly increase hospital mortality.

Szakmany et al.[19] conducted a systematic review and meta-analysis to evaluate the effects of early tracheostomy (performed within 10 days of the start of mechanical ventilation) compared with late tracheostomy (after 10 days, if still necessary). The authors included 14 randomized clinical trials with a total of 2.406 patients. The study concluded that early tracheostomy did not reduce mortality up to 60 days, nor did it decrease the duration of mechanical ventilation, ICU stay, or the incidence of ventilator-associated pneumonia (VAP). However, it was found that early tracheostomy reduced sedation duration. The authors noted that, despite the reduction in sedation time, there was no significant benefit in other clinical outcomes evaluated.

Tracheostomy as prophylaxis

The use of tracheostomy as a prophylactic measure, although some studies have evaluated its potential to prevent complications associated with prolonged ventilation, remains inconclusive. The decision on the timing of tracheostomy should be individualized, taking into account the risks and benefits for each patient.[15]

The study by Aggarwal et al.[20] aimed to evaluate the effects of prophylactic tracheostomy in patients with inhalation burns at a tertiary burn center in India. The retrospective analysis included 10 patients with thermal burns and indirect evidence of airway injury, all with total body surface area (TBSA) burned below 60%. Patients were divided into two groups: those who consented to and underwent prophylactic tracheostomy (n = 4) and those who did not undergo the procedure (n = 6). Among the patients who underwent prophylactic tracheostomy, 75% survived (3 of 4), while 25% died (1 of 4). In the group that did not undergo the procedure, 66,7% died (4 of 6) and 33,3% survived (2 of 6). The mean TBSA was lower in the tracheostomy group (34%) compared with the non-tracheostomy group (42%). The mean age of patients in the tracheostomy group was 31,3 years, while in the non-tracheostomy group it was 36,2 years. The study reported no complications related to the tracheostomy procedure.

Final Considerations

Based on the literature review conducted, it was observed that early tracheostomy in severely burned patients has become an increasingly adopted practice in specialized centers, especially in the presence of inhalation injury and anticipated need for prolonged mechanical ventilation. The studies analyzed indicate that, although patients who undergo early tracheostomy generally present with greater clinical severity, performing the procedure is not significantly associated with increased hospital mortality.

Regarding the duration of mechanical ventilation, the findings are contradictory. While some studies indicate that early tracheostomy may contribute to a reduction in ventilation and sedation time, others report longer ventilatory support, reflecting the more critical profile of patients selected for the procedure. As for the incidence of ventilator-associated pneumonia, the results remain inconclusive, with studies showing both an increase and no difference between groups. Similarly, the impact on ICU length of stay varied across studies, although some data indicate a trend toward earlier discharge among patients who underwent early tracheostomy.

In light of this evidence, it can be concluded that early tracheostomy may be safe and potentially beneficial under certain clinical conditions, but its indication should be individualized and based on objective criteria such as burn extent, presence of inhalation injury, and anticipated need for prolonged ventilation.

Despite growing interest in the topic, the literature on clinical outcomes of early tracheostomy in severely burned patients remains scarce and is mostly composed of retrospective studies, with limited sample sizes and variable criteria for indication and timing of the procedure. This methodological limitation contributes to the heterogeneity of the results found. Such variability in findings makes it difficult to formulate standardized clinical recommendations and highlights the need for more prospective research with robust design and uniform criteria to more accurately assess the real impact of early tracheostomy on the clinical course of severely burned patients.

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