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Association between clinical complications and oropharyngeal dysphagia in elderly people hospitalized with trauma-orthopedic fractures

Associação entre complicações clínicas e disfagia orofaríngea em idosos hospitalizados com fraturas traumato-ortopédicas

Asociación entre complicaciones clínicas y disfagia orofaríngea en ancianos hospitalizados con fracturas trauma-ortopédicas

Guilherme Briczinski de Souza[1]
Carine Delevatti[1]
Geovana Pacheco[1]
Karoline Weber dos Santos[2]
Sheila Tamanini de Almeida[3]

Abstract

Introduction: Aging leads to pathophysiological changes that reduce functional capacity, increasing the risk of trauma, fractures and hospitalization. Dysphagia is common among the elderly and can

[1] Universidade Federal de Ciências da Saúde de Porto Alegre – UFCSPA, Porto Alegre, RS, Brazil.
[2] Hospital Cristo Redentor, Grupo Hospitalar Conceição, Porto Alegre, RS, Brazil.
[3] Universidade Federal de Ciências da Saúde de Porto Alegre – UFCSPA, Departamento de Fonoaudiologia, Porto Alegre, RS, Brazil.

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GBS: study design; methodology; data collection and draft of the article.
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KWS: study design; methodology; data collection; draft of the article; critical review and supervision.
STA: study design; methodology; critical review and supervision.

Email for correspondence: gbriczinski@gmail.com
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exacerbate existing comorbidities, as well as contribute to a worsening of the clinical condition during hospitalization. **Objective:** To analyze the clinical outcomes of elderly people hospitalized for trauma-orthopedic fractures in a public trauma hospital after surgical intervention and the association of these outcomes with the presence of dysphagia. **Method**: Retrospective cross-sectional study using a sample from a previous study with 229 individuals from a public trauma hospital. We reviewed 229 medical records in February 2020 to analyze the outcomes of death and post-surgical complications between groups of patients with and without dysphagia. **Results**: Among the outcomes, there was a significant difference, with a shorter time to surgery, a higher indication for antibiotic use, changes in food consistency, indication for enteral feeding, need for blood transfusion, occurrence of cardiorespiratory arrest, and post-surgical death in the group of elderly patients with dysphagia. In the survival analysis, individuals with dysphagia had lower survival, with a significant difference 30 days after the surgical procedure (4.65 times higher risk for individuals with dysphagia). **Conclusion**: Elderly patients hospitalized for traumatic orthopedic fractures with oropharyngeal dysphagia have a higher predisposition to post-operative complications and lower survival rates compared to those without dysphagia.

Keywords: Deglutition Disorders; Deglutition; Fractures, Bone; Frail Elderly; Survival Analysis.

Resumo

Introdução: O envelhecimento causa alterações fisiopatológicas que reduzem a capacidade funcional, aumentando o risco de traumas, fraturas e a hospitalização. A disfagia é comum entre idosos e pode potencializar outras comorbidades e associar-se à piora do quadro clínico na internação hospitalar. **Objetivo:** Analisar os desfechos clínicos de idosos internados por fraturas traumato-ortopédicas em um hospital público de trauma após a cirurgia traumato-ortopédica e a associação desses desfechos com a presença de disfagia. **Método**: Estudo transversal retrospectivo utilizando amostra de estudo anterior com 229 indivíduos de um hospital público de trauma. Foram revisados 229 prontuários em fevereiro de 2020 para analisar os desfechos clínicos entre grupos de pacientes com e sem disfagia. **Resultados**: Dentre os desfechos, houve diferença significativa, com menor tempo para a realização da cirurgia, maior indicação de uso de antibióticos, alteração na consistência alimentar, indicação de alimentação enteral, necessidade de transfusão sanguínea, ocorrência de parada cardiorrespiratória e óbito após a cirurgia no grupo de idosos com disfagia. Na análise de sobrevida, os indivíduos com disfagia apresentaram menor sobrevida, com diferença significativa 30 dias após o procedimento cirúrgico (diferença de 4,65 vezes maior para indivíduos com disfagia). **Conclusão**: Idosos internados por fraturas traumato-ortopédicas com disfagia orofaríngea apresentam maior predisposição a complicações pós-operatórias e menor taxa de sobrevida em comparação com aqueles sem disfagia.

Palavras-chave: Transtornos de deglutição; Deglutição; Fraturas ósseas; Idoso fragilizado; Análise de sobrevida.

Resumen

Introducción: El envejecimiento provoca cambios fisiopatológicos que reducen la capacidad funcional, aumentando el riesgo de traumatismos, fracturas y hospitalización. La disfagia es común entre los ancianos y puede exacerbar otras comorbilidades y asociarse con un empeoramiento del cuadro clínico durante el ingreso hospitalario. **Objetivo**: Analizar los resultados clínicos de pacientes ancianos hospitalizados por fracturas traumáticas ortopédicas en un hospital público de trauma después de cirugía trauma-ortopédica y la asociación de estos resultados con la presencia de disfagia. **Método**: Estudio transversal retrospectivo utilizando una muestra de un estudio anterior con 229 individuos de un hospital público de trauma. Revisamos 229 historias clínicas en febrero de 2020 para analizar los resultados de muerte y complicaciones postquirúrgicas entre grupos de pacientes con y sin disfagia. **Resultados**: Entre los resultados, hubo una diferencia significativa, con un menor tiempo para la realización de la cirugía, una mayor indicación del uso de antibióticos, cambios en la consistencia alimentaria, indicación de alimentación enteral, necesidad de transfusión de sangre, ocurrencia de paro cardiorrespiratorio y muerte posquirúrgica en el grupo de ancianos con disfagia. En el análisis de supervivencia, los

individuos con disfagia mostraron menor supervivencia, con una diferencia significativa 30 días después del procedimiento quirúrgico (riesgo 4,65 veces mayor para individuos con disfagia). **Conclusión**: Los ancianos hospitalizados por fracturas traumáticas ortopédicas con disfagia orofaríngea tienen una mayor predisposición a complicaciones postoperatorias y menor tasa de supervivencia en comparación con aquellos sin disfagia.

Palabras clave: Trastornos de Deglución; Deglución; Fracturas Óseas; Anciano Frágil; Análisis de Supervivencia.

Introduction

Senescence is a natural and individual process characterized by a progressive decline in the efficiency of organic functions and physical integrity[1]. This process results from cellular damage that compromises the functions of cells and tissues[1]. Throughout the aging process, various multifactorial pathologies associated with the natural aging process may arise, leading to what is known as senility. Cognitive disability, renal failure, iatrogenesis, and body immobility can be effects of senility[2]. One of the main causes of bodily immobility are falls and trauma-orthopedic fractures[3].

Healthy aging involves factors such as the prevention of falls and subsequent injuries, which are often manifestations of underlying health conditions. Cases of orthopedic trauma increase frailty in older adults, making them more susceptible to worsening of their clinical condition[4]. In case of hospitalization, elderly people with orthopedic trauma and multiple comorbidities may experience significant complications, especially after surgical procedures[5-6]. It is estimated that approximately 25% of older adults with orthopedic trauma die within one year after surgery[7].

During senescence, structural and functional changes occur in the oral cavity which, combined with other comorbidities, increase the risk of oropharyngeal dysphagia. This condition is characterized by difficulties in the swallowing process from the mouth to the stomach[8]. Among elderly people hospitalized for trauma-orthopedic fractures, previous studies have reported a prevalence of dysphagia between 5.3% and 64.2%[9–12].

The literature indicates that identifying individuals with dysphagia requires early diagnosis, with attention to the preoperative period[13]. Dysphagia combined with other comorbidities may predispose to reduced survival[14]. In this sense, the hypothesis of this study is that dysphagia, as a secondary symptom along with other comorbidities, may be associated with the worsening of clinical conditions during hospital admission for elderly people with traumatic fractures.

In this context, the present study aims to analyze the clinical outcomes of elderly people hospitalized due to trauma-orthopedic fractures in a public trauma hospital after surgical intervention and the association of these outcomes with the presence of dysphagia.

Methods

A retrospective cross-sectional study was conducted between February and October 2019 in a public trauma hospital. In February 2020, a review of clinical information was performed using data from a previous study[12] to analyze clinical outcomes following surgical intervention. The present study was approved by the institution's Research Ethics Committee under number 3,125,527. All individuals who participated in the study signed the Informed Consent Form.

The sample size was estimated, for the previous study[12], based on the average number of individuals hospitalized by the trauma-orthopedics team over the last three years (N=3180). A maximum proportion of 20% of individuals meeting the eligibility criteria was established, with a sampling error of 5% and a confidence interval of 95%. This calculation indicated the need for 229 participants to adequately represent the study population.

Inclusion criteria required participants to be aged 65 years or older, of both sexes, hospitalized for trauma-orthopedic fractures, who did not undergo surgery during this hospitalization and who were able to respond to verbal commands. Exclusion criteria included individuals with maxillofacial fractures and those discharged from the intensive care unit (ICU) during the hospitalization.

The study assessed 1,324 individuals for eligibility. A total of 1,082 individuals were excluded for not meeting the inclusion criteria, including

being below the required age (1.038), undergoing surgery during another hospitalization (32), and being unable to respond to verbal commands (12). A total of 242 individuals met the inclusion criteria, but 13 were excluded for the following reasons: transfer to another hospital (4), hospital discharge (3), transfer to the ICU (3), death before the evaluation (1), and refusal to participate in the study (2). The study sample consisted of 229 elderly people from a public trauma hospital.

Data collection was conducted using information from medical records and a questionnaire specifically developed for this study. The questionnaire was completed simultaneously by two evaluators who were blinded to the patients' swallowing conditions. The diagnosis of swallowing disorders was conducted in a previous study[12] by speech-language pathologists. The timing for conducting the swallowing assessment varied according to several factors, such as the patient's clinical progression, the complexity of their medical condition, their availability to participate in the assessment, and the research team's availability to perform it. These variables were carefully considered to ensure that the evaluations were conducted under optimal conditions, enabling accurate diagnosis. Consequently, in some cases, the assessment was performed before surgery, while in others, it took place after the surgical procedure.

In the questionnaire, data from medical records were collected and categorized into two groups: sample characterization (age, sex, ethnicity, education, average family income in minimum wages, trauma history, and bone fractures leading to hospitalization) and clinical outcomes after surgical intervention. The clinical outcomes analyzed included: days to surgery from hospital admission, time spent in the post-anesthesia recovery room, total hospitalization duration, ICU stay, and duration of mechanical ventilation. Qualitative variables gathered included the use of sedative medications postoperatively, antibiotic use, modification of food consistencies due to deterioration in oral or cognitive function, enteral feeding recommendation, tracheostomy, ICU admission, respiratory complications, mechanical ventilation use, need for blood transfusion, sepsis, delirium, surgical site infections, readmission within 3 to 6 months post-discharge, and cardiorespiratory arrest.

Dysphagia is often not reported at the time of hospital admission. In our study, oropharyngeal dysphagia was identified only after the speech therapy evaluation. Participants were classified into groups with and without dysphagia based on their risk levels for swallowing efficiency and safety. Among the sample, 147 elderly individuals (64.2%) were found to be at risk for impaired swallowing efficacy and safety and were classified as having swallowing disorders. This classification was determined using the Volume-Viscosity Swallow Test (V-VST)[15], conducted by speech-language pathologists.

The Volume-Viscosity Swallow Test (V-VST)[15] is a protocol used to identify patients with dysphagia who are at risk of respiratory and nutritional complications. Validated in individuals with swallowing disorders, the V-VST is not restricted to a specific population, which expands its clinical applicability. In addition to being easy to administer, the protocol demonstrated a sensitivity of 88.2% and a specificity of 64.7%, highlighting its effectiveness in detecting risks associated with dysphagia[16,17].

Data were organized and analyzed using SPSS v.22 software (Chicago:SPSS Inc). The distribution of primary data was assessed using the Kolmogorov-Smirnov test. Comparisons between individuals with and without swallowing disorders were conducted. For associations between clinical evolution indicators and dysphagia, the Student's t-test (described based on mean ± standard deviation), Fisher's exact test, and chi-square test (described based on absolute and relative frequency) were employed. For survival analysis, the Kaplan-Meier estimator was used, dividing the follow-up period into intervals corresponding to the time of death occurrence after the surgical procedure. The Log Rank test was applied to compare groups in univariate analysis, considering a 95% confidence interval at a significance level of 5%.

Results

The final sample of this study consisted of 229 patients, with a mean age of 77.9 ±8.21 years. Table 1 shows the sociodemographic and clinical characteristics of the sample.

Table 2 presents the results of the time variables. It was observed that there was a significant difference in the time taken to perform the surgery in the group of elderly people with dysphagia ($p < 0.05$). Patients with swallowing disorders had a shorter hospital stay prior to the procedure. However, there was no difference between the groups regarding time spent in the recovery room or the total length of hospital stay.

Table 1. Sociodemographic and clinical characteristics of the sample

Variable	N (%)	With dysphagia	Without dysphagia
Total sample	229 (100%)	147 (64.19)	82 (35.81)
Sex			
Male	49 (21.4)	26 (53.06)	23 (46.94)
Female	180 (78.6)	121 (67.22)	59 (32.78)
Ethnicity			
White	174 (76.0)	111 (63.79)	63 (36.21)
Black	12 (5.2)	7 (58.33)	5 (41.67)
Brown-skinned	43 (18.8)	29 (67.44)	14 (32.56)
Educational Level			
Illiterate	22 (9.6)	15 (68.18)	7.(31.82)
Elementary school	142 (62.0)	98 (69.01)	44 (30.99)
High school	47 (20.5)	25 (53.19)	22 (46.81)
College	18 (7.8)	9 (50.00)	9 (50.00)
Family income**			
Not provided	5 (2.2)	3 (60.00)	2 (40.00)
Up to 1 minimum wage	58 (25.3)	37 (63.79)	21 (36.21)
1 to 2 minimum wages	54 (23.6)	30 (55.56)	24 (44.44)
2 to 3 minimum wages	56 (24.5)	37 (66.07)	19 (33.93)
3 to 4 minimum wages	40 (17.5)	34 (85.00)	6 (15)
5 to 10 minimum wages	16 (7.0)	6 (37.50)	10 (62.50)
Trauma history			
Fall from own height	191 (83.4)	125 (65.45)	66 (34.55)
Fall from stairs/bed/walker/roof	30 (13.1)	17 (56.67)	13 (43.33)
Traffic accidents	8 (3.5)	5 (62.50)	3 (37.50)
Kind of fracture			
Femur	128 (55.9)	84 (65.63)	44 (34.38)
Radius/Ulna/Humerus	52 (22.7)	29 (55.77)	23 (44.23)
Fibula/Tibia/Patella	31 (13.5)	19 (61.29)	12 (38.71)
Hip	15 (6.6)	13 (86.67)	2 (13.33)
Femur + Radius/Ulna/Humerus	3 (1.3)	3 (100)	1 (0)

Kolmogorov-Smirnov test; Student's t-test; n=absolute frequency; %=percentage relative frequency; *p<0,05;
**minimum wage in 2019 R$ 998.00

Table 2. Association between the variables time (in days) for surgery, recovery room, and hospital stay with a diagnosis of oropharyngeal dysphagia

Time (in days)	With dysphagia Average (SD)	Without dysphagia Average (SD)	p
Time for surgery	5.05 (0.34)	6.10 (0.43)	0.02*
Time in recovery room	0.34 (0.78)	0.22 (0.41)	0.20
Time of hospital stay	11.94 (13.81)	10.44 (5.74)	0.73

Student's t-test; chi-square test; SD = Standard Deviation

Table 3 presents qualitative data indicating the worsening of the clinical conditions after the surgical procedure, based on the comparison between the groups. Among elderly people with swallowing disorders, there was a greater indication for the use of antibiotics, the need to change food consistency, indication of enteral feeding, blood transfusion, cardiorespiratory arrest, and death after surgery ($p < 0.05$). Although no significant differences were observed between the groups, a higher proportion of admissions to the intensive care unit, respiratory complications, and mechanical ventilation use was noted among elderly people with swallowing disorders.

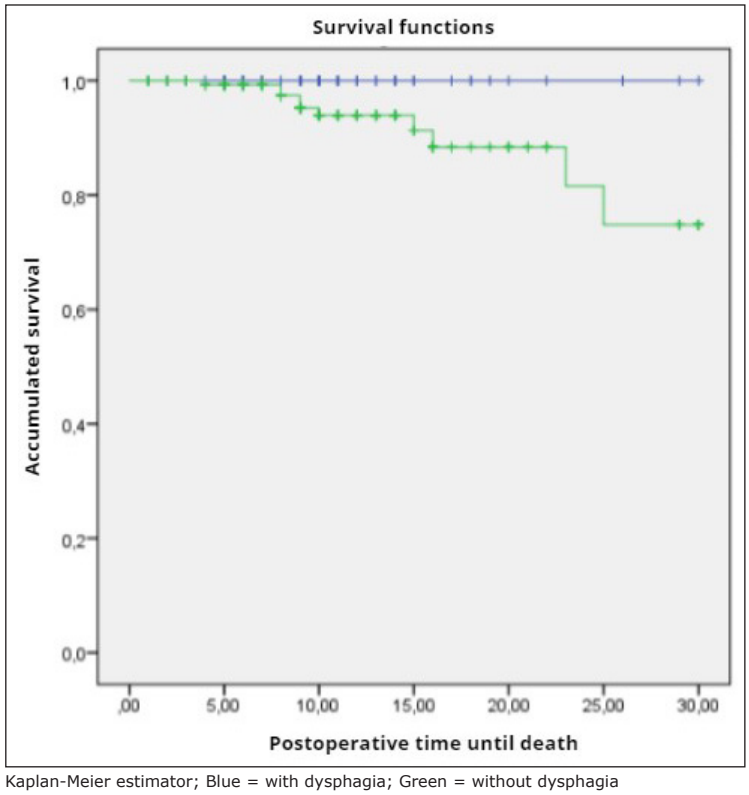
Table 3. Association between clinical evolution and groups

Clinical evolution	With dysphagia AF (RF)	Without dysphagia AF (RF)	Odds Ratio	p
Sedative medication				
Yes	56 (38.1)	26 (31.47)	1.32 (0.74-2.34)	0.389
No	91 (61.9)	56 (68.3)		
Antibiotics				
Yes	35 (23.8)	10 (12.2)	2.25 (1.05-4.82)	0.038
No	112 (76.2)	72 (87.8)		
Modification of food consistencies				
Yes	46 (31.3)	11 (13.4)	2.9 (1.42-6.06)	0.02
No	101 (68.7)	71 (86.6)		
Indication of enteral feeding				
Yes	15 (10.2)	1 (1.2)	9.2 (1.19-71.0)	0.012
No	132 (89.8)	81 (98.8)		
Hospitalization in ICU				
Yes	11 (7.5)	2 (2.4)	3.23 (0.69-14.96)	0.143
No	136 (92.5)	80 (97.6)		
Respiratory complication				
Yes	8 (5.4)	1 (1.2)	4.66 (0.57 – 37.9)	0.163
No	139 (94.6)	81 (98.80)		
Mechanical ventilation				
Yes	7 (4.8)	1 (1.2)	4.05 (0.49-33.05)	0.26
No	140 (95.2)	81 (98.8)		
Blood transfusion				
Yes	16 (10.9)	0 (0)	1.62 (1.46 – 1.80)	0.01
No	131 (89.1)	82 (100)		
Sepsis				
Yes	5 (3.4)	0 (0)	1.57 (1.42 – 1.74)	0.163
No	142 (96.6)	82 (100)		
Surgical site infection				
Yes	9 (6.1)	4 (4.9)	1.27 (0.37 – 4.26)	0.775
No	138 (93.9)	78 (95.1)		
Readmission within a period between 3-6 months after hospital discharge				
Yes	26 (17.7)	16 (19.5)	0,88 (0.44-1.76)	0.725
No	121 (82,3)	66 (80,5)		
Cardiorespiratory arrest				
Yes	8 (5.4)	0 (0)	1.59 (1.43 – 1.75)	0.027
No	139 (94.6)	82 (100)		
Death				
Yes	12 (8.2)	0 (0)	1.6 (1.44-1.78)	0.05
No	135 (91.8)	82 (100)		

Fisher's exact test; AF(RF) = absolute frequency (relative frequency); Intensive care unit (ICU)

Variables such as length of stay in the ICU, time on mechanical ventilation, indication for tracheostomy, and delirium were removed from statistical analysis due to the low frequency of these outcomes in the total sample (less than five cases), making comparison between groups unfeasible.

Overall, the total number of deaths represented 5.29% of the total sample, affecting only individuals with dysphagia. Figure 1 demonstrates the result of the survival analysis, showing that individuals with dysphagia had lower survival rates. A significant difference was observed based on the Log Rank test ($p < 0.05$) 30 days after the surgical procedure, with the risk of death being 4.65 times higher for those individuals with dysphagia.



Kaplan-Meier estimator; Blue = with dysphagia; Green = without dysphagia

Figure 1. Survival analysis in days between the group with dysphagia and without dysphagia

Discussion

As far as we know, this is the first study in Brazil that obtained results on the survival of patients with oropharyngeal dysphagia, carried out in a trauma hospital and that demonstrated lower survival rates in elderly people with oropharyngeal dysphagia after trauma-orthopedic surgery. Our results suggest the need to detect and supervise elderly people with swallowing disorders, especially before surgical procedures, as this, combined with other comorbidities, favors a reduction in survival.

In this study, elderly people with dysphagia had a shorter waiting time for surgery compared to those without swallowing disorders. Previous studies report that waiting time >48 hours for surgery is considered a risk factor for mortality[18–19], while early surgical intervention in critically ill patients can help prevent body immobility, postoperative pneumonia, and pressure injuries[18]. This data indicates that patients with dysphagia are part of a group of more fragile individuals, who require surgical priority due to increased preoperative risks associated with their overall health status. How-

ever, despite shorter waiting times, the dysphagia group waited an average of 5 days for surgery, exceeding the recommended time frame of 48 hours after hospitalization[20-21]. The literature cites that delays in performing trauma-orthopedic surgeries are common, as they require multidisciplinary coordination, availability of adequate surgical capacity with a competent team, and adequate equipment[22].

Our study also showed that blood transfusion, antibiotic use, and cardiorespiratory arrest were significantly more frequent in the dysphagia group compared to those without swallowing disorders. Recent studies have shown that the predictive factors for blood transfusion, especially in hip surgery patients, are advanced age and increased comorbidities[23-24]. In another study, 74.42% of the sample received a blood transfusion, which is associated with a high rate of complications[25].

Although the literature does not comprehensively address the risk factors associated with antibiotic use or cardiorespiratory arrest in trauma-orthopedic surgeries in the elderly. These outcomes may reflect the increased frailty of patients with dysphagia. Furthermore, the literature shows that patients who received blood transfusions have been linked to a higher incidence of postoperative infection, which necessitates antibiotic use and are associated with complications and cardiorespiratory arrest[23,25–27].

Indications for enteral feeding and changes in food consistency were more frequent in elderly people with dysphagia. These interventions were necessary to maintain the necessary nutrition and hydration reflecting the severity and probable fragility of these patients. Previous study highlight the use of artificial nutrition as a way to maintain prolonged survival, improved quality of life, and better nutritional status[28]. The literature also shows that oropharyngeal dysphagia is underdiagnosed in hospitalized elderly people, being a cause of nutritional complications[13]. It is clear, then, the importance of early identification of swallowing disorders even in the preoperative period, aiming for prior speech therapy, as many patients demand attention even before hospitalization[13,29]. In this way, the indication for enteral feeding and the change of food consistency avoid complications such as muscle and adipose changes, immunological dysfunction, insulin resistance, and recurrent infections[30].

Our study confirmed the hypothesis that patients diagnosed with oropharyngeal dysphagia have greater clinical severity, which contributes to worse prognosis after surgical interventions. Furthermore, we identified that the survival of elderly people hospitalized for trauma-orthopedic fractures with dysphagia was lower. The literature shows that the one-year mortality rate for elderly individuals without dysphagia following hip fracture surgery was 32.5%[31], while for those with dysphagia, the mortality rate within just 90 days was 8.9%[32]. Our results suggest the need to detect and supervise elderly people with swallowing disorders, especially before surgical procedures, as this, combined with other comorbidities, favors a reduction in survival[14].

Despite important findings, this study has several limitations that may have influenced its results. The retrospective design limits causal inferences, and reliance on medical records may introduce biases due to incomplete data. Excluding participants unable to respond to verbal commands or those transferred or deceased could have skewed the sample toward less severe cases. The timing of swallowing assessments, influenced by clinical factors, might have affected dysphagia detection. Additionally, the absence of objective assessments, like videofluoroscopy, may have led to underdiagnosis. Confounding factors such as comorbidities, nutritional status, and surgical variations could also impact the findings. Future research should address these limitations to clarify causal relationships.

Conclusion

This study identified that the survival of elderly people hospitalized for traumatic-orthopedic fractures with oropharyngeal dysphagia was lower than that of individuals without dysphagia. There was an association between the presence of dysphagia and the time to perform surgery, use of antibiotics, change of food consistency, indication of enteral tube, blood transfusion, cardiorespiratory arrest and death. These results contribute to the reflection of actions aimed at preventing postoperative complications, including the need to supervise and detect dysphagia in these patients, preventing worse prognosis.

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