Acute epiglottitis in adults: Retrospective study in a tertiary hospital

Review Article

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Abstract

Epiglottitis is an acute inflammatory process of the supraglottic region, potentially fatal due to the risk of airway obstruction.
We performed a retrospective study of adults admitted with epiglottitis in a tertiary hospital, between 2017 and 2022, and the aim of the study is to characterize the population and identify risk factors associated with complications.
Outcomes were defined as: airway intervention (AI); epiglottic and/or deep neck abscess; need for surgical drainage.
MEWS Score was used to evaluate the clinical baseline of the patients on admission. Sample size was 51 adults with 17 AI, 25 abscesses and 7 surgical drainages identified.
Dyspnea was the only symptom with a positive correlation with all outcomes ($p<0.05$). The duration of symptoms, MEWS score and comorbidities are possible predictors of airway intervention ($p<0.001$), which should raise a higher degree of suspicion for complications.
Keywords: epiglottitis; adult; epiglottic abscess; tracheostomy

Introduction

Epiglottitis is an acute inflammatory condition of the supraglottic region. It is potentially fatal because of the imminent risk of airway obstruction[1,2]. Although it is traditionally considered a pediatric condition, its prevalence in this age group has been decreasing due to large-scale vaccination against type B Haemophilus influenza (HiB), and it is occurring increasingly in adults. Its incidence is 1–4/100,000, the associated mortality rate is 1–20%, and it is less indolent in those aged 18 years and over[2-4]. Statistically, men aged 42–48 years are the most affected[5]. The symptoms of epiglottitis in adults include odynophagia, dysphonia, dyspnea, and dysphagia[5]. Fever is not common and may be absent in 50% of the cases[5]. Diagnosis of

epiglottitis can be challenging, and identifying risk factors in patients who may require airway protection is extremely important. The treatment of epiglottitis includes monitoring the permeability of the airway, administration of intravenous antibiotics, and detecting complications such as epiglottic abscess, deep cervical infection, and obstruction of the airway[6]. This study aimed to characterize the adult population diagnosed with epiglottitis and identify potential risk factors for complications.

Materials and Methods

This was a retrospective observational study that included all adults (>18 years) admitted for epiglottitis in *Centro Hospitalar Universitário Lisboa Norte,* conducted over six years between January 2017 and December 2022. The medical records were reviewed to characterize the population. The collected data included the following: 1) demographic data (age; sex; comorbidities such as hypertension, diabetes mellitus, and obesity; smoking habits); 2) clinical data (symptoms, imaging exams, endoscopic and analytical findings, and number of days of hospital stay). The diagnosis in all patients was confirmed by direct endoscopic visualization at the ENT emergency department (SU). The Modified Early Warning Score (MEWS) was used to determine the patient's clinical status on admission to the SU. This score evaluates the degree of disease severity based on five vital parameters: blood pressure; heart rate; respiratory rate; body temperature; state of consciousness (AVPU scale – A for "alert"; V for "response to voice"; P for "response to pain"; U for "unresponsive")[7, 8]. The sum varies between 0 and 14, and a score higher than 4 is associated with an increased risk of death or admission to the intensive care unit (Table 1).

The outcomes were defined as the main complications of epiglottitis: need for advanced airway management (AAM)—orotracheal intubation or tracheotomy; presence of cervical and/or epiglottic abscess; need for surgical drainage. Furthermore, the relationship between the assessed parameters and length of hospital stay was investigated. Statistical analysis was performed using descriptive analysis and non-parametric tests—the chi-square test or Fisher's exact test (where applicable), Spearman's correlation, Mann-Whitney U test, Kruskal-Wallis test, and multivariate analysis of variance (MANOVA). For the statistically significant parameters in MANOVA, between-subject effects analysis and post-hoc tests were performed. The statistical tests were performed using the IBM SPSS Statistics v.29 softwar e. Statistical significance was set at $p \leq 0.05$.

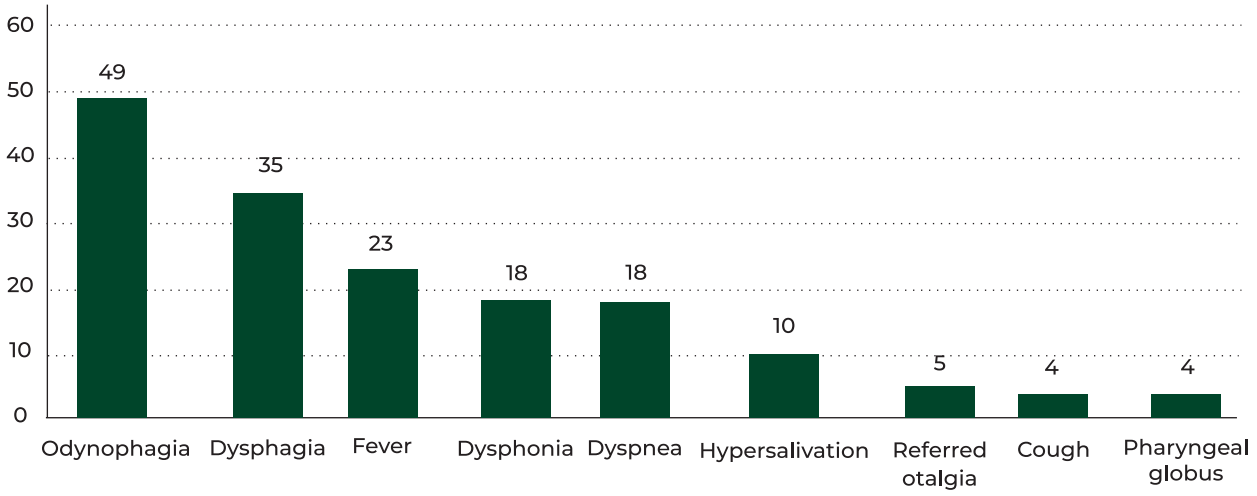
Results

The sample included a total of 51 adults with a mean age of 47 years (between 19 and 84 years), comprising 32 men (62.7%) and 19 women (37.3%). Regarding their clinical history, 28 patients (54.9%) had comorbidities, the most frequent being hypertension and dyslipidemia, and 31.4% of the patients were smokers. The most common symptom was odynophagia (96.1%), followed by dysphagia (68.6%), fever (45.1%), dysphonia and dyspnea (both affecting 35.3% of the sample), and hypersalivation (19.6%) The frequency of the

Table 1
Modified Early Warning Score (MEWS)

Score	3	2	1	0	1	2	3
Pressure (mm Hg)	<70	71-80	81-100	101-199		≥200	
Heart rate (bpm)		<40	41-50	51-100	101-110	111-129	≥130
Respiratory rate (cpm)		<9		9-14	15-20	21-29	≥30
Temperature (°C)		<35		35-38.4		≥38.5	
APVU scale				Alert	Voice	Pain	Un responsive

Figure 1
Graph showing the symptoms reported by the patients on admission to the SU



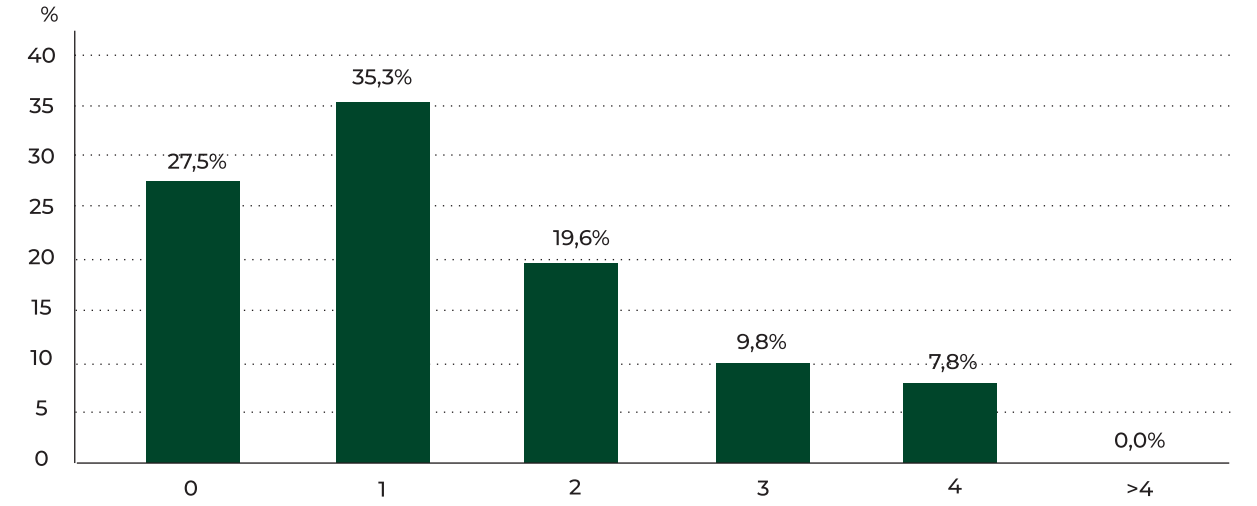
remaining symptoms (cough, pharyngeal globus, and referred otalgia) was lower than 10.0% (Figure 1).

The mean duration of the symptoms was three days (1–8 days), with 52.9% of the cases experiencing symptoms lasting for 48 hours or less. On admission to the SU, a purulent exudate was observed in the supraglottic structures of 16 patients (31.4%). Elevation of the inflammatory parameters was confirmed in most patients, with leukocytosis in 80.4%, neutrophilia in 76.5%, and elevated C-reactive protein (CRP) in 94.1% of patients. Imaging examinations were requested (lateral X-ray and/or contrast computed tomography [CT] of the neck) for 35 patients (68.6%). The mean MEWS on admission was 1.35, and the mode was 1 (35.3%). The MEWS distribution in the remaining patients was 0 (27.5%), 2 (19.6%), 3 (9.8%), and 4 (7.8%), and the score did not exceed 4 in any patient (Figure 2).

The mean length of hospital stay was seven days; however, the most frequent length was five days, varying between two and 26 days. All patients received intravenous antibiotics, with most being treated with ceftriaxone (78.4%), followed by clindamycin (29.3%). Dual antibiotics and intravenous corticosteroids were given to 58.8% and 94.1% of patients, respectively (Table 2).

Regarding the defined outcomes, the frequency of epiglottic abscess (with or

Figure 2
Graph showing the distribution of the Modified Early Warning Score (MEWS)



without spontaneous drainage) was 41.2%, and that of cervical abscess was 7.8%, with 13.7% patients requiring surgical drainage. Moreover, AAM was used in 17 patients (33.3%), with 14 and three patients undergoing orotracheal intubation and surgical tracheotomy, respectively (Figure 3).

Spearman's correlation analysis showed a statistically significant correlation between the need for AAM and duration of symptoms (p<0.001), MEWS (p=0.017), elevation of the inflammatory parameters (p=0.003), neutrophilia (p=0.014), and need for surgical abscess drainage (p=0.004). Similarly, the duration of symptoms was positively correlated with an elevated CRP (p=0.018), leukocytosis (p=0.02), neutrophilia (p<0.001), and presence of exudate in the supraglottis (p=0.026). The only symptom that was positively correlated with all outcomes and MEWS was dyspnea

Table 2
Intravenous treatment administered to hospitalized patients with epiglottitis

Treatment	Frequency in Number and Percentage (%)	
Ceftriaxone	40	78.4%
Clindamycin	15	29.3%
Metronidazole	12	23.5%
Amoxicillin/Clavulanic acid	7	13.7%
Cefotaxime	1	2.0%
Vancomycin	3	5.9%
Levofloxacin	1	2.0%
Benzylpenicillin	1	2.0%
Piperacillin/Tazobactam	1	2.0%
Dual antibiotics	30	58.8%
Corticosteroids	48	94.1%

Figure 3
a) Graph demonstrating the percentage distribution of the outcomes: epiglottic abscess; cervical abscess; surgical drainage; advanced airway management (AAM); b) Graph showing the AMM subgroups (orotracheal intubation and tracheotomy) by the percentage of occurrence

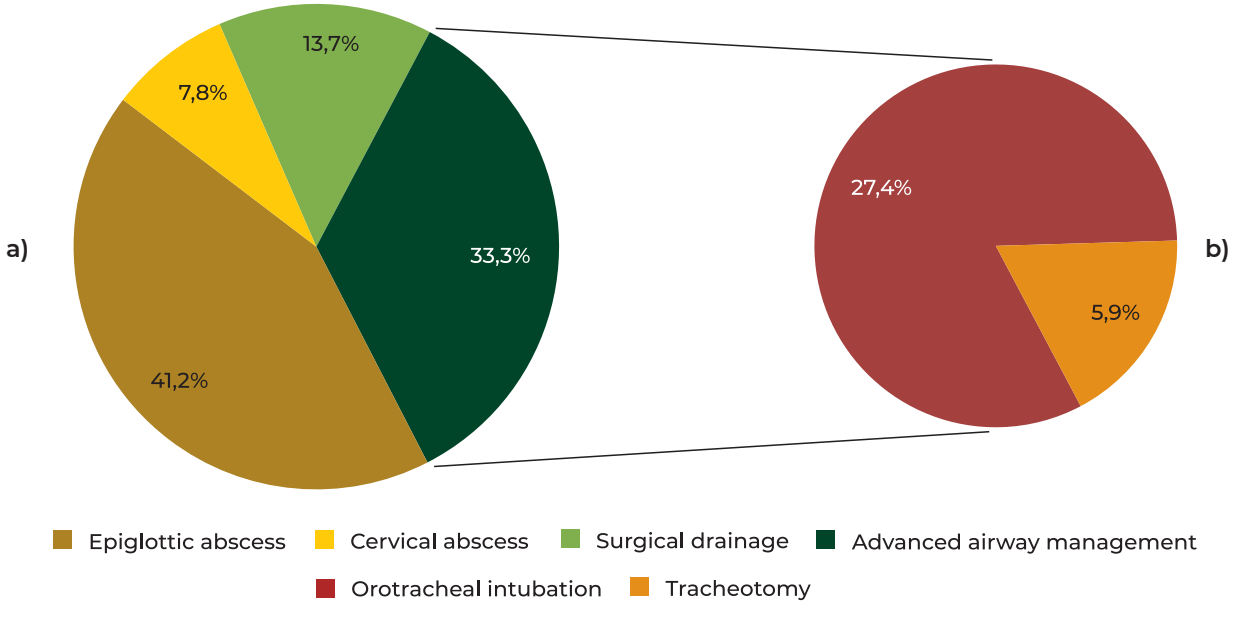
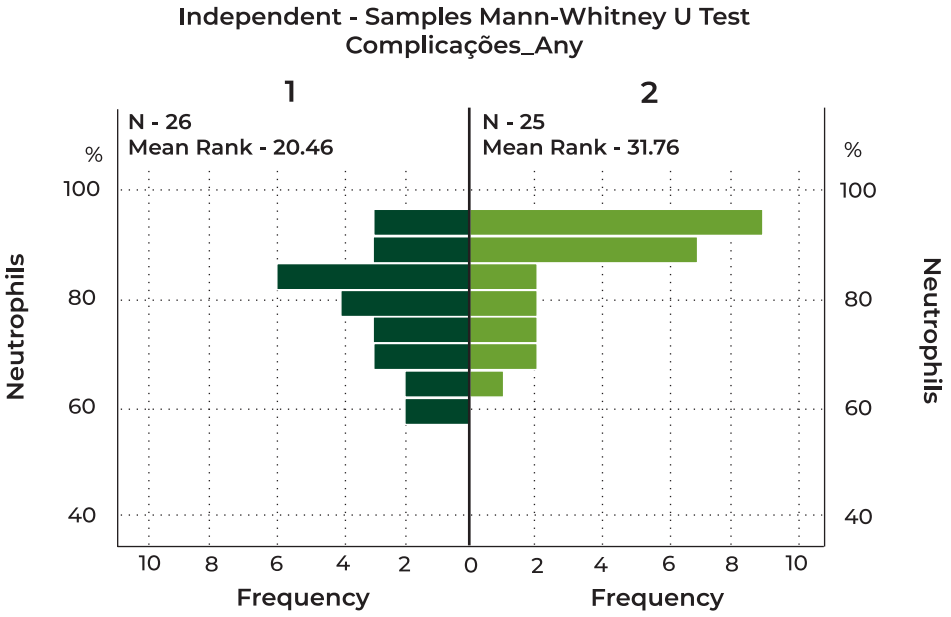


Figure 4
Graph showing the results of the Mann-Whitney test, with a difference between the groups without complications (1; in blue) and with complications (2; in red), and the associated frequency of neutrophilia



(p<0.05). The Kruskal-Wallis test showed that patients with complications had a higher MEWS (p=0.032) and higher frequency of exudate in the supraglottic structures (p=0.003). Another important factor in this group of patients was neutrophilia (p=0.007), as shown by the results of the Mann-Whitney test (Figure 4).

Additionally, the chi-square test showed an association of the need for AAM with neutrophilia (p=0.022) and elevated CRP levels (p=0.017). MANOVA results revealed that the outcomes were independently associated with the duration of symptoms, MEWS, and cumulative presence of symptoms and comorbidities, with a statistical significance of p<0.001 for all these parameters. A subsequent between-subject effects analysis showed that that these factors independently influenced the need for AAM (p<0.001) (Table 3).

The post-hoc analysis showed that the need for orotracheal intubation or tracheotomy was associated with a MEWS > 2. It was not possible to identify the discriminating parameter/value in the post-hoc analysis when applied to the other independent variables that influenced MANOVA. Regarding the factors related to the duration of hospital stay, Spearman's ρ test showed positive correlations with dyspnea (p<0.001), MEWS (p=0.019), and presence of exudate in the supraglottis (p=0.044). Moreover, the Kruskal-Wallis test showed that the relationship between the number of days of hospital stay and outcomes was statistically significant, with increased hospitalization time being associated with epiglottic abscess (p=0.002), cervical abscess (p=0.020), surgical drainage (p=0.004), and need for orotracheal intubation (p=0.001) or tracheotomy (p=0.011).

Discussion

Epiglottitis is an inflammatory disease of the epiglottis and/or the other supraglottic structures[1-2, 9]. Its incidence in the pediatric population has been decreasing, probably as a result of the introduction of the HiB (Haemophilus influenzae type B) vaccine in the National Vaccination Plan[10-11]. However, epiglottitis in adults is becoming increasingly frequent[2-4]. The characteristics of the sample in this study—a higher proportion of men and mean age of 47 years—are in line with those described in the literature[5]. Although this is a potentially fatal disease due to the risk

Table 3
Summary table of the results of MANOVA for the relationship between the independent variables and outcomes defined in this study (On the right are the p-values for each outcome that resulted from the between-subject effects analysis)

Variable	Value	p-value	Between-subject-effects	p-value
Duration of symptoms	$2.8x10^{26}$	<0.001	Surgical drainage	0.723
			Epiglottic abscess	0.274
			Cervical abscess	1.000
			Tracheotomy	1.000
			AAM	**<0.001**
MEWS score	$1.847x10^{26}$	<0.001	Surgical drainage	0.489
			Epiglottic abscess	0.65
			Cervical abscess	0.792
			Tracheotomy	0.792
			AAM	**<0.001**
Comorbidities	$3.746x10^{25}$	<0.001	Surgical drainage	0.262
			Epiglottic abscess	0.394
			Cervical abscess	0.443
			Tracheotomy	0.443
			AAM	**<0.001**
Symptoms	$1.224x10^{26}$	<0.001	Surgical drainage	0.529
			Epiglottic abscess	0.082
			Cervical abscess	0.964
			Tracheotomy	0.964
			AAM	**<0.001**

of airway loss, it continues to be frequently underdiagnosed, probably because of the non-specific clinical presentation. In this study, most patients had odynophagia, dysphagia, and fever as the main symptoms, similar to the symptoms reported in other studies, making it challenging to make a timely diagnosis [9,12]. Regarding the analytical parameters on admission, the presence of neutrophilia was positively correlated with the occurrence of complications, more specifically with the need for AAM, and elevated CRP. This correlation has been reported by other authors[13], which confirms the importance of laboratory tests for diagnosis and that these parameters may be considered markers of disease severity. Direct visualization using flexible laryngoscopy is the gold-standard for the diagnosis of epiglottitis[6]. In this study, visualization of the larynx to confirm the diagnosis of epiglottitis was performed by endoscopy, which is in line with the literature[14]. The presence of a purulent exudate in the supraglottic structures was associated with the occurrence of complications and need for prolonged hospitalization.

The mean duration of hospital stay was seven days, which is longer than that reported in the literature by Tapiovaara et al.[15]. Other authors have reported that the sensitivity of neck X-ray (lateral) was 81.0–89.4%, and an X-ray without evidence of epiglottitis cannot exclude this diagnosis[12, 16]. According to the literature[17] , CT is the method indicated to identify the complications associated with epiglottitis, such as epiglottic or cervical

abscess, but is not recommended for the initial diagnosis of epiglottitis because it cannot replace laryngoscopy. In our sample, most patients underwent imaging exams on admission, which may have been because our SU functions as an emergency center to which patients from other hospitals in the center and south of the country are referred. Moreover, CT was requested for some patients due to suspected complications. In this study, the most commonly used empirical antibiotic was ceftriaxone—a third-generation cephalosporin—to ensure broad-spectrum coverage. There is a consensus in the literature about the administration of antibiotics in all cases of epiglottitis, unlike corticosteroids, whose benefits are not fully confirmed[6, 18]. Corticosteroids were prescribed in 94.1% of cases. This high percentage does not allow a comparison analysis to establish the role of these drugs in the treatment of epiglottitis. AAM in patients diagnosed with epiglottitis continues to be somewhat controversial. Some authors argue in favor of prophylactic protection of the airway because many cases of sudden obstruction have been described, even in patients with a benign disease course[7-8, 19-20].

Nevertheless, other authors state that this early intervention may not be needed because most patients recover without complications[20-21]. The MEWS is a simple method to evaluate a patient's clinical deterioration and can be used in the medical and/or surgical settings[7-8]. A MEWS > 2 was shown to be associated with the need for orotracheal intubation or tracheotomy. This reinforces the importance of using the score in the initial evaluation of patients diagnosed with epiglottitis to improve the efficacy and safety of AAM.

Dyspnea, MEWS, and presence of comorbidities were significantly associated with the need for AAM. Nonetheless, most patients in this study did not require airway protection, and a selective approach appears to be more reasonable, as mentioned by Lam et al.[12]. However, the presence of comorbidities, number and duration of symptoms, and MEWS were shown to influence airway impairment independently and are considered predictors of this emerging complication; thus, they warrant a higher level of suspicion of complications. The limitations of this study are its retrospective nature, the fact that it was conducted in a single center, and its small sample size. Therefore, the results obtained herein may not represent the entire clinical spectrum of the disease.

Conclusion

Epiglottitis is now more common among adults than before. Its clinical presentation varies and may easily be overlooked. Most patients have a benign disease course, but sudden airway obstruction may occur in some cases, which can be fatal; thus, maintaining a selective approach to the airway is recommended. The MEWS is a useful tool for making this decision, with a score > 2 being associated with the need for orotracheal intubation or tracheotomy.

The presence of suppuration in the supraglottis, elevated CRP, or neutrophilia, as well as symptoms or presence of comorbidities, may be associated with severe complications and length of hospital stay. All these factors should be considered during clinical evaluation and monitoring to ensure the best quality of medical management of patients with epiglottitis.

Conflicts of Interest

The authors declare that there is no conflict of interests regarding the publication of this paper.

Data Confidentiality

The authors declare having followed the protocols in use at their working center regarding patients' data publication.

Protection of humans and animals

The authors declare that the procedures were followed according to the regulations established by the Clinical Research and Ethics Committee and to the 2013 Helsinki Declaration of the World Medical Association.

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Availability of scientific data

There are no datasets available, publicly related to this work.

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