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Toxic epidermal necrolysis data from the CELESTE multinational registry. Part II: Specific systemic and local risk factors for the development of infectious complications

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ABSTRACT

The aim of the study was to identify the most important systemic and local risk factors for the development of infectious complications in patients with toxic epidermal necrolysis (TEN). *Material and methodology:* This is a multicentric study that included all patients with TEN who were hospitalized between 2000–2015 in specialized centres in the Czech Republic and Slovakia. The total catchment area included a population of over 12.5 million inhabitants. The actual implementation of the project was carried out using data obtained from the CELESTE (**C**entral **E**uropean **LyE**ll **S**yndrome: **T**herapeutic **E**valuation) registry, wherein specific parameters related to epidemiological indicators and infectious complications in patients with TEN were evaluated as a retrospective analysis.

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Results: A total of 38 patients (97%) of the group were treated with corticosteroids. The comparison of patients with different doses of corticosteroids did not exhibit a statistically significant effect of corticosteroid administration on the development of infectious complications (p=0.421).
There was no effect of the extent of the exfoliated area on the development of infectious complications in this area. The average extent of the exfoliated area was 66% TBSA (total body surface area) in patients with reported infectious complications and 71% TBSA (p=0.675) in patients without infectious complications.
In the case of the development of an infectious complication in the bloodstream (BSI), the increasing effect of the SCORTEN (SCORe of Toxic Epidermal Necrosis) value was monitored during hospitalization. Within 5 days from the beginning of the hospitalization, the average SCORTEN value was 2.7 in 6 patients with BSI and 3.0 in 32 patients without BSI (p=0.588). In the period after the 15th day of hospitalization, 7 patients with BSI had an average SCORTEN value of 3.4, and 16 patients without BSI had an average SCORTEN value of 2.5 (p=0.079).
In the case of low respiratory tract infection (LRTI), the effects of the necessity for artificial pulmonary ventilation and the presence of tracheostomy were monitored. The statistically significant effect of mechanical ventilation on the development of LRTI occurred only during the period of 11–15 days from the beginning of the hospitalization (p=0.016). The effect of the tracheostomy on the development of LRTI was proven to be more significant.
Conclusion: We did not find any statistically significant correlation between the nature of immunosuppressive therapy and the risk of developing infectious complications. We failed to identify statistically significant risk factors for the development of BSI. Mechanical ventilation and tracheostomy increase the likelihood of developing LRTIs in patients with TEN.

1. Introduction

Toxic epidermal necrolysis (TEN) is a rare systemic disease, which arises from a type IV hypersensitivity reaction (DTH, delayed type of hypersensitivity) [1]. From the pathophysiological point of view, it is a large apoptosis of keratinocytes in the area of dermo-epidermal junction [2,3]. Presently, several mechanisms are described that lead to the induction of epidermal cell apoptosis in patients with TEN [4].

In terms of the development of infectious complications, patients with TEN represent one of the highest risk groups of critically vulnerable patients. The damaged continuity of the skin cover along with the need for immunosuppressive therapy leads to a high risk of developing infectious complications with potentially fatal consequences [5].

The most common infectious complications in these patients include exfoliating wound infection (EWI) and bloodstream infection (BSI). The most important potentially pathogenic microorganisms that cause infectious complications in patients with TEN are *Staphylococcus aureus* and *Pseudomonas aeruginosa* [6].

Because of the pharmacologically induced compromise of both local and systemic immune responses, a rapid increase in the number of potentially pathogenic microorganisms may cause their dissemination in the patient, leading to the rapid progression of a locally isolated infection. However, owing to immunosuppression, individual clinical signs of infection might not be fully expressed.

From the epidemiological point of view, the major source of potentially pathogenic microorganisms in patients with TEN is the large intestine, which may lose its competence if its mucous membrane is affected [7,8]. Subsequently, the individual pathogens are easily translocated to the bloodstream and other compartments. This is known as the secondary endogenous type of infection. The exogenous type of infection may also occur in patients with TEN, but it can be significantly controlled by adequate therapeutic approaches in these patients, such as early transfer to burn centres or proper local care, etc. The exogenous type of infectious complications is particularly affected by the high prevalence of resistant pathogens, wherein antimicrobial therapy may be very complicated [9]. Although infectious complications represent the dominant share in mortality of patients with TEN, no work has yet been published that addresses individual risk factors in their development in such a complex manner. This second part of the study focuses on the specific risk factors for the development of infectious complications in patients with TEN and builds on the first part, which defines the basic epidemiological indicators of the patient group [10].

2. Material and methodology

2.1. Setting

This is a multicentric study, which included all patients with TEN who were hospitalized between 2000–2015 in burn centres and other workplaces in the Czech Republic and Slovakia. The total catchment area included a population of over 12.5 million inhabitants. Clinical presentation and histological confirmation were primarily used for the diagnosis of TEN.

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