

Local complications of erysipelas: a study of associated risk factors

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Summary

Background. Local complications of erysipelas include haemorrhagic, bullous, abscessing and necrotic lesions. The risk factors predisposing patients to local complications are not fully known.

Aim. To examine local complications of erysipelas and to identify possible risk factors predisposing to their appearance.

Methods. Medical records from all patients hospitalized with complications of erysipelas (purpura, bullae, abscesses and necrosis), admitted to the University Hospital of Heraklion between 1994 and 2002, were retrospectively studied. Clinical and laboratory data were compared with those from patients with erysipelas without local complications.

Results. In total, 145 patients were analysed, of whom 46 had local disease complications. Using bivariate analysis, the factors significantly associated with disease complications were found to be age ≥ 51 years, obesity, longer duration of local symptoms, and fever on admission. During hospitalization, increased C-reactive protein level, isolation of pathogens, longer duration of fever and/or presence of leucocytosis, absence of response to initial antibiotic therapy, and longer length of hospitalization were also associated with complications in the bivariate analysis. However, in the multivariate analysis, obesity (OR 4.489, 95% CI 1.719–11.725, $P = 0.002$) was the only independent factor associated with complicated erysipelas.

Conclusions. This study found obesity to be an independent risk factor for local complications, of erysipelas. Hence, obese patients with erysipelas are prone to complications, and should be carefully evaluated because of the potential severity of disease and the increased risk of failure of empirical antimicrobial therapy.

Introduction

Erysipelas is an infectious disease of the dermis and subcutaneous tissue commonly caused by streptococci.¹ In its classic form, the disease appears as a bright-red, spreading, superficial, oedematous lesion with sharply demarcated edges.² Erysipelas has a rapid and favourable response to antibacterial therapy, so that most patients are successfully treated in primary care.³

However, the clinical features of infectious diseases may deviate from their original descriptions, as they change over the years. Striking changes in the epidemiological characteristics and typical clinical pattern of erysipelas have been reported as emerging new trends in recent decades.^{2,4}

The typical features of erysipelas are easily identifiable by the classic symptoms and physical findings, but clinicians often have to deal with an atypical clinical picture. Alarming clinical signs such as purpura, bullae, abscesses and necrosis may then predominate.^{5,6} These complications are associated with a more severe condition.^{7,8} Early recognition is important for optimal management of the disease, as complications of erysipelas can result in increased morbidity and health care costs, due to the prolonged clinical course and possible

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need for hospitalization.⁹ In this study, we reviewed all cases of erysipelas recorded in our hospital within a period of 9 years with the aim of describing clinical and laboratory findings and of assessing possible risk factors for patients developing local complications.

Methods

The study was approved by the ethics committee of the University Hospital of Heraklion, Crete, Greece. Informed consent was not required.

Study protocol

The study was a retrospective analysis of clinical records in all hospitalized patients with erysipelas in the Department of Dermatology, from 1994 to 2002. Erysipelas was defined as 'a skin infection of sudden onset with a red indurated expanding plaque with a distinct border'.² All patients with local complications of erysipelas including haemorrhagic, bullous, abscessing or necrotic lesions, who were admitted to the hospital during the same period, were also included in the study.

Patient information was recorded, including gender, age, temperature, lesion site, lymph-node involvement, fever duration, days of hospitalization, recurrences (during 1 year of follow-up) and presence of coexisting diseases. Local factors such as presence of tinea pedis, varicose veins, injury, arthropod bite and lymphoedema were also recorded,^{10,11} as were laboratory parameters, including white blood cell (WBC) count, erythrocyte sedimentation rate and C-reactive protein levels on admission and at discharge. Microbiological data from swabs or blood cultures were also evaluated.

All cases were divided into two groups: those with uncomplicated and those with complicated erysipelas. The group of complicated erysipelas included all patients with bullous, abscessing, haemorrhagic or necrotizing forms. The epidemiological and clinical characteristics of the patients with uncomplicated erysipelas and bullous erysipelas have been previously published^{12,13}; however, the characteristics of patients with uncomplicated and complicated erysipelas were not compared and the risk factors predisposing for complications were not examined in the previous studies. Hence, the concept of the present study and the findings are novel.

Statistical analysis

Risk factors for complicated erysipelas were assessed using bivariate analysis based on the Mann–Whitney test or the Student *t*-test for continuous variables, and either

the Pearson χ^2 test or Fisher exact test for categorical variables. Multivariate analysis was performed on variables that appeared to be significantly associated with complications at the 0.1 level in bivariate analysis. *P*-values < 0.05 were considered significant.

Results

In total, 145 patients were included in the analysis, of whom 46 had a local complication according to the definition. The most common local complications were bullae (21 patients; 46%), followed by abscesses (8; 17%), haemorrhagic lesions (6; 13%) and necroses (4; 9%). Seven patients (15%) had a combination of complications.

In the bivariate analysis, of the general factors, age < 51 years (*P* < 0.05) was found to be positively associated with complicated erysipelas (Table 1). Of several other comorbidities, obesity was the only predisposing factor for complicated erysipelas (*P* = 0.001). Empirical antibiotic therapy before hospitalization was recorded more often for patients with complications, although this was not significant (*P* = 0.07). The presence of entry portals such as insect bites, reported in other studies to be

Table 1 Bivariate analysis of risk factors for locally complicated erysipelas.

Characteristic	Uncomplicated <i>n</i> = 99	Complicated <i>n</i> = 46	<i>P</i>
Age, years (mean ± SD)	51.2 ± 17.5	48.7 ± 15.6	0.43
Age ≥ 51 years old	41/94 (44)	26/42 (62)	< 0.05*
M/F	41/58 (41/59)	15/31 (33/67)	0.17
Localization			
Head/neck	17 (17)	10 (22)	0.65
Trunk	1 (1)	1 (2)	
Extremities	81 (82)	35 (76)	
Coexisting diseases			
Diabetes	18 (18)	6 (13)	0.74
Obesity	9 (9)	15 (32)	0.001*
Heart disease	21 (21)	9 (20)	0.82
Chronic lung disease	4 (4)	4 (9)	0.25
Chronic renal failure	5 (5)	1 (2)	0.42
Mental disorders	4 (4)	2 (4)	0.93
Thyroid diseases	8 (8)	2 (4)	0.50
Other	10 (10)	3 (7)	0.13
Local factors			
Tinea pedis	32 (32)	10 (22)	0.19
Varicose veins	23 (23)	6 (13)	0.15
Injury	20 (20)	10 (22)	0.83
Arthropod bite	13 (13)	7 (15)	0.74
Lymphoedema	3 (3)	2 (4)	0.69
Empiric therapy before hospitalization	24 (24)	21 (39)	< 0.05*

NS, not statistically significant. Data are *n* (%) unless otherwise indicated. *Significant.

associated with risk of erysipelas,¹⁰ was not found to contribute significantly to development of complications of erysipelas.

A comparison of clinical and laboratory findings of the two patient subgroups (complicated and uncomplicated) showed that the mean duration of symptoms before admission was significantly longer in patients with local complications of erysipelas (4.1 vs. 3.1 days; $P < 0.01$). Improvement during hospitalization of parameters related to disease severity, such as duration of fever and/or leucocytosis, was delayed in patients with complications. In particular, patients with complications became afebrile 5 days later than did those with uncomplicated disease ($P < 0.001$), and required a longer time for WBC normalization ($P = 0.051$). In addition, the proportion of patients with complicated erysipelas who had positive cultures from swabs or blood was higher than that of patients without complications ($P < 0.001$). Finally, the percentage of patients with complications responding to initial empirical antibiotic therapy given in hospital was substantially lower than patients without complications (46% vs. 65%, $P < 0.05$) (Table 2).

Finally, in the multivariate analysis, obesity (OR = 4.489, 95% CI 1.72–11.73, $P = 0.002$) appeared to be the only factor independently associated with complicated erysipelas.

Table 2 Bivariate analysis of clinical and laboratory findings of patients with locally complicated and uncomplicated erysipelas.

Characteristic	Uncomplicated <i>n</i> = 99	Complicated <i>n</i> = 46	<i>P</i>
Presence of fever	24 (24)	30 (65)	< 0.001*
Palpable lymph nodes	22 (22)	11 (24)	0.82
Duration of symptoms before admission, days (mean ± SD)	3.1 ± 3.9	4.1 ± 3.1	< 0.01
Laboratory findings (mean ± SD)			
WBC, μ L	9336 ± 3957	10467 ± 3906	0.08
ESR, mm/h	45.9 ± 28.4	54.6 ± 33.2	0.18
CRP, mg/dL	4.29 ± 5.16	8.80 ± 7.13	< 0.05*
Microbiological isolation	12 (12)	20 (43)	< 0.001*
Duration for temperature normalization, days (mean ± SD)	2.4 ± 2.9	7.5 ± 5.2	< 0.001*
Duration for WBC normalization, days (mean ± SD)	3.2 ± 2.9	5.5 ± 3.6	< 0.05*
Duration of hospitalization, days (mean ± SD)	9.6 ± 5.3	11.4 ± 6.0	0.07
Response to initial antibiotic therapy	64 (65)	21 (46)	< 0.05*
Recurrences	9 (9)	6 (13)	0.47

CRP, C-reactive protein; ESR, erythrocyte sedimentation rate; WBC, white blood cell count. Data are *n* (%) unless otherwise indicated. *Significant.

Discussion

In this study, we investigated patients with erysipelas for risk factors predisposing to the development of local complications. One of the main findings was that obesity emerged as an independent risk factor. To our knowledge, this is the first study showing obesity to be a complicating factor in the disease course. In addition, clinical and laboratory parameters associated with more severe illness, such as duration of fever and leucocytosis and (marginally) length of hospital stay, had a significantly longer duration in patients with local complications. This supports the notion that local complications contribute substantially to the severity of erysipelas, and suggest that early recognition and management of these atypical features would reduce morbidity. It is worth pointing out that patients with erysipelas with complications were admitted to the hospital on average a day later than patients without complications.

A previous retrospective study concluded that location of lesions on the legs, and presence of hepatic or renal disease, hyperuricemia or diabetes mellitus were associated with complicated erysipelas, particularly bullous and haemorrhagic lesions, and that vascular occlusive disease enhanced the risk for necrotic lesions.¹⁴ Although our overall sample was large ($n = 146$), the possibility of detecting risk factors was limited by the small number of cases of complicated erysipelas ($n = 46$). This may be the reason why we failed to reveal more risk factors for complicated disease. Despite this, the positive association of obesity and complicated erysipelas is sufficiently strong to be valid.

Obesity is a well-known risk factor for erysipelas of the leg,^{3,10} and also a risk factor for recurrent disease.¹⁵ It was also thought to be a marker of severity of erysipelas, which may lead to hospitalization.⁸ In addition, obesity, oedema and skin fissures are all factors independently associated with acute cellulitis, with obesity also predisposing to recurrent cellulitis.¹⁶ Obesity often causes lymphoedema due to obstruction of lymphatic flow, and along with reduced tissue oxygenation, predisposes patients to infections.¹⁷ Several studies have documented the presence of lymphoedema or even an unrecognized lymphatic abnormality of the legs as a predisposing factor in patients with cellulitis/erysipelas.^{18,19} In our study, the percentage of patients with clinically evident lymphoedema did not differ significantly between the patients with or without complications. However, we did not perform any imaging studies to detect subclinical lymphoedema in the two groups. In addition to bacterial diseases, several

fungal infections, especially these developing in skin folds, are more commonly found in obese patients.²⁰

Several authors have suggested that complications of erysipelas may be associated with a more severe clinical condition.^{7,8} Guberman *et al.*⁷ found that the mean duration of hospitalization of patients with bullous erysipelas was significantly longer than of patients with nonbullous erysipelas. These findings are consistent with our own results that patients with local complications of erysipelas need more time for normalization of WBC and temperature, and require prolonged hospital stay. Considering the high proportion of empirical treatment failure in patients with complicated erysipelas and the high incidence of positive cultures from skin lesions, cultures should be obtained routinely for pathogen identification and appropriate antimicrobial therapy.¹³

Conclusion

Erysipelas is a common infectious disease of the skin, and uncomplicated cases can be easily diagnosed and treated as outpatients. However, complications can pose both diagnostic and therapeutic challenges, increasing morbidity and healthcare costs. It is important for physicians to be alert to the appearance of complications, and to identify predisposed patients. This study suggests that obesity is independently associated with local complications of erysipelas. Careful evaluation and close monitoring of these patients is necessary because of the potential severity of the disease and the risk of empirical treatment failure.

What's already known about this topic?

- Local complications of erysipelas can pose diagnostic and therapeutic challenges, increasing morbidity and healthcare costs.
- The risk factors predisposing patients for local complications are not fully known.

What does this study add?

- The present study reveals obesity as an independent risk factor for local complications of erysipelas.
- Obese patients require careful evaluation and monitoring, because of the potential severity of the disease and the risk of empirical treatment failure.

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