

# Diabetes & its Complications

## Deep Abscess in Diabetic Patients

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### ABSTRACT

**Introduction:** Uncontrolled diabetic patients are susceptible to infections, especially deep abscesses. The objective of our work was to analyze, clinical, biological, radiological and bacteriological characteristics of deep abscesses in patients who have diabetes and identify the factors that promote them.

**Patients and Methods:** We included 120 diabetic patients hospitalized from June 2017 to November 2018.

**Results:** The characteristics of our patients revealed a sex ratio H/F of 1.55 with a mean age of  $46.72 \pm 15$  years. Type 2 diabetes predominates (79.2%) and mean HbA1c was  $10.54 \pm 2\%$ . Admitted patients with hyperglycemia (67.5%) and ketosis (22.5%), in a feverish context (44.2%). Clinical signs were localized pain depending on the site of infection in 45.8% of patients and 10% had atypical signs. Abscess sites were polymorphic. The main contributing factor to these infections was irregular follow-up (49%,  $p < 0,001$ ). Imaging guided the therapeutic conduct. Treatment consisted of intensified insulin therapy, surgical drainage, antibiotherapy. The evolution was favorable in 97.5% and 3 patients died of post-operative pulmonary embolism or septic shock.

**Conclusion:** We found a high proportion of chronic hyperglycemia associated with deep abscesses, underscoring the value of careful clinical examination even when an unspecific clinical picture.

### Keywords

Deep abscess, Diabetes mellitus, Therapeutic.

### Background

Diabetes mellitus is a clinical condition associated with a deficiency in the secretion or action of insulin. It is considered one of the greatest emerging health threats of the 21st century. It's estimated that 700 million people in 2045 year will have diabetes compared, more than 463 million currently worldwide [1]. In addition to the classic complications of the disease, diabetes has been associated with a decrease in T cell response, neutrophil function and humoral immunity disorders [2-4]. As a result, diabetes increases susceptibility to infections, both the most common and those affecting unusual sites caused by rare germs [5-9]. Such infections can affect the patient's balance due to their severity and trigger complications related to the underlying pathology, such as high blood sugar and ketoacidosis. Hence early medico-surgical and

multidisciplinary management allows for better results, in order to improve patients' prognosis [10].

The purpose of our work was to determine the clinical, paraclinical, etiological and progressive characteristics of deep abscesses in diabetic patients.

### Patients and Methods

#### Type of study

We conducted a cross-sectional study, including 120 diabetic patients hospitalized in different departments of the Ibn Rochd University Hospital in Casablanca and presenting an abscess (bacterial, parasitic, mycotic...) during the period from June 2017 to November 2018.

#### Variables studied

An exploitation sheet report collected socio-demographic

parameters (age, sex, residence, marital status, occupation, socioeconomic level, social security coverage), history (taking steroids and non-steroidal anti-inflammatory drugs: NSAIDs), toxic habits (smoking, alcohol), diabetes history (diabetes duration, treatment regimen, treatment supply, compliance, acute and chronic complications), Glycated hemoglobin (HbA1c). An irregular follow-up was considered if her was a more than 6 months with no consultation control. Other parameters concerning the infection such as the abscess characteristics (seat, germ involved, entrance door), markers of clinical and biological inflammation (blood count, c-reactive protein and bacteriological sampling), radiological assessment (ultrasound and CT scan). Were collected finally, the indicated treatment such as antibiotic therapy and surgical drainage with evolution were noted.

### Statistical analysis

All data were calculated using SPSS version 25 software and excel 2007 for descriptive statistics. A value of  $p < 0.05$  was considered as statistically significant.

## Results

### Study population description

We included 120 patients, 61% male and 39% female patients with a sex ratio H/F of 1.55 with a mean age of  $46.72 \pm 15$  years. Table 1 illustrates the study population characteristics.

**Table 1:** Socio-demographic characteristics.

Epidemiological characteristics		Frequency n (%)
Gender	Male	73 (61)
	Female	47 (39)
Marital Status	Single	28 (23,3)
	Married	65 (54,2)
	Widower (ve)	21 (17,5)
	Divorced (e)	6 (5)
Education level	None	18 (15)
	Primary school	48 (40)
	Secondary	38 (31,6)
	Superior	16 (13,4)
Professional situation	Unemployed	54 (45)
	Employment	54 (45)
	Retired	12 (10)
Taking corticosteroids	Yes	15 (12,5)
	No	105 (87,5)
Taking non-steroidal anti-inflammatory drugs	Yes	48 (40)
	No	72 (60)

### Characteristics of diabetics

We noted a predominance of type 2 diabetic patients in 79% of the study population and 21% of type 1 diabetic patients. Mean diabetes age was  $6.2 \pm 4.6$  years, with an average HbA1c of  $10.54 \pm 2\%$ . Patients were admitted for hyperglycemia 67.5% and 22.5% for diabetic ketosis. Patients with to controlled diabetes represented only 7.5% of the patient against 92.5% with an uncontrolled diabetes. We found a poor glycemic control in patients with type 2 diabetes in 72.5% of cases compared to 20% of patients with type 1 diabetes.

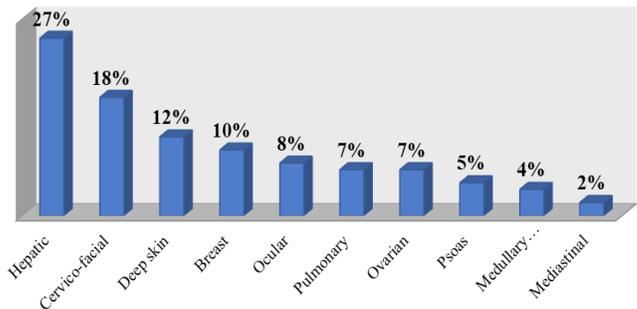
Factor leading essentially the irregularity of the follow-up in 49% of cases ( $p < 0.001$ ,  $r = 0.08$ ).

**Table 2:** Diabetes characteristics.

	Settings	Frequency n (%)
Diabetes Type	DT2	95 (79)
	DT1	25 (21)
HbA1c	6-8%	9 (7,5)
	8-10%	33 (27,5)
	>10%	78 (65)
Degenerative complications	Retinopathy	68 (57)
	Neuropathy	43 (36)
	Kidney disease	26 (22)
Treatment and follow-up		
Insulin therapy	Basal-bolus	95 (79)
	Pre-mixed	25 (21)
Therapeutic compliance	Good	32 (27)
	Wrong	88 (73)
Follow-up	Irregular	59 (49)
	Regular	61 (51)

### Infections Characteristics

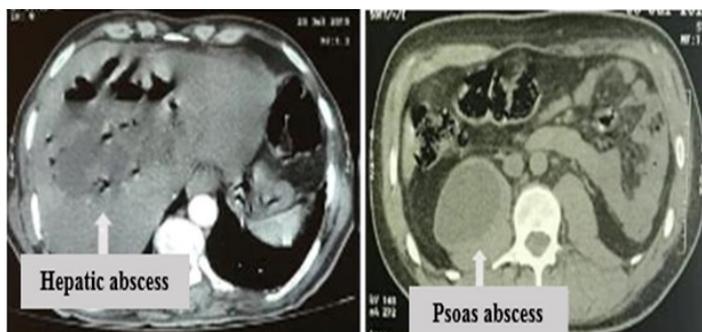
The clinical signs found in our patients were fever in 44.2%, localized pain in 45.8% of cases and atypical pain in 10%. The entry door identified in only 5% of patients with deep skin abscesses. The abscesses found by localization were shown in Figure 1.



**Figure 1:** Abscess localization.

Overall, 69.16% of our patients had hyperleukocytosis, with an average of  $13165.5 \pm 5390$  mg/l, predominantly neutrophil polynuclear, with an average of  $8571.4 \pm 2891.7$  elements/mm<sup>3</sup>. An increase in C-reactive protein (CRP) was observed in 95% of patients with an average of  $54.8 \pm 73$  mg/l. CT scan revealed variable lesions often associated with significant infiltration and/or collection in 70%. Ultrasound objectified multiple abscesses in 59.2% of cases with an average size of seven centimeters. Figure 2 illustrates the deep cutaneous abscesses.

Bacteriological examination by blood culture in 34% and pus sampling in 66% isolated Escherichia. Coli in 28.3% of cases, Klebsiella pneumonia in 15.8% of cases mainly at the hepatic level, pseudomonas aeroginas in 10% of cases with a prevalence of corneal abscesses and a specificity of Aspergillus fumigatus in the patient with a complicated pan-sinusitis after a abscessed orbital cellulitis. Cocci gram positive, especially staphylococci and streptococci, in 25.8% of patients represented the second line of germs involved in abscesses.



**Figure 2:** Deep abscesses on CT scan.

No bacteria were isolated in 20% of our patients. Patients received drainage, single after double/ triple probabilistic intravenous antibiotherapy at baseline, then after adapted according to the antibiogram with an average treatment duration of  $14 \pm 7$  days. The treatment characteristics are illustrated in Table 3.

**Table 3:** Treatments infections.

<b>Drainage n (%)</b>	Yes	86 (72)
	No	34 (28)
<b>Initial processing n (%)</b>	Ceftriaxone	42 (35)
	Imipenem	36 (30)
	Amoxicillin Clavulanic Acid	12 (10)
	Ceftriaxone + Moxifloxacin	24 (20)
	Ceftriaxon + Gentamicin	6 (5)
<b>Adapted treatment n (%)</b>	Ceftriaxone + Moxifloxacin	60 (50)
	Ceftriaxone + Moxifloxacin + Metronidazole	48 (40)
	Amoxicillin Clavulanic Acid	6 (5)
	Imipenem	6 (5)

## Discussion

Our study reported predominance of 61% a male against 39% of female, which is similar to the results of several studies [11,12]. The infections of patient diabetic did not differ in the both sexes, nor in the clinical presentation with the non-diabetic. With respect to history, the percentages of self-medication with non-steroidal anti-inflammatory drugs (NSAIDs) and corticosteroids were similar to the findings of several studies, although NSAIDs accelerate the spread of infection and reduce inflammatory signs leading to late use of care [13]. 92.5% of patients were chronically with hyperglycemia, which explains the immunosuppression linked to the alteration of phagocytic functions of leukocytes that promote infection. Abscesses, characterized by pain in some cases as found in our study in 45.8% of patients, fever in 44.2% and atypical forms in others thus show the differentiation of clinical presentation according to the sites. Xiaodong et al. [11] in a study on risk factors for fatal complications of maxillofacial infection found fever in 42.5%, pain in 96%, inconsistent with our study due to the specific location at the head level. On the other hand, for Wen-Jing wang et al. [14] found that fever was present in 91.6% consistent with our results.

The abscess sites identified on the basis of the clinic and radiology can be of various locations. Discordant studies to our series

were done by Kalpana Sharma et al. [15] who found a rate of maxillofacial abscess in 29% of patients. As well as, Hong-Hau Wang et al. [16] a rate of 54.3% of liver abscesses in diabetic patients, this percentage can be explained by the fact that the study population was larger, including 221 patients. For Rossi et al. [17] the prevalence of liver abscesses was 21%, similar to our results. The study conducted by Jenkes et al. [12] in Colorado on 770 patients with skin abscesses showed a frequency of 33% of diabetic patients, almost similar to our results, although an entry door was found in only 5% of cases. The particularity in our study was the spinal cord injury determining the multifocality of infections, as identified by Noriyoshi Takebe et al. in one case [18]. Frequent liver abscesses in diabetic patients, the most common germs involved were *E. coli* in 18.1% of cases and *streptococcus* in 29.5%, followed by *Klebsiella pneumoniae* identical to our results and those found by Lin YT et al. [19-22].

*Pseudomonas aeroginas* has been isolated mainly in ocular abscesses. In case of cutaneous abscesses, a similar identified microorganism was cocci-positive (90%) [12]. *Staphylococci* and *streptococci*, the third most commonly reported bacteria, showed high sensitivity to commonly prescribed antibiotics.

The first attitude in our centers being a probabilistic spector antibiotic therapy, not allowing time for possible colonization by nosocomial flora, has been corrected not only according to the antibiotic susceptibility test but also, taking into account the pathology evolution [12].

In this study, gram-negative bacteria were sensitive to 3rd generation cephalosporin in combination with moxifloxacin. Therapeutic adjustment in antibiotic therapy was observed in 25% in dual therapy and 40% required triple antibiotic therapy. A study would have shown that high HbA1c was a prognostic factor in hospital mortality, requiring insulin therapy for patients receiving oral antidiabetic agents in our series and taking into account the recommendations to improve patients' vital prognosis [23-25].

## Conclusion

We noted in our study that the often subtle or non-specific clinical presentation of potentially severe deep abscesses can lead to hyperglycemia and ketoacidosis in diabetic patients, with a predisposition to imbalance and/or poor therapeutic compliance. However, the bacteria polymorphism requires antibiotic susceptibility tests as soon as possible in order to obtain a better prognosis. Thus, management must be multidisciplinary, hence the obligation to place particular emphasis on prevention through therapeutic education and careful clinical examination of diabetic patients.

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