

# Severe Tetanus in a Moroccan Medical Intensive Care Unit: Epidemiological and Clinical Profile of the Patients

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## Abstract

Even if it is an exceptional type of disease, tetanus should never continue to exist, because an old and well tolerated vaccine offers an efficient protection. Through a retrospective, descriptive and analytic study of 42 patients in the intensive care unit of the university teaching hospital Ibn Rushd in Casablanca in Morocco from 2010 to 2015, the epidemiological, clinical, and prognostic characteristics of the patients admitted for serious tetanus were studied. The statistical analysis indicates that the serious tetanus affects males 100%, young adult 41.9%, the integumentary portal of entry is 85.7%. Contractures are present in 69%. The anti-tetanus vaccination was never updated. According to the Dakar score, the patients were group II 54.8%. For the Mollaret score, the crude form was found in 44.2%. Mechanical ventilation was necessary in 83.3% and tracheotomy for three patients. Diazepam and baclofen were used in 92.9%, phenobarbital 76.2% and Propofol 42.85%. All patients received a serotherapy and 26.9% a preliminary vaccination dose. The antibiotics administered were penicillin G 33.33% and metronidazole 76.2%. The mortality rate was 61.9%. During the bivariate analysis, the duration of hospitalized patients was significantly higher than that of the survivors ( $p=0.014$ ), similarly, the need for an intubation as well as its duration have significantly influenced the mortality ( $p=0.0001$ ;  $p=0.011$ ). The mortality was also significantly influenced by the occurrence of autonomic dysfunction ( $p=0.016$ ). To improve the prognosis in these serious forms of tetanus, it is highly important to identify the warning signs and refer patients in intensive care for close and taken into matched load monitoring.

**Keywords:** Severe tetanus; Intensive care; Epidemiology; Prognosis

## Introduction

Tetanus remains today an often-fatal severe disease, despite the existence of an effective vaccination. The number of cases was estimated at one million a year worldwide in 2005.

Severe Tetanus is an acute poisoning, cosmopolitan, non-contagious and not immunizing due to strict anaerobic bacterium: *Clostridium tetani*. This is a serious and potentially fatal neurological disease but it is preventable through vaccination. Diagnosis is primarily based on clinical history, combining a history of injury with a contaminated wound and muscle spasms should increase the possibility of diagnosis.

The Symptoms of tetanus have been known since Hippocrates (about 470-360 BC); he described a generalized hyper contraction syndrome in a sailor. The captain of a ship developed a suppurating a finger after injuring manipulating anchor. He manifested language disorders and he complained that he could not speak properly. Then his jaw and blocked his neck became stiff. He presented opisthotonos and died 7 days after the onset of symptoms. The vaccine was developed in 1924 by Ramon and Descombey, and on animals in 1926 and then on humans [1]. During the First World War, tetanus is a major cause of death among soldiers who were wounded in the field. Although vaccine efficacy studies were not officially over, the soldiers were immunized with tetanus toxoid before the Second World War, with almost total protection [2]. Currently, almost all the physiological aspects of tetanus have been clarified. Despite the low incidence of the disease in developed countries, the curative treatment of tetanus is still relevant to improve the prognosis in third world countries that are still paying a heavy tribute to this disease [3].

Efforts should therefore be made in prevention by strengthening vaccination campaigns emphasizing the component vaccine reminders. The incidence of tetanus in Morocco is relatively low.

A national policy of vaccination allowed decreasing tetanus but usually the main problem is about booster vaccines of tetanus. Women are moreover more covered as very restricted national guidelines for the follow-up of the pregnancy. That's why tetanus occurs more to young men in our country.

Over the advances in medicine and especially the resuscitation, the prognosis has improved. However, the mortality rate remains high despite a heavy intensive care, prolonged and expensive, what motivated this study.

This work is a retrospective study of patients hospitalized for severe tetanus in the intensive care unit of the CHU, Ibn Rushd of Casablanca entre 1<sup>st</sup> January 2010 to 30<sup>th</sup> December 2015. Our study aims to highlight the epidemiological, clinical, evolutionary and therapeutic management of patients admitted to the intensive care unit for a severe tetanus and analyze the factors influencing the prognosis of these patients.

## Patients and Methods

### Type of study

Our study is descriptive and analytical retrospective, involving hospitalized patients with severe tetanus, hospitalized in intensive care unit of the University Hospital Ibn Rushd of Casablanca 1<sup>st</sup> January 2010 to 30<sup>th</sup> December 2015.

### Population target

- Inclusion criteria: All patients admitted to the medical intensive care unit of the university teaching Hospital Ibn Rushd for severe tetanus.

### Parameters studied

- Epidemiological aspects: - Age, sex - Medical and Surgical antecedents
- Toxic habits: Smoking alcoholism others
- Clinical data
- Neurological signs and hemodynamic status at ICU admission
- Start mode
- Specific symptomatology

### Gravity scores

- Dakar
- Mollaret
- SOFA, SAPS II, APACHE II
- Prophylaxis: Tetanus serotherapy, tetanus vaccination
- Paraclinical data: Biological characteristics
- Therapeutic management
- Mechanical ventilation
- Symptomatic treatment measures
- Evolution: Favorable, complicated or death

### Data analysis

The information was reported on table. Excel processed by the SPSS 22.0, statistical analysis software. Data analysis was made in three steps:

- Univariate analysis using the mean, median and standard deviation for quantitative variables and proportions for categorical variables.

### Bivariate analysis

- For comparison, percentages of Chi-2 test were used. The level of significance was set at 5% ( $p=0.05$ ).
- Logistic regression performed multivariate analysis not step down.

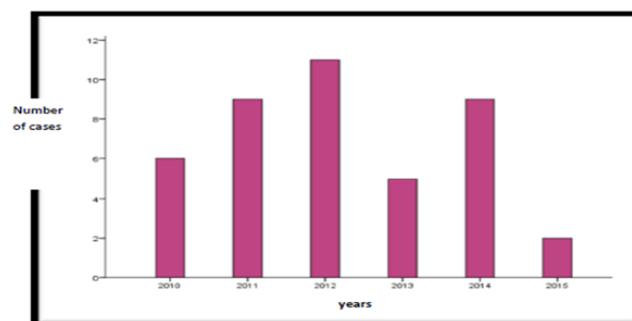
## Results

Much of this data could be showed in a table. I think the pie chart for the Mollaret score is not necessary - the authors have already described the scores in the text.

### Descriptive study

**Epidemiological aspects:** This includes incidence, age and gender.

**Incidence:** 42 were hospitalized for severe tetanus, an incidence of 2.04% of all admissions. Six patients ( $\pm 3.5$ ) on average with tetanus per year with a maximum of 11 patients in 2012 and a minimum of 2 patients in 2015 (**Figure 1**).



**Figure 1** Number of cases of tetanus hospitalized annually in the unit.

**Age:** A clear predominance of tetanus occurred is noted in young subjects. The age group 31-40 years was the most represented with 18 patients (41.9%) followed by 51 to 60 years (18.6%). The average age was 42 years ( $\pm 12$ ) years with extremes of 16 and 66 years (**Figure 2**).

**Gender:** 100% of patients were male.

### Clinical data

**Specific symptomatology:** In our study, 23 patients (54.8%) had generalized spasm, 29 (69.0%) patients developed contractures and 8 patients (19.0%) had dysphagia.

- A contracture - muscle spasm association was found in 16 patients or 38.1% of cases.
- 7 patients (16.3%) had a Contracture - dysphagia association.

- 6 patients or 14% of the cases presented dysphagia and muscle spasm.

### Gateway

- The Entry sight integumental predominated with 36 patients (85.7%) of which 66.6% in the feet and 33.4% of the hands.
- Post-surgery, uterine and intramuscular: no cases.
- The portal of entry was not found in 6 patients (14.3%) (Table 1).

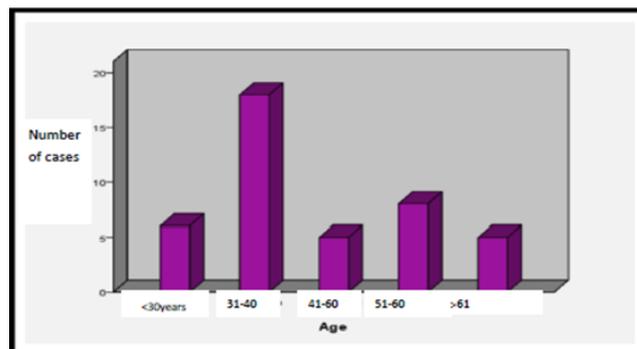


Figure 2 Distribution of cases by age groups.

Table 1 Distribution of patients according to the entrance doors.

Front Door	Number of Patients	Frequency (%)
Wound	36	85.7%
Unknown	6	14.3%
Uterine	0	0%
Post-surgery	0	0%
Intramuscular	0	0%

### Scores of severity and organ failure

#### 1. Nonspecific scores

- **APACHE II:** This score ranged from 0 to 19 on admission with an average of (5.62 ± 4.90).
- **SOFA:** varied between 0 and 5 with an average of 1.21 (± 1.67). SAPS II ranged between 2 and 38 with an average of 14.59 (± 9.01).

#### 2. Specific scores

**Dakar:** In our study, 12 patients or 28.6% had a score between 0 and 1, 2 and 3 scores were the most represented with 23 patients (54.18%), 4 patients (9.5%) had a score to 4 and 3 patients (7.1%) had a score between 5 and 6 (Table 2).

Table 2 The distribution of patients depending on the score of Dakar.

	Frequency	Percentage (%)
Score 0 at 1	12	28.6
Score 2 at 3	23	54.8
Score 4	4	54.8
Score 5 at 6	3	7.1

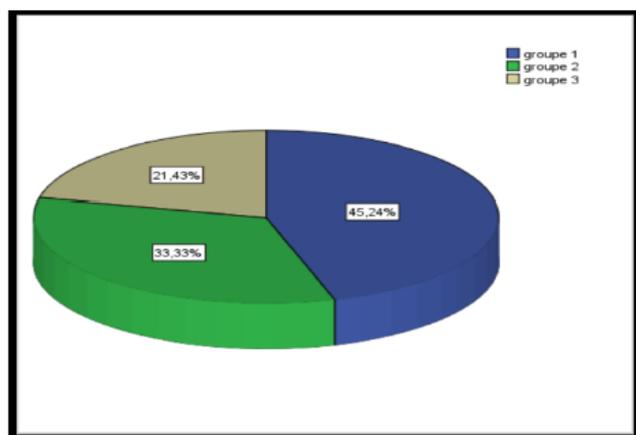
**Mollaret:** The distribution of patients according Mollaret score were as follows: 19 patients 44.2% had a rough shape. 14 patients 32.6% had generalized acute form and 9 cases or 20.9% had a severe form (Figure 3).

### Vaccination and prophylaxis status

The concept of vaccination was never found. However, in 7.1% of cases serotherapy tetanus was performed.

### Analytical study

There is a relationship between mortality and all the variables studied, but four factors present significant values at the 0.05 by Chi-2 test: autonomic syndrome, duration of hospitalization, intubation, and duration of intubation:



**Figure 3** Distribution of patients by scores Mollaret.

- The mortality rate was significantly different between patients intubated or not ( $p=0.000$ ), and the extension of the duration of intubation significantly influenced mortality ( $p=0.011$ ).
- The autonomic syndrome was more frequent in the group of patients who died with a statistically significant difference,  $p=0.016$  (**Table 3**).

## Discussion

### Epidemiological data

In France, the annual incidence between 2008 and 2011 was 0.05 to 0.14 cases per million inhabitants [1-3]. The USA, Canada and the countries of Northern Europe have lower incidences between 0 and 0.3 cases/100,000 inhabitants.

According to the results of our series, the incidence is only 6 cases/year. The disease can affect all ages during the neonatal period, but seems to predominate in adulthood.

- The duration of hospitalization of patients who died was significantly higher than survivors ( $p=0.014$ ).

**Table 3** Dependent variable mortality study.

Variable	Deaths	Percentage	P
<b>Age</b>			
≤ 30	2	7.7	0.499
31-40	11	42.3	
41-50	4	15.4	
51-60	6	23.1	
≤ 60	3	11.5	
<b>Front Door</b>			
Wound	23	88.5	0.577
Unknown	3	11.5	
<b>Paroxysm</b>			
Yes	15	57.7	0.627
No	11	42.3	
<b>Contracture</b>			
Yes	19	73.1	0.350
No	7	26.9	
<b>Dysphagia</b>			
Yes	5	19.2	0.900
No	21	80.8	
<b>Temperature</b>			
36-38.4	22	84.6	0.312
≥ 38.5	4	15.4	
<b>Apache II</b>			
0-4	11	42.2	0.168

5-9	9	34.6	
10-14	2	7.7	
15-19	4	15.4	
<b>SAPS II</b>			
0-8	3	11.5	0.232
9-19	14	53.8	
≥ 20	9	34.6	
<b>Dakar</b>			
0-1	5	19.2	0.232
2-3	16	61.5	
4	3	11.57.7	
5-6	2		
<b>Mollaret</b>			
Group 1	9	34.6	0.179
Group 2	11	42.1	
Group 3	6	23.6	
<b>Intubation</b>			
Yes	25	96.2	0.000
No	1	3.8	
<b>Intubation team</b>			
1-10	10	75	0.011
11-20	6	45.4	
21-30	3	50	
31-40	1	25	
≥ 41	1	100	
<b>Hospital stay</b>			
≤ 20 j	16	61.5	0.014
21-40 j	8	30.8	
≤ 41 j	2	7.7	
<b>Sedation</b>			
Yes	6	23.1	0.397
No	20	76.9	
<b>Tracheotomy</b>			
Yes	1	3.8	0.290
No	25	96,2	

In our series, the average age of our patients was 42 years with extremes of 16 and 66. In our study all patients were male. This gender breakdown is consistent with other studies [4-7]. This is partly due to increased exposure by men in activities that have a greater risk of injury. Tetanus remains a threat to all unimmunized persons [8]. Prophylaxis involves the

vaccination with tetanus toxoid alone or in combination with other vaccine components (poliomyelitis, diphtheria, pertussis). Perfectly well tolerated, apart from very exceptional allergic reactions [9]. The effectiveness of tetanus toxoid is well documented, in most clinical trials; it is between 80% to 100%.

The portal of entry remains predominantly integumentary in all studies whether those of the South or the North [5]. Also in our series, 85.7% (36 patients) had the disease after a traumatic wound or accidental: 66.6% in the feet and 33.4 in hands. Trismus and dysphagia are the two most common initial presentations [10,11]. Lock jaw is found in 50% to 88% of cases [12] and dysphagia appears in 77% to 80% of generalized forms of tetanus, but is rare when isolated and/or opening [12]. but in our study, the Entry sight were more integumental 85.7% feet 66.6% with no cases of post-surgery, uterine and intramuscular cases.

### Severity scores

- **Score de Dakar:** In our series, 12 patients had a crude form, 23 patients had a moderate, 4 patients had been hospitalized for severe forms and 3 patients had been hospitalized in an array of very serious tetanus.
- **Score de Mollaret:** In our series, 12 patients had a crude form, 23 patients had a moderate, 4 patients had been hospitalized for severe forms and 3 patients had been hospitalized in an array of very serious tetanus.
- **APACHE II, SAPS II and SOFA:** In the series, we report, it means APACHE II, SAPS II and SOFA were respectively 5.62, 1.21 and 14.59.

### Outcome

In our series, the average hospital stays lasting for  $20 \pm 2$  days 20 days  $\pm$  2 days with a minimum of 2 days and a maximum of 66 days. This severity is based on the intensity of the disease and the land on which it operates.

### Conclusion

Our study identifies as epidemiological and clinical characteristics of patients admitted to intensive care for severe tetanus young age, male sex, no concept of vaccination, the prevalence of wounds as a gateway and contractures as specific symptomatology. Mechanical ventilation was necessary in most cases with an early and prolonged intubation. The advent of respiratory support, improved intensive care and the availability of specific treatment improved the prognosis of patients dramatically. Intubation, duration of intubation, length of hospitalization and the occurrence of autonomic syndrome were in positive

correlation with tetanus severity which resulted in increased mortality with patients in our series. Mortality was high compared to the literature; however, we cannot deduce the exact accountability of these factors identified. Hence, the interest to expand sampling in a prospective, multi-center study in intensive care units and emergency admission.

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