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Respiratory Diseases

Epidemiological, Etiological and Evolutionary Profile of Purulent Pleurisy: About 91 Cases

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Abstract **Case Report**

Purulent pleurisy is a medical emergency characterized by the presence of purulent fluid between the two pleural sheets, which can affect lung function and compromise vital prognosis, and whose treatment remains a major challenge for the medical community. A retrospective study of 91 cases at the Centre Hospitalier Universitaire Ibn Rochd in Casablanca analyzed the epidemiological and etiological features of the disease, noting a clear male predominance and an average age of 42. Symptoms were dominated by chest pain and fever. Chest X-rays and CT scans revealed mainly free or compartmentalized pleurisy. Bacterial origin followed by tuberculosis were the main etiologies, and rapid, targeted management of purulent pleurisy was emphasized to improve patient prognosis.

Keywords: Purulent Pleurisy, Empyema, Drainage.

INTRODUCTION

Purulent pleurisy corresponds to the appearance, between the two pleural sheets, of a liquid that is either macroscopically purulent, then called an empyema, or macroscopically non-purulent but presenting bacteriological or biochemical characteristics testifying to a microbial invasion. It is a therapeutic emergency involving not only the functional prognosis of the lung, but also the vital prognosis of the patient. It is still a hot topic in the pneumology community. An increase in its incidence has been reported in various countries around the world [1, 2]. The aim of our work is to focus on the epidemiological, etiological and evolutionary profile of this pathology in the Moroccan context, in order to understand its specific features, which will help us to provide more appropriate care and thus improve prognosis.

METHODS

This is a retrospective, descriptive and analytical study of 91 cases collected in the Pneumology Department of the Ibn Rochd University Hospital in Casablanca, over a period of four and a half years from January 2020 to June 2024. We included in this study all patients who presented with purulent pleurisy confirmed by exploratory pleural puncture on admission or during hospitalization in the department. Data were collected from medical records using a pre-established data processing form. The parameters studied were anamnestic, clinical, radiological, biological, therapeutic and evolutionary.

RESULTS

The annual incidence was estimated at 18 cases/year, the mean age was 42, with age extremes ranging from 16 to 75. There was a clear male predominance (78%). Active smoking was found in 53% of patients, 12% had a history of pulmonary tuberculosis, and 10% were diabetic. The average consultation time for our patients was a relatively long 46 days. The onset of symptoms was progressive in 67% of patients, and abrupt in 33%. Clinical symptoms were dominated by chest pain (81%), dyspnea (77%), and purulent bronchial syndrome (52.7%). Fever was present in 73.6%. Physical examination revealed liquid effusion syndrome (72%), mixed (15%), and condensation syndrome (6%). Chest X-ray showed free pleural opacity (63%), encysted pleural opacity (9%), hydro-aeroid image (32%)), and alveolar opacity (6%). Chest CT scans, performed in 71% of patients, revealed free pleurisy (47%), compartmentalized pleurisy (30.7%), pneumopathy (37%), and a tissue process (3%). The pleurisy was of moderate (34%) and great abundance (29%). Macroscopically, pleural puncture revealed a purulent (63%), squinty (10%), lemon-yellow (23%) and pyorheic (6%) appearance. The odour was foul in 16 patients. Cytological study of pleural fluid identified altered

neutrophils in 45% of cases. The bacteriological study isolated the germ in 10% of cases, streptococcus pneumoniae being the main germ found, followed by Staphylococcus aureus. Pleural fluid bacteriology was sterile in 52% of cases. Pleural biopsy, performed in 20.8% of patients, revealed tuberculoid granulomatous inflammation with caseous necrosis in 2.1%, and the presence of tumour cells in one case. GeneXpert in sputum was positive in 2 cases, and BK in 2. Bronchoscopy was performed in 46% of patients, the dominant endoscopic findings being bronchial inflammation (32%), and extrinsic bronchial compression (17.5%).

As regards the etiologies of the purulent pleurisies studied, bacterial origin with common germs was retained in 46.15% of cases. Tuberculosis (17.58%), amebic pleurisy (1.10%), iatrogenic pyothorax (2.20%), metastatic pleurisy (1.1%), and the origin of the pleurisy remained undetermined in 31.87% of cases. The common therapeutic approach was to initiate broad-spectrum probabilistic antibiotic therapy (86.8%) based on amoxicillin/clavulanic acid and ciprofloxacin (65.8%) ± metronidazole (25%), for an average duration of 4 weeks. It was subsequently adapted to the antibiogram data for patients in whom one or more germs were isolated. Anti-bacillary treatment was prescribed in 16 patients. Pleural evacuation was associated with the placement of a chest drain in 42.8% of cases, or iterative punctures in 57.14% of cases. In addition, 18.68% of patients were referred to the thoracic surgery department for further management. The average hospital stay was 14 days, with extremes ranging from one day to 60 days.

Clinical, biological and radiological outcome was favorable in 88% of cases. However, among patients with an unfavorable evolution, several complications were identified, such as failure of thoracic drainage, wall infection, bronchial dilatation and sequelae of pachypleuritis. One patient died.

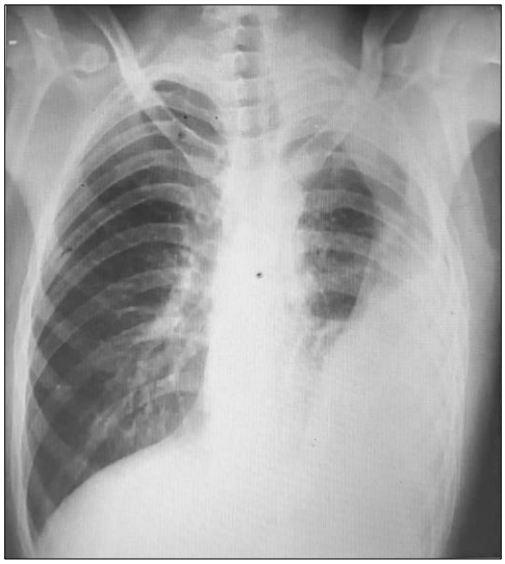

Figure 1: Chest X-ray showing a left pleural opacity

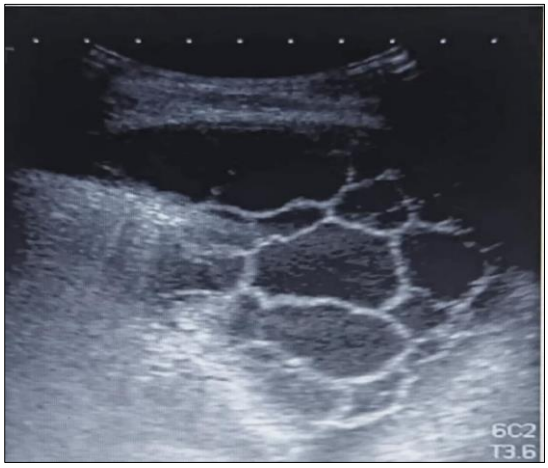

Figure 2: Thoracic ultrasonography in multicompartment pleurisy

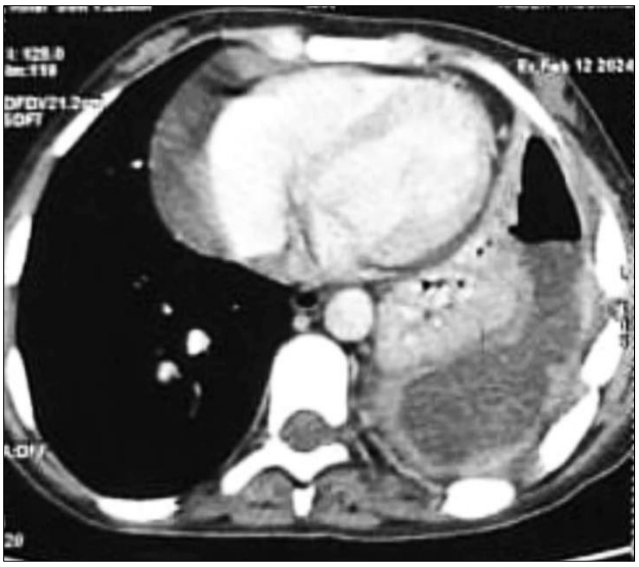

Figure 3: Chest CT scan showing purulent encysted pleurisy

DISCUSSION

Purulent pleurisy (PP) is defined by the presence of purulent fluid in the pleural cavity. First described by Hippocrates in 500 B.C., it represents the oldest known fatal disease to have benefited from "thoracic surgery", and is still a hot topic in the respirology community. It remains relatively common in pneumology, with an average of 80,000 cases per year in the USA and England [1-3], with a 30-day mortality rate of up to 10.5%, and a one-year mortality rate of over 19% [4]. The incidence of purulent pleurisy declined steadily throughout most of the 20th century, largely as a result of advances in antibiotic therapy. However, by the mid-1990s, several teams were reporting an increase in the number of cases. The authors agree on the causes of this increase in incidence : a change in bacterial ecology following the advent of antibiotics, the development of resistance due to poor prescribing, the often long delay in treatment, and an increase in the incidence of contributing factors, mainly co-morbidities (diabetes, HIV, etc.). In Morocco, there are no epidemiological studies in this area.

In our series, purulent pleurisy accounted for almost 2% of all pathologies hospitalized in the Pneumology Department over a 4-year period. Similar prevalences have been reported by other authors. This pathology can occur at any age, with a male predominance (78% in our study), which is consistent with other series in the national and [5], international literature [6, 7].

The pathophysiology of infectious pleurisy is characterized by several distinct phenomena. It may be caused by direct inoculation (traumatic, iatrogenic, postoperative), or indirect inoculation (mediastinal, subdiaphragmatic or parietal). Pleurisy evolves in three phases: exudative, fibrino-purulent, then organized. All these phenomena are linked to an inflammatory cascade involving several inflammatory cytokines (IL1, IL8, TNF alpha, NO, IFN gamma) [3].

PP occurs most often in frail patients, which underlines the importance of the notion of the patient's condition. In 80% of cases, the patient has a predisposing condition and/or an underlying disease (8), with particular emphasis on smoking and diabetes. In our study, 73% of patients had at least one significant risk factor : 58% were smokers, 10% were diabetics, and 48% had COPD.

The clinical presentation of purulent pleurisy closely resembles that of pneumonia. The most common symptoms are fever, pleural chest pain, cough with dyspnea and asthenia [3]. Other signs may be associated, depending on the etiology of the pleurisy, particularly in the case of traumatic or digestive pathologies. Particular attention should be paid to the elderly, who have few symptoms and may simply report unusual fatigue or confusion [8]. Fever is almost always present, except in the elderly. Examination should be directed towards a potential portal of entry, particularly dental, micro-inhalation, vomiting, trauma or surgery, and should identify the underlying terrain.

Chest X-rays are the first examination to be carried out when the patient presents with febrile basithoracic pain. It can reveal and quantify pleural opacities in favor of pleurisy, and may also reveal associated parenchymal condensation.

Thoracic ultrasonography is increasingly used in the management of pleural effusions. Its value has been demonstrated not only in diagnosis, to determine the nature of the effusion, but also in treatment, to guide punctures and drain insertions.

Today, thoracic CT is the gold standard for the management of purulent pleurisy. In a review comparing

ultrasound and CT in the management of purulent pleurisy, it was found that the ultrasound appearance (septations, echogenicity of the pleurisy) correlated poorly with the presence of pus and the nature of the pleurisy according to Light's criteria, whereas a correlation was found with the presence of pleural thickening on CT (9). In addition to describing the effusion (number of pockets, volume, location), the CT scan can also be used to assess lesions in the underlying lung.

In terms of etiology, in our series, parapneumonic etiology was the leading cause in 27.47% of cases, in line with other series. A review including 14 studies and 1,383 patients found pneumonia to be the cause of purulent pleurisy in 70% of cases [3]. In a North American series in 2006, it was estimated that one million patients were hospitalized for community-acquired pneumonia, 20% to 40% of whom developed pleurisy [10]. In England, in 2003, 50,000 hospitalizations for pneumonia were reported, 60% of which were complicated by pleurisy [11]. Tuberculosis is a public health problem in Morocco, as well as in developing countries. It is the 2nd leading cause of pyothorax in our series, with a rate of 17.58%, which is in line with other Moroccan [12], and Indian series [13].

From a bacteriological standpoint, the bacterial ecology of purulent pleurisy is highly variable, depending on context and series. Nevertheless, the bacterial ecology remains different from that of pneumonia, given the acidic, oxygen-poor environment of the pleural space [14]. Most of these studies agree on the predominant role of Streptococcus and Staphylococcus in the genesis of microbiologically documented purulent pleurisy, as demonstrated by Dr. Light's study [15]. As the microbiological yield of pleural fluid is limited, several studies have considered the use of bacterial DNA analysis methods.

In our study, only 10% of cases or the bacteriological study of pleural fluid was contributory, compared with 31.7% in the Dje Bi *et al*., study [16], and 57% in the Letheulle *et al*., study [6]. This low rate of isolated germs in our series may be explained by the fact that only pleural fluid was subjected to bacteriological analysis, but it is certainly also linked to the self-medication of antibiotics prior to admission to the ward.

The therapeutic management of patients with purulent pleurisy is not consensual throughout the world ; approaches differ from one team to another and from one geographical area to another [11]. Nevertheless, the speed of patient assessment and therapeutic management is a key factor in determining morbidity, mortality and healthcare costs. Treatment has three aims: to allow complete evacuation of the pus from the pleural cavity (either by pleural puncture, thoracic drainage if the empyema is free in the pleural cavity, or surgical pleural decortication if the empyema is encysted); to treat the infection; and to promote pulmonary re-expansion in order to prevent respiratory sequelae. Antibiotic therapy should be started early, at best at the stage of pneumopathy. It helps prevent the development of pleural effusion in the case of pneumonia, and prevents the progression to purulence in the case of pleural effusion. Antibiotic therapy is initially empirical, and must take into account the clinical context, the germs usually encountered and good diffusion in the infected pleural fluid, before being adapted to bacteriological data.

In our series, the evolution was favorable in 88% of cases. By way of comparison, the evolution was judged to be good in 87.03% of cases in the series by A. N'khaili [17], and 68.9% in the Dje Bi and al series [16]. The mortality rate was 1.1% in our study. While it was higher in other series, 5% in the Dje Bi and al. study [16], 4.2% in the RA Ahmed *et al*., study [17], and 1.1% in the Dje Bi and al. study [17].

CONCLUSION

Empyema is a suppurative infection of the pleural space. Without prompt treatment, it can lead to prolonged hospital stays, more invasive treatments as it progresses, and significant morbidity and mortality.

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Consent: The authors obtained written informed consent from the patient for this publication.

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