

Quality of Life after Pyothorax Surgery in the Fes-Meknes Region, Morocco

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ABSTRACT

Pyothorax is defined by the presence of a purulent, cloudy, or clear fluid containing altered polymorphonuclear cells and germs between the two layers of the pleura, as observed through direct examination. The progression to chronicity in pleural empyema results from a failure in medical treatment or a delayed diagnosis. In this case, surgery aims to restore respiratory function and prevent recurrence.

The objective of this work is to evaluate the quality of life of patients after pyothorax surgery, as well as the overall impact of this surgical intervention in the medium and long term, and to identify the associated factors.

A cross-sectional study was conducted among patients with pyothorax who underwent surgery in the thoracic surgery department at Hassan II University Hospital in Fes during the period from December 2012 to December 2020. Quality of life was assessed using the SF-12 questionnaire, which was translated and validated in Moroccan Arabic dialect.

We included 72 subjects in the study. The mean age of the patients was 38.75±15.7 years, with 69.4% being male. The most common etiology was pleuropulmonary tuberculosis, found in 38 patients (52.8%).

The average mental quality of life score was 46.11 ±8.14, and the physical score was 50.12 ±6.76. There is a statistically significant association between quality of life and the presence of a history of pleural tuberculosis, secondary pyothorax following subacute pleuritis in its physical component, dyspnea stage, WHO (World Health Organization) score, pain level, occurrence of postoperative infections, weight gain in its physical component, appetite, sleep quality, hospital stay satisfaction in its physical component, and treatment response.

Surgery is the ultimate therapeutic option for treating chronic pyothorax, as it can cure or improve the quality of life of these individuals in the medium and long term.

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Introduction

Pyothorax, also known as pleural empyema, refers to an accumulation of pus in the pleural cavity. This condition can occur in various clinical contexts, with diverse etiologies that influence the therapeutic strategy. Generally, empyema is the main complication of a poorly managed or inadequately treated pleuro-pulmonary infection [1].

It is estimated that 5 to 10% of bacterial pneumonias progress to pleural effusion, with 40 to 60% of patients experiencing such a complication [2,3].

Without prompt intervention, pyothorax significantly increases mortality, which can reach up to 33% [4]. Early management is therefore crucial to prevent complications [5]. Additionally, systemic inflammation and underlying conditions also play a significant role in the clinical progression of these patients [6].

Pyothorax is commonly associated with severe bacterial infections, often secondary to untreated pneumonia, thoracic surgical procedures, trauma, or infections such as pulmonary abscesses. The most frequently implicated pathogens include *Mycobacterium tuberculosis*, *Streptococcus pneumoniae*, *Staphylococcus aureus*, and Gram-negative bacilli, although less common germs may be identified depending on the patient's profile [7,8].

In cases of tuberculous pyothorax, treatment involves appropriate antibiotic therapy combined with thoracic drainage, often guided by ultrasound. This drainage can aid in the closure of the bronchopleural fistula after several weeks and may be supplemented with repeated saline washes, sometimes using streptokinase. Respiratory physiotherapy also plays a crucial role in this management [9,10].

In cases where the infection progresses to encapsulation, forming septated pleural pockets and causing pachypleuritis, a thoracotomy with pleural decortication is required. This typically occurs following a delayed diagnosis or inadequate medical management. In these advanced situations, surgery is regarded as a safe therapeutic alternative, with acceptable outcomes in terms of morbidity and mortality [10,11].

Although pulmonary surgery is a major intervention associated with significant morbidity and mortality rates, these figures have decreased in recent years due to advancements in anesthesia and more effective prevention of postoperative complications, particularly infections. Thoracoscopy, which allows for guided biopsies and improved drainage of septated pleural effusions, also enhances the functional prognosis for patients following decortication [12].

However, while surgery can resolve the infection, it may have long-term consequences on patients' quality of life, particularly due to postoperative and chronic pain. This pain can significantly impact the overall well-being of patients. Therefore, postoperative evaluation should not only focus on the resolution of the infection but also consider the functional, psychological, and social effects of the disease and its surgical treatment [13].

The assessment of quality of life after surgery for pyothorax is essential not only for measuring its clinical benefits but also for estimating its economic impact. It plays a key role in cost-utility evaluation. This approach contributes to a better allocation of healthcare resources and the optimization of patient care. To our knowledge, no published work in Morocco has assessed the quality of life of patients after surgery in the medium and long term. The aim of this study was to evaluate the quality of life of patients who underwent surgery for pyothorax and to identify the factors associated with its deterioration.

Materials and Methods

Study Design and Location

Our study is a cross-sectional study conducted in the thoracic surgery department of Hassan II University Hospital in the city of Fes. It focuses on all patients surgically treated for pyothorax during the period from December 2012 to December 2020.

Study Population

Inclusion Criteria

The study included all patients who underwent surgery for pyothorax, primarily referred by pulmonologists after medical treatments had failed. Some patients were also recruited directly through the emergency department. Those included in this study had presented with purulent pleurisy, either at admission or during their hospitalization in the thoracic surgery department or other services, and required surgical treatment.

Exclusion Criteria

We excluded from our study cases of pyothorax that did not undergo surgical intervention.

Patient Recruitment Method

Initially, the sample included 194 patients, but only 121 of them had retained their phone contacts with the department secretary. Among the remaining patients, 4 had died, 17 had provided incorrect contact information, and 28 were unreachable. Thus, the quality of life study was ultimately conducted on a total of 72 patients.

Data Collection

Data collection was conducted through a telephone survey of patients who agreed to participate in our study, and additional information was gathered from the patients' medical records using a structured questionnaire that included sociodemographic variables such as age and sex. Clinical variables were also collected, covering medical and surgical history, clinical signs, surgical treatment and other procedures performed, complications, and postoperative outcomes. The research team ensured the patients' informed consent, anonymity, and confidentiality of the data provided by participants and the medical records.

Definition of Variables

Modified Medical Research Council (mMRC) Dyspnea Scale: currently the most widely used in COPD (Chronic Obstructive Pulmonary Disease), graded from 0 to 4. In our study, we applied it to patients who underwent surgery for pyothorax to determine whether dyspnea affects their quality of life in the medium and long term [14].

The WHO Performance Status Score provides a quick and simple assessment of a person's autonomy. This score, also known as the 'WHO Performance Status (PS),' is divided into five categories, ranging from 0 (normal activity without restriction) to 4 (bedridden patient) [15].

Pain intensity experienced by patients: We used a numerical scale rated from 0 to 10. The patient assigns a score to their pain, with 0 representing no pain and 10 representing the maximum level of pain [16].

Hospital stay satisfaction in the thoracic surgery department was rated on a scale from 0 to 10, with 10 representing maximum satisfaction.

Quality of Life Measurement

Quality of life was measured using the SF-12 scale, which is the shortened version of the SF-36 scale, developed and analyzed by John Ware and al. The SF-12 has been validated in Moroccan dialect, allowing its use to assess the health status of the population [17,18].

This self-assessment quality of life scale is a shortened version of the 'Medical Outcomes Study Short-Form General Health Survey' (SF-36). In fact, this scale includes only 12 questions out of 36. The SF-12 provides two scores: one for mental and social quality of life and another for physical quality of life (PCS: Physical Component Summary, MCS: Mental Component Summary). The results are presented as a score ranging from 0 to 100, with scores closer to 100 indicating better quality of life.

Statistical Analysis

We conducted a descriptive study of all variables; frequencies were used for categorical variables, while means and standard deviations were used for quantitative variables. The association between different factors and the quality of life score was analyzed

using the Student's t-test and ANOVA (for qualitative variables) and Pearson's correlation (for quantitative variables). The data were entered into Excel and analyzed using SPSS version 26.

Results

Sociodemographic Characteristics and History

Among the 72 participants, 69.4% were men. The average age was 38.8 ± 15.7 years. Additionally, 15.3% of participants were smokers, and 52% had pleuropulmonary tuberculosis as the etiology of their pyothorax. (Table 1)

Table 1: Sociodemographic Characteristics and Medical History

| Variables | N (%) |
|----------------------------------|-------------|
| Age M ± SD | 38.8 ± 15.7 |
| Gender | |
| Male | 50(69.4) |
| Female | 22(30.6) |
| History and Comorbidities | |
| Pulmonary Tuberculosis | 5(6.9) |
| Pleural Tuberculosis | 22(30.6) |
| Peritoneal Tuberculosis | 1(1.4) |
| Tuberculous Contact | 2(2.8) |
| Pulmonary Hydatid Cyst | 1(1.4) |
| Smoking | 11(15.3) |
| Diabetes | 3(4.2) |
| Chronic Kidney Disease | 1(1.4) |
| Systemic Disease | 2(2.8) |
| Surgical History | 2(2.8) |
| Etiologies | |
| Pleuropulmonary Tuberculosis | 38(52.8) |
| Ruptured Hydatid Cyst | 14(19.4) |
| Subacute Pleuritis | 14(19.4) |
| Bacterial Pleuropneumopathy | 1(1.4) |
| Infected Hemothorax | 2(2.8) |
| Spontaneous Pyopneumothorax | 1(1.4) |
| Post-Traumatic Pyothorax | 1(1.4) |
| Undetermined Cause | 1(1.4) |

Clinical Characteristics and Treatment

Among the clinical signs, 38.9% of patients presented with dyspnea, and 16.7% had an WHO score of ≥ 1 , indicating moderate deterioration of their general condition. The majority of patients (86.1%) experienced postoperative weight gain, a sign of clinical improvement, although 11.1% suffered from insomnia. Nearly 17% of patients underwent pleural drainage before surgery, with an average duration of 32.6 days. The surgical treatment primarily consisted of decortication (98.6%), accompanied by postoperative pleural drainage for all patients, with an average duration of 20.8 days. Pain management was primarily handled through oral and parenteral routes, with limited use of thoracic epidurals (5.6%). Postoperatively, 16.7% of patients experienced complications, and 19.4% required blood transfusions. The average length of hospital stay was 8.3 days. In terms of outcomes, 56.9% of patients healed without sequelae, while 40.3% healed with sequelae. (Table 2)

Table 2: Clinical Characteristics and Treatments

| Variables | N (%) |
|---|-----------|
| Clinical Signs | |
| Dyspnea (mMRC ≥ 1) | 28(38.9) |
| WHO Score (≥ 1) | 12(16.7) |
| Postoperative Infectious Episode | 6(8.3) |
| Postoperative Weight Gain | 62(86.1) |
| Postoperative Anorexia | 10(13.9) |
| Insomnia | 8(11.1) |
| Procedures Performed | |
| Pre-Surgical Pleural Drainage | 12(16.7) |
| Surgical Treatment | |
| Decortication | 71(98.6) |
| Thoracotomy | 1(1.4) |
| Post-Surgical Pleural Drainage | 72(100) |
| Pain Management Modalities | |
| Thoracic Epidural | 4(5.6) |
| Oral Pain Management | 68(94.4) |
| Parenteral Pain Management | 67(93.1) |
| Postoperative Transfusion | 14(19.4) |
| Postoperative Complications | 12(16.7) |
| Treatment Response | |
| Healed Without Sequelae | 41(56.9) |
| Healed With Sequelae | 29(40.3) |
| No Healing | 2(2.8) |
| Pain Score M ± SD | 1.6±2.2 |
| Average Duration of Pre-Surgical Pleural Drainage (days) M ± SD | 32.6±67.1 |
| Average Duration of Post-Surgical Pleural Drainage (days) M ± SD | 20.8±19.5 |
| Postoperative Length of Stay (days) M ± SD | 8.3±5.1 |
| Satisfaction with Hospital Stay M ± SD | 9.7±0.8 |

*WHO: World Health Organisation

M: Mean

SD: Standard Deviation

Quality of Life

For the mental summary score, the average was 46.11 ± 8.14 , while for the physical summary score, the average was 50.12 ± 6.76 . The analysis of qualitative variables indicates that several factors significantly influence the physical (PCS) and mental (MCS) quality of life of patients. Patients with dyspnea (mMRC ≥ 1) exhibit significantly lower PCS and MCS scores ($p < 0.001$ and $p = 0.014$, respectively). Similarly, a WHO score ≥ 1 is associated with reduced scores in both dimensions ($p < 0.001$ for PCS and $p = 0.002$ for MCS).

Patients who experienced a postoperative infectious episode also had lower scores for PCS ($p = 0.050$) and MCS ($p = 0.041$). Additionally, symptoms such as anorexia ($p = 0.039$ for PCS and $p < 0.001$ for MCS) and insomnia ($p = 0.010$ for PCS and $p < 0.001$ for MCS).

for MCS) are associated with a notable deterioration in quality of life. Finally, patients who healed without sequelae had significantly higher scores than those with sequelae or without healing ($p < 0.001$ for PCS and $p = 0.003$ for MCS) (Table 3).

Table 3: Results of the Analysis of the Association between Quality of Life Scores (Physical and Mental) and Qualitative Variables

| Variables | PCS | P-value | MCS | p-value |
|-------------------------------------|-------------|---------|--------------|---------|
| Gender | | | | |
| Male | 50.4±6.3 | 0.592 | 46.3±7.5 | 0.800 |
| Female | 49.5±7.9 | | 45.7±9.6 | |
| Pleural Tuberculosis | | | | |
| Yes | 46.96±7.87 | 0.007 | 42.97±9.72 | 0.029 |
| No | 51.52 ±5.77 | | 47.50 ±7.00 | |
| Smoking | | | | |
| Yes | 50.23 ±4.69 | 0.957 | 47.46 ±5.01 | 0.555 |
| No | 50.11± 7.10 | | 45.87±8.59 | |
| Pulmonary Tuberculosis | | | | |
| Yes | 51.57 ±9.32 | 0.624 | 50.90 ±5.39 | 0.175 |
| No | 50.02±6.62 | | 45.76±8.22 | |
| Tuberculous Contact | | | | |
| Yes | 54.90 ±0.95 | 0.315 | 50.58±2.09 | 0.435 |
| No | 49.99±6.81 | | 45.99±8.22 | |
| Diabetes | | | | |
| Yes | 51.31 ±7.39 | 0.759 | 46.87 ±3.86 | 0.871 |
| No | 50.07 ±6.79 | | 46.08 ±3.86 | |
| Tuberculous Etiology/ Origin | | | | |
| Yes | 48.69 ±7.43 | 0.056 | 45.69 ±8.87 | 0.643 |
| No | 51.73 ±5.62 | | 46.59 ±7.33 | |
| Ruptured Hydatid Cyst | | | | |
| Yes | 50.14 ±6.69 | 0.990 | 45.12 ±8.74 | 0.616 |
| No | 50.12±6.84 | | 46.35±8.05 | |
| Subacute Pleuritis | | | | |
| Yes | 53.34 ±4.23 | 0.047 | 46.85 ±6.43 | 0.709 |
| No | 49.35 ±7.05 | | 45.94 ±8.54 | |
| Dyspnea (mMRC) | | | | |
| 0 | 53.51±3,59 | <0.001 | 48.31 ±7.31 | 0.014 |
| ≥1 | 42.47±329 | | 41.42±5.23 | |
| WHO Score | | | | |
| 0 | 52.26±4.83 | <0.001 | 47.43 ±7.66 | 0.002 |
| ≥1 | 39.46±4.60 | | 39.51 ±7.47 | |
| Postoperative Infectious Episode | | | | |
| Yes | 44.95 ±5.99 | 0.050 | 39.64±8.27 | 0.041 |
| No | 50.59 ±6.67 | | 46.70 ±7.93 | |
| Weight Gain | | | | |
| Yes | 50.78 ±6.45 | 0.039 | 46.78±7.61 | 0.084 |
| No | 46.05 ±7.58 | | 41.98 ±10.38 | |
| Anorexia | | | | |
| Yes | 46.04 ±8.83 | 0.039 | 36,66±9,0 | <0.001 |
| No | 50.78 ±6.21 | | 47.64±6.92 | |
| Insomnia | | | | |

| | | | | |
|-------------------------|-------------|--------|-------------|--------|
| Yes | 44.36±10.20 | 0.010 | 33.34 ±7.46 | <0.001 |
| No | 50.84 ±5.94 | | 47.71 ±6.72 | |
| Transfusion | | | | |
| Yes | 52.56 ±7.69 | 0.134 | 45.09±9.29 | 0.604 |
| No | 49.53±6.46 | | 46.36±7.90 | |
| Treatment Response | | | | |
| Healed Without Sequelae | 53.82±3.50 | <0.001 | 48.86±7.25 | 0.003 |
| Healed With Sequelae | 45.92±6.61 | | 42.73 ±8.12 | |
| No Healing | 35.37±5.51 | | 38.78±0.85 | |
| Complications | | | | |
| Yes | 48.71±7.48 | 0.430 | 43.11±8.21 | 0.163 |
| No | 50.41±6.64 | | 46.71±8.06 | |

*WHO: World Health Organisation

PCS: Physical Component Summary

MCS: Mental Component Summary

Regarding quantitative variables, pain intensity showed a strong negative correlation with PCS ($r = -0.749$, $p < 0.001$) and a moderate negative correlation with MCS ($r = -0.352$, $p = 0.002$). Furthermore, greater satisfaction with the hospital stay is associated with better physical quality of life ($r = 0.243$, $p = 0.040$) (Table 4).

Table 4: Results of the Analysis of the Association Between Quality of Life Scores (Physical and Mental) and Quantitative Variables

| Variables | r (PCS) | p-value | r(MCS) | p-value |
|---------------------------------------|---------|---------|--------|---------|
| Age | -0.127 | 0.288 | -0.046 | 0.702 |
| Pain Intensity | -0.749 | <0.001 | -0.352 | 0.002 |
| Duration of Pre-Surgical Drainage | 0.201 | 0.091 | 0.001 | 0.992 |
| Duration of Post-Surgical Drainage | -0.135 | 0.257 | 0.099 | 0.407 |
| Length of Hospital Stay | -0.125 | 0.295 | -0.110 | 0.358 |
| Satisfaction Level with Hospital Stay | 0.243 | 0.040 | 0.210 | 0.076 |

* r: Correlation Coefficient

PCS: Physical Component Summary

MCS: Mental Component Summary

Discussion

This study is the first to evaluate the quality of life after surgery for pyothorax in Morocco, and to identify the associated factors in order to formulate recommendations. This work highlighted average scores for physical and mental quality of life among individuals, with scores of 50.12 ± 6.76 for the Physical Component Summary (PCS) and 46.11 ± 8.14 for the Mental Component Summary (MCS). These results indicate that mental health is perceived less favorably than physical health, which may be attributed to the physical improvement following surgery for pyothorax, while psychological manifestations such as depression and anxiety impact mental quality of life. This observation aligns with other studies on patients who have undergone thoracic interventions. When comparing these results to those of a study on quality of life after surgery for pneumothorax [19]. It is noteworthy that the physical quality of life scores remain higher than those for mental quality of life in both studies. Although physical health generally improves after surgery, it is crucial to consider psychological factors and pain management to ensure a sustainable improvement in patients' quality of life. The results of another study on quality of life and pulmonary function after decortication pleurectomy for malignant mesothelioma reveal significant trends. Although physical function and role functioning declined without recovery over time, perceptions of general health, vitality, and social function fluctuated, reaching levels close to their baseline. This indicates that patients may initially experience a deterioration in their physical health while regaining some vitality [20].

In this study, several significant parameters were identified as influencing post-surgery quality of life for pyothorax patients. Those with a history of pleural tuberculosis reported significantly lower quality of life due to pulmonary sequelae and socioeconomic difficulties, which prolonged postoperative recovery and resulted in dissatisfaction. Additionally, a high dyspnea stage and an OMS score ≥ 1 were associated with a deterioration in quality of life, reflecting the severity of prior lesions and the complexity of the surgical intervention. The intensity of postoperative pain also showed a significant negative correlation with quality of life, as pain disrupts patients' daily lives and affects their emotional well-being. Similarly, the occurrence of postoperative infectious episodes was linked to a decline in quality of life, as these complications extended hospitalization and exacerbated postoperative symptoms.

Conversely, weight gain and preserved appetite were associated with better quality of life, suggesting that adequate nutrition promotes healing and improves patients' overall condition. Sleep quality, with insomnia having a detrimental impact, was also identified as a determining factor; a lack of sleep leads to fatigue and mood disturbances, worsening postoperative difficulties. Finally, hospital stay satisfaction emerged as a key factor, with satisfied patients perceiving an improvement in their physical quality of life, highlighting the importance of care quality and support provided by the medical team. These findings underscore the need for a multidimensional approach in the management of patients after pyothorax surgery, considering not only medical aspects but also psychosocial factors to optimize their recovery.

This study has several strengths, including a thorough assessment of the quality of life of patients after pyothorax surgery, using the SF-12 scale, marking a national first. The evaluation of multiple clinical variables and the identification of predictive parameters for improvement or deterioration in postoperative quality of life enhance the relevance of this research. This study will enrich medical education by providing data that can be integrated into pyothorax courses. For clinicians, it highlights the importance of considering quality of life in the management of the disease. From a research perspective, it establishes quality of life as a fundamental component in cost-utility analyses, aiding decision-making in healthcare resource allocation. However, it also has limitations, such as its cross-sectional nature, which prevents analysis of long-term variations in quality of life, as well as sampling issues related to the lack of data on certain patients and the geographical restriction of the study to the CHU of Fès, which may limit the generalizability of our results to a broader population. Furthermore, the absence of similar studies in the literature made it challenging to compare our findings. For future analyses, a longitudinal assessment would be necessary to capture changes in quality of life over time and strengthen the recommendations derived from this study.

Conclusion

Chronic pyothorax, primarily caused by pleuropulmonary tuberculosis in our context, often requires surgical intervention, with decortication being the technique of choice. Our study assessed the quality of life of operated patients in the medium and long term using the SF-12, revealing a significant association between quality of life and factors such as pleural tuberculosis, dyspnea, pain, and hospital stay satisfaction. In contrast, age, gender, and certain other conditions did not show a notable impact. Based on these findings, we recommend early surgical consultation, reducing the length of hospitalization, optimizing pain management, implementing appropriate nutritional preparation, and enhancing hospital satisfaction to maximize patients' quality of life after surgery. Effective preoperative drainage is also crucial to prevent complications and promote faster recovery.

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Conflict of Interest

The authors declare that they have no competing interest.

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