Research Article

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Quality of Life Assessment in Patients Treated Surgically for Infectious Spondylodiscitis

Abstract

Introduction: Studies reporting outcomes after surgical treatment of Infectious Spondylitis (ISPD) are rare. The aim of our study was to assess function and quality of life in patients treated for spondylodiscitis.

Methods: This was a monocentric, cross-sectional study, carried out in an orthopedic department. This study included 36 patients treated surgically for ISPD. All sociodemographic, clinical, biological, radiological and therapeutic data were recorded. Quality of life was assessed using self-administered questionnaires: SF36 score (Medical outcome study short form-36), Oswestry Disability Index (ODI), Pain Catastrophizing Scale (PCS), the Hospital Anxiety and Depression scale (HAD).

Results: The study population consisted of 36 patients cured of IPSD with a gender ratio (M/F) of 1.57. The average age of the patients was 56 years old. All patients received associated surgical treatment. The mean SF36 score was 65. The mean ODI score was 10.8 ± 8.1. The mean PCS score was 15.2 ± 12.4. The mean HAD score was 13.3 ± 9.7. The SF36 score was associated by its 3 domains: Psychic limitation, emotional well-being and energy/fatigue with the type of germs identified: p=0.019, p=0.027 and p= 0.017 respectively. The HAD score was associated with the presence of neuropathic pain (p=0.008). We found significant correlations between ODI and HAD (p=0.000, r=0.8) and PCS (p=0.000, r=0.8). The HAD was correlated with the PCS score: p=0.000, r=0.9.

Conclusion: The majority of patients cured of IPSD maintained a good quality of life. The type of germs responsible for the spinal infection could be linked to the deterioration of the quality of life later. The type of pain, the catastrophizing syndrome and the functional incapacity were the 3 predictive factors of psychiatric disorders in this population. This then requires appropriate monitoring and a timely alliance of the orthopedist and the psychiatrist.

Keywords: Infectious spondylodiscitis • Quality of life • SF36 • Catastrophizing score • Oswestry disability index • Anxiety and depression scale

Yosr El Mabrouk[1*], Leila Rouached[1], Adnene Ben Ammou[2], Seddik Akermi[2], Ahmed Ben Abid[2], Mohamed Ben Salah[2]

[1]Department of Rheumatology, Charles Nicolles Hospital, University of Tunis El Manar, ROMMANA 1068, Tunisia
[2]Department of Orthopedic surgery, Charles Nicolles Hospital, University of Tunis El Manar, ROMMANA 1068, Tunisia

***Author for Correspondence:**
elmabrouk@etudiant-fmt.utm.tn

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Introduction

Spondylodiscitis represents the most common spinal infection [1]. It represents 2% to 4% of osteoarticular infections. The disease has a male predominance with a gender ratio M/F: 2/1 [2,3]. Infectious Spondylodiscitis (IPSD) occurs mainly in elderly and debilitated people, with a peak prevalence between 50 and 70 years of age. Spondylodiscitis is a life-threatening disease, with a reported mortality rate of 2% to 10%.

It is estimated that 20% to 40% of patients with spondylodiscitis undergo surgical treatment. The primary indication for surgery is progressive neurologic impairment, but indications also include epidural abscess, pain caused by spinal instability, progressive deformity, or failure to respond to conservative treatment. As a result, various surgical methods have been described, all based on varying degrees of debridement of the vertebral bodies and discs by anterior, posterior, or combined surgical approaches [4].

Although the development of diagnostic and therapeutic techniques has considerably reduced the mortality rate, there is still insufficient data on the outcome of spondylodiscitis [1]. Studies reporting outcomes after surgical treatment are rare, and few studies have reported quality of life after surgery. Some studies have shown that a preoperative neurological deficit is a predictor of a negative outcome [4]. In the long term, children generally have a good functional prognosis. However, some studies

suggest a poorer prognosis for adult subjects. Many patients still have neurological disorders and persistence or even worsening of back pain after treatment. Furthermore, quality of life a year after treatment was much lower than in healthy population.

Given that few studies have focused on long-term clinical outcomes, the aim of our study was to evaluate function and quality of life in patients treated for spondylodiscitis.

Materials and Methods

Study design

This was a cross-sectional, monocentric study carried out in a third-line orthopedics department and conducted over a period of 02 years. We included in our study, patients aged over 18, surgically treated for IPSD. Patients with cognitive impairment were excluded. Data was collected, based on a pre-established information sheet. We identified in all patients: Sociodemographic data, comorbidities, physical activity, morphometric characteristics, clinical and neurological data, radiological, biological and microbiological parameters, treatment and evolution.

Quality of life was assessed using the following measurement tools:

- **The SF36 score (Medical outcome study short form-36):** Assesses eight health domains with multi-item scales: Physical functioning, physical limitations, psychological limitations, social functioning, emotional well-being, energy/fatigue, pain and general health perceptions. Each domain is scored from 0% to 100%. Higher scores indicate higher levels of functioning or well-being [5,6].
- **The Oswestry Disability Index (ODI):** Is composed of 10 items and assesses functional status and impaired quality of life in patients with acute or chronic low back pain. It assesses functional limitations in daily life activities with a score from 1 (the best) to 100 (the worst). Among other things, pain intensity, personal hygiene, walking, sleeping, social life, sex life and movement are assessed by the patient. Each section has six possible answers, scored from 0 to 5 [7-9].
- **The Pain Catastrophizing Scale (PCS):** aims to describe the type of thoughts and emotions of patients when they have pain, consisting of 13 statements describing different thoughts and emotions that can be associated with pain. Each statement is rated from 0 to 4. A PCS>30 indicates a high level of catastrophism [10].
- **The Hospital Anxiety and Depression Scale (HAD):** Composed of 2 subscales: Anxiety and depression, which consist of 7 items, each. Possible scores range from 0 to 21 for anxiety and 0 to 21 for depression, respectively. Anxiety or depression is defined by a HAD score≥8 [11].

Statistical analysis

The statistical study was carried out using the Statistical Package for the Social Sciences (SPSS) version 26.0 software. For data analysis, we used the student T test for studying the association between two qualitative and quantitative variables, the *Chi²* test for comparing percentages. To study the associated factors to scores of quality of life, we analyzed the associations between the tools used and the IPSD parameters, using linear regression. The significance level was set at $p<0.05$ for all statistical tests.

Ethical considerations

All patients participating in the study were informed in advance of the type and objective of the study and gave their consent for the use of their clinical and paraclinical data for carrying out this study. Ethical approval was obtained from the local ethical committee of our hospital.

Results

Patients characteristics

A total of 36 patients followed for IPSD, with a gender ratio (M/F) of 1.57 were included. The mean age was 56 years. All of them received surgical treatment: Arthrodesis (12%), laminectomy (6%), corporectomy (18%), internal corset (36%), fixation (22%), hydatid cyst aspiration (6%). Detailed characteristics of patients are summarized in Table 1.

Table 1: Patients Characteristics.

Parameter	Statistic
Comorbidities	
Diabetes (%)	17
Heart disease (%)	6
Psychiatric disease (%)	6
Infection characteristics	
CRP (mg/l)	143 (5-330)
White blood cell count(/mm³)	14400 (7900-26000)
Level involved	
Cervical spine (%)	16
Thoracic spine (%)	30
Lumbar spine (%)	23
Multilevel involvement (%)	31
Microbiological diagnosis	
Staphylococcus aureus (%)	22
Streptococci (%)	6
Klebsiella (%)	11
Tuberculosis (%)	33
Brucellosis (%)	11
Hydatidosis (%)	6
No pathogen cultured (%)	11
Treatment	
Antibiotics (%)	90
Surgical intervention (%)	100

Note: CRP: C Reactive Protein

Quality of life

The average ODI score was 10.8 ± 8.1 (0-34). Thirty two percent of patients had no disability, 44% had mild disability, 18% had

moderate disability and 6% had severe disability. The mean PCS score was 15.2 ± 12.4 (0-50). Eleven percent had a high PCS score. Table 2 summarizes the values for each of the 8 domains of the SF36 score. Table 3 summarizes the values of the HAD score and each of its 2 domains: Anxiety and depression. Twenty-two percent of patients had definite depression and 25% patients had definite anxiety.

Table 2: SF36 Score Dimensions

	Statistics
Physical functioning (mean ± SD)	67 ± 15
Physical limitation	62 ± 16
Psychic limitation	62 ± 17
Social functioning	68 ± 18
Emotional well-being	65 ± 21
Energy/fatigue	61 ± 18
Pain	64 ± 18
General health	73 ± 24

Note: SD: Standard Deviation

Table 3: The HAD Score and its Two Domains: Anxiety and Depression

	Statistic	Minimum	Maximum
HAD	13.3 ± 9.7	0	40
Anxiety	6.8 ± 5.03	0	20
Depression	6.6 ± 5.4	0	20

Parameters associated to quality of life scores

The SF36 score was associated by its 3 domains: Psychological limitation, emotional well-being and energy/fatigue with the type of germs identified: p=0.019, p=0.027 and p=0.017 respectively. The HAD score was associated by its anxiety component with the presence of neuropathic pain (p=0.008).

Associations between the different quality of life scores

In our study, we found significant correlations between the ODI and the HAD with its two components: Anxiety and depression (p=0.000, r=0.8) and the PCS (p=0.000, r=0.8). The HAD was correlated with the PCS score: p=0.000, r=0.9. However, we did not find correlations between the SF36 score with its eight domains and the rest of the quality of life scores (ODI, HAD and PCS) with a p-value ≥ 0.05.

Discussion

Patient-reported outcomes are recognized as essential for the evaluation of medical interventions. In the previous fifty years, the number of articles published annually on health-related quality of life research has increased dramatically from 0 to over 17,000 [12]. In our study, the average back pain VAS at the time of diagnosis was 7.1 ± 1.8. Following up, the SF36 score's pain domain was 64 ± 18, with extremes falling between 30 and 90. This explains the improvement in pain since treatment. In the study by Stoop, et al., [1], the average pain VAS for back pain after 5 years of treatment was 3.5. Forty percent of patients had a VAS ≥ 4 and twenty-three percent reported having no back pain. In 52% of patients, pain worsened since spondylodiscitis treatment. There was a statistically significant difference between the different segments of the spine with an average pain VAS of 1.4 for neck pain, 2.6 for back pain, and 4.3 for low back pain. Long-term clinical outcomes including pain intensity are little known. Some studies suggest the persistence or even worsening of back pain in these patients. Impaired quality of life tends to exist after conservative or surgical treatment, due to destruction and degenerative changes of the spine [13,14].

In the study by Pola, et al., [13], chronic back pain was noted in 17.1% of patients after 2 years of treatment. It was found that neurological deficits or the presence of an epidural abscess at the time of diagnosis and negative microbiological test results were poor prognostic factors associated with functional decline at two years of treatment. Fayazi, et al. [15], reported that 7 of the 11 patients had no back pain at the last follow-up. In another study, it was found that eight percent of patients had chronic back pain [16]. In the study by Woertgen, et al., only 14% of patients had no complaints after treatment, and almost 22% reported having more pain than before [14]. In patients who received surgical treatment, a significant improvement was observed in 88% of cases [17]. In our study, the average SF36 score with its 8 domains was 65. This shows that patients treated for IPSD have a good quality of life. The SF36 score was associated by its 3 domains: psychological limitation, emotional well-being and energy/fatigue with the type of germs identified: p=0.019, p=0.027 and p=0.017 respectively. However, SF36 was not associated to surgical techniques or comorbidities number. In the literature [1], the scores that corresponded to the physical component of the SF-36 averaged 41.7 and to the mental component 38.4. Significant differences across the 8 domains were observed in the following three domains: Physical limitations due to emotional problems, physical limitations due to physical problems, and physical functioning. The physical component scores and the mental component scores did not differ statistically between patients with ≤ 1 or ≥ 1 chronic pathology. A strong correlation was found between ODI and physical domain scores (r=-0.61, p<0.05) and moderate correlations between ODI and mental component (r=-0.43, p<0 .05) and the VAS and physical component (r=-0.48, p<0.05). There was a weak correlation between the VAS and the mental component (r=-0.35, p<0.05). This suggests that back pain has considerably influenced daily life and that the number of chronic pathologies does not primarily affect quality of life. Many studies also reported that quality of life after treatment of spondylodiscitis was much lower than that of healthy population [14,18,19]. Some studies have suggested that conservative treatment results in back pain more often than surgical treatment, with a higher risk of developing long-term deformity [20-22]. In our study, the average ODI score was 10.8 ± 8.1. Thirty-two percent of patients had no disability, 44% had mild disability, 18% had moderate disability, and 6% had severe disability. We found significant correlations between the ODI and the HAD with its two components: Anxiety and depression (p=0.000, r=0.8) and the PCS (p=0.000, r=0.8). This suggests that

the majority have a good functional prognosis and that functional disability could be a cause of psychological disorders in these patients. Stoop, et al., found that the mean ODI at follow-up was 22. Patients had good scores on self-care domains. The majority: 56% of patients reported ODI scores <20, indicating minimal disability. There was a strong correlation between VAS pain and ODI (r=0.81, p<0.05). No statistically significant difference in ODI scores was found between patients with ≤ 1 or >1 chronic condition. There was no statistically significant difference between the different segments of the spine (neck pain, back pain, low back pain) and the ODI score. Forty-four percent of patients reported disabilities with ODI scores ≥ 20, confirming that spondylodiscitis can be disabling after successful treatment of the infection [1]. Overall, the average ODI score of 22 was consistent with average values reported in the literature [18,19]. Furthermore, the comparison of conservative and surgical treatment have showed a similar distribution of ODI with a score ≥ 20 in sixty-one percent of patients [23]. In another group of surgically treated patients, the mean ODI scores were 29 at two years of follow-up [19]. A recent study comparing early surgery versus conservative treatment showed that group 1 had a significantly better ODI score. This suggests that surgery could improve quality of life [20]. All of these literature data suggest that spondylodiscitis has a significant impact on daily functioning in previously healthy patients. To our knowledge, there are no studies in the literature to date that have focused on the assessment of catastrophic thinking in patients treated for IPSD. In our study, the average PCS score was 15.2 ± 12.4. Eleven percent of patients had a high PCS score. We found significant correlations between the PCS and the ODI (p=0.000, r=0.8) and the HAD (p=0.000, r=0.9). However, catastrophizing was not associated with pain in our patients. This suggests that the majority of patients treated for IPSD have low levels of pain catastrophizing and that catastrophizing may be associated to functional disability and psychiatric disorders. In a systematic review of the literature, 66% of studies found that catastrophizing was associated with pain and functional disability during the follow-up of chronic low back pain patients [23,24]. Other studies found that eighty-three percent of patients with high level of pain catastrophizing experienced lower quality of life than those with low level [25]. In our study, the average anxiety score was 6.8 ± 5.03 and the average depression score was 6.6 ± 5.4. Twenty-two percent of patients had definite depression and 25% had definite anxiety. The HAD score was associated by its anxiety component with the presence of neuropathic pain (p=0.008). The HAD was correlated with the PCS score: p=0.000, r=0.9. We also found significant correlations between the HAD with its two components: anxiety and depression and the ODI (p=0.000, r=0.8). This suggests that a quarter of patients treated for IPSD developed neurotic disorders and that these disorders could be associated to the type of pain, catastrophic thoughts and functional disability. A retrospective study of 30 patients hospitalized in a physical medicine and functional rehabilitation department, showed that the average pain VAS was 4 ± 2 and neuropathic pain was present in 70% of patients. Depression was correlated with the presence of neuropathic pain (p=0.004) [26].

Conclusion

In summary, we found that the majority of patients cured of IPSD maintained a good quality of life. The type of germs causing the spinal infection could be linked to worsening quality of life later. These patients also have a good functional prognosis. However, those with functional disabilities developed neurotic disorders such as anxiety and depression. The type of pain, catastrophizing syndrome and functional disability were the 3 predictive factors of psychiatric disorders in this population.

According to the results of our study and the data published in the literature, IPSD not only affects the vital and/or functional prognosis of patients but also constitutes a risk factor for psychiatric disorders: Neurosis and alteration of life quality. We therefore propose the development of preventive strategies: This requires appropriate monitoring and a timely alliance between the orthopedist and the psychiatrist.

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