

Perfil Epidemiológico da Espondilodiscite Tratada Cirurgicamente



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ABSTRACT

Introduction: The term spondylodiscitis aims to describe any spinal infection. Medical treatment is the gold standard; nevertheless, surgical treatment can be indicated. The aim of this work was to study the epidemiological profile in a group of patients with spondylodiscitis surgically treated in the same medical institution between 1997 and 2013.

Material and Methods: Eighty five patients with spondylodiscitis were surgically treated in this period. The authors analysed clinical data and image studies for each patient.

Results: We treated 51 male and 34 female patients with an average age of 48 years old (min: 6 - max: 80). The lumbar spine was more often affected and *Mycobacterium tuberculosis* the most frequent pathogen. The number of cases through the years has been grossly stable, with a slight increase of dyscitis due to *Staphylococcus aureus* and decrease of the dyscitis without pathogen identification. Paravertebral abscess was identified in 39 patients and 17 had also neurological impairment, mostly located in the thoracic spine and with tuberculous aetiology. Immunosuppression was documented in 10 patients.

Discussion: In this epidemiologic study we found a tuberculous infection, male gender and young age predominance. Despite a relative constant number of patients operated over the years, pyogenic infections due to *Staphylococcus aureus* seems to be uprising. Paravertebral abscess and neurological impairment are important dyscitis complications, especially in tuberculous cases.

Conclusion: Spinal infections requiring surgical treatment are still an important clinical condition. *Mycobacterium tuberculosis* and *Staphylococcus aureus* represent the main pathogens with a growing incidence for the latest.

Keywords: Discitis/surgery; Discitis/epidemiology; Orthopedic Procedures.

RESUMO

Introdução: O termo espondilodiscite descreve uma qualquer infeção da coluna vertebral, sendo o tratamento *gold standard* baseado na terapêutica médica e a indicação cirúrgica ponderada em casos particulares. Foi objetivo deste trabalho estudar o perfil epidemiológico de um grupo de doentes com espondilodiscite submetidos a tratamento cirúrgico numa mesma instituição nacional entre 1997 e 2013.

Material e Métodos: Análise epidemiológica de 85 doentes com diagnóstico de espondilodiscite submetidos a tratamento cirúrgico. Foram analisados os processos clínicos, estudos de imagem e registos informáticos.

Resultados: Foram tratados 51 doentes do género masculino e 34 do género feminino. A idade média foi de 48 anos (min: 6 - máx: 80). O segmento lombar foi o mais afetado e o *Mycobacterium tuberculosis* o agente etiológico mais frequente. A distribuição do número de casos ao longo dos anos manteve-se aproximadamente constante, com discreto aumento da incidência do *Staphylococcus aureus* e diminuição do número de casos sem agente identificado. Trinta e nove doentes apresentavam abscesso paravertebral e 17 lesão neurológica concomitante, a maioria no segmento torácico e em relação com infeção tuberculosa. Dez doentes apresentavam imunodepressão importante.

Discussão: Nesta série verificou-se um predomínio da infeção tuberculosa, no género masculino e em indivíduos jovens. Enquanto o número de casos/ano das discites tuberculosas se mantém constante, as infeções a *Staphylococcus aureus* parecem ganhar preponderância. O abscesso paravertebral e a lesão neurológica constituíram uma complicação frequente da infeção tuberculosa.

Conclusão: As infeções da coluna vertebral com necessidade cirúrgica persistem como patologia relevante. *Mycobacterium tuberculosis* e *Staphylococcus aureus* representam os principais agentes etiológicos, parecendo existir uma incidência crescente deste último agente.

Palavras-chave: Discite/cirurgia; Discite/epidemiologia; Procedimentos Ortopédicos.

INTRODUCTION

Spondylodiscitis refers to an infection affecting the intervertebral disk, the vertebral body or the posterior arch of the vertebra, being aetiologically pyogenic (bacterial), granulomatous (tuberculous, brucellar or fungal) or parasitic.¹ Even though it is considered as a rare condition, spondylodiscitis is becoming increasingly prevalent² due to different factors including the rise in intravenous drug users, in long-term dialysis patients, in average life expectancy of immunocompromised patients and with multiple comorbidities, as well as an exponential growth in spine surgery.^{1,3} Together with higher diagnostic accuracy, these have led to

an increasing number of patients.^{1,3,4}

Haematogenous spread, direct external inoculation and spread from the infection of adjacent tissues are the three main contamination routes.¹ *Staphylococcus aureus* remains as the most frequent causative agent of pyogenic spondylodiscitis, even though *Mycobacterium tuberculosis* still remains as the most frequently described worldwide.^{1,3,5-7} Other causative agents such as *Pseudomonas aeruginosa*, coagulase-negative staphylococci and streptococci, are more frequently found in intravenous drug users.^{1,3} Fungal or parasitic infections are extremely uncommon.⁸

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The estimated annual incidence of spondylodiscitis in Europe ranges between 0.4 and 2.8 new cases per 100,000 population per year, even though these data are subject to variability of inclusion criteria used.³ More recently, the highest incidence of spondylodiscitis has been described in male patients, mainly in elderly patients probably due to the high comorbidity rate found in European men aged above 60.^{3,9,10}

Spondylodiscitis may present clinically with pain, fever, kyphotic deformity, paravertebral (paraspinal) abscess or even progressing neurological deficit. In early stages of the disease, diagnosis may be difficult and therefore clinical, laboratory and imaging assessment is crucial.¹

Antibiotic therapy remains as gold standard in spondylodiscitis approach and patients with spinal instability, failure of medical treatment, with any major and progressing deformity or, otherwise, with any paravertebral/epidural abscess with any relevant extension or with any *de novo* neurological deficit have an indication for surgical therapy.¹

Due to scarce national information regarding spondylodiscitis, our study aimed to define the epidemiological profile of a group of patients diagnosed with spondylodiscitis (pyogenic, granulomatous or with other aetiology) having underwent surgery at a Portuguese hospital over a 17-year period, between 1997 and 2013.

MATERIAL AND METHODS

This study involved a group of patients diagnosed with spondylodiscitis, regardless of the aetiology, having underwent surgery at the Department of Orthopaedic Surgery between 1997 and 2013. In total, 85 patients (34 female, 64 ethnic leucodermic, 21 melanodermic patients) with spondylodiscitis underwent surgery as adjuvant therapy to antimicrobial treatment used for all the patients, which

was supervised by the Department of Infectious Diseases.

Patient's clinical records (including imaging) were analysed. The patients for whom any clinical information was unavailable were excluded from the study. Demographic data, as well as clinical data regarding characteristics of the lesion, any neurological deficit, isolated microorganisms and associated comorbidities were obtained.

Patients presenting with (i) failure of medical treatment, (ii) any neurological deficit, (iii) an extensive paravertebral abscess with or without extension into the spinal epidural space and (iv) spinal instability had an indication for surgical treatment.

RESULTS

The average age of our group of patients was 48 years (min: 6; max: 80) with no statistically significant differences among the different age groups (Fig. 1). Lumbar spine was most frequently involved (43 patients), followed by thoracic (35), thoraco-lumbar transition (4) and cervical spine (3 patients) (Fig. 2).

Mycobacterium tuberculosis was isolated in 43 patients, apart from *Staphylococcus aureus* (15), methicillin-resistant *Staphylococcus aureus* (MRSA) (3), *Streptococcus pyogenes* (1) and *Brucella spp* (2 patients). No causative agent was identified in 21 patients (Fig. 3). All paediatric patients presented with tuberculosis.

No significant differences were found between the cause of spondylodiscitis and the affected spinal segment, considering both the infection by *Mycobacterium tuberculosis* (20 out of 43 patients presented with thoracic and 19 with lumbar spine involvement) and by *Staphylococcus aureus* (8 out of 15 patients presented with thoracic and six with lumbar spine involvement). Most patients with no causative agent identified presented with lumbar spine involvement (four patients with thoracic vs. 15 with lumbar spine

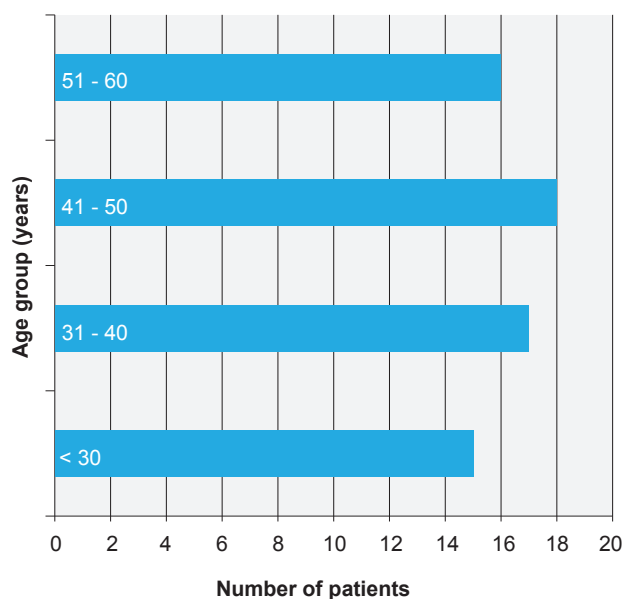


Figure 1 – Distribution of patients with spondylodiscitis in each age group.

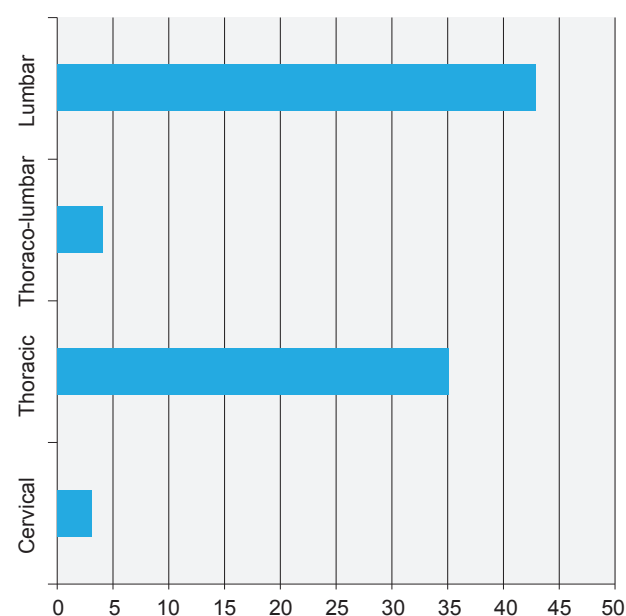


Figure 2 – Distribution of patients in each affected spinal segment

involvement).

The assessment of the distribution of the number of patients over the years did not show any increased number of spondylodiscitis with an indication for surgery (Fig. 4), with a rather stable number of patients affected by *Mycobacterium tuberculosis* (Fig. 4), whilst an increasing trend in pyogenic spondylodiscitis, namely caused by *Staphylococcus aureus*, has been found; in addition, a lower number of patients in whom no causative agent was identified has been found (Fig. 4).

In total, 39 patients presented at diagnosis with a paravertebral abscess (25 patients presenting with tuberculous spondylodiscitis, 7 pyogenic and 7 with unknown causes) (Fig. 5).

Most patients presented with neurological involvement of the thoracic spine (11), followed by lumbar (4) and by thoracolumbar transition (one patient). The presence of neurological deficit was mostly related to tuberculous (12 patients), followed by pyogenic spondylodiscitis (5 patients).

From the 85 patients, 4 patients were HIV-positive and six other patients presented with major comorbidities inducing immunosuppression namely cancer, chronic alcoholism, intravenous drug abuse and type-2 diabetes (Table 1).

DISCUSSION

Spondylodiscitis is an uncommon disease, even though showing an increasing incidence in Western countries.^{1,11,12} Different reasons, including the rise in average life expectancy of patients with multiple comorbidities, in immunocompromised patients and an exponential growth in spine surgery, explain this trend.^{1,3,11,12} These infections are

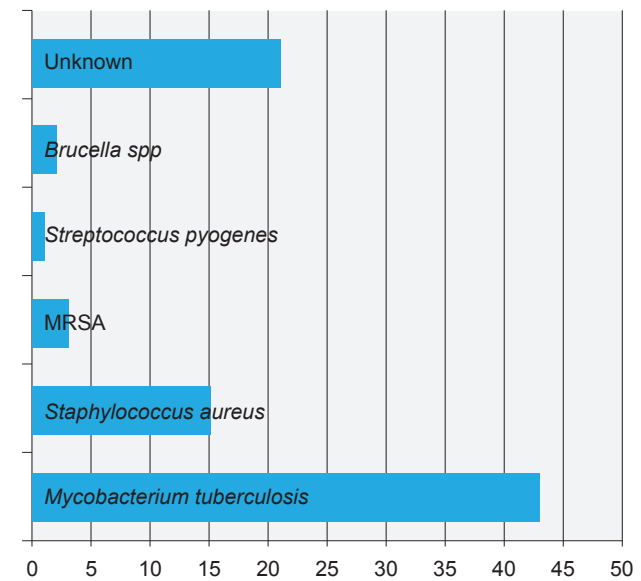


Figure 3 – Number of spondylodiscitis per causative agent

more frequent in male patients and an increased incidence and prevalence has recently been described in ageing population.^{11,12} A higher male predominance of this condition has also been found in our group of patients, unlike what was found regarding the age distribution of the disease in our group of patients. This may be explained by the fact that an important number of young patients originated from Portuguese-speaking African countries, in contrast with the trend found in the remaining Western countries where ageing population is mostly affected.

Antibiotic treatment remains the gold standard for

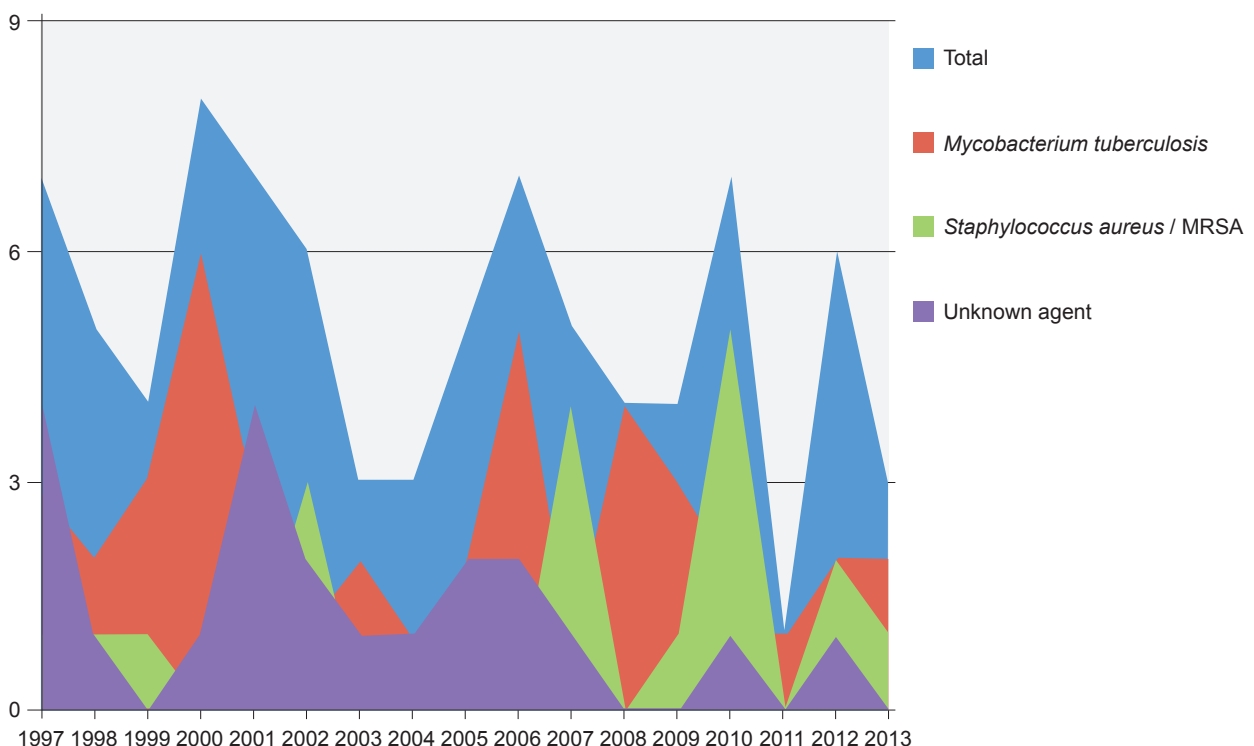


Figure 4 – Patient/years per isolated causative agent

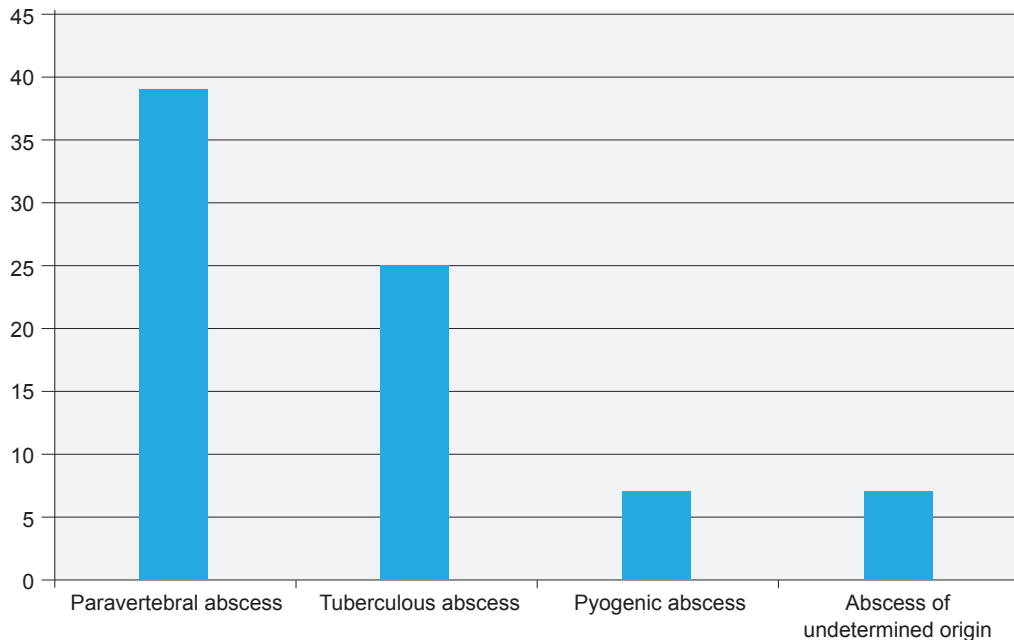


Figure 5 – Presence of paravertebral abscess according to the causative agent

the approach to spondylodiscitis. Our group of patients specifically included patients who underwent both surgical and medical treatment. Specific clinical situations - (i) failure of medical treatment, (ii) any neurological deficit, (iii) an extensive paravertebral abscess with or without extension into the spinal epidural space and (iv) spinal instability - have an indication for surgery and this was offered to patients.^{1,6,7} Our patients were proposed for surgery according to these criteria and were prescribed antibiotics concomitantly.

In our group of patients, surgically-treated spondylodiscitis affected predominantly the lumbar spine (43 out of 85 patients), in line with literature.¹ Overall, this group of patients does not confirm any increased incidence, showing some non-significant variations in the number of patients over the years. However, it should be mentioned that this group of patients only included surgically managed patients and patients managed medically were not included.

Staphylococcus aureus remains as the major causative agent of pyogenic spondylodiscitis and the most important causative agent in developed countries, even though tuberculosis remains as the major causative agent worldwide.¹ A predominance of tuberculous spondylodiscitis has been found in our study, unlike what has been usually found in other Western countries.^{9,11-14} Again, this result may be explained by the fact that our hospital is a referral centre for patients originated from Portuguese-speaking African countries, where tuberculosis is endemic. The number of patients with tuberculous spondylodiscitis has remained unchanged, while pyogenic infections, particularly by *Staphylococcus aureus*, (including MRSA), show an upward trend. Other causative agents, such as streptococci or *Brucella spp* are clearly uncommon and a small number has been found in our group of patients. A relevant number of patients in whom no causative agent

was identified agent was found in our study, despite the different cultures obtained. However, the number of patients with spondylodiscitis and no causative agent identified has decreased over the last few years, explained by a much more proactive attitude towards the diagnosis.

The assessment of our group of patients allowed for the confirmation of paravertebral abscess as a frequent complication of spondylodiscitis, particularly in patients with tuberculous spondylodiscitis (25 out of 40 patients). Pyogenic infection induced a paravertebral abscess in a lower number of patients (4 patients out of 15 patients infected with *Staphylococcus aureus*) and usually smaller.

The presence of a neurological deficit has also been significant in spondylodiscitis (17 patients) and was particularly related with tuberculous infection (12 out of 17 patients presented with neurological deficit). According to Hodgson *et al.*, early-onset paraplegia (presented within the first two years of the disease) in tuberculous infection relates to the active disease and compression is caused by the presence of pus or granulation tissue, while late-onset paraplegia (beyond the first two years) usually relates to the presence of bone compression caused by marked spinal deformities.^{14,15}

From the 85 patients diagnosed with spondylodiscitis and surgically treated, only four HIV-positive patients and six patients with important comorbidities and immunocompromised, namely with active cancer, chronic alcoholism, intravenous drug use and type-2 diabetes mellitus were found. These numbers show an overall rate of immunosuppressed patients slightly above 10% and six of these 10 patients corresponded to patients treated over the last five years, corresponding to a 25% rate of patients with immunosuppression when considering only the more recent cases. Therefore, we may reach the conclusion that

the number of these particular type of patients is increasing, while contributing more importantly to the increasing incidence of spondylodiscitis.¹¹⁻¹⁴

We believe this study gives a valid contribution for a better knowledge of spinal infections in Portugal, namely those with an indication for surgery. Further monitoring of this clinical entity is necessary in order to reach an even

better understanding of the reality in Portugal.

CONCLUSION

Spinal infections with an indication for surgery remain as relevant in the current context. Male gender was more affected in our group of patients, with highly prevalence of paravertebral abscess and neurological

Table 1 – Characteristics of our group of patients

Patient	Age	Gender	Spinal segment	Causative agent	Abscess	ASIA	Comorbidities	Surgical approach
Patient 1	26	M	L	Unknown	No	E		Dorsal
Patient 2	48	F	L	Unknown	Yes	E		Dorsal
Patient 3	38	M	L	Unknown	No	E		Dorsal
Patient 4	67	F	L	<i>M. tuberculosis</i>	Yes	E		Ventral
Patient 5	48	M	L	<i>M. tuberculosis</i>	No	E		Combined
Patient 6	52	M	T	<i>M. tuberculosis</i>	No	E		Dorsal
Patient 7	70	F	L	Indeterminada	Yes	E		Ventral
Patient 8	38	M	L	<i>S. Aureus</i>	No	E	HIV +	Ventral
Patient 9	38	M	L	Indeterminada	No	E		Ventral
Patient 10	43	M	L	<i>M. tuberculosis</i>	Yes	E	HIV +	Ventral
Patient 11	64	M	L	<i>M. tuberculosis</i>	Yes	E		Ventral
Patient 12	63	F	L	<i>Brucella spp</i>	No	E		Ventral
Patient 13	59	M	L	<i>M. tuberculosis</i>	No	E		Ventral
Patient 14	24	M	T	<i>M. tuberculosis</i>	Yes	E		Ventral
Patient 15	16	M	T	<i>M. tuberculosis</i>	Yes	E		Dorsal
Patient 16	34	M	T	<i>S. Aureus</i>	No	E		Dorsal
Patient 17	40	M	T	<i>M. tuberculosis</i>	Yes	E	HIV +	Combined
Patient 18	58	F	T	Unknown	Yes	E		Combined
Patient 19	45	F	L	<i>M. tuberculosis</i>	No	E		Combined
Patient 20	58	M	T	<i>M. tuberculosis</i>	Yes	E		Ventral
Patient 21	66	F	L	<i>M. tuberculosis</i>	No	E		Ventral
Patient 22	54	M	T	<i>M. tuberculosis</i>	No	E		Combined
Patient 23	36	M	L	<i>M. tuberculosis</i>	Yes	E		Ventral
Patient 24	32	F	L	<i>M. tuberculosis</i>	Yes	E		Combined
Patient 25	21	F	T	Unknown	No	E		Dorsal
Patient 26	44	M	C	Unknown	No	E		Dorsal
Patient 27	34	M	T	<i>M. tuberculosis</i>	Yes	E		Combined
Patient 28	53	F	L	Unknown	No	E		Dorsal
Patient 29	32	M	T	Unknown	Yes	E		Combined
Patient 30	70	M	L	<i>M. tuberculosis</i>	Yes	E		Combined
Patient 31	37	M	T	<i>M. tuberculosis</i>	No	E		Dorsal
Patient 32	41	M	T	<i>M. tuberculosis</i>	No	E		Combined
Patient 33	47	F	L	Unknown	No	E		Dorsal
Patient 34	21	M	L	Unknown	Yes	E		Combined
Patient 35	57	M	L	<i>S. Aureus</i>	No	E		Combined
Patient 36	65	M	L	<i>S. Aureus</i>	No	E		Combined
Patient 37	47	F	C	<i>S. Aureus</i>	No	E		Combined
Patient 38	66	M	T-L	Unknown	Yes	E		Ventral
Patient 39	39	M	T	<i>M. tuberculosis</i>	Yes	B	HIV +	Combined
Patient 40	25	M	L	<i>M. tuberculosis</i>	Yes	E		Combined
Patient 41	48	M	T-L	<i>M. tuberculosis</i>	Yes	E		Combined
Patient 42	55	F	L	<i>Brucella spp</i>	Yes	E		Combined
Patient 43	56	M	T	Unknown	No	E		Combined

Table 1 – Characteristics of our group of patients (continued)

Patient	Age	Gender	Spinal segment	Causative agent	Abscess	ASIA	Comorbidities	Surgical approach
Patient 44	58	F	L	Unknown	No	E		Combined
Patient 45	13	F	T	<i>M. tuberculosis</i>	Yes	D		Combined
Patient 46	38	M	L	Unknown	No	E		Combined
Patient 47	48	F	L	<i>M. tuberculosis</i>	Yes	E		Combined
Patient 48	47	M	T	<i>S. Aureus</i>	No	E		Dorsal
Patient 49	40	F	T	<i>M. tuberculosis</i>	No	C		Ventral
Patient 50	9	F	T-L	<i>M. tuberculosis</i>	No	E		Dorsal
Patient 51	72	F	L	<i>M. tuberculosis</i>	No	E		Combined
Patient 52	73	M	L	Unknown	No	E		Combined
Patient 53	44	M	L	Unknown	No	E		Dorsal
Patient 54	40	M	T	<i>M. tuberculosis</i>	Yes	A		Dorsal
Patient 55	21	F	L	<i>M. tuberculosis</i>	Yes	E		Combined
Patient 56	70	M	L	Unknown	Yes	E		Combined
Patient 57	64	F	T	<i>S. Aureus</i>	No	E		Combined
Patient 58	25	F	T	<i>M. tuberculosis</i>	Yes	D		Dorsal
Patient 59	34	M	L	<i>S. Aureus</i>	Yes	E		Combined
Patient 60	58	F	T	<i>S. Aureus</i>	No	E		Combined
Patient 61	11	M	L	<i>M. tuberculosis</i>	No	A		Dorsal
Patient 62	76	F	L	<i>S. Aureus</i>	No	E		Combined
Patient 63	48	M	L	<i>M. tuberculosis</i>	Yes	D		Combined
Patient 64	27	M	L	<i>M. tuberculosis</i>	Yes	D		Combined
Patient 65	72	F	T	<i>M. tuberculosis</i>	Yes	D	Type-2 Diabetes Mellitus	Combined
Patient 66	74	F	L	Unknown	No	E		Combined
Patient 67	60	M	T	<i>S. Aureus</i>	Yes	D		Dorsal
Patient 68	47	F	T	<i>S. Aureus</i>	No	E	Type-2 Diabetes Mellitus	Dorsal
Patient 69	49	M	T	<i>S. Aureus</i>	No	E	Drug addiction	Combined
Patient 70	52	M	T	<i>S. Aureus</i>	Yes	B	Type-2 Diabetes Mellitus; Prostate cancer	Combined
Patient 71	59	M	T-L	<i>M. tuberculosis</i>	No	B	Type-2 Diabetes Mellitus; Chronic anaemia	Combined
Patient 72	54	M	L	<i>S. Aureus</i>	No	E	Colorectal cancer; Alcoholic liver disease	Dorsal
Patient 73	24	M	T	<i>M. tuberculosis</i>	Yes	E		Combined
Patient 74	54	M	T	<i>S. Pyogenes</i>	No	E		Dorsal
Patient 75	52	F	L	<i>M. tuberculosis</i>	No	E		Combined
Patient 76	80	M	T	<i>S. Aureus MR</i>	No	E		Dorsal
Patient 77	39	M	L	<i>S. Aureus MR</i>	Yes	D		Dorsal
Patient 78	77	M	L	Unknown	No	E		Dorsal
Patient 79	69	M	L	<i>M. tuberculosis</i>	No	E		Combined
Patient 80	48	F	T	<i>M. tuberculosis</i>	No	B		Dorsal
Patient 81	47	F	T	<i>M. tuberculosis</i>	No	E		Dorsal
Patient 82	6	F	T	<i>M. tuberculosis</i>	No	E		Dorsal
Patient 83	78	F	T	<i>S. Aureus MR</i>	Yes	B		Dorsal
Patient 84	24	F	C	<i>M. tuberculosis</i>	Yes	E		Dorsal
Patient 85	48	F	T	<i>M. tuberculosis</i>	Yes	D		Combined

M: male; F: female; C: cervical; T: thoracic; TL: thoraco-lumbar; L: lumbar; ASIA – American Spinal Injury Association Impairment Scale

deficit and subsequent important morbidity. *Mycobacterium tuberculosis* and *Staphylococcus aureus* remain as the main causative agents, with a seemingly increased incidence of the latter.

HUMAN AND ANIMAL PROTECTION

The authors declare that the followed procedures were according to regulations established by the Ethics and Clinical Research Committee and according to the Helsinki Declaration of the World Medical Association.

DATA CONFIDENTIALITY

The authors declare that they have followed the protocols of their work centre on the publication of patient data.

CONFLICTS OF INTEREST

The authors declare that there were no conflicts of interest in writing this manuscript.

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