

# **Conservative versus surgical management of spondylodiscitis: a systematic review**

**A study submitted for partial fulfillment of master  
degree in Neurosurgery**

*By*

**Mahmoud Ahmed Mohamed Zidan**

M.B.B.Ch, Faculty of Medicine,  
Ain Shams University

*Under Supervision of*

**Prof. Dr. Khaled Mohamed El-Bahy**

Professor of Neurosurgery, Faculty of Medicine,  
Ain Shams University

**Assist. Prof. Dr. Khaled Saeed Ibrahim**

Assistant Professor of Neurosurgery, Faculty of Medicine,  
Ain Shams University

**Assist. Prof. Dr. Hatem Adel Sabry**

Assistant Professor of Neurosurgery, Faculty of Medicine,  
Ain Shams University

Faculty of Medicine  
Ain Shams University

**2017**

بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

قالوا

سبحانك لا علم لنا  
إلا ما علمتنا إنك أنت  
العليم العظيم

صدق الله العظيم

سورة البقرة الآية: ٣٢



## Acknowledgements

First, I would like to express my sincerest gratitude and gratefulness to **Allah** who continues to bless and fill me with hope, faith, patience and health to finish this work.

I would like to express my cardinal thanks and deepest gratitude to **Prof. Dr. Khaled Mohamed El-Bahy**, Professor of Neurosurgery, Faculty of Medicine, Ain Shams University, not only for giving me this chance to work under his supervision, but also for the scientific help, valuable guidance and kind supervision.

I would like to express my sincere thanks and deepest appreciation and gratitude to **Assist. Prof. Dr. Khaled Saeed Ibrahim**, Assistant Professor of Neurosurgery, Faculty of Medicine, Ain Shams University, for suggesting and planning the design of the entire work, and for his kind supervision and the great scientific help.

My heartfelt thanks go to **Assist. Prof. Dr. Hatem Adel Sabry**, Assistant Professor of Neurosurgery, Faculty of Medicine, Ain Shams University, for helping me throughout the study, guiding me to finish this work, simplifying and clarifying things for me through his valuable comments and for being kind enough to follow closely every step in the whole work.

Last but not least, I wish to express my deepest and sincere thanks to my family who were always beside me giving me all form of support to accomplish this work.

✍ Mahmoud Ahmed Zidan

# List of Contents

<i>Title</i>	<i>Page No.</i>
<b>List of Figures</b> .....	i
<b>List of Tables</b> .....	ii
<b>List of Abbreviations</b> .....	iii
<b>Introduction</b> .....	1
<b>Aim of the Work</b> .....	4
<b>Review of Litratrue</b>	
Historical perspective .....	5
Definitions .....	5
Epidemiology of spondylodiscitis .....	6
Pathogenesis of pyogenic spondylodiscitis .....	7
Aetiology and microbiology .....	10
Postoperative and iatrogenic spondylodiscitis .....	15
Diagnosis .....	19
Differential diagnosis .....	33
Complications .....	35
Management .....	37
a- Conservative management .....	39
b- Surgical management .....	46
<b>Systematic Review</b>	
Methodology .....	54
a- Target of the study .....	54
b- Identification and location of articles .....	54
c- Screening and evaluation of medical articles .....	56
d- Data collection and analysis .....	57
e- Discussion .....	71
<b>Conclusion</b> .....	78
<b>Summary</b> .....	80
<b>References</b> .....	83
<b>Arabic Summary</b> .....	--

## List of Figures

Fig. No.	Title	Page No.
<b>Figure (1):</b>	MR image for Early discitis .....	29
<b>Figure (2):</b>	Bone scan showing multifocal spondylodiscitis .....	31
<b>Figure (3):</b>	MR image, CT image and PET/CTimage for spondylodiscitis.....	32

## List of Tables

Table No.	Title	Page No.
<b>Table (1):</b>	Electronic search of databases. ....	55
<b>Table (2):</b>	inclusion and exclusion criteria.....	56
<b>Table (3):</b>	studies design of included articles.....	58
<b>Table (4):</b>	Studies design of included articles. ....	58
<b>Table (5):</b>	Studies criteria according to Number of patients Sex, Age and Follow up. ....	60
<b>Table (6):</b>	Studies distributions according to treatment modality.....	61
<b>Table (7):</b>	show studies that focused mainly on outcomes of systemic antibiotic treatment.....	63
<b>Table (8):</b>	show studies that focused mainly on outcomes of surgical treatment alone or with systemic antibiotics.....	66
<b>Table (9):</b>	show studies that focused mainly on outcomes of systemic antibiotics alone versus surgical treatment. ....	68
<b>Table (10):</b>	show studies that focused on microorganism specific antibiotic treatment.....	70
<b>Table (11):</b>	show study's conclusion that focused mainly on outcomes of systemic antibiotic treatment.....	72
<b>Table (12):</b>	show study's conclusion that focused mainly on outcomes of surgical treatment alone or with systemic antibiotics.....	73
<b>Table (13):</b>	show study's conclusion that focused mainly on outcomes of systemic antibiotics alone versus surgical treatment. ....	74
<b>Table (14):</b>	Show study's conclusion that focused mainly on outcomes of microorganism specific antibiotic treatment. ....	75

## List of Abbreviations

<b><i>ALIF</i></b>	: Anterior lumbar interbody fusion
<b><i>BMPs</i></b>	: Bone morphogenic proteins
<b><i>CoNS</i></b>	: Coagulas-negativestaphylococci
<b><i>CRP</i></b>	: Creactive protein
<b><i>CT</i></b>	: Computed tomography
<b><i>ESR</i></b>	: Erythrocyte sedimentation rate
<b><i>FDA-PET</i></b>	: Fluorine-18 flurodeoxyglucose positron emission tomography
<b><i>HLA</i></b>	: Human leucocytic antigen
<b><i>ICBG</i></b>	: Iliac crest bone graft
<b><i>IDSA</i></b>	: Infectious diseases society of America
<b><i>IVDA</i></b>	: Intravenous drug abuse
<b><i>LSO</i></b>	: Lumbo sacral orthosis
<b><i>MRI</i></b>	: Magnetic resonant image
<b><i>MRSA</i></b>	: Methicillin resistant s. aures
<b><i>MSSA</i></b>	: Methicillin sensitive s. aures
<b><i>OPAT</i></b>	: Outpatient parenteral antimicrobial therapy
<b><i>P.C.S.</i></b>	: Prospective case series
<b><i>P.Co.S.</i></b>	: Prospective comparative study
<b><i>PCR</i></b>	: Polymerase chain reaction
<b><i>PEEK</i></b>	: Polyether etherketone
<b><i>R.C.S.</i></b>	: Retrospective case series

## List of Abbreviations (Cont..)

<b><i>R.C.T.</i></b>	: Randomized control trial
<b><i>R.Co.S</i></b>	: Retrospective comparative study
<b><i>rDNA</i></b>	: Recombinant deoxyribonucleic acid
<b><i>Rh</i></b>	: Recombinant human
<b><i>rhOP-1</i></b>	: Osteogenic protein
<b><i>SEA</i></b>	: Spinal epidural abcess
<b><i>SOMI</i></b>	: Sterno-occipital mandibular immobilization
<b><i>TB</i></b>	: Tuberculosis
<b><i>TLSO</i></b>	: Thoraco lumbo sacral orthosis
<b><i>TTN</i></b>	: Titanium
<b><i>WBC</i></b>	: White blood cell





# **Introduction**

---

# **Introduction**

## **Rationale and Justification of the Study:**

Spinal infections can be described etiologically as pyogenic, granulomatous (tuberculous, brucellar, fungal) and parasitic. Pyogenic spinal infections include: spondylodiscitis, a term encompassing vertebral osteomyelitis, spondylitis and discitis, which are considered different manifestations of the same pathological process; epidural abscess, which can be primary or secondary to spondylodiscitis.<sup>(1)</sup>

The incidence of non-specific spondylodiscitis is about 1:250000, corresponding to about 3% to 5% of all cases of osteomyelitis.<sup>(2)</sup> Men are up to three times more often affected than women.<sup>(3)</sup> Although patients may be in any age group, spondylodiscitis is most frequent in the fifth to seventh decades of life.<sup>(4)</sup> Spondylodiscitis may occur after lumbar operations on intervertebral discs; the frequency depends on the invasiveness of the operation and is given as between 0.1% and 0.6% for microsurgical operations and from 1.4% to 3% for macrosurgical operations.<sup>(5)</sup>

Although diagnostic and therapeutic possibilities have drastically improved during the past decades, pyogenic

spondylodiscitis remains a diagnostic and therapeutic challenge. Since it is often a complication of a distant process causing bacteremia, the relatively nonspecific varieties of symptoms of spondylodiscitis may be initially dominated by the primary infection.<sup>6</sup> Consequently, clinical presentation is often unclear and a considerable delay in diagnosis frequently occurs.<sup>(7)</sup> Spondylodiscitis remains a life threatening disease with a mortality rate of 2% to 20%.<sup>(8)</sup>

Although some therapeutic guidelines are available, treatment of spondylodiscitis is certainly not standardized and is mostly based on local preferences resulting in physician related variability.<sup>(9)</sup> The essential elements for successful treatment of spondylodiscitis include: fixation of the affected section of the spinal column, antibiotic therapy, and (depending on the severity of the condition) debridement and decompression of the spinal canal.<sup>(10)</sup>

Conservative treatment can be considered if the clinical symptoms and destruction are relatively mild or the risk of operation appears to be too great.<sup>(11)</sup> The patients with this disease are mostly older and in poor general condition. If there is no fusion reaction, continuing destruction, or no

clinical improvement, it is not promising to continue conservative treatment beyond four to six weeks.<sup>(12)</sup>

The objectives of surgery in spondylodiscitis are to remove the septic focus and to stabilize the infected section of the spinal column, followed by formation of fused vertebrae. This provides a more reliable and more rapid treatment of the consequences of the infection.<sup>(13)</sup>

Many fundamental aspects of the treatment of pyogenic spondylodiscitis are still a matter of debate. Therefore, the aim of this study was to systematically review the currently available literature to determine the outcome in patients with pyogenic spondylodiscitis after the different antibiotic and/or surgical treatments.



## **Aim of the Work**

---

## **Aim of the Work**

The aim of this study is to review, analyze and compare the conservative versus the surgical management in patients with spondylodiscitis regarding the essential elements for successful treatment by fixation of the affected section of the spinal column, antibiotic therapy, debridement and decompression of the spinal canal.



# **Review of literature**

---