

Evaluation of Management of Spondylodiscitis in Patients Admitted to Neurosurgery Department of Benha University Hospitals

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Abstract

Background: spondylodiscitis is a spinal infection by a pathogen affecting primarily the intervertebral disc and the adjacent vertebral bodies, starting at the endplates, but with secondary involvement of the intervertebral discs. **Patient and methods:** this prospective, cross-sectional, observational study conducted in neurosurgery department at benha university hospitals from dec 2019 to april 2021. We included all patients with spondylodiscitis without privilege to age or gender, and at any vertebral region, we applying a scoring system for spondylodiscitis, which we term spondt (spondylodiscitis diagnosis and treatment) based on three traits: [1] the inflammatory marker c-reactive protein (crp) (mg/dl), [2] pain according to a numeric rating scale (nrs) and [3] magnetic resonance imaging (mri), to monitor its progression following treatment. **Result :**from this study on 19 patient the mean range of age was 47 years , 78,9% was spontanous spondylodiscitis and 21.1% was post surgical infection , applying spondt score of spondylodiscitis on admission was 7 and on discharge was 3 , 36.8% have surgical treatment versus 63.2% have conservative treatment. The lenght of stay in hospital mean range was 4 weaks. **Conclusion:** although the frequency of spondylolithesis has increased significantly, its diagnosis can be missed due to non specific presentation. We recommended performing laboratory inflammatory markers and mri with contrast to patient with sever low back pain. Conservative treatment is usually sufficient in most cases surgery is reserved to case with neurological deficits due to evident spinal stenosis compression and cases with marked instability.

Key words: Spondylodiscitis, Classification of severity, Scoring system.

1. Introduction

Spondylodiscitis is a spinal infection by a pathogen affecting primarily the intervertebral disc and the adjacent vertebral bodies, starting at the endplates, but with secondary involvement of the intervertebral discs [1].

Spondylodiscitis represents 0.15% to 5% of all osteomyelitis cases more command in patients over 50 years of age, the estimated incidence of the disease ranges from 4 to 24 patients per million per year with a male to female ratio 2:1.in recent decades, the incidence of vertebral infection has risen .in the former case, a relatively broad spectrum of pathogens is considered to induce spondylodiscitis; the largest proportion of spondylodiscitis cases is caused by staphylococcus aureus spondylodiscitis [15].

Is a rare disease, the widespread use of drugs that suppress the immune system and an ageing population have led to an increase in cases of infection .though the disease is most often seen in the sixth decade of life, it can occur at any age. In addition to age, risk factors include diabetes mellitus, malnutrition and disorders inducing a loss of weight, steroid therapy, rheumatic diseases and spinal surgery. Often, the actual source of infection is no longer detectable at diagnosis [3].

Infectious spondylodiscitis is uncommon infectious conditions in which symptoms may be non-specific including sever low back pain, fever, and neurological signs when deformity of the affected structures has developed. The course may be acute or chronic, but the lack of specific symptoms usually results in delayed diagnosis leading to potentially high morbidity and mortality [5].

The most important radiological investigation of spondylodiscitis mri with contrast which considered the imaging modality of choice for the detection and evaluation of spondylodiscitis, giving 96% sensitivity, 92% specificity and 94% accuracy [7,8].

In acute spinal infections, an increase in fluid signal due to marrow edema is demonstrated. Ct scan is helpful for demonstrating bony involvement as well as detailed bony anatomy in case instrumentation is required during treatment. Also x-ray changes take from 2-8 weeks from the onset of infection to develop earliest changes are loss of cortical endplate margins and loss of disc space height .biopsy is considered to be a superior diagnostic tool and may also be performed to verify diagnosis in suspicious cases, or when a polymicrobial infection is suspected, regardless of the presence of positive blood culture [2].

Laboratory tests are usually inconclusive in diagnosis and follow up of prognosis of spondylodiscitis white blood cell count (wbc) is of limited diagnostic value, as it is commonly non-specific, being elevated in less than half of patients. Erythrocyte sedimentation rate (esr) and c-reactive protein (crp) levels are more helpful esr is a sensitive laboratory test being elevated in > 90% of patients with a typical range of 43 mm to 87 mm per hour crp is more sensitive than esr with its levels also elevated in most cases [6,13].

The goal of treatment for patients with spondylodiscitis is eradication of infection, relief of pain, preservation or restoration of spinal structure stability and treatment for neurological deficits. Appropriate antibiotics in combination with non pharmacological regimes, such as immobilization and physical therapy are effective in most cases. Surgical treatment is

absolutely indicated in patient with spinal cord compression with progressive neurological deficits relative surgical indications include spinal instability due to extensive bone destruction, significant deformity or conservative treatment failure [18,9].

The prognosis of spondylodiscitis without accompanying neurological deficits is good .about 90% of patients improved on course of antibiotics and immobilization and physiotherapy. Nevertheless, the overall mortality rate in the case of inadequate treatment is given as up to 20% [19,11].

2. Material and methods

This prospective, cross-sectional, observational study will conducted in neurosurgery department at benha university hospitals from dec 2019 to april 2021. We included all patients with spondylodiscitis without privilege to age or gender , and at any vertebral region .

During this study diagnosis based on history, clinical presentation, high laboratory indices of inflammation (white blood cell count (wbc), erythrocyte sedimentation rate (esr), and c-reactive protein (crp) confirmed by magnetic resonance imaging (mri) with contrast findings the management of the disease and clinical, laboratory, and mri follow up studies of the patients will also be recorded.

We also used a scoring system of spondylodiscitis term sponddt (spondylodiscitis diagnosis and

treatment)based on three traits: (1) the inflammatory marker c-reactive protein (crp), (2) pain according to a numeric rating scale (nrs) and (3) magnetic resonance imaging (mri), to monitor the progression following treatment. Ethical committee and formal consent will be obtained from all cases [2].

3. Result and discussion

This cross-sectional study was conducted in neurosurgery department at benha university hospitals from december 2019 to april 2021. We included all patients with spondylodiscitis without privilege to age or gender and at any vertebral region.

General characteristics in the studied patients

- The mean age of the studied patients was 47 years, with a standard deviation of 14 years. Regarding gender, there was a male predominance; about three-quarters were males (73.7%).

Origin of discitis and causative organism

- One-quarter showed post-operative origin (21.1%). Regarding the causative organism, the most frequent was staph aureus (21.1%) .most of the studied patients showed spontaneous origin of discitis (78.9%). More than one-third of the patients (36.8%) showed unknown organism .

Table (1) general characteristics in the studied patients.

Age (years)	Mean ±sd	47 ±14
Gender	Males	n (%) 14 (73.7)
	Females	n (%) 5 (26.3)

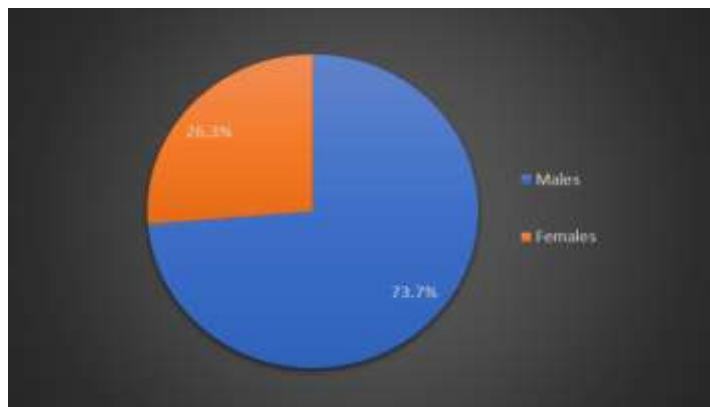


Fig.(1) gender distributionof the studied patients.

Table(2) origin of discitis and causative organism.

Origin of discitis	Post-operative	N (%) 4 (21.1)
	Spontaneous	15 (78.9)
Causative organism	Brucella	3 (15.8)
	Brucella&typhoid	1 (5.3)
	Staph aureus	4 (21.1)
	Tb	2 (10.5)
	Typhoid	2 (10.5)
	Unknown	7 (36.8)

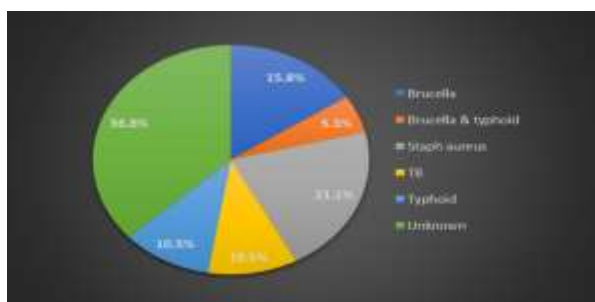


Fig. (2) causative organism in the studied patients.

Co-morbidity in the studied patients

- The most frequent co-morbidity was diabetes (21.1%). More than half of the studied patients showed no associated co-morbidity (57.9%).

Table (3) co-morbidity in the studied patients.

Co-morbidity	N (%)
Dm & hepatic	2 (10.5)
Dm only	4 (21.1)
Hepatic only	2 (10.5)
No co-morbidity	11 (57.9)

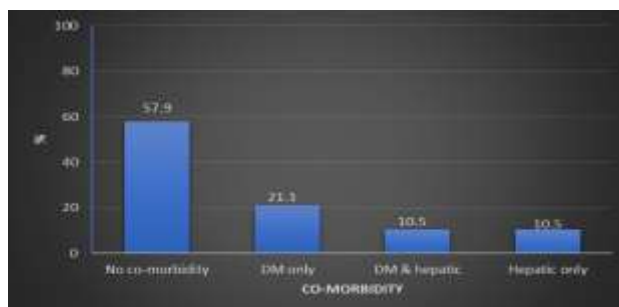


Fig 3:associated co-morbidity in the studied patients

Numerical rating scale on admission and discharge

The numerical rating scale (nrs) was significantly lower on-discharge (2) compared to on-admission (7). P-value was <0.001.

Table (4) numerical rating scale on admission and discharge

	Median (range)	P-value
Nrs on-admission	7 (5 - 9)	< 0.001
Nrs on-discharge	2 (1 - 4)	

Wilcoxon signed ranks test nrs: numerical rating scale

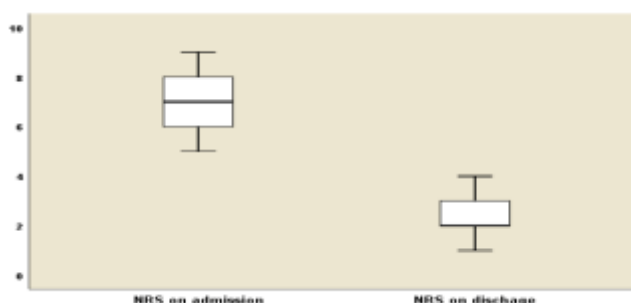


Fig. (4) numerical rating scale on admission and discharge.

Crp of the studied patients

- The median crp showed an overall significant difference between different follow-up times. P-value was <0.001. Post hoc analysis showed that median crp at four weeks (22) and on-discharge (12) were significantly lower than on-admission (96).

Table (5) crp of the studied patients at different times.

	Median (range)	P-value
On admission	96 (45 - 130)	<0.001
After 2 weeks of abs	59 (11 - 87)	
After 4 weeks of abs	22 (0 - 43)*	
On discharge	12 (0 - 26)*	

Friedman’s test was used

*significantly different from on admission

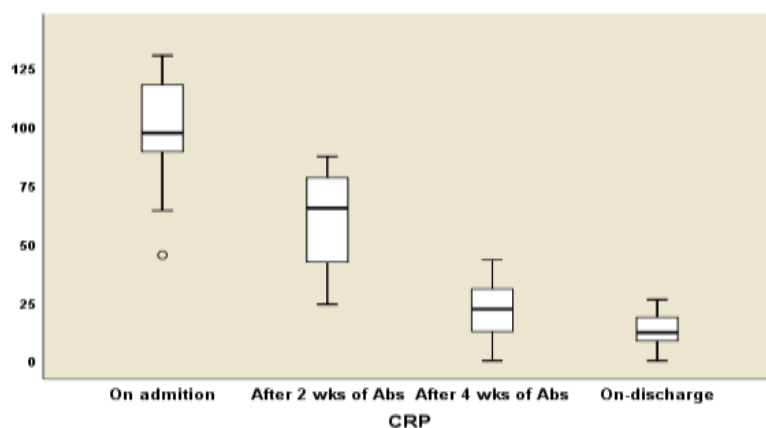


Fig. (5) crp of the studied patients at different times.

Mri findings in the studied patients

- The most frequent mri finding was spondylodiscitis (63.2%), followed by spondylodiscitis and epidural abscess (31.6%). The least frequent was discitis (5.3%).

Table (6) mri findings in the studied patients.

Mri findings	N (%)
Discitis	1 (5.3)
Spondylodiscitis	12 (63.2)
Spondylodiscitis and epidural abscess	6 (31.6)

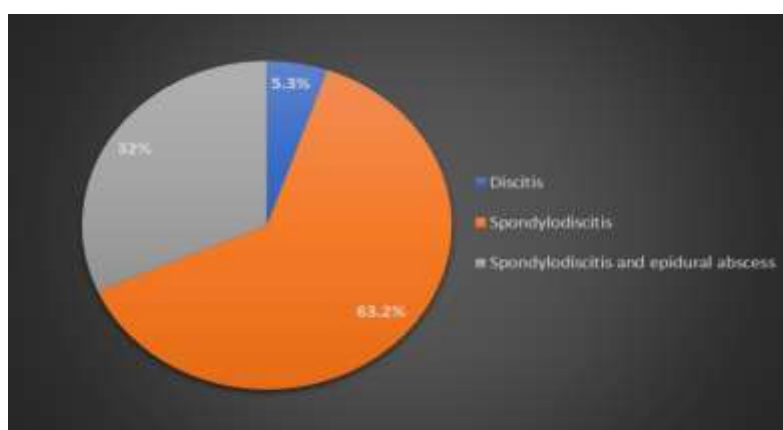


Fig. (6) mri findings in the studied patients.

Management of the studied patients

- About two-thirds of the studied patients received conservative management (63.2%). Only one-third (36.8%) underwent surgical management (36.8%).

Table (7) management of the studied patients.

		N (%)
Management	Conservative	12 (63.2)
	Surgical	7 (36.8)
Type of surgery	Decompression +fixation	3 (42.9)
	Debridement	1 (14.3)
	Debridement + fixation	1 (14.3)
	Debridement+decompression	2 (28.6)

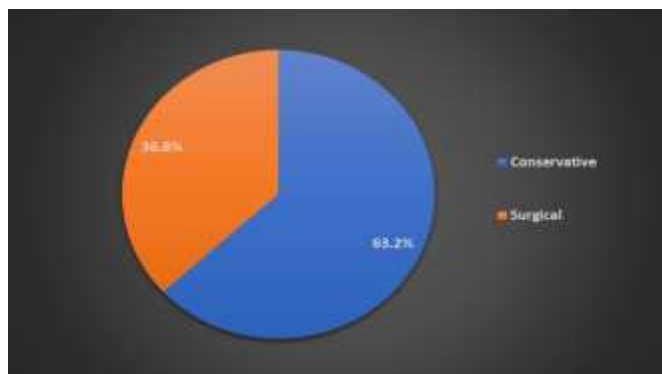


Fig. (7) management of the studied patients.

Region of discitis in the studied patients

- More than half of the patients showed lumbar discitis (57.9%). One-quarter of the patients showed dorsal discitis (26.3%). Only 15.8% showed cervical discitis.

Table (8) region of discitis in the studied patients.

		N (%)
Region of discitis	Cervical	3 (15.8)
	Dorsal	5 (26.3)
	Lumbar	11 (57.9)

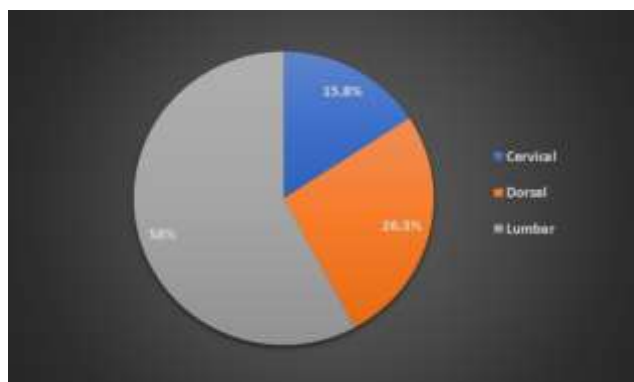


Fig. (8) region of discitis in the studied patients.

Neurological function on admission and discharge

- The neurological function showed a non-significant difference between on-admission and on-discharge. The p-value was 1.0.

Table (9) neurological function on admission and discharge.

Neurological function		N (%)	P-value
On-admission	Intact	17 (89.5)	1.0
	Motor weakness	2 (10.5)	
On-discharge	Intact	18 (94.7)	
	Motor weakness	1 (5.3)	

Mcnemar test was used

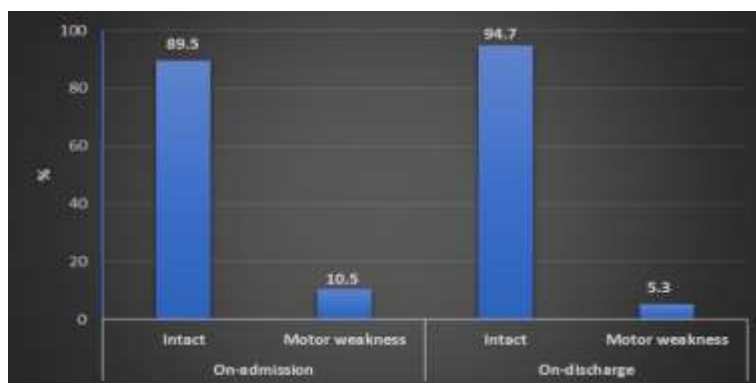


Fig. (9) neurological function on admission and discharge.

Length of hospital stay in the studied patients

- The mean length of stay in the hospital was four weeks, with a standard deviation of two weeks.

Table (10) length of hospital stay in the studied patients.

	Mean ±sd
Length of stay in hospital (weeks)	4 ±2

Spondt on admission and discharge

- The median spondt score was significantly lower on-discharge (3) compared to on-admission (7). The p-value was <0.001

Table (10)spondt on admission and discharge

Spondt	Median (range)	P-value
On-admission	7 (4 - 7)	<0.001
On-discharge	3 (1 - 4)	

Wilcoxon signed ranks test was used

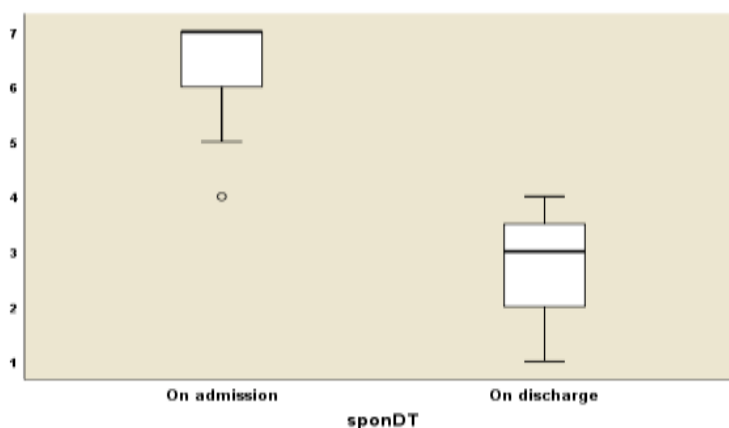


Fig. (10) spondt on admission and discharge.

4. Conclusion

Although the frequency of spondylolithesis has increased significantly, its diagnosis can be missed due to non specific presentation. We recommended performing laboratory inflammatory markers and mri with contrast to patient with sever low back pain. Conservative treatment is usually sufficient in most cases surgery is reserved to case with neurological deficits due

to evident spinal stenosis compression and cases with marked instability

References

[1] T.Gouliouris, H.sani, M.nicolas : spondylodiscitis : update on diagnosis and managment :journal of antimicrobial chemotherapy suppl.vol. 3:iii,pp.11-24,2010.

- [2] L.Homagek , D. marmelstein , N. homagk , hofmann. spondt (spondylodiscitis diagnosis and treatment):spondylodiscitis scoring system : journal of orthopaedic surgery and research .vol.14,pp.100,2019.
- [3] E.Kapsalaki , G.nikolaos , A.stefos , k. makaritsis , vassioua, fezoulidisi , G.dalekos :spontaneous spondylodiscitis : presentation, risk factor, diagnosis , management and outcome : international journal of infectious diseases.vol.13,pp. 564-569,2009.
- [4] L.Mavrogenis , D .panayiotis , megaloiconomos , V.igoumenou, G.panagopoulos , E .giannitsioti , papadopoulos , J. panayiotis , A. papagelopoulos : spondylodiscitis revisited : efort open review.VOL.8,pp. 447-461,2017.
- [5] JI.Parra , sa.martín, alu. martínez-aedo , is.ivañez, e. agreda, l.lopez-duran: management of infectious discitis. Outcome in one hundred and eight patients in a university hospital : international orthopaedics (sicot).vol.5,pp. 36:239–244,2012.
- [6] S. Rolf , H. seifert, G .fatkenheuer , A. grossmann , esyelp. current diagnosis and treatment of spondylodiscitis :dtscharzteblint.vol.9,pp.105(10)181-7,2008.
- [7] Jph. Rutges, Dh. kempen, M. van dijk, F .oner : outcome of conservative and surgical treatment of pyogenic spondylodiscitis: a systematic literature review : eur spine j.vol.2,pp. 25:983–999,2016.
- [8] J. Lopez, T. zuzana, A. tournadre, M. couderc, B .pereira, D. soubrier M and jean-jacques . characteristics of spontaneous coagulase negative staphylococcal spondylodiscitis: a
- [9] Retrospective comparative study versus staphylococcus aureus spondylodiscitis : bmc infectious diseases.vol.8,pp. 17:683,2017.
- [10] K.Ahn , C.kang, S.hong, B.kim and E. him . the correlation between follow-up mri findings and laboratory results in pyogenic spondylodiscitis : bmc musculoskeletal disorders .vol. 21,pp.428,2020.
- [11] Nj.henkelman, T.denecke, p.pieroh , S. Einhorn, Nh. hoeh heyde and A.voelker . total spine magnetic resonance imaging for detection of multifocal infection in pyogenic spondylodiscitis: a retrospective observational study : bmc musculoskeletal disorders.vol. 22,pp.78,2021.
- [12] J.Xu, l.zhang, R.bu , Y.liu, K.lewandowski and X.zhang . minimally invasive debridement and drainage using intra operative ct-guide in multilevel spondylodiscitis: a long term follow up study : bmc musculoskeletal disorders .vol. 22,pp.120 ,2021.
- [13] W.Guo , M.wang , C. chen , KH. chen , wan y , B.chen , X. uenong zou and X.Peng. early surgery with antibiotic medication was effective and efficient in treating Pyogenic spondylodiscitis : bmc musculoskeletal disorders.vol. 22,pp.288 ,2021.
- [14] K. Zarghooni , M.röllinghoff , R. sobottke and P.eysel: treatment of spondylodiscitis : international orthopaedics : (sicot) .vol.36,pp.405–411,2012.
- [15] S. Mann , M. Schütze , S.sola and J.piek : nonspecific pyogenic spondylodiscitis: clinical manifestations, surgical treatment, and outcome in 24 patients : neurosurg focus .vol.17 (6),pp.e3,2004.
- [16] L.Gentile , F.benazzo , F.de rosa, S. boriani, G.dallagiacomma , G. ranceschetti , M. gaeta , F. cuzzocrea : european review for medical and pharmacological sciences.vol. 23(2 suppl.),pp.117-128 ,2019.
- [17] A.Lobodan , V.arama , AR. negru , M. rădulescu , V.molagic , R.năstase , R.Mihăilescu, R.gnaticov, A.vornicu and C. popescu: spondylodiscitis in romania – between the risks of prolonged antimicrobial therapy and the poor access to neurosurgery : bmc infectious diseases .vol.14. 7,pp. o22 ,2014.
- [18] L.Cottle , T.riordan: infectious spondylodiscitis : journal of infection.vol.56,pp.401:412 . ,2008.
- [19] AS. Petkova , CB. zhelyazkov , BD. kitov :spontaneous spondylodiscitis - epidemiology, clinical features, diagnosis and treatment : folia medica .vol. 9,pp.5 ,2017.
- [20] C. Herren , N.jung , M. pishnamaz , M.breuninger , J. siewe , R.sobottke. spondylodiscitis: diagnosis and treatment options : dtsh arztebl int. vol. 114,pp.875 – 82,2017.