

Spontaneous Spondylodiscitis: Conservative Versus Surgical Management

ABDALLA R. ABD EL-RAHMAN, M.Sc.; AHMED A. ISMAIL, M.D.; AHMED F. SHERIF, M.D. and MOHAMMAD TAGHYAN, M.D.

The Department of Neurosurgery, Faculty of Medicine, Assiut University, Assiut, Egypt

Abstract

Background: The incidence of spontaneous spondylodiscitis is increasing per year and this attributed to an aging population, increasing prevalence of immunodeficiency and improving radiological technique.

Aim of Study: To evaluate the results of conservative versus surgical treatment of spondylodiscitis as regard efficacy, complications and functional outcomes.

Patients and Methods: This is a prospective randomized clinical trial study included 16 patients with spontaneous spondylodiscitis presented only with axial spinal pain. They were divided into 2 groups: One managed conservatively and the other surgically.

Results: 9 patients were managed conservatively and 7 were managed surgically. After complete course of treatment; only 3 patients of conservative group and 4 patients of surgical group showed fusion assessed by imaging. There was no significant statistically difference between two groups in final clinical outcome using visual analogue scale and MacNab's outcome criteria.

Conclusion: Both conservative and surgical methods are sufficient for achieving the goals of treatment of spontaneous spondylodiscitis as both are safe, feasible, and effective procedure in relieving pain.

Key Words: Spontaneous spondylodiscitis – Spondylodiscitis – Discitis – Spontaneous spine infection – Disc infection.

Introduction

SPONDYLODISCITIS accounts for only 2-4% of all osteomyelitis infections [1]. Since the clinical symptoms of all forms of Spondylodiscitis are rather uncharacteristic at the beginning, the delay in diagnosis (estimated to average 3 months) must be considered as one of the primary problems of spinal infections. Delayed introduction of adequate

therapy causes progressive destruction of the affected part of the spine, resulting in a higher incidence of neurological complications, segmental instabilities and spinal deformations. Therefore, early and exact diagnosis is essential so that a differentiated treatment adapted to the prevailing form and degree of spondylodiscitis can be started [1].

The aim of this study: To evaluate the results of conservative versus surgical treatment of spondylodiscitis as regard efficacy, complications and functional outcomes.

Patients and Methods

This is a prospective randomizing clinical trial study including 16 patients with spondylodiscitis in the Neurosurgery Department, Assiut University Hospitals through the period of one year starting on 1/3/2015. They divided into 2 groups, one treated conservatively and the other surgically.

Selection criteria:

All patients have clinical symptoms suggestive of spontaneous spondylodiscitis as axial pain, fever, elevated ESR and CRP and imaging studies showed signs of spondylodiscitis are included in this study. Patients with neurological deficit, epidural abscess and post-operative spondylodiscitis are excluded from this study.

Conservative management initiated by bed rest, nonsteroidal anti-inflammatory drugs, and broad-spectrum intravenous antibiotics as cefotaxime 1gram in combination with amoxicillin/clavulanate 1.2 gram then the choice of the antibiotics was adjusted later according to the subsequent bacterial culture and sensitivity for 2 weeks, followed by 4 weeks oral antibiotics. Neck collar or rigid brace

Correspondence to: Dr. Abdalla R. Abd El-Rahman,
E-Mail: Abdallaragab90@yahoo.com

may used during treatment to minimize the pain and prevent instability.

Surgical management: After administration of general anaesthesia to patients in surgical group, the following procedures are performed as:

In cervical region, we used anterior approach; debridement of the infected disc material and corpectomy was done then an iliac crest graft was positioned with in Harms cage between 2 endplate of vertebrae and anterior fixation by H plate and screws.

In the dorsal and lumbar spine, we did laminectomy and debridement of affected bone and disc with trans pedicular screw fixation. Harms cage with bone chips is used as a graft. Histopathology tissue sample was obtained during Surgical Debridement.

Outcome measurement:

Clinical outcome was evaluated one day after surgery or one week after conservative management, at the time of discharge, at 3 and 6 months intervals. We assessed patients clinically by assessment of the severity of pain and the functional status of the patients was done using Visual Analogue Scale (VAS) and MacNab's outcome criteria (functional scale) in this order of frequency.

Laboratory outcome: White blood cells count, ESR and CRP were assessed weekly after the start of treatment during the hospital stay. If still elevated, we changed the type of antibiotics according to bacterial and blood cultures if positive.

Radiological outcome: X-ray, CT and MRI of the spine were performed after 3 days, 6 months and 1 year interval to assess the effective of treatment regarding fusion.

Follow-up of complications was done to both groups as; surgical complications, failure of conservative management, psychological effect as depression from the long period of hospital stay and analgesics and side effects of drugs.

Statistical analysis to all data were analyzed with standard chi-squared test.

Results

The age of patients presenting with spontaneous spondylodiscitis ranged between 52.31 and 68.2 years. Out of 16 patients, 7 patients were male (43.8%) and 9 patients were female (56.3%). Axial local pain was the most common symptoms. Hypertension was the most common and was in 7

patients (43.8%), followed by diabetes mellitus was in 2 patients (12.5%) and hepatitis C virus was in 1 patient (6.25%). Spondylodiscitis were located at lumbar spine in 10 patients (62.5%), at dorsal spine in 3 patients (18.75%) and at cervical spine in 3 patients (18.75%). Blood cultures results were gram-positive organism (62.5%) (Staphylococcus aureus was in 9 patient and streptococcus was in 1 patient) and no growth was in 6 patients. Of all patients, 9 patients (56.3%) were managed with conservative method and 7 patients (43.7%) were managed by surgical method.

In conservative group; out of 9 patients of surgical group, 2 patients (22.2%) had spondylodiscitis at a dorsal region, and 7 patients (77.8%) at lumbar region. The causative organism was Staphylococcal aureus in 4 patients (44.4%) and Streptococcus in 1 patient (11.1%) while no organisms of blood culture could be detected in 4 patients (44.5%). Hospital stay ranged from 10-25 days with mean 16.3 days.

After complete course of treatment (6 weeks) blood parameters (ESR, CRP, and WBC) showed normalization in 3 cases (33.33%), stationary in 3 cases (33.33%) and progression 3 cases (33.33%); two of them underwent surgery and the other refuse it.

Regarding complications, 3 patients (33.3%) displayed failure of conservative management after 6 weeks as they developed motor weakness in form of lower limb weakness and were operated via debridement and fixation. 2 of them (22.2%) improved completely regarding motor weakness and the other was still complaining of back pain and refused the surgical treatment. The partially recovered patients with mild back pain (33.33%) were complaining from psychological effects (in the form of depression) and gastric problems from the long use of non-steroidal anti-inflammatory drugs.

After 3 months of starting treatment radiological outcome was assessed using X-ray, CT spine and MRI spine; 3 cases (33.33%) show solid fusion, 3 cases (33.33%) show partial fusion and 3 cases (33.33%) show no fusion; who underwent further instrumentation.

In surgical group; out of 7 patients of surgical group, 3 patients (42.8%) had spondylodiscitis at a cervical region, 2 patients (28.6%) at dorsal region and 2 patients (28.6%) were in the lumbar region. All patients underwent debridement and fixation in 6 patients (37.5%). Intraoperative blood loss ranged from 350-500cc (mean 421cc) and

blood transfusion was done for all patients and ranged from 300-500cc (mean 400cc). Hospital stay ranged from 5-20 days (mean 7.5 days).

Regarding laboratory investigations normalization was in 3 cases (42.9%), stationary in 3 cases (42.9%) and progression in 1 case (14.2%) who underwent surgery several times.

Disc space biopsies using tissues obtained during surgery revealed microbial growth in 4 patients (57.1%); 3 of them (42.9%) were TB granuloma (tuberculosis), while pyogenic abscess (Staphylococcal aureus) was identified in the fourth one (14.2%) and in 3 patients (42.9%) no organism could be detected.

Regarding complications, one patient (14.3%) was complaining of severing lower limb pain after surgery. Post-operative plain X-ray showed mal direction of the screws. Redirection of screws was done after 3 days but the patient did not improve. 6 months later, lower limb weakness and pus discharge from the site of wound occurred and extraction of rods and screws was done.

After 3 months of starting treatment radiological outcome was assessed using X-ray, CT spine and MRI spine; 3 cases (42.9%) show solid fusion, 3 cases (42.9%) show partial fusion and 1 case (14.2%) show no fusion; who underwent at first redirection of screws and back pain did not improved with discharging pus from site of operation so debridement to infected tissue and extraction of screws was done.

Final clinical outcome:

A- Functional outcome according to visual analogue scale: All patients (surgical and conservative ones) before start treatment had visual analogue scale 6-8 with mean 7. Regarding patients with conservative management; 3 patients (33.3%) are completely recovered with VAS (0), 3 patient (33.3%) partially recovered with VAS (4) and the last 3 patients (33.3%) worsen or unchanged with VAS (8) with mean VAS 4.67±2.65.

After treatment: Out of the surgical managed patient 5 patients (71.4%) are completely recovered with VAS (0), one patient (14.3%) partially recovered with VAS (4) and the last one patient (14.3%) worsen or unchanged with VAS (8) with mean VAS 3.14±2.27. The post management VAS in both groups (conservative and surgical ones) did not show any significant statistically difference Fig. (1).

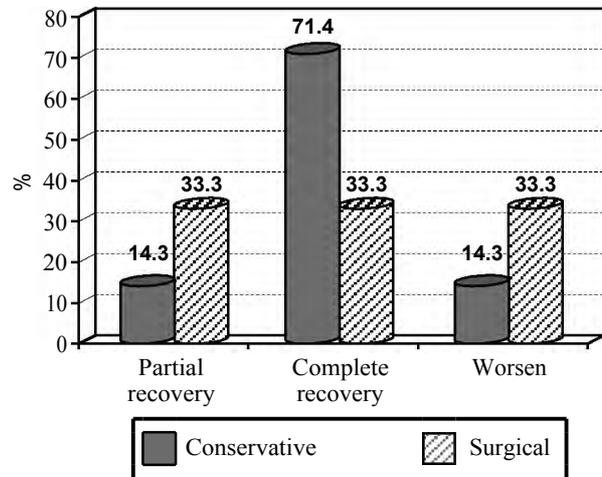


Fig. (1): Functional VAS clinical outcome.

B- Functional clinical outcome according to MacNab's criteria: After 6 months of start of treatment functional clinical outcome (MacNab's outcome criteria) of recovery showed in conservative group: Excellent in 3 patients (33.33%), good in one patient (11.11%), fair in 2 patients (22.22%) and poor in 3 patients (33.33%).

In surgical group: Excellent in one patient (14.29%), good in 4 patients (57.14%), fair in one patient (14.29%) and poor in one patient (14.29%). These results did not show any significant statistically difference (Table 1).

Table (1): Final clinical outcome (MacNab's outcome criteria) (after 6 months).

Degree of recovery	Conservative group		Surgical group		p-value
	No.	%	No.	%	
Excellent	3	33.33	1	14.29	0.267
Good	1	11.11	4	57.14	
Fair	2	22.22	1	14.29	
Poor	3	33.33	1	14.29	
Total	9	100	7	100	

Female patient 50 years old with lumbar spondylodiscitis in MRI and CT (A and B) spine presented by back pain VAS 8. Lumbar 4, 5 laminectomy with transpedicular screws fixation was done. Post-operative VAS 2. 6 months post operative CT spine (C).

Female patient 40 years old presented by back pain, VAS 6 MRI spine (A) showed lumbar L1-2 spondylodiscitis patient underwent medical treatment. After treatment VAS was 0. follow-up MRI spine after 1 year (B).

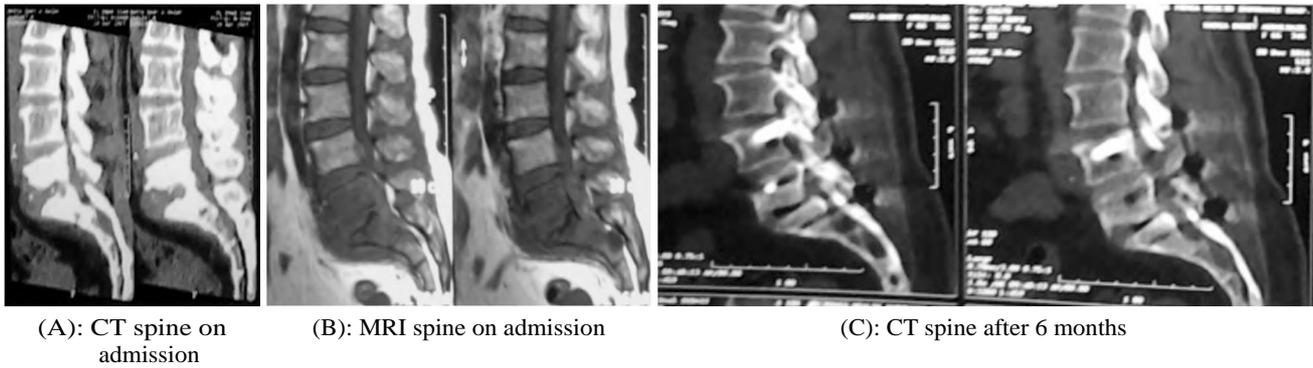


Fig. (2): Imaging of case 1.



Fig. (3): Imaging of case 2.

Discussion

The incidence of spontaneous spondylodiscitis is increasing per year. This attributed to an aging of population, increasing of prevalence of immunodeficiency and improving of radiological technique.

Regarding the treatment of spondylodiscitis; Janssen et al., assumed that to date, there are no evidence-based guidelines addressing the best treatment methods in the management of spondylodiscitis [2]. There is some controversy as to whether spondylodiscitis should be treated by surgical or by conservative therapy [3-5]. There is no clear consensus.

A number of studies as Gouliouris and Aliyu et al., [6] report a bimodal age distribution with peaks at age less than 20 years and in the group aged 50-70 years. This was also true for our patients with a mean age 52.31 years, which is also accepted with Hadjipavlou and Mader et al., where the age were ranged between 49-69 year [6].

In our study spontaneous spondylodiscitis was more common in female which is contrary to Hadjipavlou et al., [7] and Schütze et al., [8] that proved an increase in incidence among males to females 1.5-3:1, also some as Tsiodras and Falagas [9] proved it has an equal sex distribution the discrep-

ancy in our study could be correlated to small sample size in our study.

Hypertension, diabetes mellitus and hepatitis C virus were the risk factors present in our study. While Gouliouris et al., [6] concluded that; diabetes mellitus was the most commonly identified risk factor and Stefan-Mikic et al., [10] included advanced age.

Lumbar spondylodiscitis is mostly affected which approved by Friedman et al., [3] over 5 years of management of cases with spondylodiscitis, which agreed with our study.

Nolla et al., [11], Schimmer et al., [12], Seldomridge [13], Butler et al., [14] and Gouliouris et al., [6] showed that blood parameters as ESR and CPR were elevated in over 90% of cases, these results are similar to ours which showed increase ESR and CRP in all patient. Also we and Carragee [15] noted that the leucocyte count is the least useful amongst the inflammatory marker; it is high in only a third to half of affected patients.

Regarding the causative organisms in our study staphylococcus aureus was the most common organism isolated from blood culture in all cases and mycobacterium tuberculosis was the most common organism from tissue culture in cases who were managed surgically. This agreed with the studies

of Nolla et al. [11], Schimmer et al. [12], Carrega et al. [4], Hadjipavlou et al. [5], Schütze et al. [8], Seldomridge [13], Butler et al. [14], Tuli [16], Gouliouris et al. [6].

French guidelines [6] recommend a minimum treatment duration of 6-12 weeks which agreed with our study where we start intravenous antibiotics for 2 weeks to all cases of both groups followed with oral antibiotics for 4 weeks and anterior decompression with either an autologous bone graft or a titanium cage to fill the defect caused by debridement has been described in some literatures as Quinones-Hinojosa et al. [17]. Likewise in our study in which we used this method in all our cases with cervical spondylodiscitis [6,17].

Some authors as Gouliouris et al. [6], Hadjipavlou et al. [7], McHenry et al. [8], del Pozo et al. [19], assumed that persistence of pain after recovery from infection has a negative effect on the patient's psychological and functional state and the most feared complication is disability due to neurological deficit or severe pain, occurring in as many as a third of cases and this agreed with our study which showed the same result in conservative group and less than that in surgical group.

In the study conducted by Lim et al., the mean VAS score was 7.43 ± 0.54 at the pre-operative period, and 2.07 ± 1.12 at final follow-up [20]. We and Pee et al., showed similar improvement in VAS scores of both groups at the end of follow-up period [21].

Our functional clinical outcome MacNab's criteria results nearly agreed with the results of the study performed by Ozalay et al., [22] on 16 patients with non-tuberculous thoracic or lumbar spondylodiscitis; where 75% were completely relieved of pain and fully active. These result also contrary to Pee et al., [21] who used the Oswestry Disability Index (ODI), while Lee et al., [23] did not use any specified scale in the functional assessment.

References

- CANALE S.T. and BEATY J.H.: Campbell's operative orthopaedics: Elsevier Health Sciences, 2012.
- SHIBAN E., JANSSEN I., WOSTRACK M., et al.: Spondylodiscitis by drug-multiresistant bacteria: A single-center experience of 25 cases. *The Spine Journal*, 14 (12): 2826-34, 2014.
- LEGRAND E., FLIPO R.M., GUGGENBUHL P., et al.: Management of nontuberculous infectious discitis. Treatments used in 110 patients admitted to 12 teaching hospitals in France. *Joint Bone Spine*, 68 (6): 504-9, 2001.
- CARREGA G., ARENA S., BARTOLACCI V., et al.: Non-tubercular vertebral osteomyelitis: diagnosis and therapy of 45 patients from a single Italian centre. *Le infezioni in medicina: Rivista periodica di eziologia, epidemiologia, diagnostica, clinica e terapia delle patologie infettive*, 11 (4): 183-8, 2003.
- HADJIPAVLOU A., KATONIS P., GAITANIS I., MUFFOLETTO A., TZERMIADIANOS M. and CROW W.: Percutaneous transpedicular discectomy and drainage in pyogenic spondylodiscitis. *European Spine Journal*, 13 (8): 707-13, 2014.
- GOULIOURIS T., ALIYU S.H. and BROWN N.M.: Spondylodiscitis: Update on diagnosis and management. *Journal of Antimicrobial Chemotherapy*, 65 (Suppl 3): iii11-iii24, 2010.
- HADJIPAVLOU A.G., MADER J.T., NECESSARY J.T. and MUFFOLETTO A.J.: Hematogenous pyogenic spinal infections and their surgical management. *Spine*, 25 (13): 1668-79, 2000.
- MANN S., SCHÜTZE M., SOLA S. and PIEK J.: Non-specific pyogenic spondylodiscitis: Clinical manifestations, surgical treatment, and outcome in 24 patients. *Neurosurgical focus*, 17 (6): 1-7, 2004.
- TSIODRAS S. and FALAGAS M.E.: Clinical assessment and medical treatment of spine infections. *Clinical orthopaedics and related research*, 444: 38-50, 2006.
- SEVIC S., STEFAN-MIKIC S., SIPOVAC D., TURKULOV V., CVJETKOVIC D. and DODER R.: Spondylodiscitis-Current Diagnosis and Treatment. *Health Med.*, 6 (1): 81-7, 2012.
- NOLLA J.M., ARIZA J., GÓMEZ-VAQUERO C., et al.: Spontaneous pyogenic vertebral osteomyelitis in nondrug users. Paper presented at: Seminars in arthritis and rheumatism, 2002.
- SCHIMMER R.C., JEANNERET C., NUNLEY P.D. and JEANNERET B.: Osteomyelitis of the cervical spine: A potentially dramatic disease. *Clinical Spine Surgery*, 15 (2): 110-7, 2002.
- AN H.S. and SELDOMRIDGE J.A.: Spinal infections: Diagnostic tests and imaging studies. *Clinical orthopaedics and related research*, 444: 27-33, 2006.
- BUTLER J.S., SHELLY M.J., TIMLIN M., POWDERLY W.G. and O'BYRNE J.M.: Nontuberculous pyogenic spinal infection in adults: A 12-year experience from a tertiary referral center. *Spine*, 31 (23): 2695-700, 2006.
- CARRAGEE E.J., KIM D., VAN DER VLUGT T. and VITUM D.: The clinical use of erythrocyte sedimentation rate in pyogenic vertebral osteomyelitis. *Spine*, 22 (18): 2089-93, 1997.
- TULI S.: Tuberculosis of the spine: A historical review. *Clinical orthopaedics and related research*, 460: 29-38, 2007.
- QUINONES-HINOJOSA A., JUN P., JACOBS R., ROSENBERG W.S. and WEINSTEIN P.R.: General principles in the medical and surgical management of spinal infections: A multidisciplinary approach. *Neurosurg. focus.*, 17 (6): E1, 2004.
- McHENRY M.C., EASLEY K.A. and LOCKER G.A.: Vertebral osteomyelitis: Long-term outcome for 253

- patients from 7 Cleveland-area hospitals. *Clinical Infectious Diseases*, 34 (10): 1342-50, 2002.
- 19- Del POZO J.S.G., SOTO M.V. and SOLERA J.: Vertebral osteomyelitis: Long-term disability assessment and prognostic factors. *Journal of Infection*, 54 (2): 129-34, 2007.
- 20- LIM J.K., KIM S.M., JO D.J. and LEE T.O.: Anterior interbody grafting and instrumentation for advanced spondylodiscitis. *Journal of Korean Neurosurgical Society*, 43 (1): 5-10, 2008.
- 21- PEE Y.H., PARK J.D., CHOI Y.G. and LEE S.H.: Anterior debridement and fusion followed by posterior pedicle screw fixation in pyogenic spondylodiscitis: Autologous iliac bone strut versus cage. *Journal of Neurosurgery: Spine*, 8 (5): 405-12, 2008.
- 22- OZALAY M., SAHIN O., DERINCEK A., ONAY U., TURUNC T. and UYSAL M.: Non-tuberculous thoracic and lumbar spondylodiscitis: Single-stage anterior debridement and reconstruction, combined with posterior instrumentation and grafting. *Acta Orthopædica Belgica*, 76 (1): 100, 2010.
- 23- LEE M.C., WANG M.Y., FESSLER R.G., LIAUW J. and KIM D.H.: Instrumentation in patients with spinal infection. *Neurosurgical Focus*, 17 (6): 1-6, 2004.

مقارنة العلاج الجراحي والعلاج التحفظي في حالة إلتهاب الغضاريف التلقائي بالفقرات

- إلتهاب الغضاريف التلقائي يتزايد سنويا وهذا يرجع إلى زيادة أعمار السكان، وزيادة إنتشار نقص المناعة وتحسين دور الأشعة في التشخيص.
- وهدف هذا البحث مقارنة العلاج الجراحي والعلاج التحفظي في حالة إلتهاب الغضاريف التلقائي بالفقرات من حيث الفعالية والمضاعفات والنتائج الوظيفية.
- وهذا البحث عبارة عن دراسة عشوائية شملت ١٦ مريضا يعانون من إلتهاب الغضاريف التلقائي وآلام في العمود الفقري. وتم تقسيمهم إلى مجموعتين: الأولى تعالج بواسطة العلاج التحفظي والثانية جراحيا.
- النتائج: تم علاج ٩ مرضى بواسطة العلاج التحفظي و٧ جراحيا. وبعد إنتهاء دورة كاملة من العلاج. فقط ٣ مرضى من المجموعة الأولى و٤ مرضى من المجموعة الجراحية أظهرت نفس نتائج التحسن على مستوى الأشعة. ولم يكن هناك أى فروق ذو دلالة إحصائية بين المجموعتين من حيث النتائج النهائية.
- ومما سبق يدل على أن كل من العلاج التحفظي والجراحي كافي لتحقيق أهداف علاج إلتهاب الغضاريف التلقائي على حد سواء وكل من هذه الطرق آمنة وممكنة وفعالة في تخفيف الألم.