



SURGICAL TREATMENT OF TUBERCULOUS SPONDYLITIS

TÜBERKÜLOZ SPONDİLİTİN CERRAHİ TEDAVİSİ

Ibrahim KAYA¹,
Necdet SAĞLAM²,
Murat YILMAZ³,
Sevda UĞRAŞ⁴,
Akin UĞRAŞ⁵,
Fatih DİKİCİ⁶

¹ M.D. Specialist-Orthopedic Surgeon,
Department of Orthopedics and
Traumatology, Acıbadem University,
Istanbul, Turkey.

² M.D. Specialist-Orthopedic Surgeon,
Department of Orthopedics and
Traumatology, Umraniye Training
Hospital, Istanbul, Turkey

³ M.D. Specialist-Orthopedic
Surgeon, Department of Orthopedics
and Traumatology, Haseki Training
Hospital, Istanbul, Turkey

⁴ M.D. Specialist-Neurosurgeon,
Private Clinic, Istanbul/Turkey

⁵ Assoc Prof. Specialist-Orthopedic
Surgeon, Department of Orthopedics
and Traumatology, Istanbul Medipol
University, School of Medicine,
Istanbul/Turkey

⁶ Assoc Prof. Specialist -Orthopedic
Surgeon, Department of Orthopedics
and Traumatology, Acıbadem
University, School of Medicine,
Istanbul/Turkey

Address: Akin Ugras, M. D.,
Istanbul Medipol University, School of
Medicine, Department of Orthopaedics
and Traumatology, TEM Avrupa
Otoyolu, Goztepe Cikisi, No:1, Bagcilar,
34214, Istanbul, Turkey.
E-mail: akinugras@gmail.com
Tel.: 0212 4607777,
Gsm: 0532 6321844,
Fax: 0212 4607070
Received: 2nd January, 2016.
Accepted: 17th February, 2016.

SUMMARY:

Purpose: There is consensus on medical management of tuberculous spondylitis (TBS); however, literature is quite divided on surgical management of TBS. We aimed to illustrate surgical indications and treatment modalities for TBS in the management of selected patients.

Materials and Methods: A total of 19 patients with different vertebral tuberculosis were treated with surgical intervention. There were 10 male and 9 female patients, mean age was 48±18.1 years and mean follow-up time was 59.9±27.7 months. There was average 1.2±0.5 disc and 2.2±0.5 vertebral body involvement.

Results: 15 cases were surgically debrided through anterior approach, 4 were surgically debrided through posterior approach, 1 patient treated with anterior screw fixation and 17 patients treated with posterior pedicle screw fixations. Mean corpectomy level was 1.7±1.2 and mean fusion level was 6.8±3.8. Postoperatively, 4 patients had suffered from complications which were significantly higher in cases with more intervertebral disc involvement (p=0.005), with more vertebral body involvement (p=0.033), with more number of corpectomies (p=0.003) and with more fusion levels (p=0.023).

Conclusions: Debridement should be performed in cases of neurological impairment, multilevel involvement or severe abscess formation. Posterior instrumentation should be added to prevent anterior implant failure in multilevel involvement.

Keywords: pott's disease, tuberculous spondylitis, kyphosis

Level of evidence: Retrospective clinical study, Level III

ÖZET:

Amaç: Tüberküloz spondilodiskitin medikal tedavisi konusunda görüş birliği olmasına rağmen cerrahi tedavi konusunda literatürde farklı görüşler vardır. Olgularımızda cerrahi tedavi endikasyonlarını ve tedavi metodlarını göstermeyi amaçladık.

Materyal ve Metod: Farklı vertebral tüberkülozu olan toplam 19 hasta cerrahi olarak tedavi edildi. 10 erkek ve 9 bayan hasta, ortalama yaşları 48±18.1 ve ortalama takip süresi 59.9±27.7 aydı. Ortalama 1.2±0.5 disk ve 2.2±0.5 vertebral korpus tutulmuştu.

Sonuçlar: 15 hastaya anterior 4 hastaya posterior yaklaşımla debritleme yapıldı, 1 hastaya anterior vida ile 17 hastaya posterior vida ile tespit yapıldı. Ortalama korpektomi seviyesi 1.7±1.2 ve ortalama füzyon seviyesi 6.8±3.8 idi. Postoperatif 4 hastada komplikasyon mevcuttu. Komplikasyonlar daha fazla disk tutulumu olan (p=0.005), daha fazla korpus tutulumu olan (p=0.033) ve daha fazla füzyon seviyesi olan (p=0.023) olgularda fazlaydı.

Çıkarımlar: Debritleme tedavisi nörolojik defisit varlığında, çoklu seviye tutulumunda yada ciddi apse varlığında yapılmalıdır. Anterior implant yetmezliğinden kaçınmak için posterior enstrümantasyon uygulanmalıdır.

Anahtar kelimeler: pott hastalığı, tüberküloz spondilodiskit, kifoz

Kanıt Düzeyi: Retrospektif klinik çalışma

INTRODUCTION:

Tuberculosis is still a common infectious disease in the world. Every year, 10 million people are newly infected, with about 95 % of cases being in developing countries. The incidence of the disease would rise from 143 to 173 per 100,000 and deaths due to tuberculosis would climb from 2.5 to 3.5 million or more per year^{3,11,14}. The spine is the most common site for osseous involvement of tuberculosis. Tuberculous spondylodiscitis (TBS), known also as Pott's disease, was first described in 1779 by Percival Pott⁵. There are many morphological forms of TBS. In its most common form TBS involves the anterior column of a single motion segment⁶. Sometimes TBS involves more than single motion segment and this form is called multilevel (three or more vertebrae)⁹.

There is consensus on medical management of TBS; however, literature is quite divided on surgical management of TBS. Some people recommend conservative treatment others focus on anterior, posterior or combined surgeries^{9,11,14}. Goals of surgical management include radical debridement, decompression of spinal cord or cauda equina, prevention or correction of deformity, bone grafting to achieve solid fusion, stable internal fixation to allow early ambulation and return of patient back to society and occupation as soon as possible^{9,14}. Purpose of this study is to evaluate the indications and treatment of surgically treated TBS.

MATERIALS AND METHODS:

19 patients who were diagnosed with tuberculous spondylodisks and treated surgically in 3 different training hospitals were examined retrospectively. 10 patients were male (%53.6) and 9 (%46.4) were female. Average age was 48±18.1 years (range 23-75).

Neurological examination was carried out according to Frankel classification. All patients went through routine blood tests, X rays, CT and MRI. Radiological findings were classified according to Saggital index and extent of initial vertebral loss.

Depending on the extent of initial vertebral loss, three types of collapse and healing of the anterior column are noted¹⁵. Type-A healing involves partially destroyed vertebral bodies coming into contact with a large contact area between them, in the presence of intact facet joints. Type-B healing is seen in patients with loss of one or one and a half vertebral body. Type-C healing occurs when more than two vertebral bodies are lost¹⁵.

21.1 % of the patients had history of contact with tuberculosis. Definitive diagnosis was made upon pathological evaluation of the debridement material in all patients. 42.1% of the patients had biopsy prior to operation. As soon as the diagnosis was verified, multi-agent antituberculous treatment was admitted for 1 year.

Statistics:

Statistical analyses were performed with the SPSS (ver19) software. Results were evaluated with descriptive statistical methods such as mean and standard deviation. t test was used to comparison of two groups. Pearson correlation was used to determine the relationship of variables with each other. The significance level was set at $p < 0.05$.

RESULTS:

Mean follow up time was 59.9 (range 12 to 106) months. According to preoperative neurological evaluation, one patient was Frankel A, one patient was Frankel C, 17 patients were Frankel E. Postoperatively one patient was Frankel A, 18 were Frankel E. The patient who was Frankel A both pre and postoperatively was paraplegic due to prior thoracolumbar trauma. One patient who was Frankel C preoperatively had complete recovery postoperatively in 4 months following the operation.

Radiologically one cervical (C5-6), 9 thoracal, 9 lumbar (4 upper lumbar, 3 lower lumbar, 2 lumbosacral) involvement was noted. During the operation, all patients except for one had abscess formation. 89.5% of the patients had corpus involvement, 10.5% of patients had more than 20 degrees angulation in sagittal index and there was no isolated discitis. All patients had at least one disc involvement with mean disc involvement of 1.2 ± 0.5 (range 1-3).

Mean corpus involvement was 2.2 ± 0.5 (range 2-4). Two patients had kyphotic collaps. According to classification of initial vertebral loss, one patient was Type-A, two patients were Type-C and 16 patients were Type-B.

Drainage of the the abscess and debridement without instrumentation was performed via posterior approach for the patient who had Type-A involvement. One patient with persistent pain without abscess went through debridement and screw fixation via only anterior approach. Posterior debridement without instrumentation and corpectomy was performed for 3 patients. 11 patients went through anterior debridement, drainage of the abscess and interbody cage stabilization, combined with posterior instrumentation (Figure-1).

Surgically, mean 1.7 ± 1.2 (range 0-4) corpectomy and mean 6.8 ± 3.8 (range 1-14) level fusion was performed. Interbody cage stabilization was applied for 57.9% of the patients, anterior screw fixation was performed for 21.1% of the patients and posterior screw fixation was performed for 89.5% of the patients. 3 patients received both anterior and posterior screw fixation (Figure-2).



Figure-1. Destruction of the corpus. **a)** Computerised tomography and **b)** T2 weighted magnetic resonance images of the thoracic 7th vertebrae. Note that abscess is extending along the anterior longitudinal ligament.

4 patients (21.2%) had suffered from complications, postoperatively. Two patients had superficial infection which was treated with debridement. Two patients had instability which was treated with posterior instrumentation and extension of the fusion levels. When complications were examined together with the characteristics of the cases, we found that the complication rate was significantly higher in cases with more intervertebral disc involvement ($p=0.005$), with more vertebral body involvement ($p=0.033$), with more number of corpectomies ($p=0.003$) and with more fusion levels ($p=0.023$).

DISCUSSION:

If there is a cold abscess, antibiotic-analgesic therapy, bed rest or bracing cannot prevent the extensive destruction of

vertebral bone and disc material¹³. In general, debridement is performed anteriorly as the pathology is typically located in the vertebral bodies^{17,8}. If there is no vertebral collapse, grafting is not necessary. But in the case of vertebral collapse and kyphosis, curettage and grafting of the affected bone is necessary¹³.

Debridement may be followed by either anterior or posterior instrumentation^{17,8}. Many studies in the past have proven superior outcome with radical debridement of diseased tissue and anterior strut grafting, with or without addition of instrumentations⁴. However, in case of multilevel involvement or for deformity correction, the surgeon should may prefer posterior approach with pedicle screw instrumentation^{10,14,15}.

We observed that in surgical treatment of TBS, complication rate was higher in cases with more disc involvement, with

more vertebral body involvement and in those with more fusion levels. Two of the complications were due to instability and implant failure. After anterior debridement in multilevel TBS, the surgeon creates severe instability which can not be solved with anterior instrumentation alone. All stability-related complications in this study occurred in the anterior alone group only, which was later stabilised with posterior instrumentation.



Figure-2. Postoperative computerised tomography scan of the same case.

Neural deficits in spinal tuberculosis are due to a compressive etiology and a near total recovery may occur if decompressed early^{10,12}. Due to anatomical factors of lordotic curvature of the vertebral column and wider canal with the cauda equina and not the cord within, the lumbar region of the spinal column is relatively tolerant to nerve compression^{2,12}. But especially in upper segments, the surgeon should be aware of delay in

diagnosis and surgery that can cause complete paraplegia¹³. In this study, we observed rapid and complete recovery of the neural deficits.

In conclusion, debridement is essential in cases of neurological impairment, multilevel involvement or severe abscess formation. Debridement may be followed by anterior reconstruction with bone graft and either anterior or posterior instrumentation. However, posterior instrumentation should be added in all cases to prevent anterior implant failure in multilevel TBS.

REFERENCES:

1. Benli IT, Acaroğlu E, Akalin S, Kiş M, Duman E, Ün A. Anterior radical debridement and anterior instrumentation in tuberculosis spondylitis. *Eur Spine J* 2003; 12(2): 224-234.
2. Bhojraj S, Nene A. Lumbar and lumbosacral tuberculous spondylodiscitis in adults. Redefining the indications for surgery. *J Bone Joint Surg* 2002; 84-B(4): 530-534.
3. Cheung WY, Luk KD. Clinical and radiological outcomes after conservative treatment of TB spondylitis: is the 15 years' follow-up in the MRC study long enough? *Eur Spine J* 2012 May 8. [Epub ahead of print]
4. Erturer E, Tezer M, Aydogan M, Mirzanlı C, Ozturk I. The results of simultaneous posterior-anterior-posterior surgery in multilevel tuberculosis spondylitis associated with severe kyphosis. *Eur Spine J* 2010; 19(12): 2209-2215.
5. Fantoni M, Trecarichi EM, Rossi B, Mazzotta V, Di Giacomo G, Nasto LA, Di Meco E, Pola E. Epidemiological and clinical features of pyogenic spondylodiscitis. *Eur Rev Med Pharmacol Sci* 2012; 16 (Suppl.-2): 2-7.
6. Ge Z, Wang Z, Wei M. Measurement of the concentration of three antituberculosis drugs in the focus of spinal tuberculosis. *Eur Spine J* 2008; 17(11): 1482-1487.
7. Gokce A, Ozturkmen Y, Mutlu S, Caniklioğlu M. Spinal osteotomy: correcting sagittal balance in tuberculous spondylitis. *J Spinal Disord Tech* 2008; 21(7): 484-488.
8. Issack PS, Boachie-Adjei O. Surgical correction of kyphotic deformity in spinal tuberculosis. *Int Orthop* 2012; 36(2): 353-357.
9. Luk KD. Tuberculosis of the spine in the new millennium. *Eur Spine J* 1999; 8(5): 338-345.
10. Moon MS. Tuberculosis of the spine. Controversies and a new challenge. *Spine* 1997; 22(15): 1791-1797.
11. Moon MS, Moon YW, Moon JL, Kim SS, Sun DH. Conservative treatment of tuberculosis of the lumbar and lumbosacral spine. *Clin Orthop Relat Res* 2002; 398: 40-49.

-
12. Mukherjee SK, Dau AS. Anterior lumbar fusion in Pott's disease. *Clin Orthop Relat Res* 2007; 460: 93-99.
 13. Oguz E, Sehirlioglu A, Altinmakas M, Ozturk C, Komurcu M, Solakoglu C, Vaccaro AR. A new classification and guide for surgical treatment of spinal tuberculosis. *Int Orthop* 2008; 32(1): 127-133.
 14. Qureshi MA, Khalique AB, Afzal W, Pasha IF, Aebi M. Surgical management of contiguous multilevel thoracolumbar tuberculous spondylitis. *Eur Spine J* 2012 Aug 15. [Epub ahead of print]
 15. Rajasekaran S. Natural history of Pott's kyphosis. *Eur Spine J* 2012 May 15. [Epub ahead of print]

