

Research Article

## **Presurgical Aspects of Nutrition in Tuberculous Spondylitis Patients**

**Farid Yudoyono, Rully H. Dahlan, Muhammad Z. Arifin, Achmad Adam**

Department of Neurosurgery  
Faculty of Medicine, Padjadjaran University - Hasan Sadikin Hospital  
Jl. Pasteur 38, Bandung 40161, Indonesia  
Email: faridspine@gmail.com

### **Abstract**

*Tuberculous spondylitis is a chronic infectious disease caused by Mycobacterium tuberculosis on the vertebral bone. Involved less than 3% of all cases of TB, but the incidence varies around the world, and is associated with the quality of public health and socioeconomic conditions. The purpose of this study is to investigate the presurgical aspects of nutrition in patients with tuberculous spondylitis. A total of 39 consecutive patients between January 2011-December 2012 were evaluated retrospectively. All patients diagnosed with spondylitis tuberculosis and treated with decompression, stabilization and fusion. All patients had been diagnosed with Spondylitis tuberculosis based on history taking, physical examination, laboratory finding and MRI. Our study showed that of all subjects, ten male patients and eight female patients had cervical (n=1), thoracic (n=15), and lumbar (n=2) tuberculous spondylitis. The average age of the patients was  $32.83 \pm 12.25$  (17-56) years old. The average preoperative body mass index (BMI) was  $16.67 \pm 1.2$  kg / m<sup>2</sup>, albumin levels  $3.23 \pm 0.21$  g / dl, total protein level  $6.2 \pm 0.34$  g/dL. These were lower than normal value. We conclude that tuberculous spondylitis patients experience nutritional deficiencies presurgically and nutritional support should be considered pre-operatively.*

**Keywords:** *Mycobacterium tuberculosis, nutritional state, presurgical aspect, tuberculousspondylitis*

Research Article

## Aspek Nutrisi Prabedah pada Pasien Spondilitis Tuberkulosis

*Farid Yudoyono, Rully H. Dahlan, Muhammad Z. Arifin, Achmad Adam*

Departmen Ilmu Bedah Saraf  
Fakultas Kedokteran Universitas Padjadjaran / RSUP. Dr. Hasan Sadikin Bandung  
Jl. Pasteur 38, Bandung 40161, Indonesia  
Email: faridspine@gmail.com

### Abstrak

Spondilitis tuberkulosis merupakan infeksi kronis yang disebabkan oleh kuman spesifik yaitu *Mycobacterium tuberculosis* yang mengenai tulang belakang. Secara keseluruhan insidensinya di bawah 3% dan berhubungan erat dengan kondisi kesehatan lingkungan dan sosial ekonomi di negara tersebut. Tujuan penelitian ini adalah untuk mengetahui status nutrisi prabedah pasien spondilitis TB. Secara retrospektif didapatkan total 39 pasien spondylitis TB dalam kurun waktu Januari 2011 sampai Desember 2012. Pada semua pasien dilakukan operasi laminektomi dekompresi, stabilisasi posterior dan fusi. Diagnosis ditegakkan berdasarkan anamnesis, pemeriksaan fisik, hasil laboratorium dan gambaran MRI tulang belakang. Data demografi dan hasil laboratorium dibandingkan dengan nilai normal. Dari penelitian ini didapatkan sepuluh pasien laki-laki dan delapan pasien perempuan dengan kelainan di tulang servikal (n=1), torakal (n=15), and lumbal (n=2). Usia rata-rata pasien adalah  $32,83 \pm 12,25$  (17-56) tahun. Rata-rata *body mass index* (BMI) prabedah adalah  $16,67 \pm 1,2$  kg/m<sup>2</sup>, kadar albumin  $3,23 \pm 0,21$  g/dL, dan protein total  $6,2 \pm 0,34$  g/dL. Keseluruhannya di bawah nilai standar. Dari penelitian ini disimpulkan pasien spondylitis TB mengalami defisiensi nutrisi pada fase prabedah, dan diperlukan penanganan malnutrisi yang komprehensif sebelum dilakukan pembedahan.

**Kata kunci:** aspek prabedah, *Mycobacterium tuberculosis*, spondilitis tuberkulosis, status nutrisi

Research Article

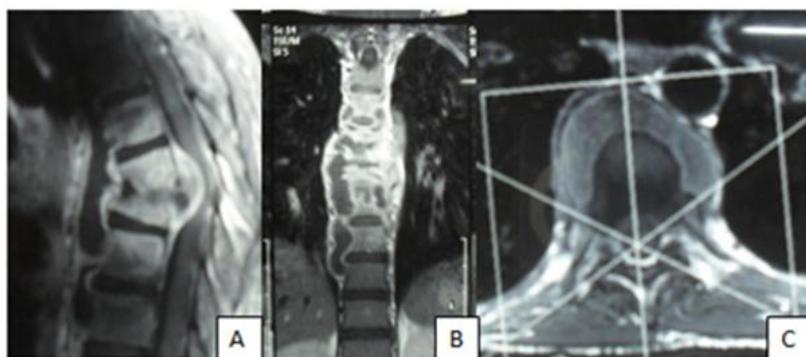
**Introduction**

Tuberculosis of the skeletal accounts for less than 3% of all cases of tuberculosis and remains the cause of a higher morbidity and mortality in developing countries. Tuberculous spondylitis accounts more than half of the cases.<sup>1,2,3,4,5</sup> Chronic state of infection in tuberculous spondylitis is often associated with decreased immune system. In surgical candidate patients, poor nutritional status before surgery interferes with the wound healing process and has been associated with postoperative problems that increases morbidity and mortality.<sup>6,7</sup>

The prevalence of preoperative low nutrition state in patients with tuberculous spondylitis is yet unknown. We consider this to be important as a prediction of patient's preoperative nutritional status that can decrease morbidity and mortality; hence, the number of disability can be reduced.

**Methods**

We retrospectively evaluated data for 39 patients who were treated with laminectomy decompression, stabilization, and fusion for tuberculous spondylitis at our institutions from January 2011- December 2012 and 18 (eighteen) patients were included in this study. Inclusion criteria of this research were patients aged 14-70 years with tuberculous spondylitis confirmed by history taking, physical examination, laboratory findings, and MRI image which showed abscess collection and expansion of granulation tissue adjacent to the vertebral body that is highly suggestive of tuberculous spondylitis. The subligamentous multiple contiguous bones paraspinal mass can be very well demonstrated by MRI.<sup>8,9,10</sup> We collected blood specimens, Magnetic Resonance Imaging (MRI) data, nutritional state markers: body mass index, serum albumin level, total protein level, and hepatic enzymes.



**Figure 1 MRI Examination**

Description

- A) T1 Weighted sagittal MRI image sagittal cut showed subligamentous abscess.
- B) T1 weighted coronal MR images showed multilevel paravertebral abscess.
- C) T2 weighted axial MR images showed compression of spinal cord and paravertebral abscess.

Research Article

Results

Thirty patients met the inclusion criterias, but 12 patients were excluded due to refusal to follow the surgery procedure; 5 patients refused surgery because of family reasons, 7 patients refused surgery and chose to follow the medication therapy. Final data was collected from 18 patients.

**Table 1 Subjects Characteristics and Presurgical Nutritional Status**

Age	Sex	Spondylitis	Surgery	BMI (Kg/m <sup>2</sup> )	Albumin (g/dL)	Total Protein (g/dL)	SGOT U/L	SGPT (U/L)
35	M*	Th**4-5	Lami decomp <sup>††</sup> + Posterior Stabilisation	15.06	3.2	6.1	5	10
39	M	Th 11-12	Lami decomp + Posterior Stabilisation	15.63	3.3	5.9	7	9
45	M	C <sup>§§</sup> 4-5-6	ACCF	16.42	3.2	6.2	6	10
23	M	Th 7-8-9	Lami decomp + Posterior Stabilisation	19.07	3.1	5.6	6	12
19	F <sup>§</sup>	Th 3-4	Lami decomp + Posterior Stabilisation	15.59	2.8	5.6	7	13
25	F	Th12-L1	Lami decomp + Posterior Stabilisation	17.16	3.4	5.9	5	11
43	F	Th 4-5-6	Lami decomp + Posterior Stabilisation	17.04	3.5	6	10	9
56	M	L <sup>†</sup> 2-3	Lami decomp + Posterior Stabilisation	17.40	3.1	6.2	14	15
21	F	Th 4-5	Lami decomp + Posterior Stabilisation	17.51	3	6.4	9	20
17	M	Th 11-12	Lami decomp + Posterior Stabilisation	15.79	2.9	6.5	12	21
29	F	Th 7-8	Lami decomp + Posterior Stabilisation	17.90	3.3	6.4	13	19
56	M	Th 9-10-11	Lami decomp + Posterior Stabilisation	16.11	3.1	6.3	18	17
40	F	Th 11-12	Lami decomp + Posterior Stabilisation	14.03	3.5	5.8	15	20
33	F	Th 12-L1	Lami decomp + Posterior Stabilisation	17.26	3.2	6.8	16	14
39	F	Th 5-6-7	Lami decomp + Posterior Stabilisation	18.20	3.5	6.4	12	9
31	M	Th 5-6	Lami decomp + Posterior Stabilisation	16.51	3.4	6.5	13	10
22	M	Th 4-5	Lami decomp + Posterior Stabilisation	16.53	3.2	6.6	17	19
18	M	L 2-3	Lami decomp + Posterior Stabilisation	16.96	3.4	6.4	10	15

\*M: male; §F: female; \*\*Th: Thoracic; §§C: cervical; †L: lumbar; ††Lamidcomp: laminectomy decompression

From the data we found that the average age of the patients was 32.83 ± 12.25 (17-56) years old, spondylitis were located mostly on thoracic spine 15 (83.3%). To all subjects were performed decompression laminectomy and debridement followed by installation of posterior stabilization with pedicle screw which is due to instability and thoracic spine except one for anterior cervical corpectomy and fusion (Figure 2). Body mass index (BMI) averaged 16.67 ±

Research Article

1.2 kg/m<sup>2</sup> (14.03 to 19.07), 30% below normal BMI. Albumin levels before surgery were 3.23 ± 0.21 g/dL (2.8 to 3.5 g/dL), 24% below the normal value. Total protein levels were 6.2 ± 0.34 g/dL, 3% below the normal value. SGOT levels were 10.83 ± 4.33 U/L and SGPT levels were 14.06 ± 4.33 U/L; these were within normal limit.

**Table 2 Subject Average Values of Several Variables**

Variable	Average value
Age (years old)	32.83 ± 12.25 (17-56)
BMI (kg/m <sup>2</sup> )	16.67 ± 1.2
Albumin (g/dL)	3.23 ± 0.21
Total protein (g/dL)	6.2 ± 0.34
SGOT (U/L)	10.83 ± 4.33
SGPT (U/L)	14.06 ± 4.33
Spondylitis location	
Thoracic	15
Lumbal	2
Cervical	1

**Discussion**

Tuberculous spondylitis is a frequent and the most dangerous form of skeletal tuberculosis, increasing in prevalence during the past decade in endemic regions, especially in patients with immune deficiency. Tuberculous spondylitis can occur in any age. Middle aged adults are the most frequently affected.<sup>11,12</sup> In recent study, the most common age presenting with Tuberculous spondylitis is between 17 to 56 (32.83 ± 12.25) years old, which was different among countries. Low nutrition, poverty, and poor hygienic environment influence the spreading of disease. Males suffer more than females, and in recent study we found males were 1.25 times more than females and this is consistent with previous reports.<sup>12</sup>

In recent study, more than 80% of cases involved thoracic vertebra, which is also consistent with previous reports. This is accordance with the theory that it is easier to spread tuberculosis in thoracic spine from arterial way to subchondral region and valveless system of Batson's venous plexus in the vertebra that is allows two-way flow of blood correlated with pressure on intra abdominal and intra thoracic cavities or by lymphatic drainage to the para-aortic lymph node enabling the bacteria to spread.<sup>13,14,15</sup>

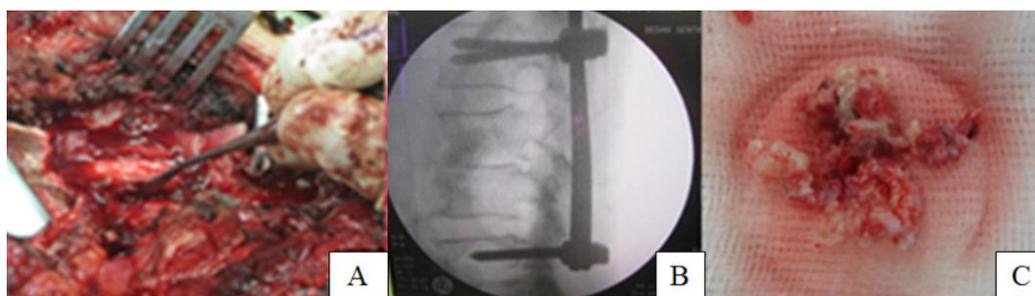
In recent study, BMI showed to be below normal, and this is consistent with the previous study. BMI lower than 18.5 kg/m<sup>2</sup> and lack of adequate weight gain are associated with an increased morbidity and mortality.<sup>2,16</sup> The reduced of food intake due to loss of appetite and physically debilitated caused by back pain aggravated by spinal instability and weight bearing and spinal cord and nerve root compression are the most devastating complication.<sup>15</sup>

In the previous study, tuberculosis patients with hypoalbuminemia were associated with increase mortality. Patients with serum albumin <3.2 g/dL had a six-month mortality above 20%, indicating that these patients will need extra nutritional support to reduce the risk of mortality.<sup>17,18</sup>

### Research Article

Recent study consistent with the previous study showed lower than normal value of albumin level  $3.23 \pm 0.21$  g/dL (normal range 3.5-5.4 g/dL). Moreover, in recent study the total protein level  $6.2 \pm 0.34$  g/dL was decreased to 3% of normal value. The hypoproteinemia and hypoalbuminemia may be due to poor nutritional intake of the patients. Given that low nutrition is correlated with decreased survival rate in tuberculous spondylitis patients, earlier reversal to improve nutrition could also have advantages for long term survival outcomes.<sup>2,19,20,21</sup>

The goal of surgery is liberating the spinal cord from compression by debridement and eradication the infection and achievement of a solid fusion by the installation of posterior stabilization with screw (Figure 3).<sup>22,23</sup>



**Figure 2 Intraoperative View**

Description

- A) Laminectomy decompression and spinal cord released after pus debridement.
- B) fluoroscopy following installation of posterior stabilization.
- C) Abscess formation.

Our study has a number of notable limitations, including those associated with its retrospective design. Clinical outcomes such as the Nutrition derived Outcome Risk Assessment (NORA) Score and the 36-Item Short-Form Health Survey and imaging were not evaluated because the long term recovery period after surgery and difficulty of patient in rural area to access to the health service center. However, despite these limitations, our study demonstrated the characteristics of presurgical nutritional state in Tuberculous spondylitis patients. To explain the nutritional and clinical outcome, further study is required.

### Conclusion

We can conclude that patients with tuberculous spondylitis experience nutritional deficiencies presurgically and nutritional support should be considered preoperatively. This would be a clinical consideration for neurosurgeons, especially for those who work in developing countries, to evaluate the nutritional state for optimal clinical outcomes.

### Reference

1. VaratharajahaS, Charlesa YP, Buy X, Walter A, Steiba JP. Update on the surgical management of Pott's disease. *Orthop Traumatol Surg Res.* 2014;100:233-9.
2. WHO. Nutritional care and support for patients with tuberculosis. Geneva: World Health Organization; 2013.
3. Rodriguez-Gomez M, Willisch A, Fernandez-Dominguez L, Lopez-Barros G, García-Porrúa C, Gonzalez-Gay MA. Tuberculous spondylitis: epidemiologic and clinical study in non-HIV patients from Northwest Spain. *Clin Exp Rheumatol.* 2002;20:327-3.

**Research Article**

4. Trecarichi EM, Di Meco E, Mazzotta V, Fantoni M. Tuberculous spondylodiscitis: epidemiology, clinical features, treatment, and outcome. *Eur Rev Med Pharmacol Sci.* 2012;16(Suppl 2):58-72.
5. Bajwa GR. Evaluation of the role of MRI in spinal tuberculosis: a study of 60 cases. *Pak J Med Sc.* 2009;25(6):944-7.
6. Moon MS. Tuberculosis of spine: current views in diagnosis and management. *Asian Spine J.* 2014; 8(1):97-111.
7. Cegielski JP, Arab L, Cornoni-Huntley J. Nutritional risk factors for tuberculosis among adults in the united states, 1971–1992. *Am J Epidemiol.* 2012;176(5):409–22.
8. Khalequzzaman S, Hoque HW. Tuberculosis of spine Magnetic Resonance Imaging (MRI) evaluation of 42 cases. *Medicine Today.* 2012; 24(2):59-62.
9. Anley CM, Brandt AD, Dunn R. Magnetic Resonance Imaging findings in spinal tuberculosis: comparison of HIV positive and negative patients. *Indian J Orthop.* 2012;46(2):186–90.
10. Hong SH, Choi JY, Lee JW, Kim NR, Choi JA, Kang HS. MR imaging assessment of the spine: infection or an imitation? *Radiographics.* 2009;29:599–612.
11. Moon MS, Kim SS, Lee BJ, Moon JL. Spinal tuberculosis in children: retrospective analysis of 124 patients. *Indian J Orthop.* 2012;46(2):150–8.
12. Benzagmout M, Boujraf S, Chakour K, El Faiz Chaou Mi. Pott's disease in children. *Surg Neurol Int.* 2011;2:1.
13. Ansari S, Rauniyar RK, Dhungel K, Lal Sah P, Chaudhary P, Ahmad K, Amanullah F. MR evaluation of spinal tuberculosis. *Al Ameen J Med Sc.* 2013;6(3):219-25.
14. Moorthy S, Prabhu NK. Spectrum of MR imaging findings in spinal tuberculosis. *Ajr.* 2002; 179:979–83.
15. Garg RK, Somvanshi DS. Spinal tuberculosis: a review. *J Spinal Cord Med.* 2011;34(5):440–54.
16. Sarin R, Vohra V, Sachdeva R, Sachdeva S. Magnitude of malnutrition amongst hospitalized TB patients. *Lung India.* 2011;28(3):231-2.
17. Alvarez-Uria G, Midde M, Pakam R, Naik PK. Diagnostic and prognostic value of serum albumin for tuberculosis in HIV infected patients eligible for antiretroviral therapy: data from an HIV cohort study in India. *Bioimpacts.* 2013;3(3):123–8.
18. Damburam A, Garbati M. A, Yusuph H. Serum proteins in health and in patients with pulmonary tuberculosis in Nigeria. *J Infect Dis. Immun.* 2012;4(2):16-9.
19. Gupta KB, Gupta R, Atreja A, Verma M, Vishvkarma. Tuberculosis and nutrition. *Lung India.* 2009; 1:9-16.
20. Paton NI, Chua YK, Earnest A, Be Chee C. Randomized controlled trial of nutritional supplementation in patients with newly diagnosed tuberculosis and wasting. *Am J Clin Nutr.* 2004;80:460–5.
21. Schwenk A, Macallan DC. Tuberculosis, malnutrition and wasting. *Curr Opin Clin Nutr Metab Care.* 2000; 3:285-91.
22. Do Brito JS, Tirado A, Fernandes P. Surgical treatment of spinal tuberculosis complicated with extensive abscess. *Iowa Orthop J.* 2014;34:129-36.
23. 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;32:127–33.