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Case-report

Two-Stage Reconstruction Surgery on Cervical Deformity Caused by Spondylitis TB

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ABSTRACT

Background: Of all form of spinal tuberculosis (TB), cervical involvement is immensely rare and merely found in 3-5% of all cases. Kyphotic deformity in spondylitis TB was caused by vertebral destruction in the anterior segment due to infection that lead to hyperemia, bone marrow edema, and osteoporosis. Treatment of spinal TB was divided into two sections which run simultaneously, medicament and surgery. The use of cage for spinal surgery has shown its effectivity in supporting the anterior segment of vertebrae and providing long term stability. The purpose of this study was to compare functional outcome of two patients with cervical deformity caused by spondylitis TB that underwent two-stage reconstruction surgery with expandable and non-expandable cage.

Case Presentation: Two patients were reported with cervical deformity caused by spondylitis TB in Orthopedic Hospital Prof. Dr. R. Soeharso, Surakarta. Both patients had their neurological status, Cobb angle, decompression effects and post-operative fusion rate assessed. The patients were diagnosed with cervical deformity due to spondylitis TB showing the involvement of C4-5 in the first patient and C3-5 in the second one. Both underwent two-stage reconstruction surgery and were evaluated right after. There was no decadence in their post-operative neurological function. In the first patient, pre-operative Cobb angle was 44° and becoming 18° post-operatively. The pre-operative Cobb angle of the second patient was 14° and becoming 3° post-operatively.

Results: Assessment of post-operative decompression effects and fusion rate were carried out by CT scan and both patients showed a favorable result even when they both were given a different cage. Although both cages had their own advantages based on surgical consideration, we prefer to used expandable cage due to minimal dissection needed.

Conclusion: Two-stage reconstruction surgery using whether expandable or non-expandable cage to treat cervical deformity caused by Spondylitis TB gave equally satisfactory outcome.

Keywords: Spondylitis, tuberculosis, cervical deformity

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BACKGROUND

Tuberculosis (TB) is a multi-systemic disease that is known not only affecting the lungs but vary throughout the body. Its manifestation outside pulmonary system is called extra-pulmonary TB (EPTB) and it ranges from 15-20% of all TB cases (Houston, 2014). One of the common site reported for EPTB is musculoskeletal whilst more than 50% of musculoskeletal TB occurs on spine (Leonard, 2017; Held, 2017).

Spondylitis TB is one of the most dangerous form of skeletal TB as it can cause neurologic deficit due to spinal deformity. It mostly affects thoracolumbar vertebrae. Spondylitis TB rarely occurs on cervical and merely found in ±3-5% cases (Rasouli 2012; Wang, 2014). Shi et al. (2016) reported 967 spinal TB patients and found only 6.4% encountering cervical TB (Shi 2016). Bodapati et al. (2017) reported 48 spinal TB patients and only 1 experienced cervical TB.

The treatment options for treating spondylitis TB were medicament and surgical (Zhang, 2016). Anti-TB therapy (ATT) remains the mainstay of treatment whereas surgical approach must be considered once the patient's showing vertebral instability (Hou, 2015). Zeng et al. (2016), reported that 360° arthrodesis combined with anterior debridement and decompression is an effective method in treating cervical TB while posterior fixation was recommended in repairing the kyphotic angle.

CASE PRESENTATION

This study was conducted by reporting two patients with cervical deformity caused by spondylitis TB whom each underwent two-stage reconstruction surgery. Both patients were assessed by several outcomes. Their neurological status, Cobb angle, decompression effects and post-operative fusion rate were each compared.

Patient was a 26 years old housewife living in Boyolali, Central Java. Patient came to our clinic complaining mainly due to posterior cervical pain that trailed towards right shoulder. Pain started approximately 1 year ago, was experienced all day long, it elevated with cervical movement and did not improve with resting. Patient had a contact history with active pulmonary TB patient then diagnosed with TB and had taken anti TB regiments for 2 months. No prior trauma nor similar history were identified within family.

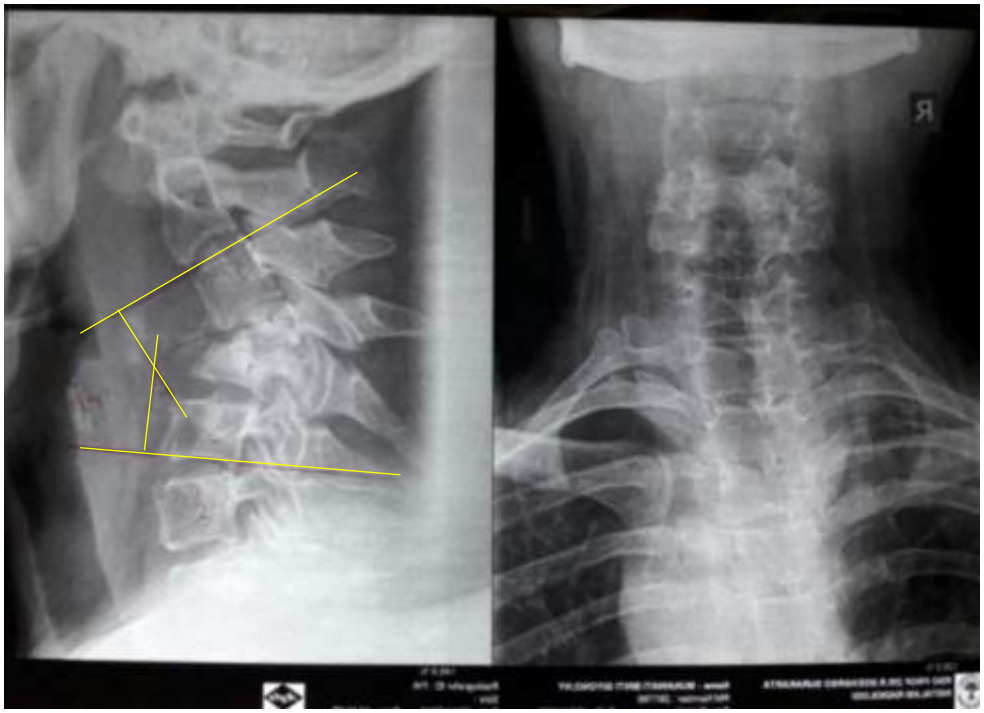

Figure 1. AP Lateral cervical X-Ray.

No abnormality was found in general physical examination. In local cervical region, no inflammation sign nor deformity were found during inspection. Mid cervical pain tenderness was experienced in palpation. There was no motoric and sensory deficit within neurological examination. Laboratory result showed leukocytosis (13,900/UL), ESR 1 (57 mm/h), ESR 2 (79 mm/h) as well CRP (+) indicating an ongoing infection process.

Lateral cervical X-ray examination demonstrated a 44° kyphotic deformity (Figure 1). Cervical region in CT scan denoted vertebral corpus destruction in C4 and C5 where some of the fragments entered the intraspinal causing canal stenosis, kyphotic deformity and instability. We observed bone marrow edema especially in C5 vertebral corpus suggesting the features of Spondylitis TB (Figure 2). Furthermore, the MRI within cervical region exhibited kyphotic figure and destruction along the nearly-complete compression of C4 C5 vertebral corpus with bone marrow edema (+) and gibbus formation simultaneously with paravertebral soft tissue abscess indicating Spondylitis TB (Figure 3).

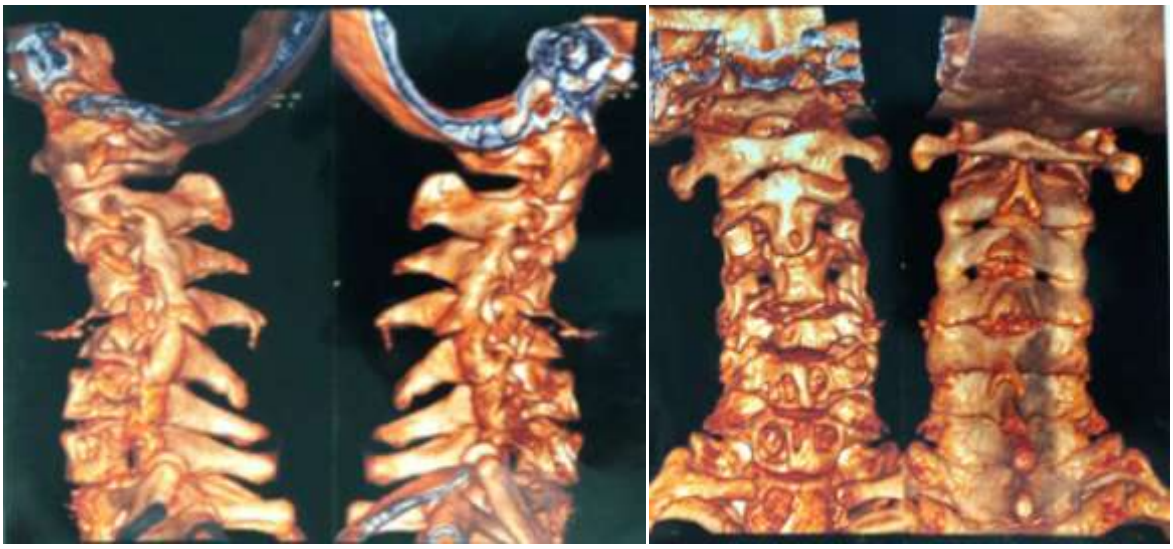

Figure 2. 3D Cervical CT-scan

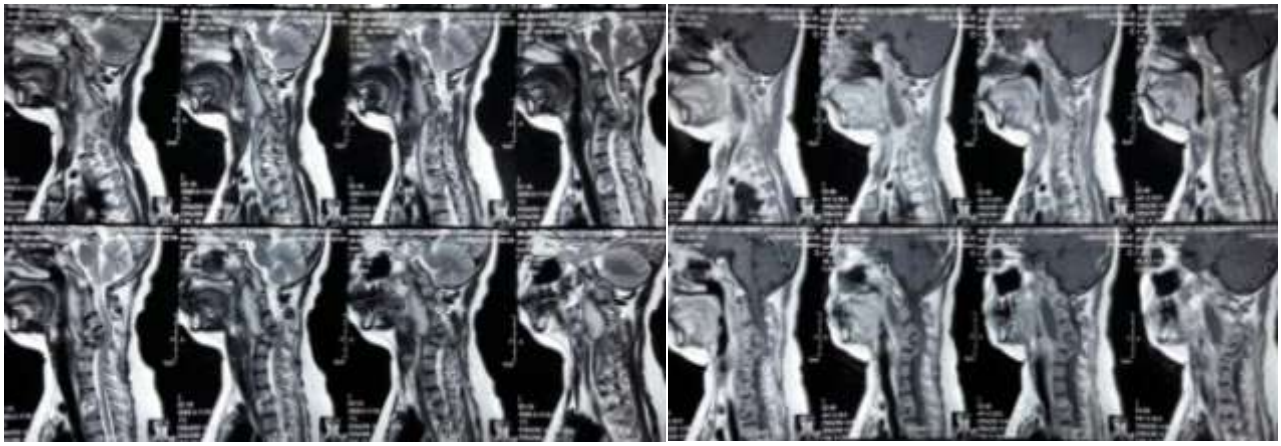

Figure 3. Sagittal Cervical MRI with sequences TI and T2

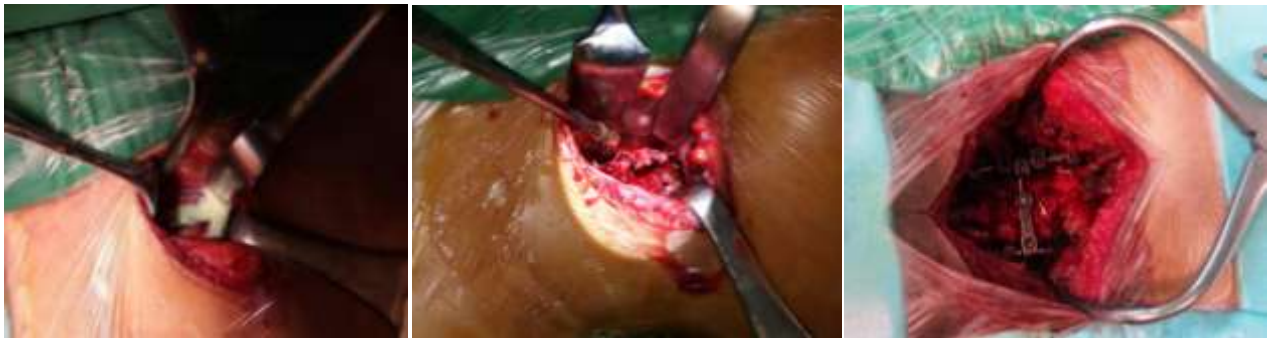

Figure 4. (A) Pus intra-operative, (B) Anterior debridement, (C) Posterior stabilization

Patient underwent two-stage reconstruction surgery. First surgery was anterior debridement and posterior fusion then the second stage was anterior stabilization using expandable cage and fusion. First surgery was conducted while patient was in supine position, using anterior approach incision where pus was found in which then the sample was collected and sent to laboratory for bacterial culture. Surgery was continued by doing debridement, anterior decompression and C4-C5 corpectomy (Figure 4B). After wound closure, patient was positioned prone then posterior approach was performed, followed by decompression and posterior stabilization using Cervical Lateral Mesh and Crosslink (Figure 4C).

Figure 5. Cervical X-Ray post Anterior Debridement and Posterior Stabilization

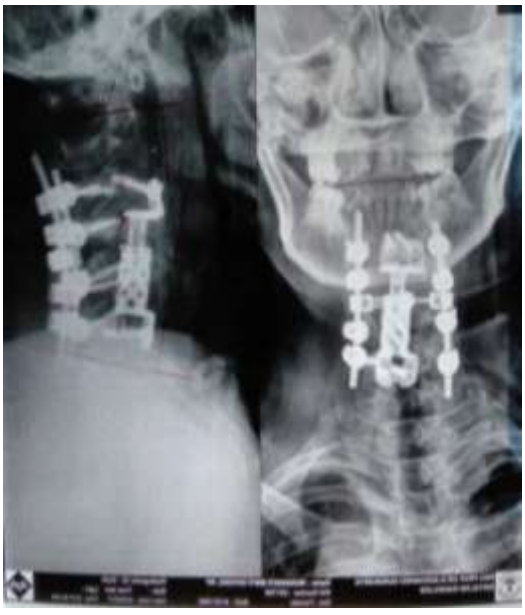

Figure 6. Cervical X-Ray post-Anterior Stabilization with Expandable Cage

Second stage surgery was carried out using anterior stabilization utilizing expandable cage and fusion. The patient, in supine position, was performed anterior approach incision through the previous scar. Fibrotic tissue was collected then refreshed until the inferior end-plate edge of C3 and C6 superior end-plate were visible where then the

collapsed C4-C5 corpus were seen. Expandable cage implantation was performed so that it filled the defect within C4-C5. Post operatively, patient was given the antibiotic, analgetic and wound care. In post-operative cervical X-ray, patient showed an 18^{o} lordotic posture. Neurological assessment asserted no neurological function deficit post operatively.

Second patient was a 42 years old female from Tuban, East Java, coming to our clinic with chief complaint of posterior cervical pain. Pain started about a month, 'come and go' at first but got worse within the last week. Patient did come to get treatment in Tuban Public Hospital, underwent Cervical MRI and was put on Soft Collar Brace. Patient was then referred to Dr. Moewardi Hospital, Surakarta, due to limited resources with diagnosis of Spondylitis TB in VC 3-5 and paravertebral abscess.

From history taking, patient denied either prior TB infection or contact with active pulmonary TB patient. General physical examination exhibited no abnormality. Regional assessment in cervical vertebra demonstrated no inflammation nor deformity in inspection but positive tenderness in the mid cervical midline. Neurological assessment pointed no deterioration in sensory and motoric function.

Figure 7. AP Lateral Cervical X-Ray.
A 140 Kyphotic deformity was shown above

Lateral cervical X-ray denoted kyphotic deformity 14^{o} (Figure 7). Cervical MRI signified the kyphotic and spinal stenosis due to C4 destruction with C4 compression and para-ligament extension to C3-5 along with C4 corpus indentation and paravertebral abscess, suggesting Spondylitis TB C3-5 with Paravertebral Abscess (Figure 8). She underwent two-stage reconstruction surgery, the same procedure as the first patient. First surgery was anterior debridement and posterior fusion (Figure 9). The difference was the second stage being anterior stabilization using non-expandable cage instead of expandable one, and then fusion. Post-operative evaluation was executed in the same manner as the first patient. In post-operative cervical X-ray, patient showed an 3^{o} lordotic posture (Figure 10). There was no neurological impairment

post operatively. Assessment of decompression effects and fusion rate were carried out by CT scan and showed a favorable result.

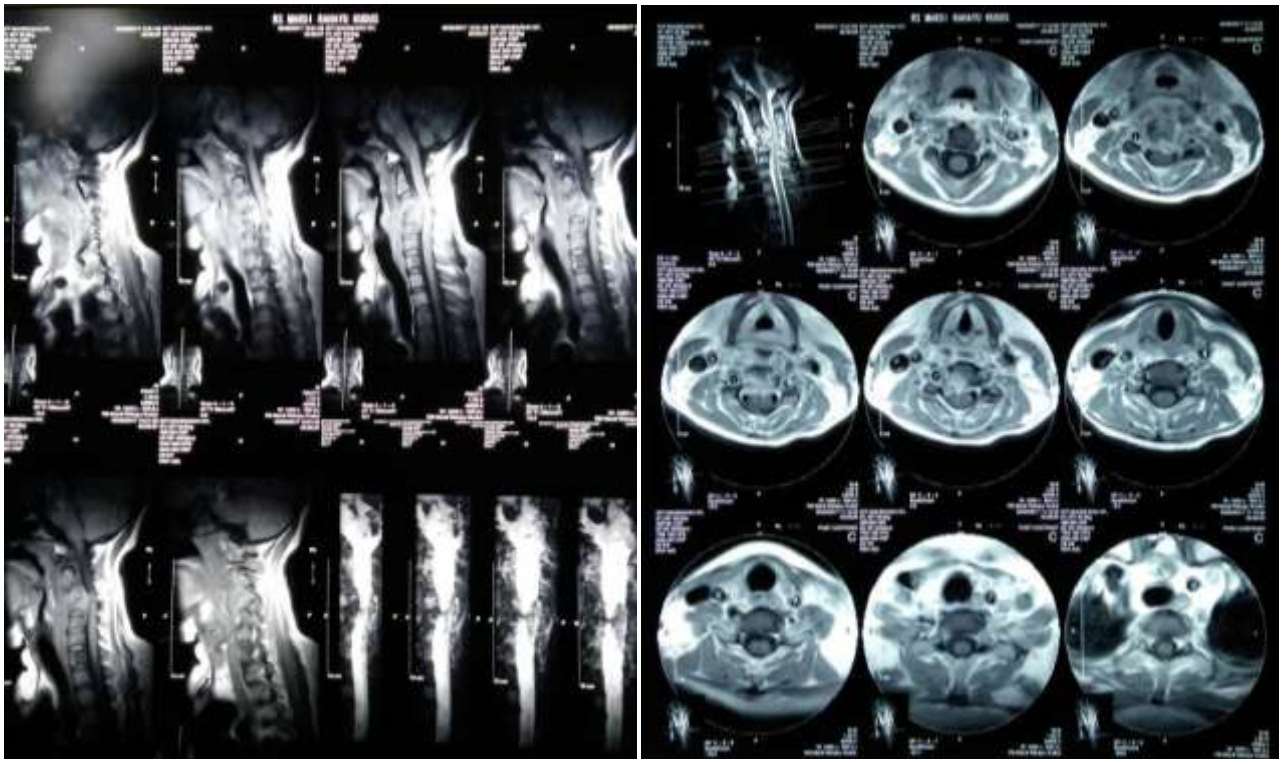

Figure 8. Cervical MRI in sagittal and axial windows

Figure 9. Intra-operative for posterior stabilization

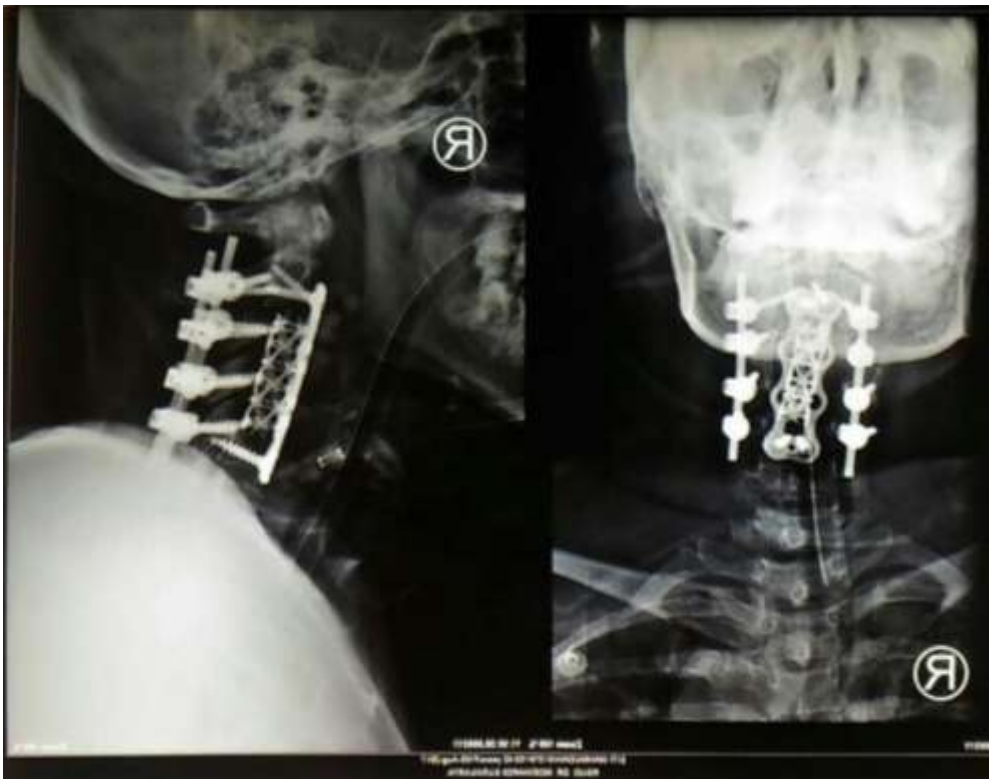

Figure 10. Cervical X-Ray post-Anterior Stabilization with Non-expandable Cage

DISCUSSION

Cervical tuberculosis is a rare case that need an extra care as it can cause kyphotic deformity that threaten patients' functionality and life (Rasouli, 2012; Wang, 2014; Shi, 2016; Bodapati, 2017). The principles of treatment of kyphotic deformity in the cervical vertebra due to TB infection are debridement, decompression, and reconstruction of the vertebra especially aiming to achieve the re-alignment of C2-7 sagital axis (Pan, 2017).

Zeng et al. (2016), observed 12 patients with kyphotic deformity caused by cervical TB and reported that the entire patients having anterior debridement and posterior fixation to correct the kyphotic showed an improvement in neurological status and established no complication related to instrumentation. Moon et al. (2012) in his retrospective study reviewed 124 children for over 30 years and concluded that stabilization by applying posterior instrumentation was indeed able to correct and/or prevent the kyphotic progress, but in the active cases, stabilization with posterior instrumentation combined with anterior surgery was recommended better, especially for those with instability and progressive or severe deformity.

Both of the patients were being treated with surgery to the deformity they encountered. All of them were having progressive neck pain that was unrelieved by rest. The 1st patient had multiple vertebral involvement in VC4-5 while the 2nd patient had multiple destruction as well on cervical 3-5. Spondylitis TB was discovered as one of the most common cause of kyphotic deformity and the incidence of severe deformity in spondylitis TB reached 5% (Issack, 2012). The kyphotic deformity in 1st patient was 44° whereas the 2nd patient was 14°.

After surgery, the first patient showed 18° lordotic posture whilst the second patient came up with 3°. Albeit the different instrumentations in first and second patient but principally they did not exhibit different outcomes. Cabraja et al. (2010) published a paper due to high acceptance of both expandable and non-expandable cage in spinal surgery. They demonstrated that expandable cage was useful because it could be adjusted to corpectomy size in situ and provide immediate strong anterior column support.

Perrini et al. (2015) compared expandable cage to autograft and pointed no significant difference in neurologic presentation nor in duration of stay. The result of this study could give an additional evidence for clinician to choose whether to use the non or the expandable cage as the instrumentation that fit best for the patient. Decompression was achieved and neurological function was preserved both ways. In our experienced, we need to consider some factors before choosing which method we would use. If we planned to correct the lordotic alignment of the cervical, expandable cage is preferable, with the condition that bony endplate of the vertebrae should already hardened. But if the cervical lordotic already achieved and the distance between vertebrae body can be measured, non-expendable cage is recommended due to additional anterior plate support, moreover if the bony endplate has not hardened yet.

The conclusion in this study was that two-stage reconstruction surgery using whether expandable or non-expandable cage to treat cervical deformity caused by Spondylitis TB gave equally satisfactory outcome.

AUTHOR CONTRIBUTION

Each author individually made significant contributions to the development of this manuscript.

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No financial support has been received from any source.

CONFLICT OF INTEREST

All the authors declare that there was no conflict of interest referring to this manuscript.

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