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Original Research Paper

The surgical approach and clinical results for cervical spine tuberculosis: A retrospective study in 15cases

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ABSTRACT:
The surgical approaches to treating cervical spinal tuberculosis (CSTB) were contentious, and there is little literature on the subject. The study's objectives were to assess the clinical results of three surgical methods in Cervical Spine TB patients and choose the best strategy for these patients. We conducted a retrospective evaluation of clinical and radiological data gathered from 50 consecutive spinal tubercular patients between Jan 2020 and November 2022, including 20 patients who were identified and treated for CSTB in our hospital. The remaining patients (15 cases) underwent surgery using anterior debridement, interbody fusion, and instrumentation (A group), posterior instrumentation and anterior debridement, fusion, and instrumentation in a single or two-stage operation (AP group), or posterior debridement, fusion, and posterior instrumentation (P group), with the exception of 4 patients who were treated conservatively (P group). Hematological, radiological, and neurologic tests were used to evaluate the patients both before and after surgery. The average follow-up period for the 15 patients was 24 months (range, 18-24 months). After surgery, the erythrocyte sedimentation rate (ESR) value in all patients reverted to normal in 3 to 6 months, and solid bone fusion was accomplished in 3 to 8 months. Following surgery, the patients showed a considerable reduction in deformity and neurological deficiency, and at the final checkup, all patients had had a significant improvement on the visual analogue scale for pain. The results of the follow-up procedures showed that all 3 surgical techniques were effective ways to treat CSTB.
Abbrevations: CSTB stands for cervical spinal tuberculosis, ASIA stands for American Spinal Injury Association. Computerized tomography Ethambutol, erythrocyte sedimentation rate, isoniazid, MRI, rifampicin, tuberculosis, VAS, and pyrazinamide are the abbreviations used in this sentence.

***Keywords*: anterior, surgical approach, cervical tuberculosis**

INTRODUCTION:

Both in developing and affluent nations, the prevalence of spinal TB has grown along with HIV infection and medication resistance. [1] The frequency of cervical spinal tuberculosis (CSTB) ranges from 2% to 12%, making it a very uncommon condition. [2–6] However, because of the cervical spinal canal's narrow cross-sectional dimension, the disease's subtle beginning, the delay in diagnosis, and treatment resistance, CSTB may result in serious neurological problems, cervical instability, and invasion of the nerve root and vertebral artery [7] Surgery is necessary for individuals with CSTB when conservative measures have failed and there is substantial neurological impairment, spinal deformity, or both. The surgical strategy to treating CTSB is still debatable, and there is a dearth of literature on the condition. The literature that is presently accessible does not mention any conventional management strategy. In this article, we examine the pertinent therapeutic approaches for the treatment of CSTB. The Dr. PDMMC Hospital Ethics Committee gave its approval to this work. A continuous series of 50 patients with the diagnosis of CSTB were treated at our institution between Jan 2020 and Nov 2022. Of these, 20 individuals had CSTB that was radiologically established; 5 of these patients received conservative care, and the other 15 instances required surgery. The affected areas spanned from C0 to C7. The neurological outcome was evaluated using the American Spinal Injury Association (ASIA) classification function. [8] In accordance with this, 5

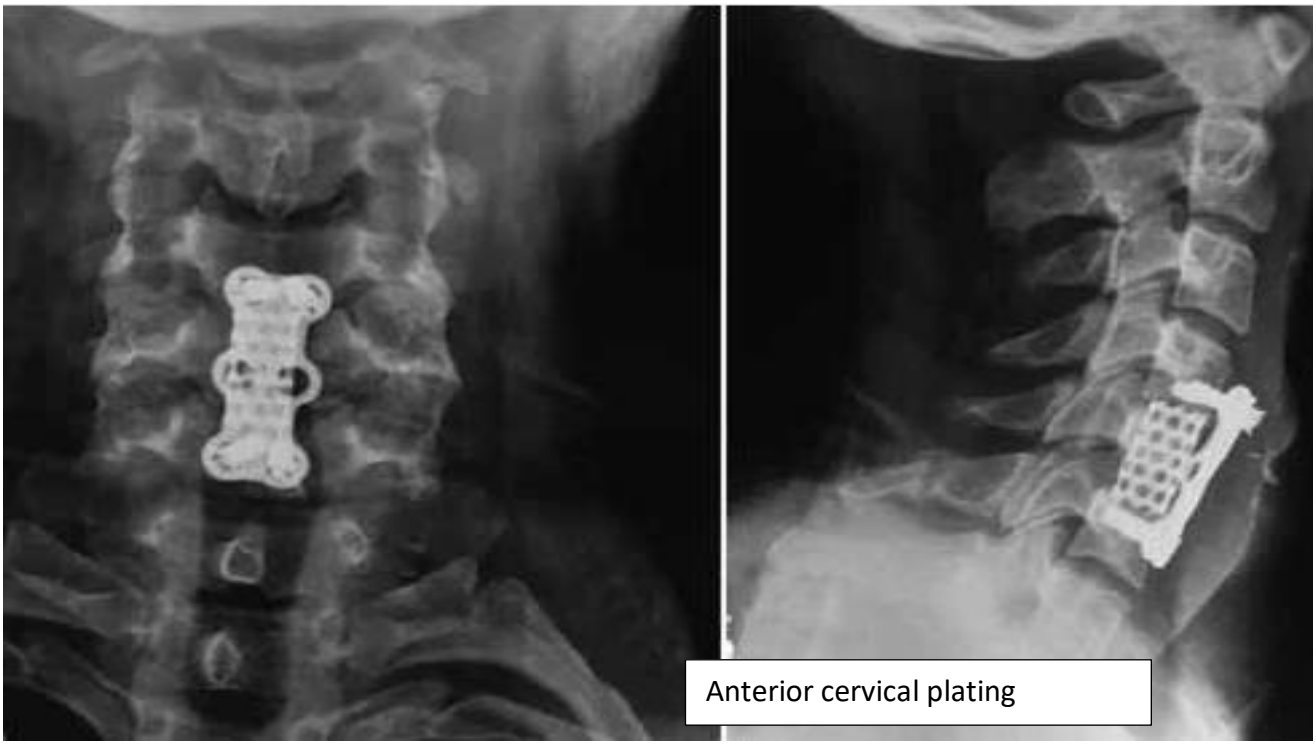
patients were in grade B, 5 were in grade C, 4 were in grade D, and 1 was in grade E. Preoperatively and at the most recent follow-up appointment, pain was evaluated using the visual analogue scale (VAS). [9] Clinical presentation, radiologic signs, hematologic testing, a patient's response to anti-TB treatment, and a pathological investigation all contributed to the diagnosis of cervical tuberculosis. A blood complete count, the T-SPOT test, the erythrocyte sedimentation rate (ESR), the C-reactive protein, and tests of the liver and kidney function were all carried out in the laboratory. Chest radiography, plain radiographs, computed tomography (CT), and magnetic resonance imaging were among the standard radiologic techniques (MRI). The nine patients with minor vertebral body damage who had early TB with or without minimal abscess were treated conservatively according to the following guidelines. Spinal instability, severe and/or growing kyphosis, neurological deficiency, lack of response to chemotherapy, and a sizable paraspinal abscess were all indicators for surgery. [10] The other patients (n = 15) had surgery utilising the anterior, posterior, and combined anteroposterior techniques, with the exception of the 5 patients who received conservative care. The features of the nidus, the patient's overall health, and the surgeon's experience all played a role in the surgical method selection. Preoperatively, there were, however, no clear selection criteria.

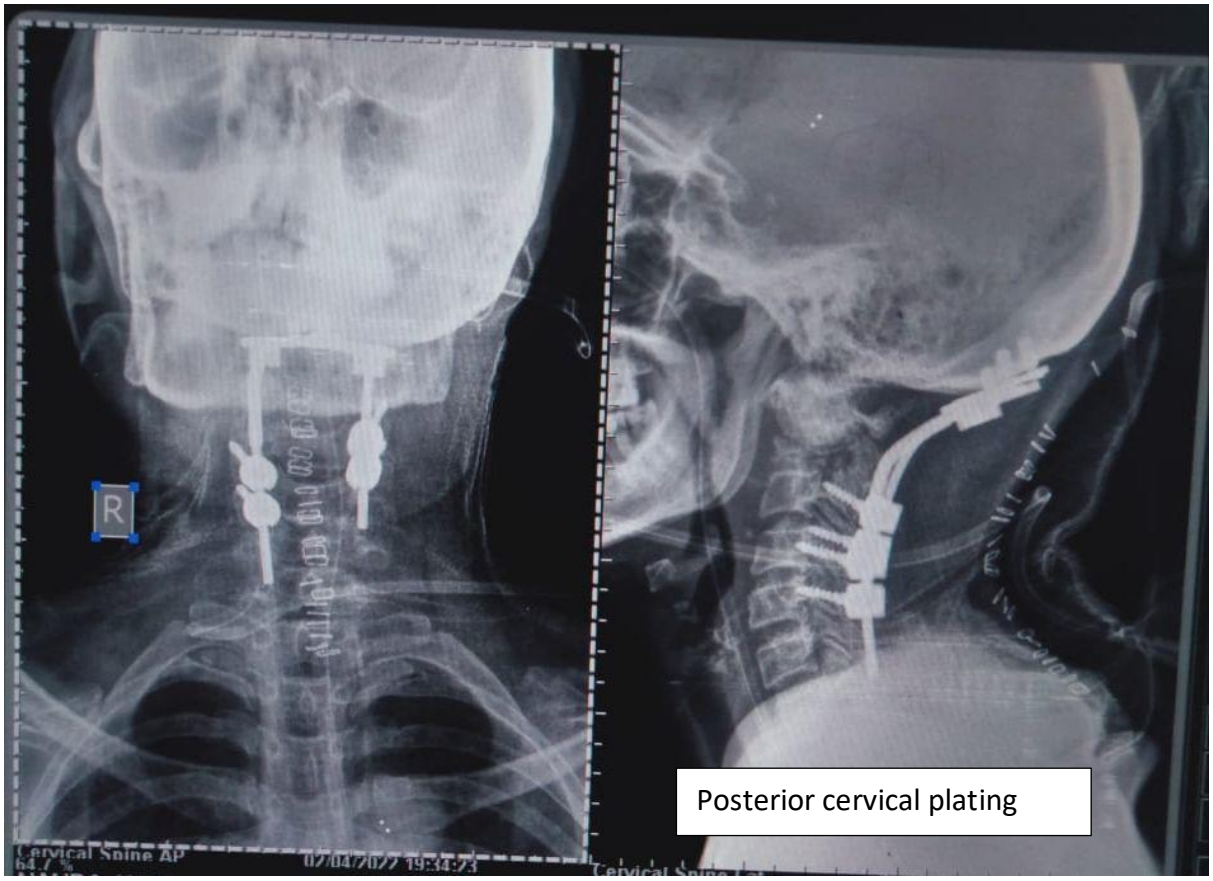
PRRIOPERATIVE MANAGEMENT:

Before surgery, the patients received the following antituberculosis medications: pyrazinamide (15-30 mg/kg), isoniazid (15 mg/kg), rifampicin (15 mg/kg), ethambutol (15-25 mg/kg), and isoniazid (5 mg/kg). Prior to beginning the surgical operation, it was determined that the patient's ESR and temperature were either normal or much lower. For patients who suddenly had total paralysis or respiratory obstruction brought on by a sizable abscess, immediate surgery was advised. Nutritional improvement, anaemia and hypoproteinemia treatment were regularly done. For individuals with a moderately severe kyphosis deformity, we used preoperative halo traction (1-3 kg). In this research, there were no HIV-positive patients.

OPERATIVE PROCEDURE:

The procedure was carried out while completely unconscious. Anterior debridement, decompression, bone grafting, and instrumentation were carried out if the involvement was limited to a single segment without a mass paravertebral abscess, with or without moderate kyphosis. [11] Depending on the patient's condition, anterior focused debridement, bone grafting, instrumentation, and posterior instrumentation were carried out in one or two phases in patients with significant kyphosis, involvement of >2 neighbouring segments, or big paravertebral abscesses (Fig. 2). [12] Additionally, posterior debridement, decompression, bone grafting, and instrumentation might be used to treat an upper cervical lesion, whether or not it included a mass abscess and the loss of the vertebral body (Fig. 3) [13]





POSTOP MANAGEMENT:

Patients were ambulatory for 2 to 3 days postoperatively, then a brace was provided to each patient, which was continued for at least 3 months until graft union was achieved. The antituberculosis therapy was administered for 12 to 18 months, postoperatively. If the drug sensitivity test results indicated resistance to any first- line drug, chemotherapy was tailored to these patients based on their pervious chemotherapy history and drug-susceptibility profiles. X-ray, ESR, and liver function were evaluated at 1, 2, 3, 6, and 12 months after surgery.

RESULTS:

The cohort's average age was 36.9 ± 6years, and there were 9 males and 6 women in it (range, 20–79). Six individuals had two affected vertebrae, while 4 patients had several degrees of vertebral involvement. 5 patients exhibited no evident change, whereas 66.6% (10/15)of the patients had lost disc height. In 66.6% of the patients (9/15), the vertebral body was destroyed (mostly anterior). In the remaining 44 %, a clearly aberrant spinal signal could be seen. 93% (14/15) of cervical TB patients exhibited paraspinal abscess development, and 8 of them showed calcification in the paraspinal masses. In the three groups, the average kyphotic angle was 14.5° ±7.5°, 30.8° ±10.5°, and 2.6° ±12.5, respectively. Patients were hospitalised with symptoms of incomplete paraplegia brought on by spinal cord injury (99%), throat discomfort (99%), low-grade fever (45%), progressive torticollis (32%), weight loss (70%), stiffness/restricted neck range of motion (100%) and breathing problems (5%). Table 1 The average length of the illness was 4.5 ±1.1 months. The follow-up period was at least 17 months long. 15 patients in all received surgical care. Table 3 displays the average operating time, blood loss, and bone fusion for each group.

NEUROLOGICAL STATUS:

There was no increase in neurological impairment after surgery. The neurologic impairment in all 14 instances who had it before to surgery had improved by the time of the final follow-up appointment. Due to a delay in CSTB diagnosis, 1 individual postoperatively had reduced neurological function

CLINICAL OUTCOMES:

All patients experienced decreased neck discomfort and stiffness. Additionally, the mean VAS score rose since the last visit

Kyphosis deformity and erythrocyte sedimentation rate results:

Within 3 to 6 months following surgery, the ESR in this series reverted to normal in all patients. In groups A, AP, and P, the average degrees of kyphosis were 14.5°± 7.5°, 30.8° ±10.5°, and 2.6°± 12.5°, respectively. Postoperatively, they considerably dropped to -4.8 ±2.1 °C in group A, 5.1 ±4.0 °C in

group B, and 13.2 ±10.6 ℃ in group C. Compared to the preoperative measures, they had greatly improved. At the most recent follow-up, the mean kyphosis angle was -4.6° ±1.8° in group A, -4.9° ±3.8° in group AP, and -13.9° ±17.0° in group P.

COMPLICATIONS:

When the blood sugar levels were under control, a patient in group B's delayed wound healing caused by pre-existing diabetes improved. Additionally, two patients in groups A and AP had cerebrospinal fluid leaking. After surgery, one patient in group A showed signs of internal fixation loosening. After the fusion, we had to take the instrument out. four patients had postoperative discomfort at the harvest site; however, this was treated with acupuncture and physical therapy, and the symptoms had subsided by the time of the last check-up. Three individuals with a history of gout presented with joint pain and oedema brought on by urate build-up as a result of taking pyrazinamide. Gout symptoms became better after the pyrazinamide was stopped

DISCUSSION:

The line of weight transmission in the cervical spine runs through the back half of the vertebral bodies. As a result, CSTB initially eliminates natural cervical lordosis before kyphosis subsequently appears. The development of symptoms happens quickly due to the cervical spine's high degree of movement and load factors. Additionally, spinal deformity and spinal cord compression may be brought on by pus, fractured vertebrae, and granulation tissues, which can make it difficult to breathe or swallow. [14–16] There is a dearth of research on the management of cervical spine TB patients. The incidence of cervical spine tuberculosis (CSTB) is known to range from 4.2% to 12%[2-6] and was 9.18% in our research. The average time between the development of symptoms and the clinical diagnosis used to be around 12 months, but it is currently between 3 and 6 months. [17] Due to cervical TB' vague and non-specific clinical presentation, delays in diagnosis are frequent. [18–20] Neck discomfort and limited neck mobility are the major signs and symptoms of cervical TB. [21,22] The most prevalent complaint in our research was cervical discomfort, which was very often accompanied with cervical stiffness. At the final follow-up, both of these symptoms showed statistically significant improvement. Due to the likelihood of spinal cord compression and quadriplegia, cervical spine TB is regarded as a catastrophic illness. This emphasises how critical early detection is in the treatment of cervical TB. Plain x-rays are still used as the first step in the screening process when infectious spondylitis is suspected, even if they may seem normal in the early stages of the illness. [23,24] This is because by the time the patient is examined for the condition, simple x-ray abnormalities are often visible. [25–27] On the basis of the x-ray results, further disorders are also tentatively excluded. We advise include an x-ray examination in the initial TB diagnosis. According to earlier research, disc narrowing and vertebral body disintegration are the two most typical x-ray results. However, up to the latter stages of the infection, the height of the disc space could still be retained. [23] In individuals with CSTB, prompt medical and surgical therapy may prevent significant consequences. Because of its excellent specificity and high sensitivity, MRI is regarded as the investigation of choice when a spinal infection is suspected. There is currently a dearth of evidence outlining thorough therapy approaches for cervical spine TB. Conservative therapy and surgery have both been used as therapeutic options for cervical spine TB. [28] In order to determine the most effective treatment options for cervical spine TB, we evaluated the results of surgical care (including anterior surgery, posterior surgery, and a combination of anterior and posterior surgery).

ANTERIOR APPROACH:

Most CSTB lesions are seen on the anterior column. The benefits of doing a 1-stage anterior debridement and bone grafting fusion with instrumentation include direct access to the disease target, bony union, and spine stability. Hassan[29] reported the results of 5 patients who had 1-stage anterior debridement, bone grafting fusion, and H-plate fixation who had lower cervical TB with neurological sequelae or unacceptable kyphosis. All instances had bone fusion at the conclusion of the follow-up period (22 months), and there were no worsening neurological impairments. The results of 5 patients with lower cervical spine TB who had anterior debridement, decompression, bone grafting, and instrumentation in 20120 were reported (8 males and 4 women; average age, 39 years). The average time for fusion was 6.8 months (range, 3–10 months). Radiologic evidence of internal fixation failure wasn't seen in any of the patients. No individuals had sinus drainage or TB infection recurrence. With the exception of two patients who reported with screw loosening, all cases (in group A) in this study had excellent clinical outcomes. In our experience, the mono-stage anterior approach may provide good results with a shorter surgical time and less blood loss if the number of damaged vertebrae is two and the patients do not have significant kyphosis

ANTERIOR + POSTERIOR APPROACH:

The screws are more likely to break or loosen if anterior instrumentation was performed across three or more remaining vertebrae since both proximal and distal screws will have to resist substantially higher tension. We advise patients to have a combination

anterior and posterior surgery in this case. A follow-up time of 17 ±3.0 months on average was used (18–22 months). According to the authors, combining anterior and posterior surgery may result in a more effective repair of the deformity, a quicker return of spinal cord function, and fewer problems. For the treatment of severe, active sub-axial cervical TB complicated by kyphosis in children, In the preoperative stage, the mean Cobb angle of cervical kyphosis was 30.8 ±10.5°, in the postoperative stage it was 5.1± 4.0°, and at the end of the follow-up it was -4.9 ±3.8°. The combined anterior and posterior operation was performed on 5 patients in our research, and the follow-up data showed positive outcomes. In light of decompression and fusion, anterior debridement and fusion is thought to be a preferable strategy, according to our experience. An anterior debridement is necessary in situations with multilayer involvement. A combined anterior and posterior approach is required when more than two consecutive vertebrae are badly injured, particularly in patients with significant kyphosis. In these situations, posterior instrumentation is crucial for both kyphosis partial correction and safeguarding against screw fracture or loosening. Patients should undergo a 3kg sustained halo traction when the Cobb angle of their cervical kyphosis is more than 30° in order to lessen the deformity. These methods not only result in total spinal decompression but also vertebral repositioning (restoration of the cervical spine's natural curvature and intervertebral height). The AP strategy is not without its drawbacks, however. According to the current study's findings, using two placements and two incisions leads in lengthier operations (213 128.5 minutes), more blood (206 112.3 mL), and bigger wounds.

POSTERIOR APPROACH:

According to certain accounts, the posterior surgical technique is used while treating cervical spine TB. After performing a 1-stage posterior surgery on 5 patients with upper cervical spine TB. The average follow-up time in the research was 16± 3 months. The latest follow-up revealed better neurologic function and no instrumentation-related surgical sequelae. Within 3 to 8 months of surgery, bone fusion was accomplished in all patients. patients with CSTB who had posterior radical debridement, decompression, and internal fixation experienced positive results. A posterior-only cervical approach produced effective results in patients with atlantoaxial TB. 5 patients who had posterior debridement, fusion, and fixation surgery participated in our research. The surgical wounds recovered without developing sinuses or a persistent infection. In the postoperative period, the mean Cobb angle of kyphosis was 2.6 ±12.5°, and at the most recent follow-up appointment, it was 13.9 ±17.0°. After surgery, each patient significantly improved. Our belief is that individuals with upper cervical spinal tuberculosis without a significant abscess, when chemotherapy fails, and there isn't a clear vertebral collapse or spinal cord compression, and cervical vertebral accessories TB call for a posterior-only surgical treatment. The CSTB's administration is difficult and debatable. The most effective surgical approach depends on the features of each patient (age, degree of vertebral damage, patient requests for different levels of relief from their symptoms, severity of abscess, and patient's overall health). The applicability of our research is constrained by variations in how practitioners specify the requirements for various management techniques.

CONCLUSION:

According to the study's findings, all three surgical approaches—posterior, anterior-posterior, and anterior—are effective for treating cervical TB and each has specific advantages. The various characteristics of CSTB patients should be taken into account while developing customised surgical approaches.

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