

## Case Report

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# Extra pulmonary tuberculosis and hyperkyphosis: case report of surgical treatment and outcome

Volume 8 Issue 6 - 2017

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**Received:** May 26, 2017 | **Published:** September 13, 2017

## Introduction

Extra-Pulmonary Tuberculosis (TB), which affects 10-15% of patients with TB,<sup>1</sup> may present with complications such as severe kyphosis, which may be hazardous to the structural and functional integrity of the spine and the spinal cord. Skeletal TB occurs in 10% of extra-pulmonary manifestations, of which spinal TB accounts for approximately 50%.<sup>1,2</sup>

The severe kyphosis which ensues, leads to immense cosmetic and psychological disturbance in a growing child, and can also result in costo-pelvic impingement, cardiorespiratory problems, and late onset paraplegia.<sup>3,4</sup>

Surgical treatment of TB kyphosis is the management of choice for patients who do not respond to antibiotics, have severe and/or progressive kyphosis, or begin to develop neurological deficit.<sup>5</sup> Neurologic deficit is present in 10-35% of cases and the dorsal spine is commonly affected. Prediscal involvement occurs in 50% of cases, with metaphyseal and endplate erosion. Central vertebral body involvement occurs in 30% of cases with a high incidence of vertebral collapse and resultant kyphosis. Anterior lesions occur in 20% of cases and cause cortical bone destruction under the anterior longitudinal ligament. Deformity in such cases is uncommon.

The surgical options available are, anterior debridement and uninstrumented fusion, anterior debridement followed by anterior or posterior instrumentation, posterior only approach with transpedicular decompression and osteotomies with or without vertebral column resection.<sup>5</sup>

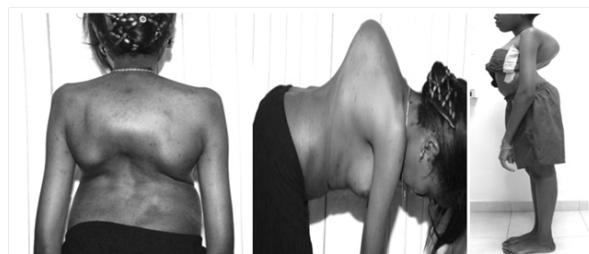
Posterior vertebral column resection (PVCR) albeit technically challenging and considered high risk, has gained wide acceptance for treatment of severe kyphosis.<sup>6</sup>

In this case report, we present the clinical and radiographic results of a patient with severe tuberculosis kyphosis treated with preoperative halo Gravity traction and posterior vertebral column resection.

## Case report

A 15-year old female had a 3-year history of recurrent episodes of dry cough associated with low-grade fever, shortly followed by upper back moderate pain, and a hump on her back (Figure 1-3). She had been given chemotherapy for tuberculosis over a period of 6 months. There was resolution of the pulmonary TB but the spine deformity progressively worsened over time. She had been experiencing worsening episodes of shortness of breath at rest. Her initial Body Mass Index (BMI) was 18.2kg/m<sup>2</sup>, and improved to 19.4kg/m<sup>2</sup> after a 4-month period of nutritional optimization and Halo Gravity traction. She was neurologically intact.

A pulmonary function test revealed a forced vital capacity of 34%, which improved to 46% after a four months period in halo gravity traction.



**Figure 1** Posterior View.



**Figure 2** Bent Lateral View.



**Figure 3** Lateral View.

Antero-Posterior and lateral view radiographs showed a severe thoracic kyphosis of 135° from T7-T12 and a lumbar lordosis of 111° (Figure 4 & 5).



**Figure 4** Full Spine Antero-Posterior.



**Figure 5** Full Spine Lateral Radiograph.

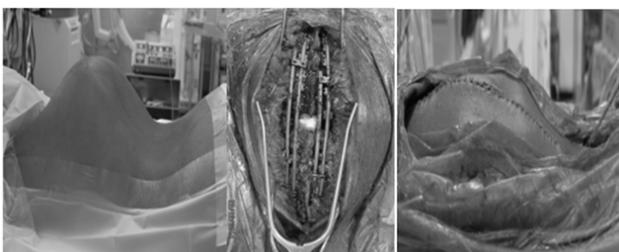
An MRI did not show any spinal cord anomaly but was significant for severe draping of the cord at the apex of the deformity (Figure 6). A CT scan with 3 dimensional reconstruction further detailed the degree of the deformity (Figure 7).



**Figure 6** Full Spine MRI Scan.

**Figure 7** Thoraco-Lumbar Spine CT Scan with 3D Reconstruction.

Halo gravity traction was maintained over a 4 month period with resultant improvement in curve magnitude from 135° to 119° and a lumbar lordosis from 111° to 94°. Surgical treatment consisted of posterior fusion, vertebral column resection of the 9th and 10th thoracic vertebrae, with posterior segmental spinal instrumentation from the 3rd thoracic vertebra to the 3rd Lumbar vertebra and an interbody cage inserted at the site of the resection (Figure 8-10). The estimated blood loss for the entire procedure, which lasted for 360minutes, was 1,100mls. The surgery was performed with sensory and motor neuro-monitoring and there was no intraoperative neuro monitoring changes during the whole procedure. We maintained a mean arterial blood pressure of 70 to 80 mmHg and also gave pre op and intraoperative infusion of tranexamic acid.



**Figure 8** Pre-Op. On-Table.

**Figure 9** Intra-Op View.

**Figure 10** Post-Op. On-Table Lateral View.

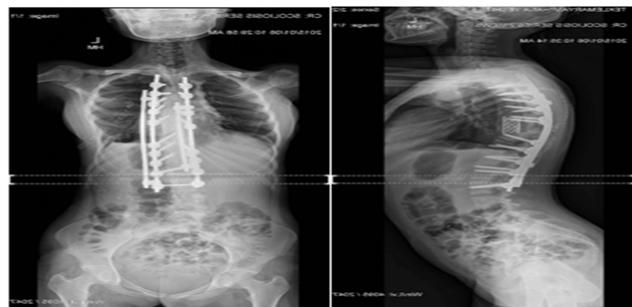
Immediate postoperative radiographs confirmed intact spine instrumentation. Postoperatively the anterior cage became dislodged and this was managed with a second stage anterior approach and cage reinsertion (Figure 11 & 12). The operating time was 95 minutes and the estimated blood loss was 200mls.



**Figure 11** Intra-Op Anterior Approach View of Inter-body Cage.

**Figure 12** Post-Op. On-Table View of Anterior Approach.

The patient had an uneventful recovery and remained neurologically intact. At the 2 year follow up the clinical improvement was satisfactory and the radiographs demonstrated a solid fusion and intact instrumentation. Her lumbar lordosis was 87 degrees and her global thoracic kyphosis was 77degrees (Figure 13 & 14).



**Figure 13** Post-Op Full Spine Standing AP View.

**Figure 14** Post-Op Full Spine Standing Lateral View.

Below are her clinical images at 2 years post-operative review (Figure 15-17).



**Figure 15** 2-Year Post-Op Posterior View.

**Figure 16** 2-Year Post -Op Lateral View.

**Figure 17** 2-Year Post-Op Bent Over Lateral View.

## Discussion

The opportunity to start medical treatment for extra-pulmonary tuberculosis early in the disease process may be missed and may result in the severely debilitating complications such as severe kyphosis and paraplegia. In spite of medical treatment, this alone may not address bony destruction that may occur with TB spondylitis.<sup>7</sup> Tuberculosis preferentially affects the vertebral column in more than 90% of the patients and although chemotherapy may inactivate the infectious process, vertebral collapse may continue until healthy vertebral in the region of the kyphosis approximate anteriorly and consolidate.<sup>3</sup> At the time the patient visited our clinic, severe kyphotic deformity had occurred, despite early and appropriate chemotherapy.

With such severe kyphosis, an unavoidable progressive deterioration in cardio-pulmonary function occurs, which if left unattended to, can lead to death.

Patient's fitness to withstand extensive posterior fusion and posterior vertebral column resection is key to a successful surgery and good outcome. An improvement in BMI to normal range (ie 18.5kg/m<sup>2</sup> to 24.9kg/m<sup>2</sup>), an optimal cardiopulmonary function, a physiologically stable patient and a spine and spinal cord adaptable to correction are desirable for a good outcome. Our patient's initial BMI of 18.2kg/m<sup>2</sup> was improved to 19.4kg/m<sup>2</sup>.

The indications for surgical intervention include failure of medical management with progressive bone destruction, or presence of persistent, severe pain, neurological dysfunction, restoration of spinal stability, or as occurred in our case, significant deformity that is unacceptable to the patient, and pulmonary insufficiency.<sup>8</sup>

Posterior spinal decompression alone is ill advised in such cases and should be combined with circumspinal decompression, posterior column shortening, anterior column lengthening, posterior fusion and instrumentation and anterior column support provided by a structural graft or mesh cage.<sup>3,5</sup>

The literature is replete with the surgical outcomes of PVCR for severe kyphosis as a technically demanding procedure with a high neurologic risk. One cannot undertake such procedure without gaining much experience and also having the benefit of intraoperative neuro monitoring facility especially the motor evoked potentials. Despite being in an underserved region in West Africa the FOCOS hospital has established a state of the art surgical facility and multidisciplinary care team for effective perioperative management. Our case demonstrated the utility of preoperative nutritional optimization, halo gravity traction to improve the deformity while stretching the cord and soft tissues over a period to allow adaptation of these structures to definitive surgical correction.

## Acknowledgments

None.

## Conflicts of interest

None.

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