Out Come of Kelafong Procedure in The Treatment of Spinal Tuber Culosis

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ABSTRACT

Objective: To find the outcome of Kelafong procedure in the treatment of spinal tuberculosis

Methods: This prospective study was conducted on 8 patients diagnosed with active spine tuberculosis in the Department of Orthopedics Khyber Teaching Hospital, Peshawar from august, 2015 to December 2017 who underwent Kalafong procedure. Efficacy of Kalafong procedure was noted as improvement in neurological symptoms of a patient with spinal tuberculosis i.e. paraplegia, bowel and bladder symptoms after the Kalafong procedure measured according to Frankel et al [6] at the time of 06 months follow-up. Data was analyzed with SPSS version 20.

Results: The mean age of the patient was 50.35 years ±2.53SD with the age range of 15 to 55 years. There were 6 (75%) females and 2 (25%) males. The mean pre operative cob angle was 45.15 ± 2.73SD. The post operative Cobb angle was 42.38 ± 2.68SD. Three (37.5%) patients improved to nurological status A and B while 2 (25%) patients improved to Cnurological status.

Conlcusion: Kelafong procedure is effective in the treatment of spinal tuberculosis regarding improvement in neurological status.

Key Words: Kalafong Proceedure, Spine Tuberculosis, Neurological status

INTRODUCTION

The WHO Global TB report 2015 regarded tuberculosis in parallel with AIDS as a leading cause of death worldwide [1]. The common bony site for involvement of tuberculosis is spine, accounting for almost half of all musculoskeletal tuberculosiscases [2,3]. Spinal tubercular infection is the most common and dangerous form of skeletal tuberculosis. It constitutes 1/3rd of all bone and joint tuberculosis. It is a result of hematogenous dissemination from primary focus in the lungs, lymph nodes, etc [4].

Thoracic and lumbar spine are commonly affected area.10-40% of patients with thoracic spine tuberculosis may get neurologic deficit [5]. Urgent measures are needed to halt progression of destruction and deformity and especially to prevent and overcome paraplegia [6,7].

Absolute non-operative treatment was offered in pre-antibiotic era. Dabsen in 1951 reported 48% of paraplegia-improved neurologically [9]. Seddon, et al.in 1955 reported 55% neurological recovery rate with the advent of modern chemotherapy [10]. However, the response to conservative treatment was slow and its efficacy was doubtful.73% neural recovery has been reported in ambulatory chemotherapy in Korea and Rhodesia [11,12].

The radical surgical treatment pioneered in Hong Kong (anterior debridement, decompression and autogenous bone grafting under antibiotic cover) was reported to give 1 degree correction of kyphosis in their series, but allowed 21 degree deterioration in a South African series of patients with spinal tuberculosis and central nervous system involvement [13,14]. A recent study conducted in india reported 10.5 degrees average correction with final 4 degrees loss of correction at final followup using tranpedicular decompression and instrumented fusion in thracolumbar tuberculosis [15]. In Hong Kong, Jenkins et al reported a 46.4% increase in kyphosis from admission to 10-year follow-up in children managed by anterior decompression and fusion in 1975 [16].

Bony fusion of the tuberculous focus in the spine has long been regarded as the surest evidence of healing, though positive proof has never been presented. Sound healing is known to be slow; outpatient chemotherapy alone resulted in bony fusion in only 46% of patients after 60 months in Korea [17].

A new surgical approach, the KALAFONG procedure is proposed to improve the results of surgical treatment of spinal tuberculosis. It consists of

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anterior debridement with decompression of the spinal cord by Hodgson and stock 1956, steotomy and/or soft tissue release and a vascular rib pedicle bone graft (Rose, Owen and Sanderson 1975; Bradford 1980) [18]. This is followed, either under the same anesthetic (combined one-stage procedure) or 14 days later, by posterior multilevel osteotomies, spinal instrumentation and fusion. The author does not claim originality for the individual techniques, but rather proposes a new combination of methods.

METHODS

This prospective study was conducted on 8 patients diagnosed with active spine tuberculosis in the Department of Orthopedics Khyber Teaching Hospital, Peshawar from august, 2015 to December 2017. The inclusion criteria adopted was; patients with lower throcao-lumbar and lumbar active spinal tuberculosis between 15-55years of either gender. Patient younger than 15 years and having kyphotic deformity of less than 40 degree were excluded from the study. Sampling technique adopted was consecutive sampling.

Kalafong Procedure included Anterior debridement, De-compression of the spinal cord and Osteotomy and/or soft tissue release and a vascular rib pedicle bone graft followed by posterior multilevel spinal instrumentation and fusion. Patients were registered as out-patient, the purpose of study was explained and written informed consent was taken from all patients. Normal X-rays of the patients having history of tuberculosis of spine were thoroughly assessed and followed. Patients were diagnosed as a case of spinal tuberculosis both clinically and radiologically. The pre-op neurological assessment was done and compared with the post op neurological results.

Neurological function on admission was classified according to Frankel et al [6]. Anteroposterior and lateral radiographs and technetium-99m bone scans of the entire vertebral column was obtained to exclude involvement at more than one level. Kyphosis was measured from the upper end-plate of the first uninvolved proximal vertebra, to the lower end-plate of the first un involved distal vertebra. On admission this should have average 56 (range 12 to 85) over a mean of three vertebral levels. Hyperextensions views were confirm that the deformity is rigid in all the patients. Destruction of vertebral bodies, as shown on lateral tomographs, was recorded as the total number of vertebrae, or parts of vertebrae, that had been destroyed by tuberculosis. The average should be 1.9 vertebrae (range 1 to 4).

The rib to be used as the pedicled bone graft was selected before surgery. Since anterior decompression and debridement was always performed for active spinal tuberculosis, the abscess wall was incised longitudinally to reach the affected vertebrae. This necessitated division of the intercostal vessels where they are incorporated into, and densely adherent to, the abscess wall. The blood supply to the ribs lateral to such an incision was therefore also interrupted. The intercostal vessels that cross anteriorly over the first uninvolved upper and lower vertebrae were not disturbed, so a rib, which articulates with the transverse process of either of these, was used as the bone graft. As well as plain radiographs, which give some indication of the extent of bone and soft tissue involvement, tomography, computed tomography or magnetic resonance imaging were essential to establish without doubt the first normal proximal and distal vertebrae beyond the tuberculous process.

Surgery was performed under additional prophylactic antibiotic cover, using a first generation cephalosporin. Hypotensive anesthesia is used to give 25% reduction of the mean arterial pressure. For the anterior procedure, a thoracotomy was done using the technique of Bradford (1980). The anterior debridement and decompression were performed by the technique described by Hodgson and stock (1956). All pathological issue, pus and debris in bone and soft tissue were removed until normal bleeding cancellous bone and soft tissues were exposed throughout the field. The Dura was exposed and decompressed both anteriorly and laterally. Adhesions were frequently found at the apex of the deformity, anchoring the Dura, pulling it posterior into the apex of the curve and preventing anterior displacement and expansion of the Dura and spinal cord. A meticulous anterior and lateral release of all adhesions was therefore done before correction of the kyphosis was attempted. All bone and soft tissue which may prevent reduction of the kyphosis were also removed or divided.

The posterior procedure was performed before the rib graft was inserted. The operating table is tilted from side to side to facilitate access to both wounds. This does not alter the length of the anterior column or the torso, because the anterior strut graft acts as a pivot. At all the levels where spontaneous fusion had occurred, V-shaped osteotomies were made. The

osteotomies were closed using either Harrington compression or synthes internal fixator instrumentation in adults, and sublaminar mersilene tape attached to a Luque rectangle in children.

The aim of combined anterior and posterior procedure was to obtain maximum correction of the kyphosis by elongation of the anterior column and simultaneous shortening of the posterior column and simultaneous shortening of the posterior column in such a way that the spinal cord is kept under constant direct vision from both anterior and posterior aspects to ensure that neither distraction nor compression occurs. The kyphosis was reduced by anteriorly directed pressure on the apex of the kyphosis and posterior traction both proximally and distally.

Efficacy of Kalafong procedure was noted as Improvement in neurological symptoms of a patient with spinal tuberculosis i.e. paraplegia, bowel and bladder symptoms after the KALAFONG procedure measured according to Frankel et al [6] at the time of 06 months follow-up.

Data was analyzed with SPSS version 20. Descriptive statistics was applied. Continuous variable was calculated as mean ± standard deviation. Categorical variables were calculated as frequency and percentages.

RESULTS

The mean age of the patient was 50.35 years ±2.53SD with the age range of 15 to 55 years. There were 6 (75%) females and 2 (25%) males. The mean pre operative cob angle was 45.15 ± 2.73SD. The post operative Cobb angle was 42.38 ± 2.68SD.

The neurological symptoms improved are shown in table No.1

Table No. 1: Improvement in neurological status after Kalafong procedure

Neurological status	Pre Operative	Post Operative
A	0	3 (37.5%)
B	0	3 (37.5%)
C	2 (25%)	2 (25%)
D	4 (50%)	0
E	2 (25%)	0

DISCUSSION

For the last 800 years spinal tuberculosis have paralyzed & killed a lot of human beings. After the advent of anti T.B chemotherapy, it has improved the life of diseased individuals after 1958 but it had not properly eradicated the disease especially in those having developed kyphotic deformity more than 60 as a result of spinal tuberculosis.

A lot of surgical interventions have been introduced to prevent the potential threat of kyphotic deformity as a result of spinal T.B at thoracic & lumbar region. More than 400 patient having history of T.B lesion in thoracic & lumbar spine and having neurology positive have been treated by kalafong procedure which includes debridement from outdoor side, decompression & bone grafting and posterior fixation by pedicle screws & rods/metallic work, & at same times fusion as well. These patients also have reviewed anti tuberculosis therapy for one year. This newly emerging procedure initially practiced in Hong-Kong & then in orthopedics & spine unit of Khyber teaching hospital Peshawar Khyber pakhtunkhwa, which includes anterior debridement, decompression & posterior fixation with pedicle screws, & rods & fused by bone grafts and anti T.B drugs administration. That procedure has been named as KALAFONG procedure. Very gentle handling of cord under direct vision and careful release of adhesions both anteriorly and posteriorly avoid the spinal cord damage. Specially designed rods and screws are used which not only provide an effective three point pressure system but also allows for shortening of the posterior column.

As a result of this procedure there has been a marked reduction observed in kyphotic deformity of spine caused by spinal tuberculosis. Before this new procedure, even with anti tuberculous therapy & bony fusion there was marked increase of kyphotic deformity in more that 40% of patients. There was also deterioration of neurological symptom with others conventional treatments as were studied before this.

Unfortunately, there is very little work and research available on kalafong procedure and only one study in south Africa and one in hong kong included patients with positive neurology.

From this comparison it is concluded that anterior debridement, decompression bone grafting & posterior instrumentations produced the best surgical results.

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