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Koch's spine prevalence and its management modalities: A prospective study of 25 cases

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Abstract

Background: A characteristic destructive form of the Koch's spine constitutes half of the all musculoskeletal tuberculosis. The root cause of increased incidence in even developed countries described its molecular genetic association. It is of no doubt where overpopulation and overcrowding in developing countries the disease itself is a challenge to healthcare and a burden on incumbent Government.

Methodology: We studied 25 patients of Koch's spine with various level of vertebral segments involvement with altered neurology and clinical presentations with cold abscesses, 2 or more vertebral collapse, kyphotic deformity, contiguous segment involvement in adult populations. All patients underwent surgery according to level of involvement. Evaluation done with ODI questionnaires.

Results: Upper middle socioeconomic patients were of 72%. 2 patients had cervical Koch's (8%), 6 patients had dorsal spine (24%), 8 patients had D-L spine (32%) while 9 patients had lumbar spine Koch's. Patients with stage II paraplegia was 1(16.67%) while stage III paraplegia were 5(83.33%). 20 patients were treated surgically via posterior approach, 3 patients via antero-lateral approach and 2 patients of cervical spine were treated via anterior approach. Irrespective of approach, 24 patients have excellent outcome. Majority of patients recovered around a year. 3 patients (12%) had ODI Score between 61-80 while 22 patients (88%) had score between 81-100.

Conclusion: Predominantly Koch's spine affects dorsolumbar region of spinal column confer good result with operative intervention with strict AKT regime in developing countries with a close watch of recurrence and relapse.

Keywords: Koch's spine, socioeconomic status, paraplegia, ODI

Introduction

Koch's spine is described as clinical and radiological manifestation of a sequence of generalised weakness, malaise to symptom free period and sudden leap of vertebral body destruction, collapse to kyphotic deformity with or without neurological encroachment. Developing world which is estimated to be one fifth is in Indian continent with bad hygienic conditions and overcrowding uprisers this condition significantly.

With arrival of state of the art technology like imaging diagnosis of these deadly disease in incipient stage becomes easy but this has again created a big healthcare burden on government of developing countries. Disease progression of central as well as peripheral neuronal system had been considered as advanced stage of the condition which is now managed accurately with technologically furnished surgical approaches and techniques.

Population awareness as well as accessibility to healthcare services play a major role to detect early and treat this disease comprehensively with available resources. Modern equipments and improved learning of the disease pathology with eradication measures taken by stringent government policies aid patient's increased compliance and adherence to treatment upto the complete recovery.

Resurgence of DOTS and regular protocol expedite favourable outcome of disease cure and deformity regression.

25 cases of tuberculosis of spine with outlook of the disease in different age, gender, socioeconomic status, occupation, involvement of level of spine treated by operative techniques were studied for functional and radiological outcome

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Materials and methods

A prospective study of 25 patients of tuberculosis of spine for studying prevalence of disease in population with functional and radiological outcome following surgical managements had been carried out at the department of orthopaedics in a Tertiary Care Government Hospital of Jamnagar during the period of May 2015 to May 2017 after obtaining permission from Institutional Ethics Committee.

Inclusion criteria

- Adult patients with clinical and radiological evidence of active tuberculosis involving any vertebral body from the first cervical vertebrae to first sacral vertebrae level.
- Clinical and /or radiological evidence of deformity.
- Neurological deficits.
- Radiological evidence of collapse.
- The patients available for full follow up observation.

Exclusion criteria

- Patients younger than 18 years.
- Early stages of tuberculosis with no evidence of collapse or neurological deficits.
- Involvement of having disorders of central nervous system.
- History of major surgery for any other disease of spine.

All the patients were admitted through the outpatient department. A complete history regarding the nature of illness, the duration since starting of illness and history of constitutional symptoms or any other medical or surgical ailments was taken. Thorough clinical evaluation of the disease was done. A thorough systemic examination was also done. Radiological confirmation of the diagnosis was carried out by taking antero – posterior and lateral view of spine and MRI study. Routine laboratory investigation of blood and urine and special investigation like blood sugar, blood urea, x-ray of the chest and ECG were carried out. Every patient were managed conservatively initially by injectable analgesics, muscle relaxants and AKT in ward.

All the surgeries were done general anaesthesia once the patient was found to be fit for anaesthesia and surgery.

All patients were treated by proper debridement, decompression and instrumentation (anterior and/or posterior).

For thoracic koch's spine we used transpedicular or sometimes posterolateral approach which is the best access to anterior decompression of dorsal spine.

For cervical koch's lesions we used anterior approach decompression and fusion with left transverse anterior neck incisions.

For lumbar koch's vertebra we frequently used posterior midline approach of decompression and fusion. Sometimes combined approach fusion were utilised when extensive panvertebral and perivertebral encroachment of the disease, more than 2-3 segments were involved, junctional involvement and widespread involved vertebral levels with kyphotic deformity.

Decompression of the neurological structures, debridement of the necrotic tissues, correction of deformity and stabilization, and fusion of the involved spine were done.

Parenteral antibiotics were instituted to all postoperative patients usually third generation cephalosporin group, protective cervical brace, thoracic moulded brace and lumbar frame type brace or taylor's brace given for minimum 4-6 weeks. Xrays were taken usually 2-3 days later when patients

are stabilised hemodynamically. AKT regimen started in all patients immediately. Patients were discharged after stitch removal especially thoracic intervention where intercostal drainage tube was kept. On followup clinical and neurological thorough assessment done according to ODI questionnaire. Patients were next called after another 3 weeks and reassessment, both clinical as well as radiological, was done and patients were next called at 3 months and reassessment, both clinical and radiological was done. Complete record of treatment and follow up examination was maintained.

Oswestry Disability index Questionnaire ^[10]

The Oswestry Disability Index (also known as the Oswestry Low Back Pain Disability Questionnaire) is a valuable tool for functional outcome of postoperative spine surgery patients and considered gold standard to evaluate back pain overall assessment.

Discussion

Most patients (around 72%) belonged to middle age group (3rd, 4th, 5th decades of life). Ibrahim *et al.* ^[1] study showed 59 patients (59%) out of 100 were among 15-74 years of age group.

This difference in the age distribution may be due to recent change in the tendency of spinal tuberculosis being more prevalent in adult age groups. The disease is more common in males (80%). It may be because of socioeconomic and cultural factors leading to barriers in accessing health care ultimately leading to under notification in women, particularly in developing countries. The sex distribution of this series and Ghosh *et al.* ^[2] series show male preponderance.

Majority of Koch spine patients are labourers (44%). This might be because the workers have to work in a congested and overcrowded work place. So disease spreads from one labourer to the other and also they have poor nutrition and compromised general health status, also generally their socio-economic status is low. Alam *et al.* ^[3] study demonstrated 66% patients came from low class society, 28% of patients from middle class and 6% of patients from high class.

In my study, lower, upper lower and middle lower class patients were less in number than upper middle class and that might be because they might not have visited the hospital. Tuberculosis of spine is more common in lower socio-economic class persons as they have less health concerns, malnutrition, overcrowding, illiteracy, poor sanitation and immune-deficiency status. Koch's spine is also seen in upper socio economic class but in my series, no any patient operated for Koch's spine belonging to upper class was present.

Tuberculosis of spine requiring surgical management is more common in upper middle class people (72%), but may occur in the lower middle and upper socioeconomic class also. This low incidence and under surface status of the disease in lower middle class may be due to health ignorance and poor reachability to health facilities.

Koch spine is a chronic disease with majority of patients presenting between 1 to 6 months of initiation of symptoms (48%). This delay may be because of the chronicity of the disease, socio-economic factors, ignorance and missed early diagnosis. Ahmed *et al.* ^[4] reported average four months lapse between onset of symptoms and diagnosis but sometimes it can be longer than this ^[5].

Constitutional symptoms were present in about 76% patients. But absence of constitutional symptoms does not necessarily rule out presence of the disease. Constitutional symptoms are present in 20-30% of osteoarticular disease.

Pulmonary tuberculosis is contagious disease with spread to other family members also. This is not the case with spinal tuberculosis. Only 16 % patients had positive family history of pulmonary tuberculosis not the spinal tuberculosis. Any osteoarticular tubercular lesion is the result of a hematogenous dissemination from a primary focus. The primary focus may be active or quiescent, apparent or latent, either in the lungs or in other viscera. Thus Family history of tuberculosis anywhere in the body definitely increases the risk of Koch's spine in other members of the family, but most patients do not have positive family history.

Almost half of the patients of Koch spine managed operatively are chronic smokers. Smoking directly increases the risk of pulmonary tuberculosis but not the spine.

Koch spine is predominantly a disease of dorsolumbar spine. But in my study, majority of patients who needed surgery (36%) had lumbar vertebrae involvement, which is just more than Dorso-lumbar vertebrae involvement (32%). This opens the gateway for further future study and research to find the cause that why disease localised to lumbar spine is more likely to get surgically intervened. Dae Won *et al.* [8] study also had 44.8% of lumbar vertebra involved.

Most of the patients (76%) had only severe mechanical back pain and only 24% patients had neurological deficit at presentation. Zhang *et al.* [6] demonstrated patients who had no neurological deficit at initial presentation didn't develop deficit later on. Most of the patients of Koch spine having neurological deficit had grade III of paraplegia (83%). Chandra *et al.* [9] study showed 146 patients underwent surgery with mean follow up 20 months had results revealed 89% sensorimotor deficit improvement, 71% pain relief and 77% paraplegia recovered.

Posterior approach is the most commonly used approach for surgical debridement.

About 10-12 months are required for complete recovery in majority of the patients (76%). Sai Kiran NA *et al.* [7] study obtained from 48 patients for minimum 3 months followup showed improvement in neurology of patients from Frenkel grade C to D/E after surgery.

Disease per se has a very favourable course and has very good outcome. All the patients (100%) had either excellent (96%) or good (4%) result. Only 1 patient had good result outcome and she was assessed at 6 1/2 months and she had improved neurological status which is likely to improve further in future.

Further study for operated cases of Koch's spine should be done after completion of AKT to improve outcome related statistics.

Most patients returned to job in 6-8months time after surgery. After 6 months of surgery 96%, patients had ODI score between 0-20%. It indicates minimal disability. The patient can cope with most living activities. Usually no treatment is indicated apart from advice on lifting, sitting and exercise.

Results

The age distribution shows involvement of mainly middle age (3rd, 4th, 5th decades of life). The Youngest patient was 26 years old and the oldest patient was 71 years of age.

The sex distribution shows that the disease is more common in males. Majority of the patients of Koch's spine are

labourers amounting to about 44%.

Patients have been classified into the above mentioned classes on the basis of modified Kuppaswamy's socio economic scale. 72% patients are in the upper middle socio-economic class. The patients with Koch's spine usually present between 1 to 6 months of initiation of backache. Out of 7 patients who presented very late (>12months) 4 patients (out of 6 with neurological deficit) had neurological deficit. But In my study neurological deficit was more common in patients who presented very late.

Constitutional symptoms were present in 19 out of 25 patients. In my study, only 4 patients had family history of pulmonary tuberculosis in close relatives in their childhood.

12 patients out of 25 are chronic smokers in my study. Almost half of the patients (48%) operated for Koch's spine were chronic smoker.

2 patients had cervical koch's(8%), 6 patients had dorsal spine involvement(24%), 8 patients had D-L spine(32%) while 9 patients had lumbar spine koch's. majority of patients who needed surgery (36%) had lumbar vertebrae involvement rather than dorsal vertebrae involvement. L2-L3 tuberculosis is taken as lumbar spine tuberculosis in my study.

Based on motor weakness, patients with stage II paraplegia was 1(16.67%) while stage III paraplegia was observed in 5 patients (83.33%). Patients were assessed according to this scale at the time of presentation. 19 patients out of 25 had only severe mechanical back pain. Out of 6 patients having neurological deficit 5 patients had excellent result and one patient had good result.

20 patients were treated surgically via posterior approach, 3 patients via antero-lateral approach and 2 patients of cervical spine tuberculosis were treated via anterior approach. Anterior approach was used for tuberculosis of cervical spine. Tuberculosis of dorsal spine in three patients was approached via anterolateral approach and in all other patients posterior approach was used. Irrespective of approach, 24 patients have excellent outcome.

Out of 25 patients only 6 patients have neurological deficit also and other 19 patients have only severe mechanical back pain.

4 patients(16%) showed recovery in form of clinical as well as radiological within 2 months of operative procedure. 3 patients(12%) showed recovery in 4 months. 2 patients(8%) recovered in 6 months. 10 patients(40%) showed recovery in 12 months. While 6 patients (24%) took more than a year to recover.

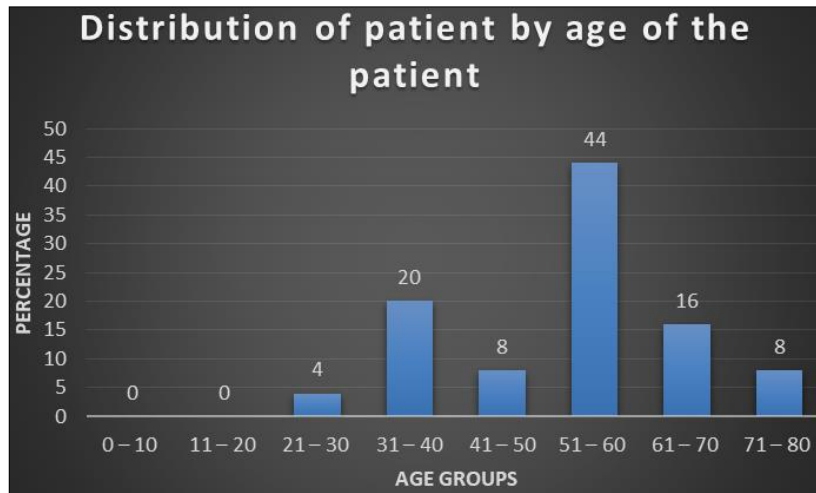
Complete recovery means after this time patient had no any complaint except occasional mild backache. And in any patient no any residual neurological weakness was there after this time.

3 patients (12%) had ODI SCORE (on admission) between 61-80 while 22 patients (88%) had score between 81-100.

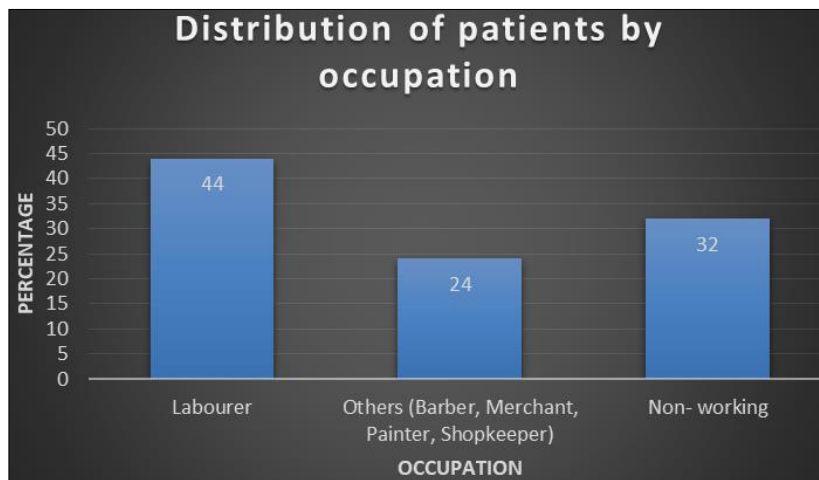
24 patients (96%) had ODI SCORE (more than 6 months post op) was between 0-20 with excellent outcome while 1 patient (4%) had score between 21-40.

24 patients out of 25 operated for Koch's spine have excellent result after 6 months of follow up and returned to their normal activity.

Overall all the patients of Koch's spine managed operatively have excellent outcome.



Graph 1: Distribution of patient by age



Graph 2: Distribution of patients by occupation

Table 1: Distribution of patients by socio – economic status

Socio – economic class	Frequency	Percentage%
Upper (I)	0	0
Upper middle (II)	18	72
Lower middle (III)	7	28
Upper lower (IV)	0	0
Lower (v)	0	0

Table 2: Distribution of patient by duration of backache at presentation

Duration of backache at presentation	Frequency	Percentage %	Tuli series (%)
< 1 month	-		12.8
1 – 6	12	48	29.5
6 – 12	6	24	26.8
>12	7	28	30.9

Table 3: Distribution of patient by presence or absence of constitutional symptoms.

Constitutional symptoms	Frequency	Percentage %
No symptoms	5/25	20 %
Fever, anorexia	12/25	48%
Weight loss	19 /25	76%

Table 4: Distribution of patients on the basis of result as per ODI score

Result	Frequency	Percentage %
Excellent(minimaldisability)	24	72
Good(moderate disability)	1	28
Fair(severe disability)	-	-
Poor (crippled)	-	-
Very poor	-	-

Case with clinical pictures final follow up



MRI Scan Sagittal Section



MRI Sagittal Section



Post Op Ap View



Post Op Ap View



Posterior Approach



Flexion



Extension

Conclusion

Considering the magnitude of problem of Koch's spine in population especially lower socioeconomic class as well as previous pulmonary affection, the medical management along with various newer surgical techniques with safe approaches can eradicate the disease and diagnose the pathology early and can aid rehabilitation easy and feasible and dampen the rate of recurrence.

Conflict of interest: nil

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