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CARIES SPINE: COMPARISON OF COMBINED SURGICAL AND MEDICAL MANAGEMENT WITH MEDICAL MANAGEMENT AT BOLAN MEDICAL COLLEGE, BALOCHISTAN

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ABSTRACT

Background: Caries spine is a major health problem in our country. The management either with medical means alone or surgical intervention along with the ATT is being debated for long time. There are several factors to assess the outcome between the two treatment options. **Objective:** To compare the short term outcome in combined surgical and medical management with medical management alone in caries spine, with six month follow up. **Study Design and Setting:** Randomized controlled trial. Department of Neurosurgery, Bolan medical college, Quetta. Eight months from 25th June 2010 to 25th February 2011. **Methods:** our study was conducted on two groups, twenty four patients in each group; they were diagnosed as cases of caries spine on the basis of history, clinical examination, ESR, X-Ray spine and MRI spine appearances. All patients were randomly distributed in two groups; one group underwent surgical intervention along with the ATT (group A) while other was treated with medical treatment (ATT) alone (group B). **Results:** Statistically significant difference was found in between the treatment groups at final follow up visit at 6th month in terms of Frankel Grade, bladder involvement and ESR decline. 88.88% in Group A and 35.29% in group B improved from poor to good Frankel

grade. **Conclusion:** Surgery is beneficial in patients with caries spine.

KEYWORDS: Pott's disease, medical treatment, surgical treatment, out come, caries spine

INTRODUCTION

Tuberculosis (T.B.) is a major cause of morbidity and mortality in the both developing and underdeveloped countries. It has been detrimental to the mankind for a long period of time. Brain and spine can be affected by tuberculosis. Spinal tuberculosis, the most frequent and the most unsafe pattern of extra-pulmonary tuberculosis, accounts for 50 to 60 % of osseous T.B.[1]

World Health Organization (WHO) report tuberculosis has become the world's most dreadful infectious disease, nearly two billion people, about 1/3rd of world population have tuberculosis.[2]

6 million become ill with tuberculosis and 2 million die from disease worldwide annually (data from WHO 2006). This rise has been associated with concomitant rise in bone and joint tuberculosis. In developing countries, caries spine remains a major health problem.[3]

The entire region of human spine can be infected by mycobacterium tuberculosis. Most commonly involved are the lower thoracic and upper lumbar levels.[4] The diagnosis of caries spine is difficult and it commonly presents at an advance stage.[5]

When considered in the context of total number of cases that seek treatment, it is a fairly significant problem, especially in South Asian countries like Pakistan, where tuberculosis is a rife. Globally, Pakistan ranks 6th in terms of tuberculosis burden, with a WHO, possible incidence rate of 181 cases per 100000 persons, of 272000 new cases annually.[6]

Usually clinical manifestation favors the diagnosis however; diagnosis should be confirmed by evaluating the radiographic changes, computed tomography (CT) and magnetic resonance image (MRI) findings, cultures of blood, and/or percutaneous vertebral aspirates, then bone biopsy, either by an open or percutaneous procedure. PPD is predictive in 86% of the cases. 99 Tcm-methylene diphosphonate (99Tcm- MDP) bone scintigraphy may be negative in 35% and furthermore slow growth rate of mycobacteria on solid media is a problem due to the nature of the mycobacteria and direct microscopy is insensitive because samples may contain only a few organisms. The polymerase chain response has facilitated the diagnosis and

management of tuberculosis.[7]

Caries spine has constant a controversial subject and divided between those who favor the exclusive medical means of treatment and others who support the surgical intervention along with the chemotherapy.[8] As surgery is expensive, technically demanding and often involves the risk of complications in our financially constrained society, it is of immense importance to assess, if surgery really benefits the patients of caries spine, so that it shall be undertaken in selected cases that benefit the most from surgery.

MATERIAL AND METHODS

Total 48 Patients with caries spine admitted through outpatient department or referred from other units to Neurosurgery Department, Bolan Medical College, Quetta were included in this study after taking informed written consent. The diagnosis of caries spine was made on the basis of history, clinical features, ESR, plain x-ray spine and MRI spine findings. All patients underwent full clinical assessment and their neurological status was assessed according to Frankel neurological performance scale (see Proforma). All the patients were investigated with base line investigation including CBC, ESR; special imaging investigations such as CT or MRI spine were done to evaluate level of lesion. All patients were started on four drug antituberculous chemotherapy (Rifampicin, Isoniazide, Ethambutol, and Pyrazinamide) in accordance to their body weight.

Patients were randomly assigned to either of the following groups.
Group 1, twenty four patients on medical treatment alone.
Group 2, twenty four patients on medical treatment combined with surgery.

Those who underwent the medical treatment alone were continued on four drug antituberculous chemotherapy, for six months and then Rifampicin and Isoniazid for other 12 months. Those who underwent surgery, preoperative informed consent were taken with the explanation of risks and benefits of surgery. They underwent one of the following procedures, along with chemotherapy.

1. Anterior cervical decompression and spinal stabilization with Caspar plates for cervical tuberculosis.
2. Anterior decompression and Webb Morley screw system: where there is significant anterior cord compression at thoracic or thoracolumber level.
3. Decompression laminectomy for posterior spinal cord compression at any level.

All patients were fully observed monthly at outdoor patient department, Neurosurgery department of Bolan Medical College, Quetta, for six months, with complete neurological examination. Patients' outcome was recorded as good or poor based on Frankel neurological performance scale on prescribed proforma. The exclusion criteria was followed to control confounder and bias in the study results. All medicines were arranged for patients. The data collected was kept confidential.

DATA ANALYSIS PROCEDURE

All patients data was entered in statistical software "SPSS-24". The ratio (M: F) for sex distribution and mean with standard deviation was computed for age. Frequencies and percentages of categorical variables such as clinical presentation, ESR, sphincter control and short-term outcome were calculated at subsequent follow up visits. Chi^2 test applied to compare proportions of above-mentioned categorical variables in two groups. P-Value less than 0.05 was considered statistically significant.

RESULTS

Fifty five patients were diagnosed with caries spine, on the basis of history, clinical examination and supported by X-Rays and MRI spine. seven out of these were excluded from the study, as were not meeting the inclusion criteria.

Forty eight patients were available for evaluation at the end of six months. All patients received standard ATT as combination of four drug therapy containing Rifampicin, Isoniazid, PZA and Ethambutol. Pyridoxine was added to prevent peripheral neuropathy (an established side effect of INH). Ethambutol was excluded after three months and PZA was excluded after six months, Rifampicin and INH continued for remaining twelve months. At the end of six months, outcome was assessed as good or poor on the basis of Frankel neurological grading. Both the groups compared statistically and $p = < 0.05$ was considered statistically significant.

Forty eight patients were divided randomly into two groups, twenty four patients in each group. The first group, group A (medical and surgical treatment) and group B (medical treatment only). Group A underwent surgical intervention along with ATT according to radiological and clinical presentation while group B was treated only with chemotherapy along with other conservative measures (strict bed rest and immobilization with either cervical color or external immobilization corset according to level of evolvement) for 18 months.

In Group A sixteen (67%) patients were males and eight (33%) were females, where as in Group B female patients (54%) were slightly greater than male patients (46%) (Figure 4; Table 3). Decade wise age distribution shows that 60.70% of the patients fell in the third and fourth decade of their lives in both the treatment groups, only two patients were in their 50s in both the groups (Table 1). Mean age at presentation in Group A was 24.16 years, SD ± 10.18, and in Group B, was 23.33, SD ± 10.90 (Table 2).

Commonest level involved was dorsal spine, it was 54.2% and 45.8% in Group A and B respectively, second most common site affected was lumber region (20.8%) of spine (Table 4), only 8.3% of the patients studied had TB of cervical spine. The mean ESR remain around 85 mm/hr in both the treatment groups (Table 5), which improved dramatically during the following months of management in group A but not so in group B. Figure 5 showing steep down fall of ESR from around 85 mm/hr to 24.46mm/hr in Group A and 41.92mm/hr in Group B at the end of six months.

Those within the Group A underwent the surgical intervention. The commonest level involved was dorsal spine. To access and decompress it, the best approach is anterior (transthoracic) approach, which was performed in fourteen (58.3%) patients (Table 6). This was combined with stabilization with Webb Morley stabilization system. Webb Morley stabilization system was chosen, as it is comparatively inexpensive. Inlay osteoinductive rib graft was used in all patients who underwent the transthoracic decompression and stabilization for inducing the osteoblastic activity.

Only three of these patients developed wound infection which was managed successfully, one patient developed lower respiratory chest infection during immediate post operative period, which prolonged his hospital stay. It was dealt successfully with broad spectrum antibiotics and active rehabilitation.

Eight (33.33%) patients with significant circumferential cord/thecal compression or having compression secondary to granulation tissue causing extradural posterior compression underwent decompressive laminectomy, with maximum removal of infective granulation tissue. Anterior cervical decompression and stabilization with Casper plating was performed in only two (8.3%) patients having lesion of cervical cord (Table 6). Tricortical strut iliac crest graft was used for vertebral fusion after anterior cervical decompression.

Fifteen patients in each group presented with bladder dysfunction. One patient in group A and five in Group B had urinary incontinence, but with post void residual urinary volume between 50-150 ml, hence not included in final assessment and all of them improved during first few months of treatment. At the end six month, fourteen patients in Group A and fifteen in Group B were present for statistical analysis. Both the groups compared by applying chi^2 test and significant difference was found (p=0.0006399) between the treatment groups (Table 7).

Out of twenty four patients in each group, six patients in Group A and seven in Group B had residual motor power (Frankel grade 3), hence were considered good Frankel neurological grade and were not include in the final assessment. Eighteen patients in Group A and seventeen in Group B were evaluated at the end of six months.

At the conclusion of the study we found that 88.88% in Group A and 35.29% in group B improved from poor to good Frankel grade. Statistically this was found insignificant (p=0.0005196) when both groups were compared, by applying the chi^2 test (Table 8).

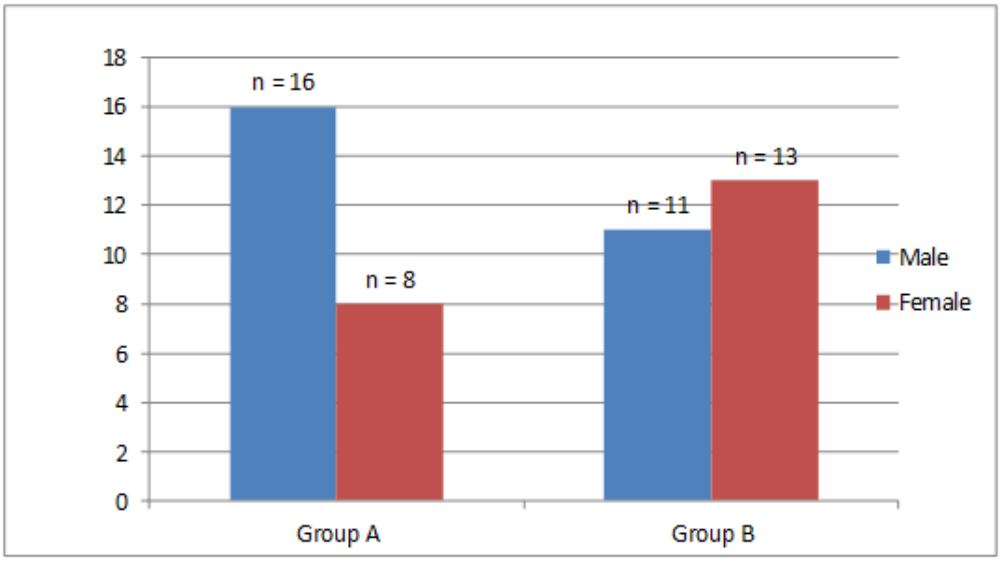

Figure 4: sex distribution in the treatment groups.

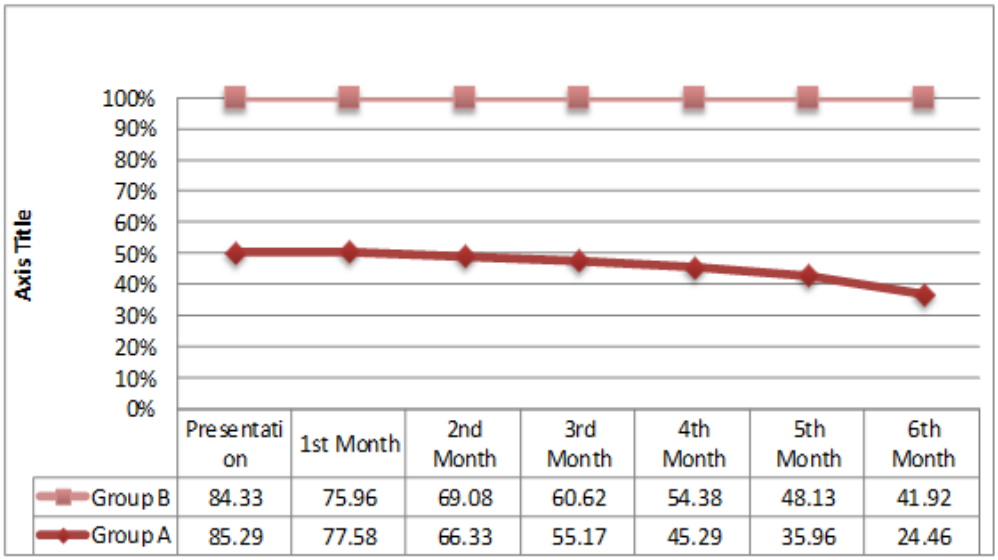

Figure 5: Trend of ESR Decline in both the treatment Groups.

Table 1: Age distributions in the treatment groups.

Age	Group A (n=24)		Group B (n=24)	
	Frequency	Percentage	Frequency	Percentage
11-20	03	12.5	05	20.8
21-30	13	54.2	11	45.8
31-40	04	16.7	04	16.7
41-50	03	12.5	03	12.5
51-60	01	4.2	01	4.2
Total	24	100	24	100

Group A= Medical and surgical.

Group B= Medical alone.

Table 2: Mean ages of Patients in two groups.

	Group A (n=24)	Group B (n=24)
Mean	24.16	23.33
Range	17-58	15-55
SD ±	10.16	10.90

Group A= Medical and surgical.

Group B= Medical alone.

Table No. 3: Sex Distribution in Group A & Group B.

Group	Sex (n=48)		Total
	Male	Female	
Group A	16	08	24
	67%	33%	100%
Group B	11	13	24
	46%	54%	100%
Total	27	21	48
	56.25%	43.75%	100%

Table 4: Different levels of spine affected in the treatment groups.

Level	Group A (n=24)	Group B (n=24)
Cervical Spine	02 (8.3%)	02 (8.3%)
Dorsal Spine	13(54.2%)	11(45.8%)
Dorso-lumbar Spine	04 (16.7%)	06(25%)
Lumbar Spine	05 (20.8%)	05 (20.8%)
Total	24 (100%)	24 (100%)

Group A= Medical and surgical.

Group B= Medical alone.

Table 5: Mean ESR of patients in treatment groups during the course of the treatment.

Duration	Group A (n=24) ESR (mm/1st hr)	Group B (n=24) ESR (mm/1st hr)
Presentation	85.29	84.33
1st month	77.58	75.96
2nd month	66.33	69.08
3rd month	55.17	60.62
4th month	45.29	54.38
5th month	35.96	48.13
6th month	24.46	41.92

Group A= Medical and surgical.

Group B= Medical alone.

Table 6: Surgical Procedures performed in Group A.

Surgical Procedures	Frequency	Percent
Webb Morley's (Transthoracic decompression and stabilization)	14	58.3%
Caspar Plating (Anterior cervical decompression and stabilization)	02	8.3%
Decompressive Laminectomy	08	33.33%
Total	24	100%

Table 7: Sphincter Control at 6 months.

Group	Sphincter Function (n=24*)			p-value
	Good N (%)	Poore N (%)	No Sphincter involvement N (%)	
Group A	13 (92.85%)	01 (7.15%)	08 (33.33%)	**0.0006399**
Group B	03 (30%)	07 (70%)	09 (37.5%)	
Total	16 66.66%	08 33.34%	17 (35.41%)	

Key: Good outcome :< 50ml post void residual urinary volume

Poor outcome :> 150ml post void residual urinary volume

No sphincter involvement: no post void residual urinary volume

*One (01) patient in group A and six (06) in Group B had urinary incontinence but with post void residual urinary volume between 50-150 ml, hence not included in final assessment. Rest of Seventeen (17) patients in both (A and B) groups had no sphincter involvement at presentation.

Group A= Medical and surgical.

Group B= Medical alone.

Table 8: Frankel Grade at 6 months.

Group	Frankel Grade (n=35*)		Total	Chi Square	p-value
	Good	Poor			
Group A	16	02	18	**10.76**	**0.0005196**
	88.88%	11.12%	100%		
Group B	06	11	17		
	94.11%	5.89%	100%		
Total	22	13	35		
	62.85%	37.15%	100%		

* Six (06) patients in Group A and Seven (07) Patients in Group B had residual motor power below the lesion (Frankel grade 3), and were considered good at presentation, therefore total thirteen (13) patients are not included in final assessment.

DISCUSSION

There is a Cochrane data base review available, randomized control trials by Jutte PC and Van Loenhout - Rooyackers JH. Both authors assessed 331 patients with caries spine during 1970s and 1980s with at least one year follow up. It was a comparison between chemotherapy and surgery with chemotherapy alone for treating active tuberculosis.[9]

Mehmet Turgut has had the Meta analysis of Turkish literature on Potts' disease. This study provides an over view on clinical symptoms, diagnostic studies, and surgical treatment in 694 patients with caries spine.[10]

Jutte and Vanloenhout –Rooyackers[9] worked on the objectives to compare chemotherapy plus surgery with chemotherapy alone for treating patients diagnosed with active TB. They have searched Cochrane Infectious Disease Group Specialized Register.

In their final analysis they found no statistically significant difference for any of the outcome measures. Of the many variables the most important were the neurological deficit and regained activity level.[9] In contrast to this in our study we find significant difference between both groups.

Park DW et al determined the influence of disease severity and treatment modality on outcome of patients with caries spine by examining the clinical features, management and treatment outcomes of patients with caries spine. Radical surgery along with chemotherapy show favorable results.[11]

Other study in our part of the world is by Sai Kiran et al. They studied 48 patients with severe motor deficit, and defined their surgical results. This study was conducted in one of well known institute of India.[12]

Very few literatures trials in our country addressing this common but devastating illness. One such review article is by Enam SA and Shah AA. They defined the rationale for surgical intervention.[13,14]

Caries spine constitutes about half the cases of extra pulmonary tuberculosis. Patients belong to under privileged strata of the society with limited finical recourses and often present at the advance stage of the disease. Most patients do not get enough benefit from surgery in terms of improvement in neurological status, if the reason of surgery is to prevent kyphosis, it is best to operate earlier on while the kyphosis is still mobile and not excessive, which is no more beneficial to operate upon at late stages of the disease.[15]

Caries spine is a disease of young age as Turgut[10] defined the mean age of patients at presentation is 32.4 years in his study. In our study mean ages where 24.16 and 23.33 years in Group A and B respectively, majority of our patients belonged to third decade. In his survey

he found equal male and female patients in the treatment groups. In our study Group A comprises of 16 male and 08 female, where as in Group B male patients were 11 and 13 were females.

The commonest level involved was thoracic spine (55.2%) followed by lumbar spine (22.8) and then thoracolumber (6.9%). Only 13 (4.2%) out of 312 patients presented with the involvement of cervical spine in the study of Turgut.[2] In our study dorsal spine involvement was 53.3% in Group A and in Group B it was 43.3%. Lumbar spine involvement was 20.8% in both the treatment groups. It was followed by dorsolumbar (Group A 16.7% Group B 25.0%) and then cervical spine only 8.3% of patients in each group. This distribution appears to be similar in both studies.

In literature few studies have considered ESR as main prognostic factor. Karaeminogullari et al[15] found mean ESR at presentation was 64.5mm/hr which reduced to 20.5mm/hr. In our study ESR remained the best prognostic index in the patients of caries spine, managed with either means. At the end of 6 months the mean ESR was 24.46 mm/hr in Group A which was 85.29 mm/hr at presentation, while in Group B it was 41.92 mm/hr which was 84.33 mm/hr. This suggests that the eradication of active disease is faster in group A as compare to group B. Compare the effectiveness of different surgical procedures and shows favorable results in each surgical procedure in terms of neurological recovery and kyphosis correction.[16]

Su SH et al retrospectively studied the patients with caries spine over a seven year period at medical centre of Taiwan. He analyzed Clinical features, underlying diseases, laboratory results, imaging findings, therapy, treatment duration and outcomes of 48 patients with caries spine. Surgery was carried out on 30 patients (62.5%). Patients who received surgery had a more favorable outcome. He concluded that combined surgical intervention tended to have a more favorable outcome and longer treatment periods had no additional benefit.[17] Our results are in consistent with this study and show more recovery in surgical group.

CONCLUSION

Our study concludes the short term outcome of caries spine, after the initial six months of management, the outcome was better in patients undergoing surgery along with chemotherapy. That there is significant neurological difference between those managed with chemotherapy alone and those who underwent surgery along with chemotherapy. while current medication and operative techniques are now far more advanced, our results indicate

that surgery can be recommended to patients of caries spine desiring better and rapid recovery.

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