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POTT'S SPINE: CLINICAL PRESENTATION AND MANAGEMENT

Neurosurgery

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ABSTRACT

The authors conducted a retrospective study in order to gain a better understanding of the clinical presentation and management of the patients diagnosed with Pott's spine. This research paper gives insight about the study done on the surgically treated Pott's spine patients with a discussion about the clinical presentation of spinal tuberculosis, its management and stresses the importance of early diagnosis to give a timely & judicious surgical treatment to the affected.

KEYWORDS

Pott's Spine, Spinal Tuberculosis, Surgically treated.

INTRODUCTION

Percival Pott in 1779 first described spinal tuberculosis; hence, spinal TB was called 'Pott's Disease'(1,2,3,4). TB of the spine is the common extrapulmonary form of TB which can lead to permanent neurologic deficits and severe deformity (1,2,3,4). Spinal TB accounts for 2% of all cases of TB, 15% of the cases of extrapulmonary TB and 50% of the cases of skeletal TB.(1). Kyphosis and spinal cord compressions were the most common complications. The neurological involvement is relatively benign if urgent decompression is performed at the onset of the disease(5,6).

Methods : Patients of any age diagnosed with Pott's spine who had underwent surgical treatment previously at our institute and were on subsequent follow up between September 2015 to February 2020 were included in this retrospective analytical study after getting their consent for participation in our study. Variables were collected from patient files at departmental records, discharge summary and during follow-up clinical visits. Clinical, pathological, and radiological data of such patients was collected from departmental records and registers. The outcomes were analyzed subjectively in terms of pain severity scale and objectively by limb muscle power grading before and after surgical intervention during the follow up period and subsequent visits.

Statistical Analysis: The collected data were analysed with IBM. SPSS statistics software 23.0 Version. To describe about the descriptive data statistics frequency analysis, percentage analysis were used for categorical variables and the mean & S.D were used for continuous variables. To find the significance in categorical data Chi-Square test was used ; if the expected cell frequency is less than 5 in 2×2 tables then the Fisher's Exact was used. In all the above statistical tools the probability value .05 is considered as significant level.

RESULTS :

In this study we have a total of 32 cases of Pott's Spine out of which 20 were males (62.5%) and 12 were females (37.5%).

Gender Profile

	Frequency	Percent
F	12	37.5
M	20	62.5
Total	32	100.0

Fig 1 : Gender Profile Tabulation

In our study Pott's Spine most frequently involved the Dorsal Spine in 16 cases (50%); Lumbar Spine in 9 cases (28.1%) ; Cervical Spine in 6 case (18.8%); Lumbosacral Spine in 1 case(3.1%).

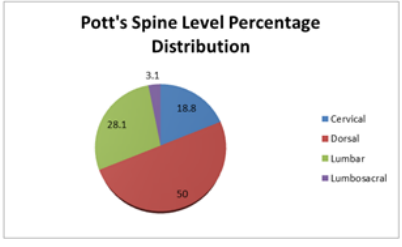

Fig 2 : Pott's Spine level Distribution

Pain was the most common symptom seen in all 32 cases (100%) which manifested as back pain/neck pain. Pain duration ranged from 1 week to 12 months in our study with a mean Pain duration of 4.5 months. The mean patient age was 36.25 years (SD 19.13). Pain was the most common symptom of Pott's Spine. It preceded the onset of weakness of limbs and sensory disturbances.

Descriptive Statistics

	N	Minimum	Maximum	Mean	S.D
Age	32	6	75	36.25	19.133
Pain duration	32	.20	12.00	4.4956	3.35162

Fig 3 : Age & Pain Duration Statistical Tabulation

History Taking and Clinical examination revealed motor weakness in the entire study set of 32 cases (100%) in the form of paraparesis, quadriparesis, monoparesis corresponding to the diseased level. Sensory manifestations were present in 13 cases (40.6%).

Examination revealed paraspinal swelling in 5 cases (15.6%), which were correlated as paraspinal abscess on MRI imaging. Spinal deformity occurred in 5 patients (15.6%); Bladder & Bowel disturbances occurred in 5 cases (15.6 %).

All the 32 cases of Pott's Spine did not report any cranial symptoms like headache, altered sensorium, loss of consciousness, seizures ,vomiting or any other history suggestive of cranial nerve disturbances or cerebellar involvement.

CLINICAL PRESENTATION	Number of Cases	%
FEVER	12	37.5
LOA/LOW	11	34.4
MOTOR DISTURBANCES	32	100
SENSORY SYMPTOMS & SIGNS	13	40.6

BOWEL BLADDER DISTRURBANCES	5	15.6
SPINAL DEFORMITY	5	15.6
BACK PAIN/NECK PAIN	32	100
PARASPINAL SWELLING	5	15.6

Fig 4 : Clinical Presentation Data Table

MRI Imaging findings in the study set correlated with the clinical presentation and MRI is the investigation of choice in diagnosis of Pott's spine and its Management including follow up. In our Study Population of Pott's Spine , Out of the 32 cases, 27 cases had paravertebral abscess (84.4%); 3 cases had epidural abscess (9.4%). 2 cases (6.3 %) were found to be diabetic and both the cases had paravertebral abscess. There were no HIV positive cases. None of the cases in the study set had tuberculous contact history. 5 out of 32 cases (15.6 %) were on prior ATT therapy. X ray /C.T Chest was suggestive of Pulmonary Tuberculosis in only one case(3.1 %) . Sputum AFB was negative in all the cases of the study population. Two cases (6.3%) had preexisting PTB. Most of the Cases (93.8 %) did not have any preexisting pulmonary tuberculosis. No newly diagnosed Pulmonary Tuberculosis was present in the study set.

Though all the 32 cases of surgically treated Pott's Spine had a subjective pain reduction when quantified by pain severity scale before and after surgery, this outcome did not achieve statistical significance. p value was found to be >0.05.

PAIN SEVERITY BEFORE SURGERY * PAIN SEVERITY AFTER SURGEY Crosstabulation

PAIN SEVERITY			PAIN SEVERITY AFTER SURGERY		Total
			MILD	MODERATE	
PAIN SEVERITY BEFORE SURGERY	MODERATE	Count	17	0	17
		% of Total	53.1%	0.0%	53.1%
	SEVERE	Count	12	3	15
		% of Total	37.5%	9.4%	46.9%
Total		Count	29	3	32
		% of Total	90.6%	9.4%	100.0%

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	3.752[a]	1	.053		
Continuity Correction[b]	1.767	1	.184		
Likelihood Ratio	4.900	1	.027		
Fisher's Exact Test				.092	.092
N of Valid Cases	32				

a. 2 cells (50.0%) have expected count less than 5. The minimum expected count

b. Computed only for a 2x2 table

p - Value: # Not Significant at p >.050

Fig 5 : Cross Tabulation & Chi Square test for Pain Severity

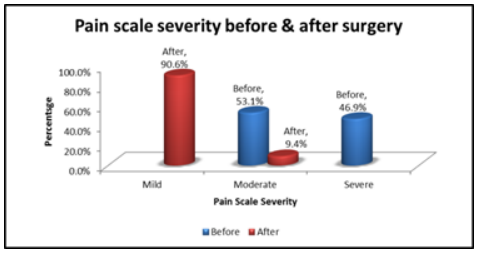

Fig 6: Illustration showing reduction in pain severity scale after surgery

But the other outcome, i.e. the surgically treated Pott's spine cases in the study had an improvement in the limb power after surgery, achieved statistical significance. p value was found to be <0.01 for this outcome which is highly significant.

LPG BEFORE SURGERY * LPG AFTER SURGERY Crosstabulation

LIMB POWER GRADE (LPG)			LPG AFTER SURGERY			Total
			2	3	4	
LPG BEFORE SURGERY	1	Count	1	0	0	1
		% of Total	3.1%	0.0%	0.0%	3.1%
	2	Count	1	10	1	12
		% of Total	3.1%	31.3%	3.1%	37.5%
	3	Count	0	2	15	17
		% of Total	0.0%	6.3%	46.9%	53.1%
	4	Count	0	0	2	2
		% of Total	0.0%	0.0%	6.3%	6.3%
Total		Count	2	12	18	32
		% of Total	6.3%	37.5%	56.3%	100.0%

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	35.416[a]	6	.0005
Likelihood Ratio	29.442	6	.000
Linear-by-Linear Association	19.136	1	.000
N of Valid Cases	32		

a. 9 cells (75.0%) have expected count less than 5. The minimum expected count is .06.

p - Value: ** Highly Significant at p < 0.01

Fig 7 : Cross Tabulation & Chi-square Tests for Limb Power Grading

The Limb Power Grading done in the study population of Pott's spine objectively during the follow up period after surgery and in the subsequent visits showed improvement when compared to preoperative Limb power. This outcome had a high statistical significance.

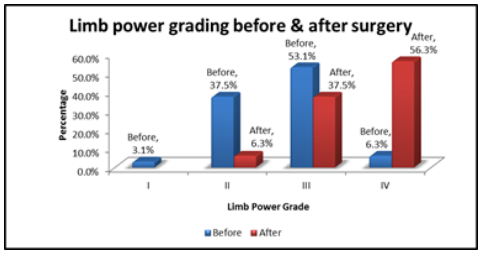

Fig 8: Illustration showing improvement in Limb Power Grading after surgery

DISCUSSION

Spinal TB is usually secondary to lung or abdominal involvement and may also be the first manifestation of TB. Lower thoracic and lumbar vertebrae are the most common sites of spinal TB followed by middle thoracic and cervical vertebrae (1,6,10).Spinal involvement occurs due to hematogenous spread of *Mycobacterium tuberculosis* into the dense vasculature of cancellous bone of the vertebral bodies either through arterial or venous spread(10).

Pott's Spine affects two continuous vertebrae usually because its segmental arteries bifurcate to supply two adjacent vertebrae. Spread of the disease beneath the anterior or posterior longitudinal ligaments (sub ligamentous spread) involves multiple contiguous vertebrae due to the lack of proteolytic enzymes in mycobacterial infections(7). But Pott's spine can also present as a skip lesion (a second lesion not continuous with the more obvious lesion) or a solitary lesion(10).

CLINICAL PRESENTATION

Pott's spine has a insidious onset with slow disease progression. In the recent literature the duration of symptoms before diagnosis is quoted to be between 3 to 6 months.

Constitutional symptoms such as weakness, loss of appetite, loss of weight, evening rise of temperature, and night sweats generally occur before the symptoms related to the spine manifest(8). Clinical findings included back pain (the most common symptom), motor weakness, kyphosis, sensory disturbance, and bowel and bladder dysfunction(8).

Physical examination of the spine reveals localized tenderness, soft tissue swelling, paravertebral muscle spasm, kyphotic or scoliotic deformities due to collapse and anterior wedging of vertebral bodies, varying degrees of motor weakness, nerve root compression, and sensory involvement.

Paraplegia is the most devastating complication of spinal TB. It has been divided into two groups: early onset paraplegia and late onset paraplegia. Early onset paraplegia develops in the active stage of spinal TB and requires active treatment for a better prognosis. Late onset paraplegia is a neurological complication that develops after a variable period in a patient with healed TB 2-3 decades after active infection (10).

Tuberculous necrotic material from the Pott's spine may lead to cold abscess formation .The inflammatory exudates in cerebrospinal fluid cause clumped nerve root leading to arachnoiditis(10).

DIAGNOSIS

Diagnosis of spinal TB is made on the basis of typical clinical presentation along with systemic constitutional manifestation, evidence of past exposure to TB or concomitant visceral TB, and neuroimaging modalities. Other hematological and immunological investigations include complete blood count (CBC), erythrocyte sedimentation rate (ESR), Montoux test, enzyme-linked immunosorbent assay (ELISA), and polymerase chain reaction (PCR). Bone tissue or abscess samples are sent for Acid fast bacilli Staining, Culture & Sensitivity. CT guided or ultrasonography (USG) guided needle biopsy and/or aspiration or surgical biopsy are more commonly employed (9, 10).

IMAGING

Plain radiographs: In Pott's spine , radiolucent lesions tend to be visible in plain x-ray films after 30 % of bone mineral loss (1,2,10). In paradiscal type of lesion, narrowing of the joint space, anterior wedging or collapse of the involved vertebrae and kyphosis is seen depending on the stage of the disease (10). In anterior type of lesion, paravertebral abscess shows the bird nest appearance. Central type of lesion is seen as concentric collapse. In appendiceal or neural arch type of lesion, there is erosion and destruction of the posterior arches with relative sparing of the intervertebral discs (10).

Computed Tomography: Provides much better bony detail of irregular lytic lesions, sclerosis, disc collapse, and disruption of bone circumference and calcification in soft tissue abscesses which is virtually diagnostic (1, 10).

Magnetic resonance imaging: Characteristic findings in Pott's spine included destruction of two adjacent vertebral bodies and opposing end plates; destruction of intervening disc; vertebral body edema; and occurrence of prevertebral, paravertebral, and epidural abscesses (10). MRI provides the extent of soft tissue disease and its effect on the theca, cord, and foramen. MRI assesses the radiological response to treatment in the early follow-up period around 6-8 weeks (10).

MANAGEMENT

The Treatment of Pott's Spine needs a multidisciplinary team approach. The Combination of surgical and medical treatment gives better results (11). Indications for Surgery depend on neurological deficits.

Tuli et al categorizes the neurological deficits in Spinal Tuberculosis into four stages. Stage I patients have no weakness and myelopathy is detected on examination. Stage II patients have motor weakness & myelopathy on examination. But patients ambulate unaided and have a muscle power greater than grade 3. Stage III patients are bedridden and have severe motor weakness. Sensory loss is less than 50 %. Stage IV patients have complete motor weakness with loss of sensation more than 50 % and /or bladder/bowel involvement and/or flaccid paraplegia and/or paraplegia wth flexor spasms.

Uncomplicated tuberculous spondylitis without any neurological deficit can be managed conservatively with ATT and orthotic support. Spinal TB is a paucibacillary disease, prolonged duration of ATT is usually recommended to eliminate the persistent slow growing bacilli.Patients with Grade I and Grade II deficits are conservatively managed.

Any worsening of the disease or non improvement after 3 to 4 weeks of ATT therapy or complications during conservative therapy or patients presenting with higher grade of deficits are indications for surgery. Surgery is the treatment of choice when there is abscess formation, excessive bony destruction with cord compression and rapidly progressive neurological deficit.Progressive Pott's Spine patients with neurological deterioration for whom medical treatment (ATT) has failed, should undergo surgery which include decompression, debridement with or without stabilization.

The approach depends on the site of lesion. The anterior approach which enables removal of all infected tissue and devitalized bone can be done via thoracic route for dorsal lesions and retroperitoneal or lumbar route for thoraco-lumbar and lumbar lesions. Cervical lesions up to T1 can be accessed by anterior approach; Dorsal lesions up to dorsolumbar junction by anterolateral approach and lumbar/ lumbosacral lesions by extraperitoneal route.

Planned anterior and posterior approaches can be combined in single sitting to achieve optimal debridement, stability and correction of deformity. A patient with progressive Pott's paraplegia and severe kyphotic deformity with failed medical management posterior vertebral column resection, multiple level posterior decompression, and instrumented fusion, followed by an anterior interbody fusion with cage was done to decompress the spinal cord and for restoration of sagittal alignment, and for debriding the infection (6).

CONCLUSION :

Early Detection of Pott's Spine by effective diagnostic modalities and the decision for the need of surgical intervention has to be arrived by considering factors like age, antitubercular therapy (ATT) response, and clinical /radiological profile of the patient in correlation with the patient's neurological status due to spinal cord / nerve root compression. Currently MRI is the best diagnostic modality for spinal TB for earlier detection and treatment. The treatment of Pott's Spine needs a multidisciplinary team approach. The Combination of surgical and medical treatment (ATT) gives better results when medical therapy fails and the patient has progressive neurological deterioration. The principles of surgical management in Pott's spine includes decompression the spinal cord , restoration of the sagittal alignment, and debridement of the infection (6) .Serial MRI helps in assessing the response to treatment and regression of the disease (10).

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