Scholars Journal of Applied Medical Sciences
Abbreviated Key Title: Sch J App Med Sci
ISSN 2347-954X (Print) | ISSN 2320-6691 (Online)
Journal homepage: www.saspublishers.com

OPEN ACCESS

Surgery

Hematological Indices of Spinal Tuberculosis versus Spinal Tumour: A 10 Year Review of Cases in a Regional Tertiary Hospital in Enugu, Nigeria

Dr. Ekwunife Remigius T[1], Dr. Iyidobi Emmanuel C[2*], Dr. Nwadinigwe Cajetan U[3], Dr. Ekwedigwe Henry C[4], Dr. Obande Bernard O[5], Dr. Agbo Emmanuel O[6], Dr. Nwoye Olisa[7]

[1,2,3,6,7]National Orthopedic Hospital, Enugu Nigeria
[4]Enugu State University Teaching Hospital Parklane, Enugu Nigeria
[5]Department of Surgery, Federal Medical Center, Markudi Benue State, Nigeria

DOI: 10.36347/sjams.2019.v07i12.001 | **Received:** 21.10.2019 | **Accepted:** 28.10.2019 | **Published:** 06.12.2019

***Corresponding author:** Dr. Iyidobi Emmanuel C

Abstract **Original Research Article**

It is well known that the differential diagnosis between tumour and tuberculosis of the spine may be difficult, as the symptoms and signs are very much alike. The aim of the study was to determine the hematological indices involved in the diagnosis of spinal tuberclosis (TB) and spinal tumours. This was a retrospective study over a 10 year period at National Orthopedic Hospital, Enugu Nigeria. The case notes of the patients treated for either spinal TB or spinal tumors were retrieved and reviewed. The inclusion criteria included patients diagnosed and treated for either spinal TB or spinal tumour in the hospital within the study period. The data collected included patient's biodata, presenting symptoms, duration of symptoms, hemogram, total white cell count, neutrophil count, lymphocyte count, pretreatment ESR, posttreatment ESR among other parameters. The data were analyzed using statistical packages for social sciences (SPSS) version 20.0. A total of 40 patients were included in the study and analysed. The mean age of the patients was 42.43 ± 17.54 years. Majority (65%) of the patients are within the age bracket of 21 – 50 years. The most common presenting compliant is low back pain (85% of the patients). The ESR value at presentation before treatment is usually higher in patients with spinal tumour than spinal TB. The hemogram of patients with spinal tumours were statistically significantly lower than those with spinal TB. The presence of discitis on spine MRI is significantlty associated with spinal TB. It is concluded that patients with spinal TB have lower ESR values usually < 100mm 1st hour than patients with spinal tumours. Patients with spinal TB usually have discitis of the affected vertebra on spine MRI. Therefore, hematological indices and Spine MRI findings are useful in establishing diagnosis of either spinal TB or spinal tumours.

Keywords: Hematological, indices, spinal tuberclosis, spinal tumours, diagnosis.

INTRODUCTION

It is well known that the differential diagnosis between tumour and tuberculosis of the spine may be difficult, as the symptoms and signs are very much alike [1]. Tuberculosis (TB) remains the most common cause of death from infectious disease world-wide [2]. The World Health Organization(WHO) estimates there were 8.8 million new cases of TB in 2003,equating to 140 per 100,000 population and annual deaths are reported to reach 3 million [3]. Musculoskeletal tuberculosis accounts for about 10-15% of all TB notifications in the non-industrialized world [4]. Skeletal involvement is usually secondary, with the primary lesion occurring in the chest or genitourinary system [5]. Most common site is the spine [5, 6]. The diagnosis of musculoskeletal TB remains a challenge to clinicians and requires a high index of suspicion [6]. Typical radiographic pattern of bony involvement aid in diagnosis of TB but radiographs alone are never diagnostic [5]. It is important to confirm diagnosis and subsequently institute appropriate management. In the study by Iyidobi EC *et al.* at National Orthopedic Hospital Enugu, they noted that about 82.5% of spinal tuberculous patients had elevated erythrocyte sedimentation rate (ESR) of > 20mm 1st hr at diagnosis, 86.6% had relative lymphocytosis with lymphocyte count of between 32-84% of total white cell count while about 82.5 % of patients had positive mantoux test at diagnosis [7]. In his study, Bernhard Pads reported that it seems justified to assert that ESR 50 mm or more

contradicts the diagnosis of tuberculosis of the spine if there is no complication or other concomitant disease [1]. Similarly, Weng CY *et al*. reported that most patients (89%) with spinal TB had elevated ESR; > 20 mm 1st hr with an average ESR value of 62 mm 1st hr [8]. Also, Subramanian A *et al*. noted that ESR rarely exceeded 55 mm 1st hr in TB of spine [9]. A history of tuberculosis, a positive skin test and an elevated ESR may be useful in the diagnosis of spinal TB [10, 11]. The aim of the study was to determine the hematological indices involved in the diagnosis of spinal TB and spinal tumours. The findings will greatly strengthen the support of use of these indices in the differential diagnosis of spinal TB or spinal tumours.

MATERIAL AND METHODS

This was a retrospective study over a 10 year period (January, 2007 – December, 2016) at National Orthopedic Hospital, Enugu Nigeria. The case notes of the patients treated for either spinal TB or spinal tumors were retrieved from medical records department and reviewed. The inclusion criteria included patients diagnosed and treated for either spinal TB or spinal tumour in the hospital within the study period, patients that completed their treatment in the hospital with a follow up period of at least 12 months. The exclusion criteria included patients diagnosed with concomitant spinal TB and spinal tumour and patients with incomplete relevant data. The data collected included patient's biodata, presenting symptoms, duration of symptoms, presence or absence of paresis or paraplegia, hemogram, total white cell count, neutrophil count, lymphocyte count, pretreatment ESR, posttreatment ESR, histology report of biopsy, special tests done (Mantoux test, HIV test, Bence Jones protein assay, serum protein assay, microscopy culture and sensitivity[M/C/S]), Xrays findings, anatomic site(s) of involvement, treatment given, outcome and complication(s) encountered. The data generated were coded, entered and analyzed using electronic computer software, statistical packages for social sciences (SPSS) version 20.0. Descriptive statistics which includes frequency, percent, mean and standard deviation were used to summarize categorical and continuous variables. Associations between categorical variables were analyzed using chi-square and Mann Whitney U tests. Student's t-test was used to compare means of continuous variables.

RESULTS

A total of 40 patients (32 had a diagnosis of spinal TB) were included in the study and analysed. The age range of the patients is 3 – 75 years with mean of 42.43 ± 17.54 years. The spinal tumour ranges from benign to malignant, primary to metastatic and extradural to intradural/intramedullary lesions.

Table-1: Gender distribution of the patients

Gender	Frequency	Percent
Male	22	55.0
Female	18	45.0
Total	**40**	**100.0**

Table 1 show there is slight male preponderance with male to female ratio 1.2: 1.

Table-2: Age distribution of the patients

Age group	Frequency	Percent
≤20	3	7.5
21 – 30	7	17.5
31 – 40	9	22.5
41 – 50	10	25.0
51 – 60	5	12.5
>60	6	15.0
Total	**40**	**100.0**

Table 2 shows that majority (65%) of the patients are within the age bracket of 21 – 50 years

Table-3: Occupation of the patients

Occupation	Frequency	Percent
Pupil/Student	6	15.0
Trading	19	47.5
Housewife	4	10.0
Artisan	2	5.0
Public/civil servant	5	12.5
Farming	3	7.5
Health worker	1	2.5
Total	**40**	**100.0**

Table 3 shows that the most commonly affected group of people are traders.

Table-4: Distribution of presenting symptom(s) of the patients

LBP	**Frequency**	**Percent**
Present	34	85.0
Absent	6	15.0
Total	**40**	**100.0**
MASS		
Present	1	2.5
Absent	39	97.5
Total	**40**	**100.0**
Back Deformity		
Present	5	12.5
Absent	35	87.5
Total	**40**	**100.0**

Table 4 shows that the most common presenting compliant is low back pain (85% of the patients).

Table-5: Distribution of neurological deficit

Neurological deficit	Frequency	Percent
Nil	9	22.5
Paresis	26	65.0
Paralysis	5	12.5
Total	**40**	**100.0**

Table 5 shows that majority (65%) of the patients had paresis of both lower limbs at presentation.

Table-6: Distribution of anatomical site(s) of involvement

Anatomic site	Frequency	Percent
Cervical	1	2.5
Thoracic	8	20.0
Thoracolumbar junction	6	15.0
Lumbar	25	62.5
Total	**40**	**100.0**

Table 6 shows that the most common anatomic site of affectation is lumbar spine (62.5%).

Table-7: Correlation of the esr values before and after treatment with the diagnosis

	Diagnosis		Mann Whitney U	P value
	TB median	Malignancy Median		
Pre-treatment ESR (mm1st hour)	77.00	150.00	85.000	0.076
Post-treatment ESR (mm1st hour)	14.00	36.00	90.000	0.105

Table 7 shows that the ESR value at presentation before treatment is usually higher in patients with spinal tumour than spinal TB. Although, this is not statistically significant (p-value = 0.076).

Table-8: Correlations of the hemogram (hb), total white blood cell counts (wbc) and differentials at presentation with the diagnosis

	Diagnosis		T	P value
	TB Mean ± SD	Malignancy Mean ± SD		
Hb (g/dl)	11.72 ± 1.81	10.16 ± 1.64	2.332	0.025
Total WBC (cell/mm^3)	7290.32 ± 3203.06	9877.78 ± 5317.61	1.823	0.076
Neutrophil (%)	56.35 ± 18.26	68.67 ± 12.87	1.883	0.067
Lymphocytes (%)	40.71 ± 18.98	29.67 ± 13.89	1.618	0.114

Table 8 shows that the hemogram of patients with spinal tumours were statistically significantly lower than those with spinal TB (p-value = 0.025). While the WBC and its differentials were not satistically significant between the 2 groups.

Table-9: Correlation of the mantoux test results with the diagnosis

Mantoux	Diagnosis		P value	OR	95% C.I for OR
	TB n (%)	Malignancy n (%)			
Positive	21 (95.5)	1 (4.5)	0.012	16.800	1.841 – 153.304
Negative	10 (55.6)	8 (44.4)			

Table 9 shows that positive Mantoux test is significantly associated with spinal TB. Also that a patient with positive Mantoux test is about 17 times more likely to have spinal TB than spinal tumour (OR = 16.800 at 95% CI).

Table-10: Correlation of the retroviral status of the patients with the diagnosis

RVS	Diagnosis		P value	OR	95% C.I for OR
	TB n (%)	Malignancy n (%)			
Positive	1 (100.0)	0 (0.0)	NA	NA	NA
Negative	30 (76.9)	9 (23.1)			

*NA = Not applicable

Table 10 shows that majority of the patients tested negative to retroviral screening test.

Table-11: Correlation of the of presence of vertebral collapse on spine x rays with the diagnosis

Vertebral collapse	Diagnosis		P value	OR	95% C.I for OR
	TB n (%)	Malignancy n (%)			
Positive	14 (82.4)	3 (17.6)	0.530	1.647	0.347 – 7.807
Negative	17 (73.9)	6 (26.1)			

Table 11 shows that vertebral collapse on spine xrays is not significantly associated with either spinal TB or spinal tumour (p-value = 0.530).

Table-12: Correlation of presence of osteoporosis of the vertebrae on spine xrays with the diagnosis

Osteoporosis	Diagnosis		P value	OR	95% C.I for OR
	TB n (%)	Malignancy n (%)			
Positive	21 (91.3)	2 (8.7)	0.025	7.350	1.287 – 41.984
Negative	10 (58.8)	7 (41.2)			

Table 12 shows that presence of osteoporosis on spine xrays is significantly associated with spinal TB (p-value = 0.025).

Table-13: Correlation of presence of discitis on spine mri with the diagnosis

Discitis	Diagnosis		P value	OR	95% C.I for OR
	TB n (%)	Malignancy n (%)			
Present	10 (100.0)	0 (0.0)	NA	NA	NA
Absent	21 (70.0)	9 (30.0)			

*NA = Not applicable

Table 13 shows that presence of discitis on spine MRI is significantlty associated with spinal TB.

Table-14: Distribution of the treatments given and their outcomes

Outcome	Treatment			
	Anti – TB drugs n (%)	Jacket n (%)	Decompression n (%)	Referred n (%)
Resolution of symptoms	20 (64.5)	2 (50.0)	1 (100.0)	0 (0.0)
Improvement of symptoms	9 (29.0)	1 (25.0)	0 (0.0)	1 (25.0)
No improvement of symptoms	1 (3.2)	0 (0.0)	0 (0.0)	0 (0.0)
Referred	1 (3.2)	1 (25.0)	0 (0.0)	3 (75.0)

$\chi^2 = 18.787$, P = 0.027

Table 14 shows that majority of the patients had resolution or improvement of symptoms and that use of anti-TB drugs for patients with spinal TB is significantly associated with a good outcome (p-value = 0.027).

DISCUSSIONS

This was a retrospective study that highlights the hematological indices of patients diagnosed of either TB spine or spinal tumour which is useful in establishing diagnosis. Differentiating spinal TB from spinal tumour may be difficult when only clinical and radiographic findings are considered [10]. Howerver a history of TB, positive Mantoux test and elevated ESR may be useful in the diagnosis of spinal TB [10, 11]. The study found that there is no sex predilection in the occurrence of either TB spine or spinal tumour. This is similar to the finding by Iyidobi EC *et al*. [7] that also reported no sex predilection in spinal TB infection in their study. The study also found that majority (65%) of the patients were within the age bracket of 21 – 50 years with a mean age of 42.43±17.54 years. This is also similar to the age range of 21-50 years for majority of the patients (60%) reported by Iyidobi EC *et al*. in their series. However, this differs from the findings by Weng CY *et al*. [8] in their study where majority (55%) of the patients were elderly above 70 years with a mean age of 68 years. Majority of the patients (85%) with either spinal TB or spinal tumour presented with low back pain as their compliant. Only 1 patient (2.5%) diagnosed with spinal TB presented with mass at the back. Also majority of the patients (65%) had weakness of both lower limbs at presentation. These are similar to the findings by other researchers [7, 8]. The most common anatomic site of affectation for both spinal TB and spinal tumour is the lumbar spine (62.5%). This is similar to the finding by Weng CY et al who reported the lumbar spine as the most common location (39%)

for spinal spinal TB in their study [8]. The study found a lower ESR values with a median of 77mm1st hour in spinal TB and a higher ESR value of 150mm1st hour in spinal tumours at presentation before treatment. The finding is similar to those reported by Bernhard Pads [1] and Weng CY *et al*. [8] in their respective studies. However, when subjected to statistical test, it was found not to be statistically significant (p-value = 0.076). It was also found that the hemogram (Hb) value is significantly lower in spinal tumours compared to spinal TB (p-value = 0.025). However, the total WBC and lymphocyte count were found not to be statistically significant in either spinal TB or spinal tumour (p-value = 0.076 and 0.114 respectively). A positive mantoux test was found to be significantly associated with the diagnosis of spinal TB (P-value = 0.012 at 95% confidence interval). This is similar to the finding by Weng CY *et al*. [8]. It was also found that a patient is about 17 times more likely to have spinal TB than spinal tumour once the mantoux test is positive (OR= 16.800). The finding of vertebral collapse was found not to be significantly associated with either spinal TB or spinal tumour. However, osteoporosis of the vertebrae on spine xrays and discitis on spine MRI were statistically significantly associated with spinal TB but not with spinal tumour (p-value = 0.025). Majority (93.5%) of the patients who had spinal TB and were treated with anti-TB drugs and application of jacket for the stabilization of the spine had resolution or improvement of their symptoms. The use of anti-TB drugs in the treatment of spinal TB is significantly associated with good outcome (x^2 = 18.787; p-value = 0.027). This finding is similar to those reported by Iyidobi EC *et al*. [7] and Weng CY *et al*. [8] in their respective studies.

CONCLUSION

From the results of the study, it is concluded that patients with spinal TB have lower ESR values usually < 100mm 1st hour than patients with spinal tumours who usually have ESR values > 100mm 1st hour. Also that positive Mantoux test is significantly associated with spinal TB infection. Finally those patients with spinal TB usually have discitis of the affected vertebra on spine MRI. Therefore, it is recommended that hematological indices and Spine MRI findings are useful in establishing diagnosis of either spinal TB or spinal tumours and should be included in the evaluation of patients with low back pain.

DECLARATIONS

Funding: No funding sources
Conflict of interest: None declared.
Ethical approval: The study was approved by the institutional ethics committee.

REFERENCES

1. Bernhard Pads Tumour, Tuberculosis and Osteomyelitis of the Spine: Differential diagnostic aspects. Acta Orthopaedica Scandinavica. 1973; 44:4-5, 372-382.
2. World health organization. Global Tuberculosis control: surveillance, planning, finances. WHO Report. 2005.
3. Muradali D, Gold WL, Vellend H, Becker E. Multi focal osteoarticular tuberculosis: report of four cases and review of management. Clin Infect Dis. 1993; 17: 204-209.
4. Shah BA, Splain S. Multifocal osteoarticular tuberculosis. Orthopedics.2005; 28: 329-332.
5. Maulin MS, Subir NJ, Mohan ST. Musculoskeletal tuberculosis in children. Surgery in Africa-Monthly review. 2011.
6. Talbot JC, Bismil Q, Sarayala D, Newton DA, Frizzel RM. Musculoskeletal Tuberculosis in Bradford- A 6year review. Ann R Coll Surg Engl. 2007; 89: 405-409.
7. Iyidobi EC, Nwadinigwe CU, Ekwunife RT. Management of Musculoskeletal Tuberculosis in Enugu, Nigeria. Trop Med Surg. 2013; 1: 156.
8. Weng CY, Chi CY, Shih PJ, Ho CM, Lin PC, Chou CH, Wang JH, Ho MW. Spinal tuberculosis in non-HIV-infected patients: 10 year experience of a medical center in central Taiwan. J Microbiol Immunol Infect.2010; 43(6):464–469.
9. Subramanian A, Rangarajan K, Pandey RM, Gandhi JS, Sharma V, Bhoi SK. Evaluation of an automated erythrocyte sedimentation rate analyzer as compared to the Westergren manual method in measurement of erythrocyte sedimentation rate. Indian J Pathol Microbiol. 2011; 54:70-4.
10. Nussbaum ES, Rockswold GL, Bergman TA, and Erickson DL, Seljeskog EL. Spinal tuberculosis: a diagnostic and management challenge. J Neurosurg. 1995; 83:243- 7.
11. Jain AK. Tuberculosis of the spine: a fresh look at an old disease. J Bone Joint Surg Br. 2010; 92:905-13.