

Computed Tomographic evaluation of Pott's disease in Accra

*M. O. Obajimi, K. B. Jumah, E. Ogoe, S. Asiamah,
A. Kaminta and E. Brakohiappa

Department of Radiology,
Korle-Bu Teaching Hospital, Accra, Ghana

Summary

Background: Radiological investigations are central in the diagnosis and management of TB spine. In Ghana there is a dearth of literature on the disorder. This paper seeks to describe the CT features of the bony and soft tissue changes in Pott's disease.

Method: It is a descriptive report of the CT scans performed on 30 patients with proven Pott's disease from January 1998 to December 2000 at the Korle Bu Teaching Hospital Accra, Ghana.

Results: The disorder was common among children and young adults (76.7%). Chronic back pain was the frequent presenting complaint (53.3%). The dorsal spine remains the site of preference while T11 recorded the highest incidence (73.3%). The vertebral body was destroyed in all the cases and the fragmentary type of bone destruction was the common observation. The incidence of cord compression demonstrated by CT was high (73.3%). Other findings were paraspinal and epidural masses observed in (66.7%) and (73.3%) respectively.

Conclusion: CT images demonstrated the spinal level of destruction. Improved resolution also showed detailed changes within the outlined soft tissue masses, facilitating early diagnosis and prompt initiation of therapy.

Key words: Pott's disease, Ghana, CT-scan.

Résumé

Des enquêtes radiologiques sont obligatoires dans le diagnostic et la prise en charge de TB de la colonne vertébrale. Au Ghana, il y a la pénurie de la documentation sur le trouble. Cet article fait des efforts de décrire les traits de CT pour ce qui est du changement de tissu mou et osseux dans la maladie de Pott.

Méthode: C'est un rapport descriptif de CT examiné au scanner opéré sur 30 malades atteints de la maladie de Pott éprouvée de janvier 1988 au décembre 2000 au centre hospitalier universitaire de Korle Bu, Accra, Ghana.

Résultats: Le trouble est courant parmi des enfants et jeune adultes 76,7% un mal de chien dans le dos était la plainte courante pendant la présentation (53,3%). L'épine dorsale est toujours le siège de préférence tandis que le T11 est recensé ayant l'incidence la plus élevée (73,3%). La colonne vertébrale était détruite dans tous les cas et l'observation la plus courante est le type fragmentaire de la destruction d'os. L'incidence de compression de cordon démontrée par CT était élevée 73,3%. D'autres résultats étaient grande quantité de paraépine et épinal remarqués en 66,7% et 73,3% respectivement.

Conclusion: des images à travers le CT ont démontré le niveau de la destruction dans la colonne vertébrale. Résolution améliorée a également démontré des changements détaillés à l'intérieur de grande quantité de tissu mou déjà indiqués, ce

qui permet un diagnostic immédiat et l'initiation rapide de la thérapie.

Introduction

Tuberculosis (TB) of the spine otherwise known as Pott's disease remains an important medical problem in West Africa.^{1,2,3} Its morbidity and mortality rates are also well known in the subregion.^{1,2,3,4,5} Expectedly radiological investigations are central in the diagnosis and management of the disease.^{4,6} In 1997 Obisesan et al.⁴ in Nigeria described the plain film findings in TB spine in Ibadan Nigeria. However very little has been documented about the disorder in Ghana. The correlation of the radiological picture of Pott's disease together with an understanding of its pathophysiology is said to be vital to the initiation of appropriate therapy and overall prognosis.^{1,2} Since the advent of Computed Tomography (CT) neuroimaging has been given a boost.^{4,5} The dependency of this imaging modality on attenuation numbers is known to enhance the differentiation between soft tissue and bony abnormality, which is invaluable in demonstrating disc, vertebral, and spinal cord disorders in TB spine. The aim of this study is to describe the CT features of Pott's disease in Ghana in order to facilitate early diagnosis especially with the recent resurgence of tuberculosis in association with HIV/AIDS.

Material and Methods

This is a descriptive study of the CT scans performed on 30 patients with proven Pott's disease whose diagnosis were based on clinical and radiological findings. The study period was between January 1998 to December 2000. All procedures were done in the Department of Radiology, Korle - Bu Teaching Hospital Accra. Patients were examined using a Philips CSQ Scanner. Fifteen mls intrathecal metrizamide was administered in all the patients before post contrast scanogram and contiguous 4mm axial slices were done. The cuts were performed from one vertebra above, through the region of interest to just one vertebra below the level of the disease, after the scanogram had been reviewed.

These CT images were analysed with regards to the following: presence of scoliosis and or kyphosis, evidence of vertebral destruction and disc space involvement, region and number of vertebrae affected, type of bony destruction and the site of vertebral destruction, whether in the body or posterior elements. The presence of any soft tissue; Para spinal or epidural as well as calcified debris were also noted.

Results

Of the 2,112 CT scans of the spine done during the four year - period only 30 (1.42%) were carried out for Pott's disease. These patients were made up of 20 males and 10 females aged 2 - 47years (mean 32years).

Table 1: This is the age distribution of the patients in the

*Correspondence

study. The peak incidence was in the third decade and the male female ratio was 2: 1.

Table 1 Distribution of age and sex in the 30 patients with Pott's disease

Age groups	Number (Percentage)		
	Male	Female	Total
0 - 9	3(10)	3(10)	6(20)
10 - 19	5(16.7)	2(6.7)	7(23.3)
20 - 29	7(23.3)	3(10)	10(33.3)
30 - 39	4(13.3)	1(3.3)	5(16.7)
40 - 49	1(3.3)	1(3.3)	2(6.7)
Total	20(66.7)	10(33.3)	30(100)

Table 2 Clinical presentation and percentage incidence

Clinical presentation	Number	(%)
1. Back pain	16	(53.3)
2. Paraplegia	12	(40)
Flaccid	3	(10)
Spastic	9	(30)
3. Neck pain	3	(10)
4. Inability to walk	14	(46.7)
5. Kyphosis	27	(90.0)
6. Soft tissue swelling over the spine	6	(20)
7. Urinary incontinence	5	(16.7)
8. Feecal incontinence	3	(10)
9. Feecal and Urinary incontinence	2	(6.7)
10. Quadripareisis	2	(6.7)

Table 2: This describes the clinical features of the patients. The most common presenting symptom was longstanding back pain and this occurred in 16(53.3%), while inability to walk was noted in 14(46.7%) and quadripareisis in 6.7%.

Table 3 Distribution of vertebral destruction in the 30 cases of Pott's disease

Site of lesion	No (% out of 30 patients)
Cervical spine	3(10.0)
Thoracic spine	11(36.7)
Lumbar spine	7(23.3)
Thoraco lumbar spine	9(30.0)
Lumbo sacral spine	--
Sacral spine	--

Table 4 Computed tomographic features of Pott's disease and incidence

CT features	No (%out of 30)
1 Site of vertebral destruction	
• Vertebral body	30(100)
• Posterior element	18(60.0)
the pedicles	9(30.0)
the laminae	4 (13.3)
spinous process	3(10.0)
transverse process	2 (6.6)
2. Intervertebral disc destruction	26(86.7)
3. Presence of paraspinal soft tissue	20(66.7)
Unilateral	14 (46.7)
Bilateral	6 (20.0)
4. Associated cord compression with epidural mass	22(73.3)
5. Kyphoscoliosis	27(90.0)
6. Straightening of the spinal curvature	10(33.3)

Table 3 shows the distribution of the lesion in the spine. The highest frequency of destruction occurred in the dorsal spine (11/30,36.7%) followed by the lumbar (7/30,23.3%) and only 3 cases were noted in the cervical spine. Multiple vertebral

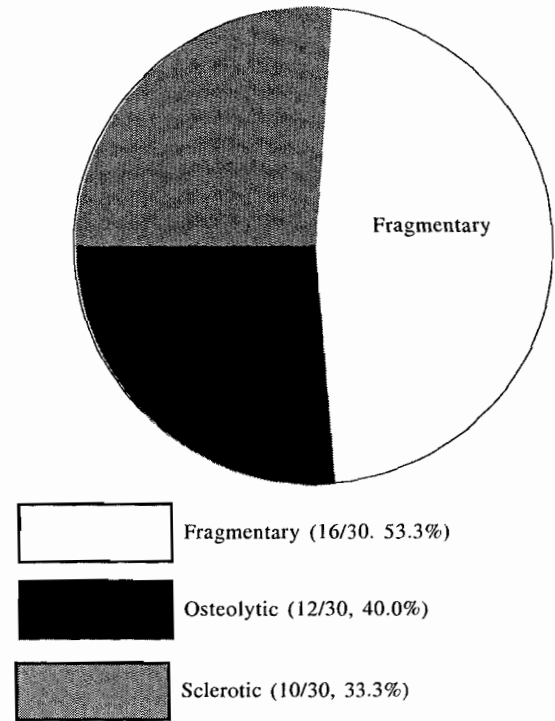


Fig. 1 Piechart showing the type of bone destruction in the spine.

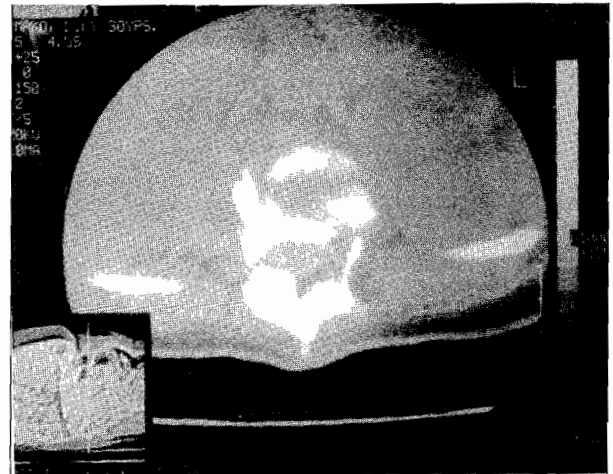


Fig. 2 Contrast enhanced axial CT image of the vertebral body showing fragmentary pattern of bone destruction. Note the extradural compression of the spinal cord on the right.

body involvement were demonstrated in 26/30(86.7%), of these 86.7% 16(53.3%) involved two contiguous vertebral bodies. T11 recorded the highest incidence of destruction 73.3%. Skip lesions were seen in only (2/30, 6.7%).

Table 4 has listed the various CT features recorded in the study. The scanogram confirmed kyphoscoliosis in 90.0% most of which were in the dorsal spine. The vertebral bodies were destroyed in all 30 cases. In 18(60.0%) there were also destruction of the posterior elements. The common site of destruction in the posterior element was the pedicle (50.0%). Associated lamina destruction was recorded in 4(13.3%), while

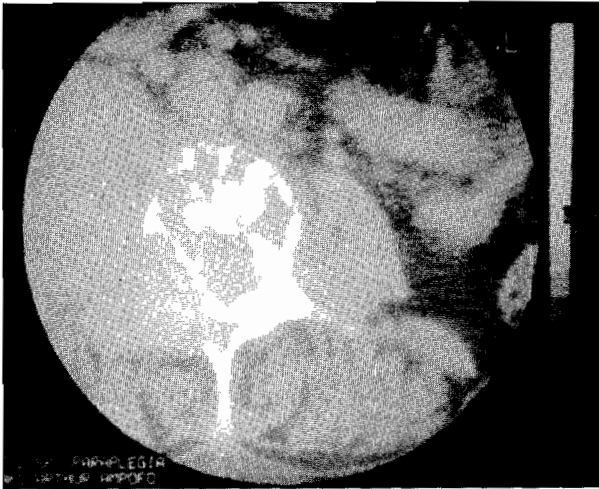


Fig. 3 Contrast enhanced axial CT image of the intervertebral disc showing irregular osteolytic destruction. Associated right paraspinal and extradural soft tissue masses are also present.



Fig. 4 Contrast enhanced axial CT image showing pedicular destruction with bilateral paraspinal soft tissue containing calcific densities.

the spinous processes were affected in 3(10.0%). The costal heads of the ribs were destroyed by an equal incidence. Associated paraspinal soft tissue masses were demonstrated in 20(66.7%) and calcifications were present in 50% of these masses. Fig. 4 They were noted within the Psoas muscles as prominent soft tissue densities with loss of the usual fat planes. These paraspinal abscesses even though at the level of the bony destruction, were demonstrated in their entire longitudinal extent by CT. They were always significantly greater than the extent of the vertebral body destruction. The average extent of these soft tissue masses was 4 vertebral body lengths when compared with an average of two body lengths in the case of the bony disorder.

Bony destruction

Fig 1 shows the pattern of destruction. The fragmentary type Fig 2 occurred most 16(53.3%), while the sclerotic type was found in 10(33.3%).

Intervertebral disc involvement

The hypodense end plates appeared irregular in outline and showed several areas of destruction within it. This was

noted in all the 86.7% with destruction of contiguous vertebral bodies.

Cord compression

Neurological signs of cord compression were present in 22(73.3%) but compression by epidural mass was seen in all the patients. This compression was enhanced by intrathecal contrast. The bony fragments within the epidural soft tissue mass were also well demonstrated Fig 4 in 6(20.0%). The axial images produced a reasonable resolution to enhance proper evaluation of the paraspinal and epidural masses.

Discussion

Though a low CT scan frequency of the spine in Pott's disease (1.42%) is noted in our study. This disorder is said to occur in approximately 1% of patients with Tuberculosis^{4,5,6,7} while TB spine accounts for more than 50% of musculoskeletal TB.^{6,7,8} The disease commonly affects children and young adults.^{5,6,7} This agrees with our report where 23(76.7%) of our study population were below 30years. Chronic back pain is also a known presenting complain.^{4,5} This can occur alone or with other symptoms as stated in table 2. Like previous reports in the subregion.^{3,4,5} The dorsal spine remains the site of preference (56.7%) with T11 recording the highest incidence of 73.3%. This again is in consonance with the report by Obisesan et al.⁴ This site of predilection in the lower dorsal and upper lumbar spine is said to be due to the ease at which these areas twist, strain and also undergo minor trauma which helps the tubercle bacilli to settle in them.^{4,5} Although single level of contiguous vertebral involvement is more frequently observed,^{8,9} multilevel involvement can also occur.¹⁰

The focus of infection can either be in the vertebral body or around the disc.¹¹ When vertebral body destruction occurs centrally, there is reduction of the vertebral height, which was best demonstrated in the reconstructed sagittal images. The involvement of vertebral appendages and ribs is usually due to direct spread of the disease from the vertebral body.¹² This posterior element extension is common in the Negroid population.^{3,4,12} Our study is in agreement with this observation as 60.0% (Table 4) had posterior element involvement. In such cases the pedicles were the frequent site of destruction especially in the dorsal spine 83.7%. This is attributed to the close proximity of the contiguous thoracic vertebrae.^{13,14} The intervertebral discs 26(86.7%) showed irregular osteolytic destruction in the axial images (Fig 3) and narrowed outline on the sagittal slices.

Tissue necrosis and breakdown of inflammatory cells result in paraspinal abscess which were noted in 20(66.7%). These paraspinal masses were detected at the exact level of the disorder, which is possible because of the increased contrast and improved resolution between the abscesses and the normal paraspinal soft tissue, provided by the CT images (fig 4) when compared with those of conventional radiography. The abscesses were noted above and or below the level of the involved vertebra and accounted for an average of 4 vertebral body lengths in their longitudinal extent.

These soft tissue masses have been characterised by their CT attenuation values into, granulation tissue or frank

abscess; the latter having higher values than the frank abscess.^{15, 16} The abscess can track intraspinally into the canal causing an epidural compression which is well demonstrated by the displacement and compression of the hyperdense intrathecal contrast (fig 4). The frequency of cord compression diagnosed by CT was high in our study 73.3%, a radiological finding made easy by the use of the bony window in CT images. The presence of bony fragments within these epidural masses was well demonstrated in 6(20%) (fig 4).

The fragmentary type of bone destruction recorded the highest incidence 60.0% Fig.1 This was demonstrated in the vertebral body and appendages fig.2 It is said to be due to numerous residual small bone fragments that were readily picked up by the bony window. The above findings are in consonance with other reports.^{8,9} A combination of osteolytic and fragmentary destruction was observed to be common.

Conclusion

This communication reiterates spinal TB as an important differential diagnosis for chronic back pain. The authors agree that the demonstration on CT images of fragmentary bone destruction especially if associated with para spinal soft tissue mass is strongly indicative of tuberculosis of the spine. The presence of calcification or bony fragments in this soft tissue mass lends further support to the diagnosis. In patients with neurological deficit, CT accurately defines the presence and extent of epidural compression and is especially useful in planning tissue biopsy and in the detection of bone fragments within the epidural space especially if surgery is contemplated.

References

1. Dickson J A S: Spinal tuberculosis in Nigerian children: A review of ambulant treatment J. Bone and Joint Surg. 1967; 49 - B: 682-694.
2. Edington, GM and Gilles HM: Pathology in the tropics. 1969 Edward Arnold (Publishers)Ltd. London.
3. Bell D, Cockshott WP: Tuberculosis of vertebral pedicles, Radiological features of Tuberculosis of the spine in Ibadan Afr. J. Med. Sc. 1977; 6: 55 - 67.
4. Obisesan AA, Lagundoye SB and Lawson EA: Radiological features of tuberculosis of the spine in Ibadan Afr. J. Med. Sci. 1977; 6:55 - 67.
5. Solagberu BA, Ayorinde RO: Tuberculosis of the spine in Ilorin, Nigeria. East African Med. J 2001; 78: 179 - 197.
6. Stanley DJ: Tuberculosis of the spine; imaging features A. J. R 1995; 164: 659 - 664.
7. Bureau N and Crdinal E: Imaging of musculoskeletal and spinal infections in AIDS. Radiol Clin North Am 2001; 343 - 355.
8. Jain R, Sawhney S and M Berry: Computed tomography of vertebral tuberculosis: patterns of bone destruction. Clinical radiology 1993; 47: 196 - 199.
9. Brant-Zawadzki M, Burke VD and Jefferey R B: CT in the evaluation of spinal infection. Spine 1983; 8: 358 - 364.
10. La Berge JM, Brant-Zawadzki M: Evaluation of pott's disease with Computed Tomography. Neuroradiology 1984; 26: 429 - 434.
11. Gropper GR, Acker JD and Robertson: Computed Tomography in Pott's disease neurosurgery 1982; 10: 506 - 508.
12. Arthronthurasook A: Chongpreboon patina: Aspinal tuberculosis with posterior element involvement. Spine 1990; 15: 191 -4.
13. Resnick D: Diagnosis of bone and joint disorders. Philadelphia WB, Saunders 1995; 2463-2474.
14. Lin-Greenberg A and Cholankeril J: Vertebral arch destruction in tuberculosis CT features: Journal of computer assisted tomography 1990; 14: 300 - 302.
15. Im, J, Song KS, Kang HS, Park HJ, Yeon KM, Han MC and Kium C: Mediastinal tuberculosis lymphadinitis: CT manifestations. Radiology 1987; 115 - 119.
16. Epstein BM and Mann JH: CT of abdominal tuberculosis. American Journal of Roentgenology 1982; 139: 861 - 866.