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Research Article

CONTRIBUTION OF IMAGING IN THE DIAGNOSIS OF POTT'S DISEASE IN THE MEDICAL IMAGING DEPARTMENT OF THE CHU Pr.BOCAR SIDY SALLOF KATI

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Abstract

Introduction: Pott's disease is an infectious spondylodiscitis caused by Mycobacterium tuberculosis. Imaging is essential in its management.The objective was toto study the contribution of imaging in the diagnosis of Pott's disease at the imaging department of the CHU Pr. BSS in Kati.

Patients and Method: This was a descriptive cross-sectional, retrospective and prospective study (from January 1, 2019 to December 31, 2024), a period of 5 years. A 16-slice CT scanner and a 1.5 Tesla MRI were used for the study.It concernedall patients referred to the medical imaging department of the CHU Pr BSS in Kati for CT and/or MRI of the spine in whom the diagnosis of Pott's disease was retained.

Results: we collected 73 cases out of 13778 CT/MRI examinations of the spine, representing a frequency of 0.52%.The mean age of the patients was 39.8 ± 16.85 years, with a male-to-female ratio of 1.6. Spinal pain was the main reason for CT/MRI examinations (97.3%). CT was the most frequently performed radiological examination (76.7%). The lumbar region was the most common location (45.2%). Mirror erosion was the most frequently observed finding on CT and/or MRI (75.3%). Paravertebral abscess was the main complication observed (34.2%). Associated lesions were degenerative in 58.5% of cases.

Conclusion: Pot's disease is a rare condition in our region. It has affected individuals of all ages, with a male predominance. Imaging has allowed for assessment of the lesions and guided treatment.

Keywords: Pott's disease-Diagnosis-CT MRI-CHU Kati

Introduction

Tuberculous spondylodiscitis, also known as Pott's disease, is an infection characterized by the presence and development of Koch's bacillus in the intervertebral disc and adjacent vertebral bodies.[1]This form is generally secondary to hematogenous dissemination of Mycobacterium tuberculosis (Koch's bacilli) from a pulmonary or lymph node focus [2].

Tuberculosis is experiencing a resurgence of interest due to its current increase.[1,3,4]It is currently experiencing a resurgence both in developed countries and in our countries with high tuberculosis endemicity, where it remains a public health problem [3,5,6].

In 2014, according to the World Health Organization (WHO) report, 9.6 million people contracted tuberculosis (TB) and 1.5 million people died

from it [7]. Osteoarticular tuberculosis (OAT) represents less than 5% of all TB cases[4]Spinal involvement, or "Pott's disease," is the most frequent manifestation (50% of TOAs) [4].

In Europe, spinal tuberculosis accounts for 11% to 39% of all spinal infections in various French series [4].

In Congo, Angella et al. reported a hospital frequency of 16.1%[8]In Tunisia, Abdelmoula et al. found 86.7% of cases of Pott's disease in the TOA[9] In Niger, Gbané et al. found a hospital frequency of 4.9%[10]In Côte d'Ivoire, the study by Gbané-Koné et al. shows a prevalence of 4.87% [3]. In Mali, Traoré M at CHU-GT and Toloba Y et al. at CHU-PG reported 3.77% and 5% respectively of Pott's disease [11,12].

Pott's disease can present with varying clinical manifestations, ranging from simple spinal pain to severe forms that may involve significant neurological disorders and spinal deformities. The frequent neurological involvement and vertebral deformities are what make this condition so serious.[13]Biologically, leukocytosis is found in 35% of cases, the erythrocyte sedimentation rate is elevated in 75%, and blood cultures are positive in 50% of patients [13].

Imaging is undoubtedly one of the cornerstones of Pott's disease diagnosis. It allows for the detection and characterization of lesions, guides diagnosis, assists in sampling, and contributes to treatment, ensuring follow-up and post-treatment monitoring [14,15]. Nowadays, however, this diagnosis is facilitated by computed tomography and magnetic resonance imaging, and confirmed by the tuberculin skin test, the presence of Mycobacterium tuberculosis in abscess drainage fluid, and by bone biopsy [16].

The treatment for Pott's disease is primarily medical, involving antituberculosis polychemotherapy, sometimes supplemented by surgical treatment [8]. Surgery is indicated when there is a collapse of the sagittal balance of the spine, major extension of the abscess into the perivertebral structures and into the canal resulting in spinal cord compression [16].

Tuberculous spondylodiscitis has been the subject of several studies around the world and in Mali, but this study is the first in the Medical Imaging department of the CHU Pr Bocar Sidy SALL (CHU Pr BSS) of Kati with the aim of specifying the different radiological aspects of Pott's disease.

PATIENTS AND METHODS

This was a descriptive cross-sectional study conducted in two phases: retrospective (from January 1, 2019 to December 31, 2023) and prospective (from January 1 to December 31, 2024), for a period of 5 years. The study population consisted of all patients who underwent a CT and/or MRI scan of the spine in the imaging department.It concernedall patients of both (02) sexes and of all ages who were referred to the medical imaging department of the CHU Pr BSS in Kati for computed tomography and/or magnetic resonance imaging of the spine in whom the diagnosis of Pott's disease was retained.In this study, Pott's disease is defined in imaging as any vertebro-discal lesion suggestive of spinal tuberculosis, characterized by involvement of at least two adjacent vertebral bodies, associated with vertebral endplate involvement, progressive disc narrowing, and/or the presence of paravertebral, prevertebral, or epidural abscesses, with or without spinal deformity. The questionnaire survey technique allowed us to collect quantitative and qualitative data using a pre-established form, which were entered and analyzed using SPSS version 27.

Materials and techniques

Materials

We used a 16-slice SIEMENS scanner and a FUJIFILM high-field, closed 1.5 Tesla MRI scanner.

Techniques

CT Protocol

The CT protocol was a helical acquisition in axial slice of 0.6mm thickness without then with injection of iodinated contrast medium in bone parenchymal window and with coronal, sagittal reconstructions.

MRI Protocol

The patient is positioned supine with a suitable spinal coil (cervical/thoracic/lumbar), which improves the signal-to-noise ratio, fine structure resolution, reduces artifacts, and enables rapid acquisition with 3–4 mm thick sagittal and axial slices. The examination begins with sagittal T1-, T2-, and STIR sequences for a comprehensive study of the spine. Axial T2-weighted and then T1-weighted sequences are acquired, targeting the pathological levels. Gadolinium contrast is administered in cases of suspected infection, tumor, or spinal cord compression, followed by fat-suppressed T1-weighted sequences.

Ethical considerations

The records are anonymous, the information collected in each record is confidential and will never be disclosed, and the results will be used for scientific research and development. Informed consent was obtained from patients over 18 years of age, as well as parental consent from patients under 18 years of age.

RESULTS

During the study period, we collected 73 cases of Pott's disease from 13,778 CT/MRI scans of the spine, representing a frequency of 0.52%, distributed as follows: 13,615 spinal CT scans and 163 spinal MRI scans. Of the 13,615 spinal CT scans, 56 showed Pott's disease, and of the 163 spinal MRI scans, 15 suggested Pott's disease. The mean age of the patients was 39.8 ± 16.85 years, with a range from 2 to 78 years. The male-to-female ratio was 1.6. More than half of the cases (61.7%) resided in rural areas, with laborers or farmers being the most numerous (43.8%) (Table I).

PaintingI: distribution of patients according to socio-demographic data

Sociodemographic	Effective	Percentage
Age range		
< 20	5	6.8
20-39	25	34.2
40-59	29	39.8
60-79	14	19.2
Sex		
Men	45	61.7
Women	28	38.4
Occupation		
Merchants	10	13.7
Students	6	8.2
Children	2	2.7
Employees	13	17.8
Housewives	10	13.7
Workers/farmers	32	43.8
Residence		
Urban environment	27	37.0
Peri-urban environment	1	1.3
Rural environment	45	61.7

The examinations were prescribed by specialist physicians in 46.6% of cases. Spinal pain was the main reason for the examinations in 97.3% of cases. A history of tuberculosis exposure was the most frequently observed medical history in 32.9% of cases (Table II).

PaintingII : distribution of patients according to clinical data

Clinical data	Effective	Percentage
Prescribers		
Specialist doctors	34	46.6
General practitioners	25	34.2
Students	14	19.2
Clinical information		
Radiculalgia	26	35.6
Neurological deficit	33	45.2
Spinal/lumbar pain	71	97.3
Sphincter disorder	9	12.3
Medical History		
Concept of tuberculosis contagion	24	32.9
Diabetes	16	21.9
HTA	6	8.2
HIV/AIDS	9	12.3

The paraclinical data were immunological and radiological
The tuberculin skin test was the immunological test requested; it was positive with an induration ≥ 8mm in 76.7% of cases (Table III).

Table III: Distribution of patients according to the results of the tuberculin skin test.

tuberculin skin test	Effective	Percentage
Positive ≥ 8mm (Induration)	56	76.7
Positive (blister) (6-8mm)	11	15.1
Anergy ≤ 5mm	6	8.2
Total	73	100

CT and MRI were the two radiological examinations used. CT was the most frequently performed radiological examination, accounting for 76.7% of cases. The lumbar region was the most common location, present in 45.2% of cases. Osteolysis of the pedicle was the most prevalent posterior arch involvement, occurring in 54.5% of cases. Involvement at two levels was the most common finding, occurring in 58.9% of cases. Mirror erosion was the most frequently observed CT and/or MRI finding, present in 75.3% of patients, followed by vertebral body destruction and intervertebral disc space narrowing in 56.2% and 54.8% of cases, respectively. Paravertebral abscess was the main complication observed (34.2%), followed by spinal deformity in 20.5% of cases. Associated lesions were degenerative in 58.5% of cases (Table IV).

Table IV: distribution of patients according to radiological data.

Radiological examinations	Effective	Percentage
MRI	15	20.5
TDM	56	76.7
CT and MRI	2	2.7
Site of the injury		
Cervical	3	4.1
Thoracic	27	37.0
Lumbar	33	45.2
Thoracolumbar	4	5.5
Sacral loin	6	8.2
Radiological characteristics		
Disc pinching	40	54.8
Vertebral body lysis	20	27.4
Mirror erosion	55	75.3
Vertebral compression	16	21.9
Destruction of the vertebral body	41	56.2
Complications		
None	44	60.3
Epidural abscess	1	1.4
Paravertebral abscess	25	34.2
Spinal cord compression	3	4.1
Spinal deformity	15	20.5
Associated lesions		
Lung damage	4	5.5
Lymphadenopathy	5	6.8
Degenerative lesion	43	58.9
Bladder stones	4	5.5

ICONOGRAPHY

The figures below are iconographic illustrations bearing witness to the spondylodiscitis (Pott's disease) of our study.

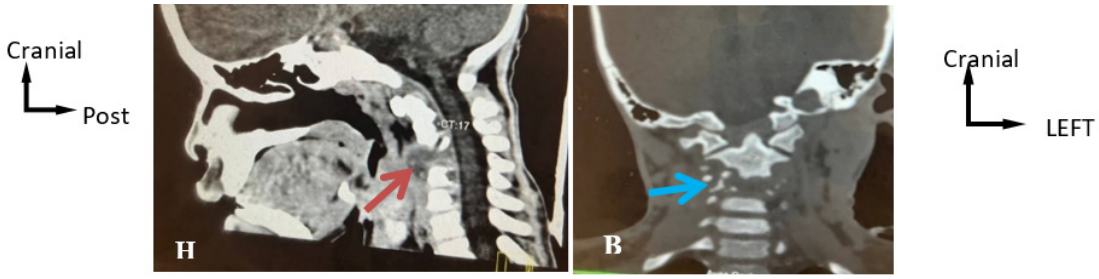

Figure 1: CT scan of the cervical spine, sagittal reconstruction in parenchymal window (A) and coronal reconstruction in bone window (B) showing an osteolytic lesion of C3 with an anterior paravertebral collection (red arrow) and bone fragments (blue arrow) in a 10-year-old child.

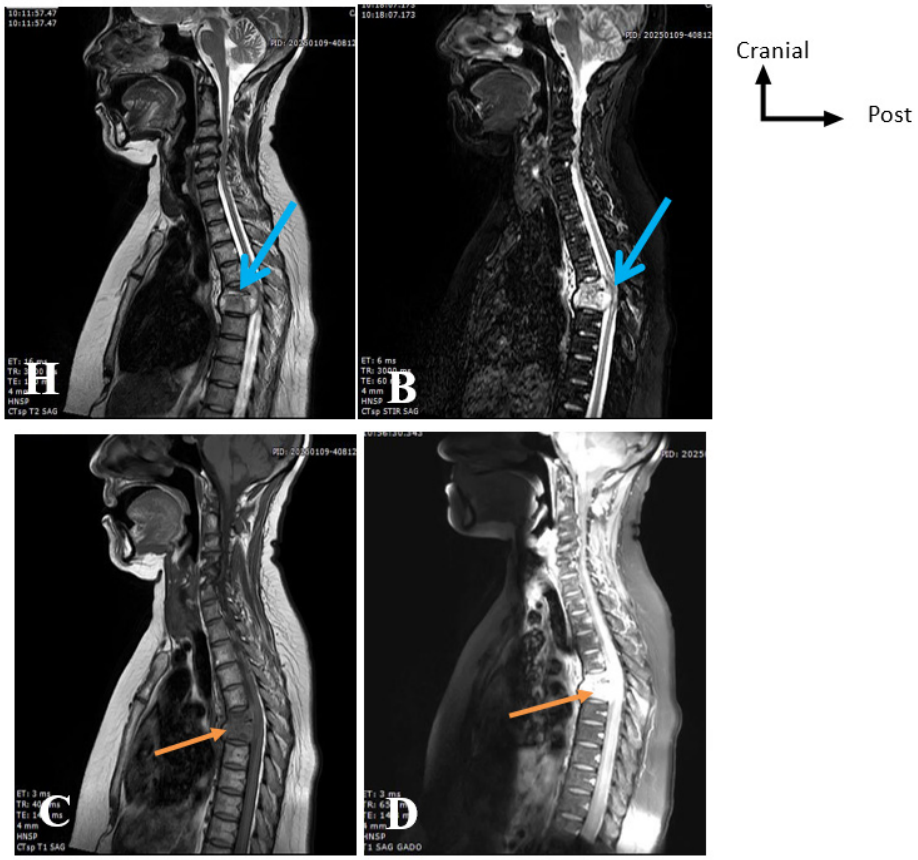

Figure 2: Sagittal MRI of the spine in T2-weighted (A), T2 STIR (B), T1 (C) and T1 Gado (D) sequences showing an osteolytic lesion of the vertebral body of T5 (orange arrow) with epiduritis (blue arrow) causing spinal cord compression (blue arrow B).

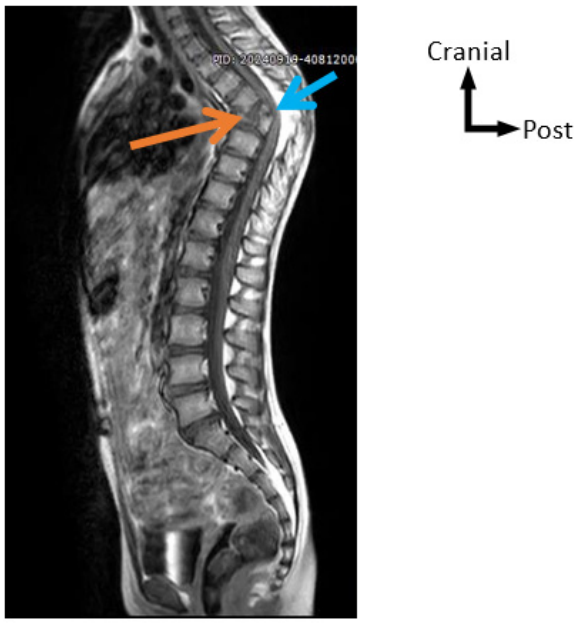

Figure 3: T1-weighted Fatsat sagittal MRI of the spine showing osteolysis of the vertebral bodies of T7 and T8 with thoracic gibbosity (orange arrow) and spinal cord compression (blue arrow).

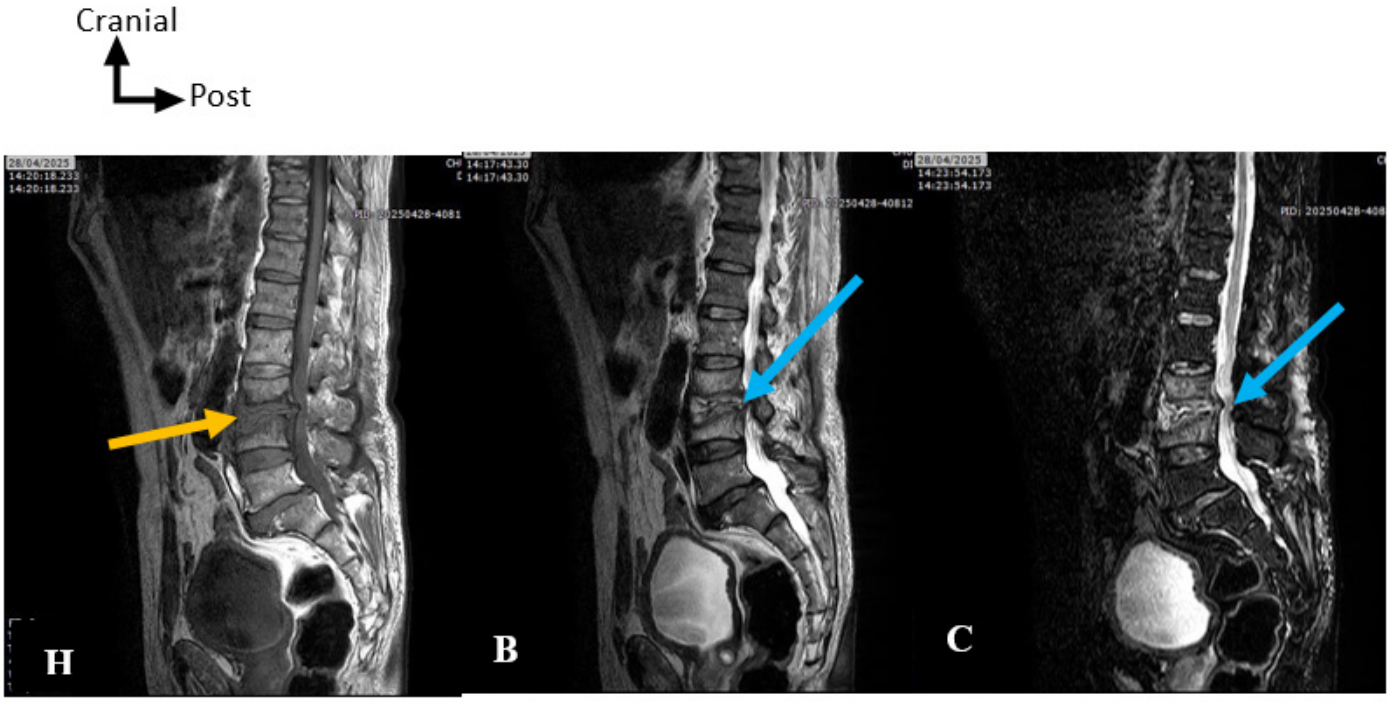

Figure 4: Sagittal MRI image in T1(A), T2(B) and T2 STIR(C) weighted sequences highlighting mirror erosion of the adjacent vertebral endplates of the L3-L4 disc (orange arrow) with epiduritis (blue arrow) responsible for spinal cord compression (blue arrow).

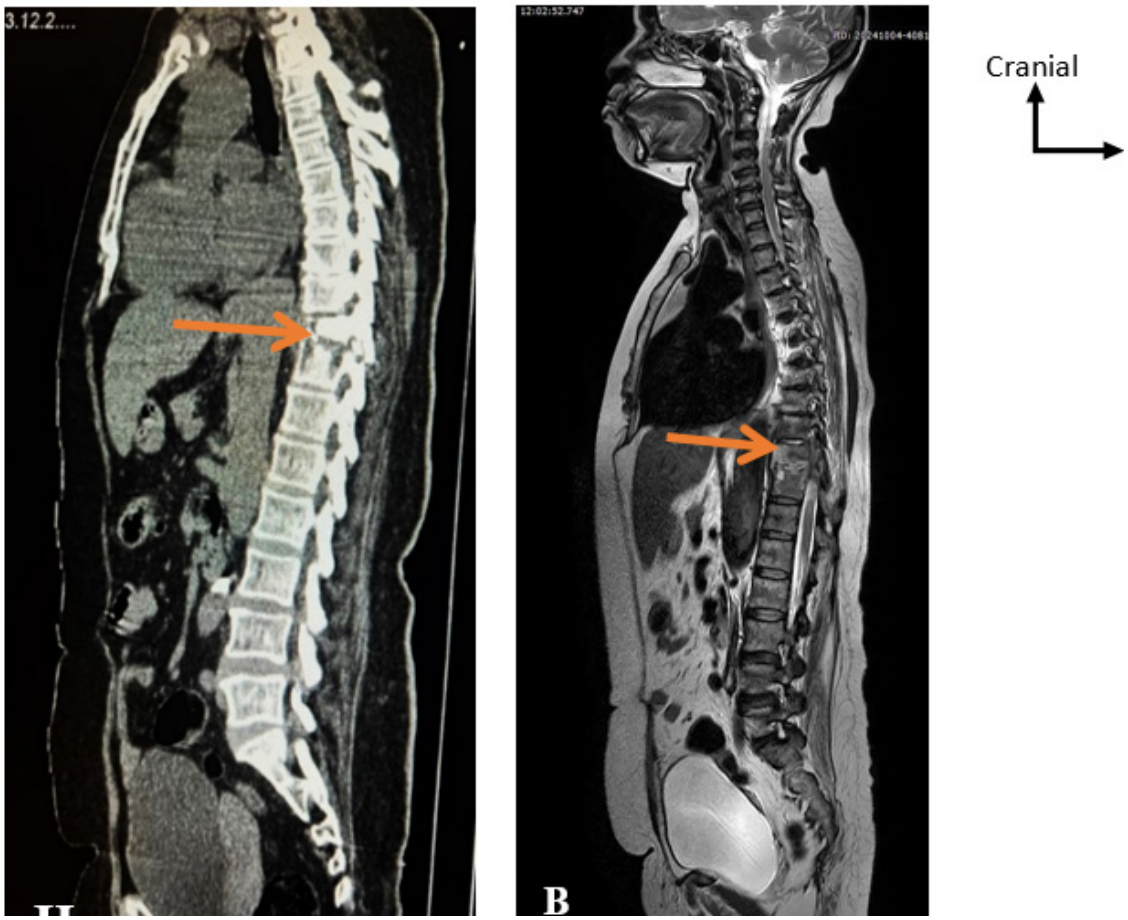

Figure 5: CT scan of the spine in sagittal reconstruction and parenchymal window (A) showing osteolysis of T9, T10. MRI of the spine in sagittal section T1 weighted sequence of the same patient (B) showing mirror erosion of the vertebral endplates adjacent to the disc Th9-Th10 and Th10-Th11 with somatic vertebral osteolysis of Th9, Th10 and Th11.

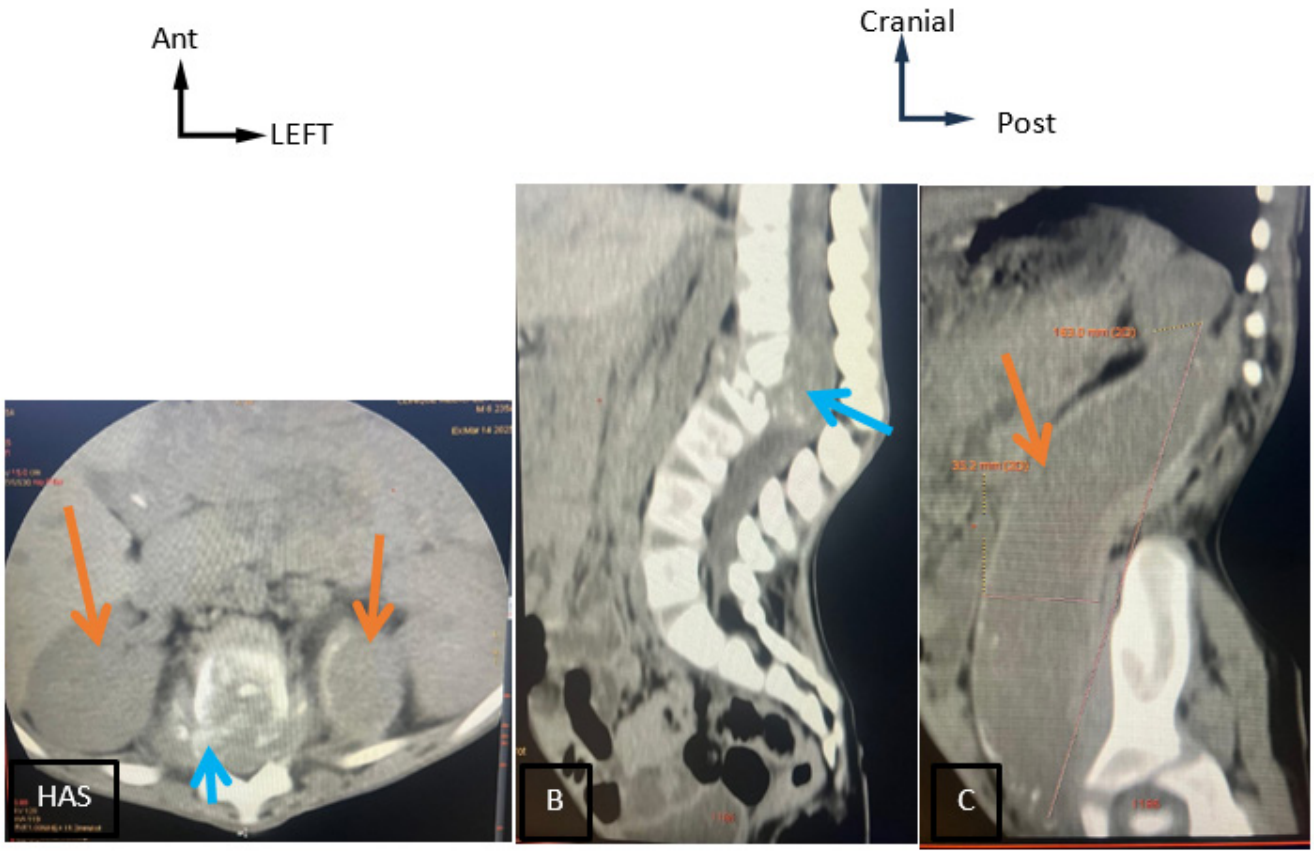

Figure 6: CT scan of the lumbar spine in axial section (A) with sagittal reconstructions (B and C) in parenchymal window without injection showing lumbar kyphosis with epiduritis and spinal cord compression (blue arrow) and a bilateral paravertebral collection taking up the entire psoas (orange arrow) in a 7-year-old child.

DISCUSSION

The frequency of Pott's disease was 0.52%, while Traore M (in 2021) and Tiama A (in 2023) found frequencies of 3.77% and 4.2% respectively [12,17]. Berthé AD (in 2016) found a frequency of 7.63% in his study[18] These results show on the one hand a reduction in the rate of Pott's disease in our country and on the other hand this difference could be explained by the sampling or the study population; in our context the population was any patient admitted for CT or MRI of the spine which was not the case in the specialized clinical/surgical departments.

In our study, the 40-59 age group was the most represented, with a mean age of 44.35 years and a standard deviation of 16.85, covering extremes ranging from 2 to 78 years.This result is similar to those of Hida et al. and Traoré M, who observed a mean age of 41 years and 41.1 years respectively in their studies [12,19]. These data indicate that Pott's disease primarily affects adults, although pediatric and geriatric cases may exist (as evidenced by the age range of 2 to 78 years). The high standard deviation (16.85 years) suggests significant variability in the age distribution. This could be explained by different risk factors across populations (the resurgence of HIV, promiscuity, weakened immune systems, and living conditions).

The results of our study show a male predominance, with 61.7% males and a sex ratio of 1.6. This result corroborates those of Gbané-Koné et al. and Toloba Y et al., who observed sex ratios of 1.2 and 1.3, respectively, in their studies.[3,11]These data reflect a male predominance of Pott's disease.
Progressive and localized spinal pain is the most frequent clinical sign in tuberculous spondylodiscitis[19]In our study, it was the main clinical sign observed in 97.3% of cases, Gbané-Koné et al.[3]had found 100% of cases of spinal pain. However, Fadiga S. found a different rate than ours, 36% of cases in his study[20]According to a review of the literature, spinal pain is the primary symptom of tuberculous spondylodiscitis, although its intensity and frequency vary among the populations studied [19].

The tuberculin skin test (TST) is a crucial diagnostic tool, but a negative result does not rule out Pott's disease. It was performed on all our patients, with a 76.7% positivity rate. Our results corroborate those of Berthé AD in Mali and Coulibaly SR in Ivory Coast, who found 69% and 79.5% positivity rates, respectively [18,21]. HIV serology and sputum smear testing for Mycobacterium tuberculosis were not systematic in our study. They were, however, invaluable in understanding the pathophysiology of co-infection with tuberculous spondylodiscitis, as reported in the literature.

MRI has become the gold standard examination in the field of bone infection, and more specifically disc-vertebral infection [22]. In our study, it was performed in 20.5% of cases. Our result differs from those ofGbané-Koné et al.[3],who had observed an MRI rate of 6.6% of cases. CT was the most frequently requested imaging examination, at 76.7% of cases. The result of our study is lower than that of [3], 83.6% of patients had undergone a CT scan. This data indicates that CT and MRI are the primary imaging modalities used in the diagnosis of Pott's disease.

The lumbar region was found in 45.2% of cases. This result is similar to that of Zermouni R et al.who had found 46.57% [22]. Fedoul et al. andTraoré M had respectively found 52.4% and52.9% of lumbar localization in their studies [12,23]. In the literature, several authors agree on the lumbar predominance in Pott's disease [23].

In our study, bi-level involvement was the most common, at 58.9%. Our result is higher than that of Gbané-Koné et al., who found 19.5% bi-level involvement [3] However, in the study by Traoré M, single-level involvement predominated, accounting for 64.7% of cases [12].This difference could be explained by the recruitment of patients at a more advanced stage

in our context, or by the use of MRI, allowing detection of discrete extensions.

Mirror erosion and vertebral destruction are the most frequent lesions in tuberculous spondylodiscitis [13,21]. Disc narrowing is the earliest sign, observed in 58.4% of cases in our study. Vertebral destruction and mirror erosion were observed in 56.1% and 75.3% of cases, respectively. From these results, we can therefore conclude that disc narrowing, vertebral destruction, and mirror erosion are the main CT and MRI findings in the diagnosis of Pott's disease.

All anatomical elements of the posterior arch (pedicles, laminae, spinous processes, transverse processes) can be affected by tuberculous infection. Thus, in our study, osteolysis of the pedicle was the most common manifestation of posterior arch involvement, at 54.5%. However, a negligible percentage of 0.86% of posterior arch involvement was reported in the study by [3].

Paravertebral abscess was the main complication, occurring in 34.2% of cases. This rate is similar to those reported by Fadiga S and Ahoury N, who found 28% and 32% paravertebral abscess rates, respectively, in their studies [20,24]. These results demonstrate the sensitivity and specificity of CT and MRI in the investigation of paravertebral abscesses.

CONCLUSION

This study allowed us to illustrate that Pott's disease is rare but still occurs in our region. Young adult males were most affected, especially those living in rural areas. CT scanning was the primary imaging modality used. Imaging (CT and MRI) allowed us to assess the extent of the lesions. Lumbar involvement was predominant, and the main complications were paravertebral abscess and spinal deformity.

Conflicts of interest

No conflict of interest to declare.

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Author contributions

All authors contributed equally to the conception, execution, and writing of this work. They have read and approved the final version of the manuscript.

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