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Radiological Evaluation Of Extra Pulmonary Tb

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Abstract
Introduction
Tuberculosis is a very common disease in our country more commonly in lower socio echonomic people .
Extra Pulmonary TB refers to TB involving organs other than the lungs (e.g. lymph nodes, abdomen, genitourinary tract, skin, joints and bones, or meninges)
Extra-pulmonary tuberculosis (EPTB), caused by Mycobacterium tuberculosis, is the leading cause of communicable disease-related deaths in people. Mycobacterium tuberculosis disseminates haematogenously from an active primary lung focus and may affect extra-pulmonary sites in up to 15% of patients. Extra-pulmonary TB may present with a normal chest radiograph, which often causes a significant diagnostic dilemma. This review describes the main sites of involvement in EPTB, which is illustrated by local imaging examples.
Material and Methods:
Study will be conducted in GCS Medical College, Ahmedabad patients who has complains related to extrapulmonary TB like fever,weight loss,convulsion,pain,diarrhoea.
Out of 50 patients, 30 were females and 20 were male patients. Among these 8 patients had HIV infection. Most common findings were lymphadenopathy, bowel wall thickening and ascitis.
Result:
The most frequent sites of EPTB include the lymph nodes, peritonitis and the ileocaecal, hepatosplenic, genitourinary, central nervous system (CNS), and musculoskeletal involvement.
Population groups with an increased risk of TB include immunocompromised individuals (AIDS, lymphoma, leukaemia, post-organ transplant), diabetics, children, the elderly, alcoholics, persons with a low socio-economic status, persons with poor compliance, immigrants from developing countries, prisoners, nursing home residents, health care workers, and the homeless
Extrapulmonary TB may occur in multiple sites, with relative frequencies of 42% for lymphatic, 18% for pleural, 12% for bone or joint, 6% for genitourinary, 6% for meningeal, 5% for peritoneal, and 11% for other sites

Keywords: *circulatory system,chest radiograph , extra-pulmonary TB, organ systems.*

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I. Introduction

Worldwide and in India , tuberculosis (TB), a communicable airborne disease caused by *Mycobacterium tuberculosis*, remains the leading cause of death, followed closely by circulatory system diseases. In addition, it is one of the main causes of mortality amongst patients with human immunodeficiency virus (HIV) infection worldwide.(1 ,2)

Tuberculosis predominantly affects the lungs; however, in up to 15% of patients, extra-pulmonary sites may be involved. Extra-pulmonary tuberculosis (EPTB) may be the result of haematogenous dissemination from an active primary focus in the lung to other organ system(s) in the body, and this may present years after the initial pulmonary infection A normal chest radiograph or negative laboratory tests do not exclude EPTB, a diagnosis that necessitates a high index of suspicion, especially when the patient also tests HIV positive.(1 ,2)

This review briefly outlines the main radiological findings of TB in extra-pulmonary sites, of which pleural and lymph node involvement was found to be the most prevalent in this research setting.

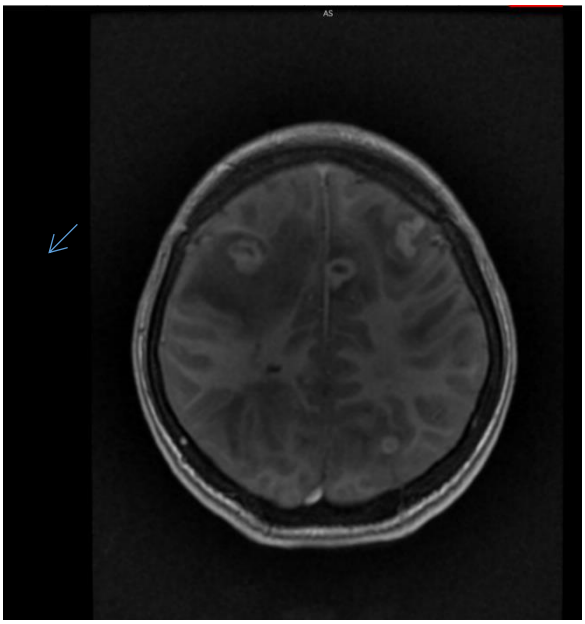
Central nervous system tuberculosis

Tuberculosis may involve the parenchyma, meninges or spine.

Parenchyma

Parenchymal tuberculosis can result from direct spread of infection via the cerebrospinal fluid (CSF) or haematogenous dissemination.(3,4)

A tuberculoma – also known as the TB granuloma – is the most frequent manifestation of parenchymal involvement, with both computed tomography (CT) and magnetic resonance imaging (MRI) signal characteristics depending on the stage of infection. Tuberculomas, whether caseating or non-caseating, are usually surrounded by moderate to marked oedema on all modalities. Tuberculomas may be hypo- or hyperdense on uncontrasted CT and reveal avid, homogeneous or rim enhancement on post-contrast CT. At MRI, the non-caseating granulomas are T1-weighted (T1W) hypointense and T2-weighted (T2W) hyperintense with solid, homogeneous T1W post-Gadolinium-contrast enhancement. A solid caseating granuloma is hypointense on both T1W and T2W sequences, and reveals ring enhancement. Caseating granulomas demonstrate diffusion restriction, with hyperintense signal at diffusion-weighted imaging (DWI) and corresponding hypointense signal on apparent diffusion coefficient map (ADC), because of their central viscous nature.

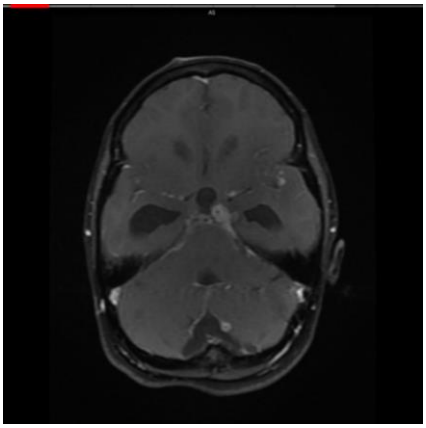


we can see there is few ring enhancing lesions are seen with perilesional edema suggestive of - TUBERCULOMA

A tuberculoma may rarely progress to a tuberculous abscess. A tuberculous abscess is usually solitary, can become very large, is often multiloculated with rim enhancement on post-contrast imaging and surrounded by marked oedema on all modalities. On MRI, a tuberculous abscess is hypointense on T1W, hyperintense with a hypointense rim on T2W and reveals rim enhancement on T1W post-gadolinium-contrasted imaging.(5,6,7)

Infarcts typically involve the deep grey nuclei, that is, basal ganglia, thalamus and internal capsule.(5,6,7)
Meninges

Meningeal spread occurs because of either rupture of a subpial focus or haematogenous spread via the meningeal vessels, resulting in a thick basal leptomeningeal exudate that enhances avidly on post-contrast imaging. Dural involvement with pachymeningitis is also possible.



On post contrast study we can see basal lepomeningeal enhancement suggestive of - MENINGITIS

The sequelae of meningeal involvement include hydrocephalus, infarcts, vasculitis and cranial nerve palsies. Hydrocephalus is caused by reduced CSF absorption at the level of the arachnoid villi. Cerebrospinal fluid analysis and typical imaging findings aid in distinguishing tuberculous meningitis from other infective aetiologies.(7,8)

Spine

The bacilli spread haematogenously via Batson's venous plexus or as a result of reactivation of dormant foci.In severe cases, multiple microabscesses may be scattered throughout the spine with involvement of the meninges .

The spine is the most common site of musculoskeletal involvement, with the lower thoracic and upper lumbar spine being the most frequently affected sites. Classical findings of tuberculous spondylitis (Pott disease) are contiguous involvement of more than one vertebral level, with a predilection for the anterior vertebral body adjacent to the end plates. Involvement of the posterior elements is rare in comparison with the end plate changes. Presentation with ivory vertebra or complete vertebral collapse (plana) is possible.(6,8)

Subsequent spread of infection is beneath the anterior or posterior longitudinal ligament or through the vertebral end plates Paraspinal and extradural soft tissue and gibbus formation are the most common findings reported. On MRI, the paraspinal or subligamentous abscesses demonstrate T2-weighted (T2W) hyperintense and T1W hypointense signal.

There is presence of ill defined altered signal intensity collection is seen arising from dorsal vertebra and extending into prevertabral space suggestive of TB SPINE

Extradural abscess may cause cord compression with neurological fallout. Psoas abscess formation with possible associated calcifications is often a clue to the diagnosis.

Mycobacterium tuberculosis preferentially affects end plates, with relative sparing of the intervertebral disc, whilst pyogenic infection affects the intervertebral disc during the early stage of the disease. Metastases typically involve the posterior elements more commonly with expansion of the vertebral body.

Arachnoiditis

Arachnoiditis is characterised by clumped, thickened, and enhancing nerve roots adherent to the dura, with CSF loculation and attenuation of the CSF spaces as typical features on both CT and MRI.

Head and neck tuberculosis

The lymphatic system is the second most common extra-pulmonary site affected by TB in this study setting. The most common presentation is matted, painless lymphadenitis (scrofula), with only mild inflammatory superficial skin changes. Cervical lymph nodes are typically involved.Central necrosis is a typical finding and may be seen as hypoechoic lymph node centres on ultrasound and low-density central attenuation on CT, depending on the degree of caseation, with possible rim enhancement on post-contrast imaging .(8)

Paradoxical transient nodal enlargement during treatment is usually observed in HIV patients.Lymphoma and other infective causes of lymph node enlargement must be excluded, usually by fine needle aspiration or core biopsy of the involved lymph nodes.

The sinonasal cavity, larynx and glottis may also be involved, with non-specific imaging findings.

Breast tuberculosis

Breast involvement occurs rarely, with the most frequent presentation being a hard painless mass or mastalgia in a young, multiparous woman. Sinus tracts and abscesses are the associated findings.

Three types of breast involvement are recognised: nodular, diffuse and sclerosing. The nodular form presents as a dense round area, which represents a caseating lesion, whilst the diffuse form leads to sinus tracts and ulceration. Fibrosis with nipple retraction is the dominant feature of the sclerosing form.

Cardiovascular tuberculosis

Pericardium

Spread of infection to the pericardium may occur via haematogenous dissemination or direct thoracic lymph node extention. The typical findings include a globular cardiac configuration on chest radiography related to pericardial effusion, with late-stage pericardial calcifications .

Echocardiography may demonstrate effusion. Slow accumulation of pericardial effusion is typically seen without tamponade. Mild pericardial thickening and enhancement may be evident on CT .

Constrictive pericarditis is a consequence of pericardial involvement, with typical pericardial calcifications seen at chest radiography.

Myocardium

Although very rare, three types of involvement are recognised, which include the miliary, infiltrating interstitial and caseating nodular types.

Aortic

Secondary involvement from contiguous mediastinal lymphadenopathy, empyema, pericarditis or haematogenous dissemination. Pseudo-aneurysms may occur because of contiguous vertebral involvement.

Abdominal tuberculosis

Spread of infection may occur via ingestion of mycobacteria, haematogenous dissemination, contiguous spread from adjacent organs or lymphatic involvement.

Peritoneal involvement

Three types of peritoneal involvement can occur, namely, the wet, fibrotic and dry. The wet type is the most common, presenting as free ascites or loculated pockets of high-protein content fluid. The dry type leads to fibrous adhesions with mesenteric thickening. The fibrous type may manifest as omental or mesenteric masses.(9,10,11).

Omentum

Omental involvement may result in a combination of omental caking or mass formation.Differential diagnosis includes carcinomatosis in the case of a known primary neoplasm or mesothelioma, if possible asbestos exposure is present.

Lymph nodes, liver and spleen

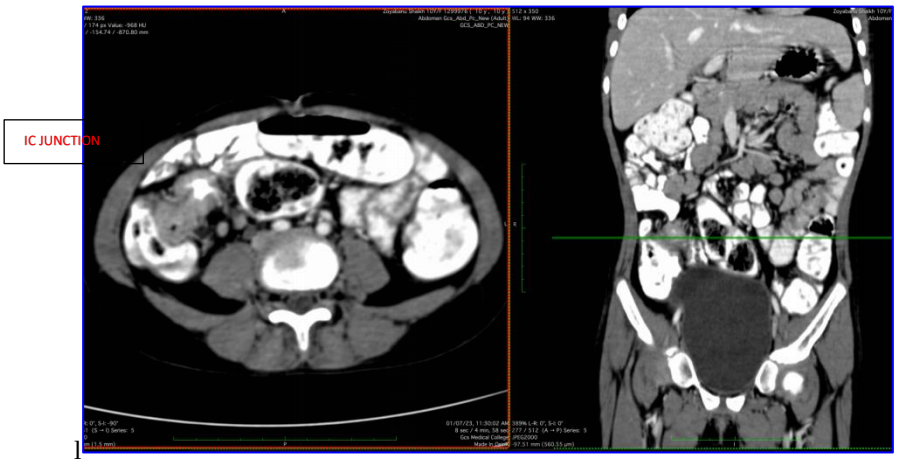
Intra-abdominal lymph nodes demonstrate the typical low-density, central caseous necrosis and rim enhancement at CT, similar to lymph node involvement in the neck or chest. Hepato-splenic involvement may be in the form of organomegaly, with micro- or rarely macroabscesses, which can calcify (12, 13)

There is presence of well defined hypodense lesion with central necrotic areas are seen in paraaortic region suggestive of - TB NODAL ABSCESS

Gastrointestinal tract

There is a predilection for the terminal ileum and caecum, with acute findings including mural thickening, narrowed terminal ileum and adjacent lymphadenopathy (often necrotic).

A widely gaping, iliocaecal valve (Fleischner sign) and a shrunken conical caecum are seen in the chronic stages. Differential diagnoses include Crohn's disease and lymphoma



Diffuse circumferential bowel wall thickening is noted at ileocecal junction in a k/c/o tuberculosis suggestive of - ILEOCECAL TB

Adrenal glands

The adrenal glands typically demonstrate bilateral involvement. There is gland enlargement and rim enhancement with central low-density necrosis in keeping with adrenalitis.The acute gland enlargement may either resolve or lead to small, dystrophic calcified glands.

Tuberculosis is the most common cause of Addison's disease and the patient may present with an acute Addisonian crisis

Genito-urinary

Irregular renal cortical calcifications and focal caliectasis are the common findings. Other possible findings include renal papillary necrosis, ureteric stenosis (pipe stem), ureteric calcifications and pelviureteric junction narrowing (Kerr's kink). Renal atrophy with ground glass calcifications are late sequelae (12 ,13 ,14)

Bladder wall irregularity, with peripheral calcifications and a small-volume ('thimble') bladder, may be found, which may result in vesico-ureteric reflux with hydronephrosis related to fibrosis at the ureteric orifice. (15 , 16)

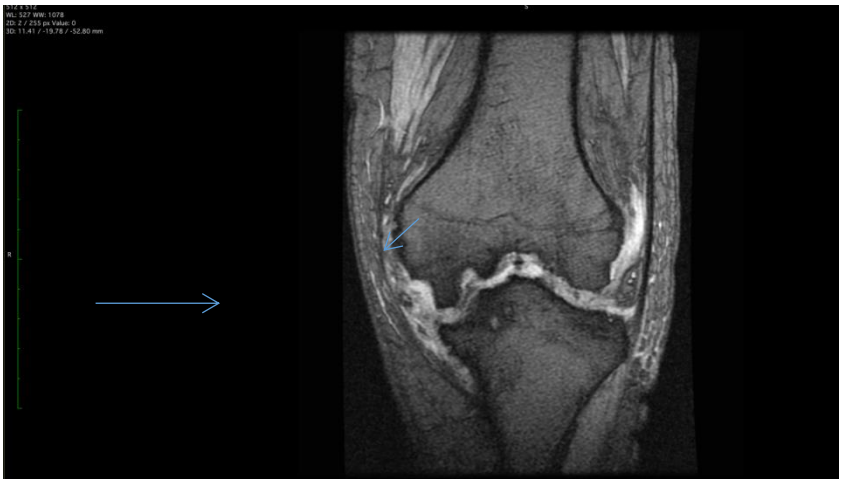
Epididymal and testicular involvement may cause epididymo-orchitis. Seminal vesicles and vas deferens may be affected with wall thickening or calcifications. Prostatic involvement may take the form of abscess or prostatitis. Diffuse dystrophic calcification is seen in the chronic form.

Salpingitis, with a fallopian stricture, typically occurs at the junction of the isthmus and ampulla.Endometrial adhesions or synechiae formation may develop.

Musculoskeletal

Monoarthritis of weight-bearing joints is common.Patterns of involvement include spondylitis, tuberculous arthritis – knee), osteitis or osteomyelitis soft tissue involvement, bursitis , tenosynovitis and dactylitis. Periarticular osteopenia, marginal erosions and subtle joint space loss are seen with articular involvement and are called the Phemister triad. A recent case series by Swarap et al. demonstrates atypical sites of musculoskeletal involvement, and emphasises the need for maintaining a high index of suspicion in order to make the correct diagnosis. (17, 18)

There is presence of ill defined altered signal intensity area with destruction of adjacent articular cartilage is seen involving proximal and middle phalangeal joint surface suggestive of - TB DACTYLITIS



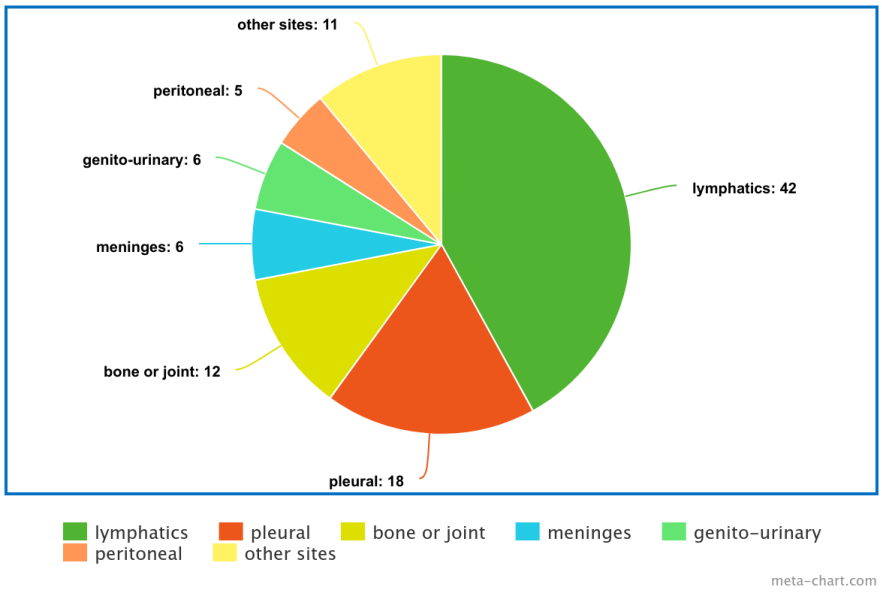
Ill defined infectictive joint effusion is seen with erosion of articular surface suggestive of -TB KNEE TUBERCULAR ARTHRITIS

II. Result

Number of extrapulmonary TB patient according to age

0 - 10 yrs	9	18%
10-20 yrs	12	24%
20-30 yrs	12	24%
30-40 yrs	4	8%
40-50 yrs	7	14%
50-60 yrs	6	12%

Out of 50 patients, 30 were females and 20 were male patients. Among these 8 patients had HIV infection. Most common findings were lymphadenopathy, bowel wall thickening and ascites



Extrapulmonary TB may occur in multiple sites, with relative frequencies of 42% for lymphatic, 18% for pleural, 12% for bone or joint, 6% for genitourinary, 6% for meningeal, 5% for peritoneal, and 11% for other sites

1	LYMPHATICS	42%	21
2	PLEURAL	18%	9
3	BONE OR JOINT	12%	6
4	MENINGES	6%	3
5	GENITO-URINARY	6%	3
6	PERITONEAL	5%	3
7	OTHER SITES	11%	5

According to study of **Tajeldin M Abdallah Et al** lymphatic were involves in 35 % cases while out study have 42% cases.

Most commonly involved nodes are cervical followed by mediastinal and axillary nodes

According to study of **Marrier R Griffin Et al** the pleural involvement was seen in 27% of caes and in our study it is seen in 18 % of the caes.

In present study bone and joint involvement is seen in 12 % of cases which is seen in 11.7% of caes in a study carried by **Marrier R Griffin Et al .**

Most commonly involved bone is lower thoracic and upper lumbar vertebra in adults where in children most common upper thoracic vertebra is involved. Bone and joint involvement is seen more commonly in HIV patient , as in present study 3 out of 8 patients have bone involvement.

According to study conducted by **Holt Erin et al** the meninges were involved in 4.2% caes and genitourinary system is involved in 5.5% caes while in present study the meninges and genitourionary system is involved in 6% of cases.

The most common CNS presentation of TB is Meningitis followed by tuberculoma , tubercular brain abscess and pott's spine

III. Conclusion

Tuberculosis remains a common diagnosis made on a daily basis by radiologists in South Africa, and hence, is known to be a silent pandemic when misdiagnosed. Extra-pulmonary TB remains underdiagnosed, with patients often presenting at advanced stages of the disease with extensive destruction of the organ system(s) involved, which is mainly because of the stigma and its association with HIV infection.

Tuberculosis is known as the great mimicker and remains the leading cause of communicable-disease-related deaths in our country. It must be considered as a differential when evaluating patients with sequelae of chronic infection in all pandemic areas.

Conflicts of interest : none