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Osteo-articular tuberculosis

La tuberculose ostéo-articulaire

Auteurs : Annabi H., Abdelkafi M., Trabelsi M.

Orthopaedics & Traumatology Department. Aziza Othmana Hospital - Tunis- Tunisia

RÉSUMÉ

La tuberculose ostéoarticulaire, connaît à l'instar des localisations tuberculeuses extra pulmonaires, un regain de fréquence ces dernières années. Le polymorphisme clinique et radiologique de la tuberculose ostéoarticulaire rend compte des difficultés diagnostiques. La Tunisie reste encore un pays d'endémie tuberculeuse. Le diagnostic de Mal de Pott doit être suspecté devant toute lombalgie chronique de type mixte chez des patients parfois en bonne santé apparente. La radiologie standard reste incontournable surtout si elle met en évidence des lésions typiques (pincement discal, destruction et tassement des corps vertébraux, aspects de reconstruction et abcès). La TDM et l'IRM montrent des lésions évocatrices de tuberculose vertébrale. L'étude tomographique en fenêtre osseuse et parties molles constitue le meilleur moyen pour étudier le degré de destruction osseuse et pour guider les biopsies à visée diagnostique. L'IRM est plus sensible que les autres examens dans le diagnostic de la tuberculose vertébrale. En permettant des coupes multiplanaires en T2 et T1 sans et après injection de produit de contraste et une excellente résolution anatomique, l'IRM constitue la meilleure exploration pour l'étude des atteintes médullaires et des abcès Pottiques. La preuve formelle de la nature tuberculeuse des lésions n'est pas toujours facile à obtenir vu le caractère pauci bacillaire et la lenteur des cultures d'une part et les aspects parfois incomplets de l'étude histologique d'autre part, avec une nécrose caséuse discrète voire absente et une organisation folliculaire inhabituelle. Le traitement médical long et contraignant reste efficace, cependant l'émergence de souches multi résistantes aux antituberculeux majeurs, dans certaines régions du monde, doit inciter à garder un haut degré de suspicion et à une plus grande rigueur dans les efforts de prévention de la tuberculose en général.

ABSTRACT

During the two last decades, we have seen a big recrudescence of extra-pulmonary tuberculosis particularly bone and joint localizations. Because of variability of its clinical and radiological signs, diagnosis of osteo-articular tuberculosis is often difficult. Because Tunisia remains an endemic country, diagnosis of Pott's disease must be suspected in patients with a chronic history of mixed-type lumbago. X-rays are sometimes useful when they show typical hurts like plucking disc, destruction and collapse of the vertebral bodies, aspects of reconstruction and abscess. Computed tomography is the best imaging technique in studying osseous destruction. It permits also to guide diagnostic biopsies. MRI is more sensitive than radiographic and more specific than scintigraphy in vertebral localization. With its high 3D anatomical resolution, MRI is very sensitive in analysing the pottic abscess and spinal cord compression. The bacteriological cultures contain a low rate of Koch bacillus which needs a long period to grow. Histology studying is sometimes insufficient with a discreet caseous necrosis. Follicular organization is unusual. In doubtful cases and when diagnosis is not certain, computed tomography and MRI are very helpful when showing suggestive lesions of vertebral tuberculosis and justifying starting of medical treatment. Anti-tuberculosis antibiotics are often effective. However, in certain countries we have seen recently emergence of multi-resistant bacillus. More effective prevention strategy has to be developed.

MOTS CLÉS

tuberculose, spondylodiscite, mal de Pott, ostéo-arthritis

KEYWORDS

tuberculosis, spondylodiskitis, Pott's disease, osteoarthritis

Correspondance

Hedi ANNABI
Service d'Orthopédie et Traumatologie - Hôpital Aziza
Othmana. La Kasbah - Tunis
E-mail : annabihadi@yahoo.fr

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INTRODUCTION- DEFINITION

The Osteo-Articular Tuberculosis (OAT) is defined by all the pathologic manifestations, following the localisation of Koch's bacillus (KB), at the structures constituting the locomotor's system.

The OAT is frequent in developing countries, and the surgeon, whether orthopaedist or not, in these countries is often confronted with problems inherent to the diagnosis and treatment of this affection.

Though it has become exceptional in industrialised countries, it has not been totally eradicated as it concerns, more and more, the elderly people or the immune-depressed (AIDS).

Nowadays, the treatment is essentially medical, based on the anti-tuberculosis antibiotic therapy. In the majority of cases, this allows the stabilisation and the recovery of the tubercular lesions.

HISTORICAL BACKGROUND

The clinical description of the vertebral tuberculosis is attributed to Sir Percival Pott who, around 1782, described a clinical feature combining a spinal kyphosis associated with abscesses and paraplegia.

Delpech, in 1819, established the existence of tubercles in Pott's disease.

Woster, in 1869, discovered the tubercular follicles.

In 1882, the aetiology of the pathology was identified owing to the discovery of the tubercular bacillus, by Robert Koch.

At the beginning of the century, tuberculosis was one of the first causes of mortality.

The epidemiology of the tuberculosis and the OAT have been radically modified thanks to the advent of antibiotics (streptomycin since 1945 and the other major anti-tuberculosis in 1950's).

The OAT treatment has thus undergone radical changes with a decrease in the occurrence of the disease, a positive result due both to the preventive BCG vaccination, and the systematic treatment of the primo-infections.

EPIDEMIOLOGY

At the era of anti-Tuberculosis therapy, based on antibiotics, the OAT has a rate of 3 to 5% of all the tuberculoses, and of 9 to 20% of extra-pulmonary tuberculoses.

In countries, with high incidence of tuberculosis, including Tunisia, (27.07 cases / 100.000 inhabitants in 1995); the OAT affects both the young adult and the child.

In industrialized countries, a re-increase of the number of tuberculosis cases has been noticed since 1985, because of the infection by the HIV, on the one hand and the re-activation of old primo-infections, among the elderly persons, on the other one.

A factor of immune-depression is found again in 29% of the cases, such as the chronic alcoholism, above all hepatic cirrhosis, a prolonged corticotherapy, cancerous

pathologies with their treatments, sugar diabetes, chronic kidney insufficiency (Fig 1)



Figure 1 A child with agranulocytosis presenting pulmonary aspergillosis and dorsal spondylitis.

TOPOGRAPHICAL DISTRIBUTION

If the age, the field, and the occurrence circumstances have been influenced by the progress of the treatment, the topographical distribution of the OAT has remained unchanged for a long period.

The spinal tuberculosis or Pott's disease remains frequent with a rate of 39 to 54% of the OAT.

PATHOGENESIS**Tubercular Bacillus Recalling**

Only *Mycobacterium hominis* and *bovis* have been found again in osteo-arthritis tuberculosis.

The tubercular bacillus or Koch's bacillus is acid-alcoholic resistant and strict aerobe: its multiplication demands an oxygen tension close to the one of the air. It has a very slow multiplication.

Evolution and Contamination Modes

Three stages have been identified by Ranke in the course of the tuberculosis natural history:

- The initial phase corresponds to the penetration and fixation of KB in the virgin structure. It is usually aerial. From the alveolar inoculation chancre, the dissemination occurs either via lymphatic relays or a haematogenous canal. Several cases exist where the primary complex (chancre - adenoiditis) heals without any clinical manifestations. The apparition of hypersensitive reactions to the tuberculin, within the following 3 to 6 weeks, proves the bacillary localisation.
- The secondary phase can immediately follow or happen after a variable delay. It is expressed through a haematogenous dissemination starting from the primary complex or via a re-infestation which is responsible for visceral localisations. At this stage, the osteo-arthritis can, above all, concern both the young adult and the child under the shape of bacillema episodes.
- The tertiary phase happens fairly later at the occasion of a re-infestation which contaminates again, the system, or simply by a re-activation of tubercular foci which have been latent till the manifestation.

Natural History

The OAT evolves in the child's body in a cyclic way. Mazabraud has distinguished 3 phases with a total duration, ranging from 3 to 5 years:

- The Starting or Attack Phase: The KB's localisation can be done either at the level of the synovial (synovitis tuberculosis) or at the level of the juxta articular bone (metaphyso-epiphysal osteitis). This phase is characterised by the absence of macroscopic destructions.
- The phase of destruction: All the elements of the articular structure are concerned about the tubercular process; the bone is invaded by geodes filled with pus moving towards the cavity, the cartilage collapses under both the ischemic phenomena and the bacillary synovitis aggression. The destruction of the joint means, such as the capsules and the ligaments, is responsible for instability and offsetting, while the soft parts are invaded by fistulae and cold abscesses.
- The phase of reparation: It usually occurs one or two years later if the osteo-arthritis remains untreated. The abscesses heal and the fistulae dry up leaving fibrous sequels which cause the retraction of the soft parts. This reparation is incomplete, circumscribing tubercular focuses where mycobacterium can subsist for a long time. The destruction of the chondritis plate and the revival of epiphyses prove the existence of late ankyloses considered, before the advent of anti tubercular chemotherapy, as the unique real guarantor of the healing.

With the adult patient, the cyclic evolution is less distinct, the abscesses are more frequent and their apparition is earlier than that of the child, the deformations, once set, worsen quite a little with time. The spontaneous fusion never happens, that is why relapses are frequent.

Which modification have been brought forth by the anti tuberculosis chemotherapy to the evolving scheme?

- It stops the destructive process at the stage of the diagnosis and heals tuberculosis.
- It never repairs the anatomic destructions, what has been destroyed, remains as it is for ever.
- Among adult patients, it favours the bone fusion which has become extremely rare with children.

CLINICAL STUDY

The clinical symptoms differ both according to the localisation and the evolution phase of the lesion and the patient's age.

However, there exists a certain number of common aspects to all the lesions which, when encountered, evoke tuberculosis.

The insidious installation of the symptoms explains the usual difficulties of the diagnosis, and the long delays - ranging from 2 months to 7 years - which have been engendered.

Clinical Complaints

- The pain which is the key symptom of the progressive installation forms, and which keeps for a while a mechanical aspect.
- The swelling which is normal in superficial articulations, it goes along with both a local increased heat and modifications of the teguments' tint more often purplish-blue than whitish.
- The tumefaction can correspond to an inflammatory infiltration of the soft parts but also to a hydrarthrosis which should be thoroughly investigated for the analysis of the articular liquid.
- The amyotrophy is often rapid and intense, in contrast with the globular aspect of the damaged joint.
- The satellite adenopathy, inconsistent, usually voluminous, mobile and slightly painful.
- The abscess: a fluctuating mass, voluminous enough to attract the concerned person's attention, cold and painless, it can be perceived close to the tubercular focus, drifting according to its weight (Fig 2).
- The fistula, classically, it is an ulceration with flat edges, irregular and purplish-blue. The course is sinuous, difficult to be spotted by a grooved probe. The pus which flows is brownish-yellowish, clotted and tinged with blood. The fistulization, on the cold abscess surface, is a serious complication due to the over-infection of the tubercular focus.
- The deformation, being isolated, is frequently the cause which urges the patient to go to the doctor: a discreet swelling, a permanent knee flex, a vicious attitude of the hip followed by lameness...

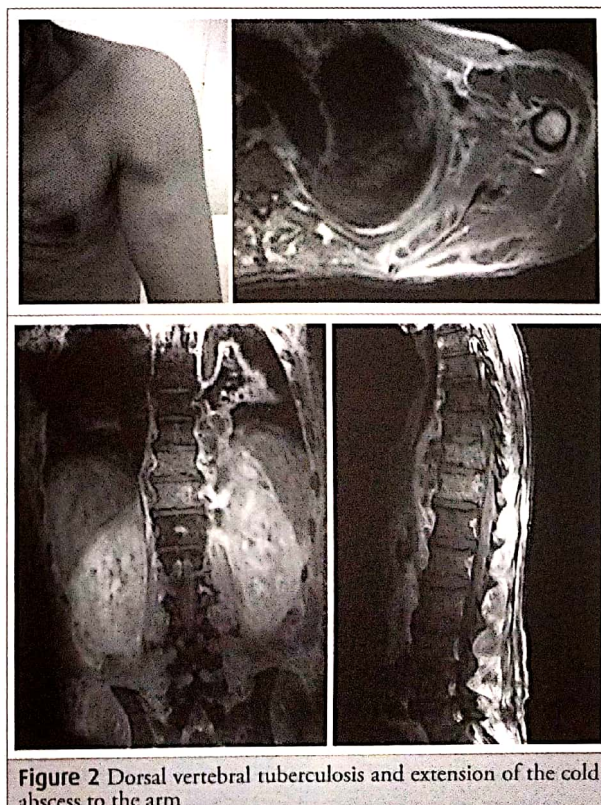


Figure 2 Dorsal vertebral tuberculosis and extension of the cold abscess to the arm

General Symptoms

They combine, at variable degrees, symptoms of the classic tuberculosis "impregnation" such as a loss of weight, evening febricula that rarely overpasses 38°, anorexia and progressive alteration of the general health state.

The physical signs are less easy to sum up because their characteristics depend essentially on the localisation. Nevertheless, whatever the symptomatic richness of the clinical examination can be, whether it is a starting lesion or an already destructive one, it is evident that none of the symptoms, described in the previous pages, can be pathognomonic of the tuberculosis.

VERTEBRAL TUBERCULOSIS

It remains a frequent disease. It is the most frequent localisation of the osteoarticular tuberculosis (50% for Kassab)

This spine localization corresponds to a spondylodiskitis or Pott's disease which is very often characterised by the damage of the intervertebral disk (IVD) along with the two adjacent vertebrae. The spondylitis is an osteomyelitis of the vertebral body and / or that of the posterior arch, without damaging the IVD, due to the seeding via the retro-corporeal arterial branches.

The segments which are mostly hit are the low dorsal and high lumbar, between T6 and L4 for Kassab. The cervical localization is rare, 4 to 15% of the cases. Multi-staged vertebral tuberculosis is in connection with a multi focal spondylitis, a serious form but happily fairly rare.

The gravity of the spinal localisation of tuberculosis lies with the risk of neurological complications which are visible in 10 to 47% of all the cases, ranging from the modifications of osteotendinitis reflexes to paraplegia.

Clinical Findings

A fundamental physical sign is the spine rigidity whose intensity is characterised by the Pott's disease of the child. It is very often at the appearing of a swelling that children are taken to the doctor. This swelling is more evident at the dorsal segment or at dorso-lumbar segment. A contracture of the Para vertebral muscles plus a pain at each pressure or percussion can be noticed.

The para vertebral abscess is frequent (57 to 70% of the cases), its discovery is of great importance for diagnosis. It is systematically researched in the retro-pharyngeal space area, in the dorsal or lumbar zone, in the buttock in Scarpa's triangle. The fistulization on the surface of Pott's abscesses is a serious complication due to the over infection of the tubercular focus; happily it is rare.

The neurological examination should be thorough in order to detect a radicular compression, sphincter troubles, deficient or pyramidal signs. The atloïdo-axodien (upper cervical spine C1-C2) tuberculosis comprises a severe torticollis, sometimes a trismus or dysphasia, and frequently a paralysis and/or a myelopathy.

Imaging (Fig 3)

It is important as it brings out anomalies which often evoke the diagnosis of a vertebral infection. However, these anomalies, unspecific to tuberculosis, do not allow a thorough diagnosis.

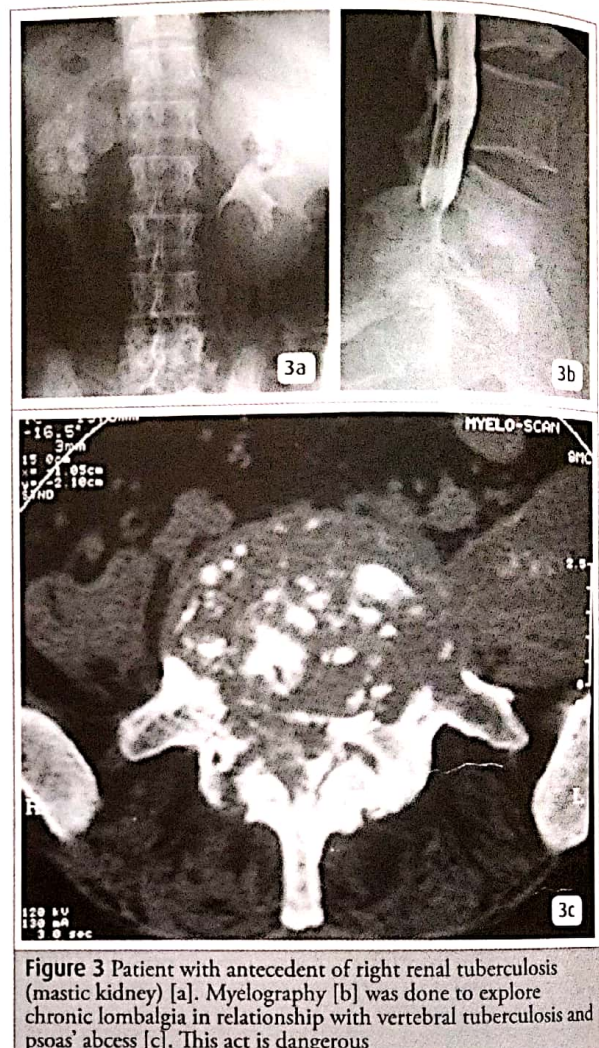


Figure 3 Patient with antecedent of right renal tuberculosis (mastic kidney) [a]. Myelography [b] was done to explore chronic lombalgia in relationship with vertebral tuberculosis and psoas' abscess [c]. This act is dangerous

Standard Radiographs

It remains the first examination. In 5 to 10% of all the cases it is normal.

- The earliest radiographic sign of the spondylodiskitis remains the IVD pinching. The second sign to appear is an attack of the vertebral plateaus which become blurred, eroded or erased. Then, the osteolytic affection extends into the vertebral areas with, sometimes with symmetric geodes, and intra-bone's sequestra. The perilesional osteo-condensation, typically discreet or absent, evokes a tubercular origin.
- The osteolysis, with an anterior predominance, can result in a cuneiform vertebral compression which, at the disappearance of IVD leads to a kyphosis whose angle can be over 30° in its most severe forms.
- The spondylitis causes, very often, a homogenous geodic- osteolytic lesion with clear cut and regular contours. It is typical centro somatic. These lytic attacks can lead to a cuneiform compression, responsible for a kyphotic angulation, a lateral compression



- at the origin of a scoliosis deformation or compression with a "pancake" shape
- The affection of the posterior arch is badly seen on the standard radiography (X Rays).
- An anterior sub-ligament abscess can lead to an erosion of the anterior face of one or several vertebral systems resulting in a Scallop aspect.
- The cold abscesses are radiologically detectable in 40 to 60% of the cases under the aspect of paravertebral opacities which can be the center of calcifications reminding of the tuberculosis' origin or even expelled bones'sequestra. At the cervical stage, the para-vertebral abscess detaches the aero-digestive axis which is pushed forward, a thing quite visible on the snapshot (photography) in profile. At the dorsal level, the lateral opacity is quite visible on the full face snapshot, achieving a "tapered" "or bird nest" aspect (Fig 4)

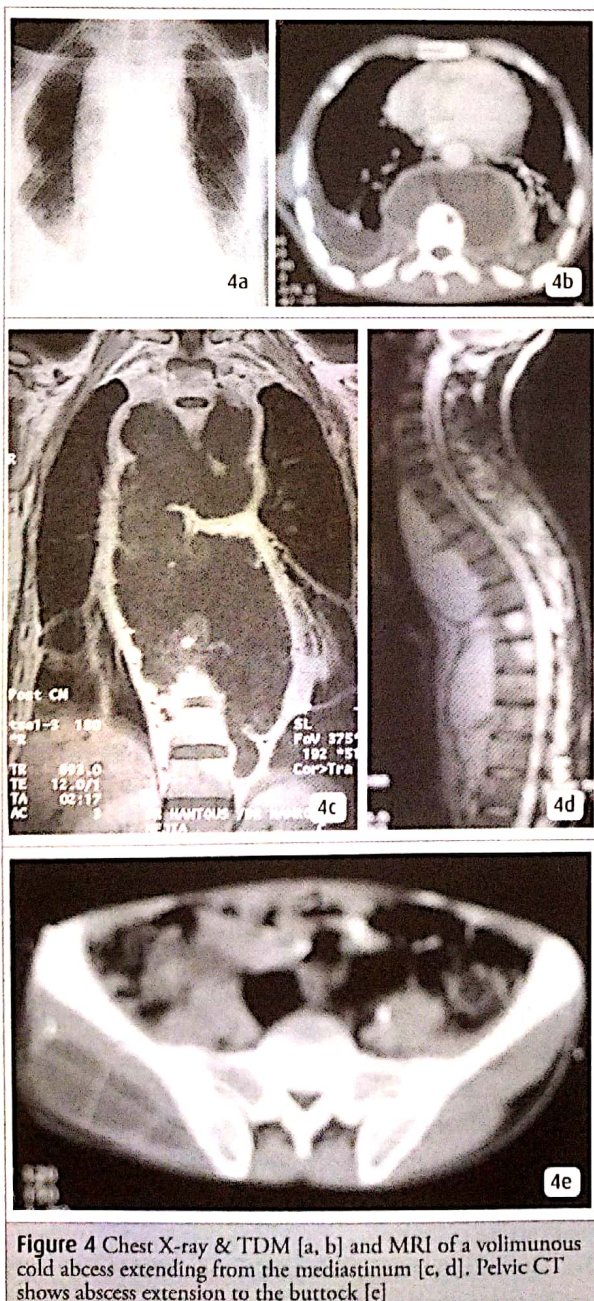


Figure 4 Chest X-ray & TDM [a, b] and MRI of a voluminous cold abscess extending from the mediastinum [c, d]. Pelvic CT shows abscess extension to the buttock [e]

Scintigraphy

The sensitivity of the bone scintigraphy with technetium is of 60 to 100% according to the series. It renders an image with a clear hyper fixation, more or less intense, and extending to the contiguous vertebrae which appear separated by a discal zone of a lesser fixation. This examination allows the clear distinction between the spondylodiskitis and a pseudo pottic erosive arthritis which engenders a moderate hyper fixation. However, the scintigraphy does not allow the differentiation between a Pott's disease and a spondylodiskitis with banal germs.

The scintigraphy allows the detection of a second infectious focus either disco vertebral or peripheric osteo articular.

The fixation remains high even after a complete recovery both clinical and bacteriological of the disc-somatic focus, thus, the scintigraphy does not constitute a recovery test, whereas an obvious increase of the fixation while it was previously decreasing should signal an evolutive revival of the affection.

Computed Tomography (CT)

The spinal tomodensitometry is the most efficient examination for the detection of vertebral tuberculosis. It shows many abnormal signs at their early stages much better than the standard X rays. It is quite useful for the sub-occipital Pott's disease (Fig 5).

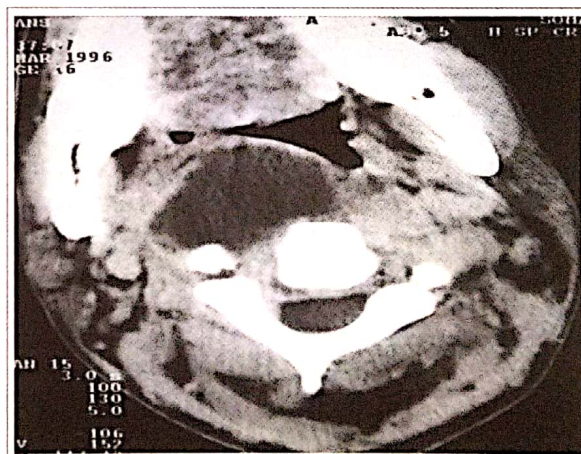


Figure 5 Cervical abscess causing dysphagia by oesophagia compression

It perfectly reflects the bone's affection by showing the respective parts of the osteolysis and the osteo condensation by often showing a fragmentary aspect made up of numerous small sequestra inside the osteolysis, by frequently showing an extension of the posterior arch. The CT shows in 90% or more, of cases an external epiduritis and a paravertebral abscess, sometimes calcified.

Magnetic Resonance Imaging (MRI)

It has become the most performant examination of the vertebral tuberculosis. The MRI anomalies are the first to appear. MRI is useful in determining:

- localization and extent of lesions,

- type of vertebral tuberculosis (affects or not the IVD)
- existence of a canal shrinking with a recession of the posterior wall
- existence of vertebral deformation
- existence of epiduritis and its extent (Fig 6) or paravertebral abscess
- existence of a radiculomedullar compression and its mechanism.

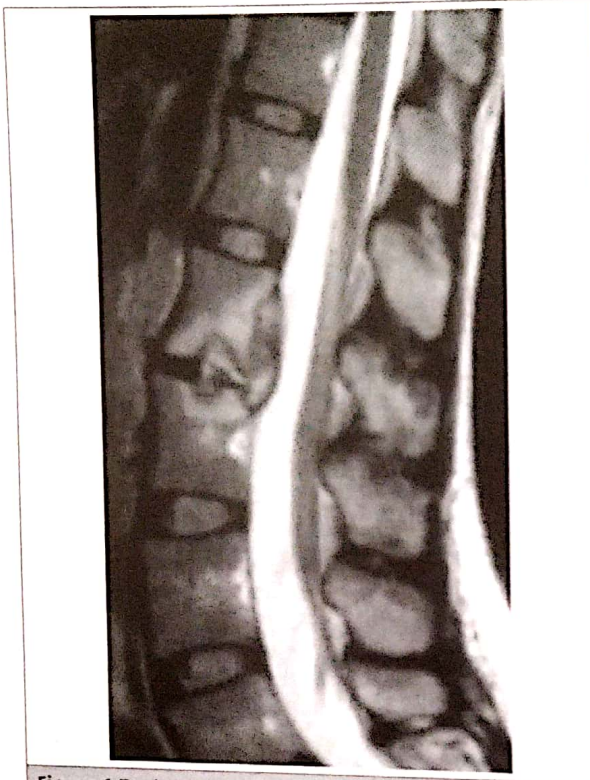


Figure 6 Epiduritis complicating lumbar Pott's disease

The anomalies of the bone signal inherent to the tubercular infection are non specific: T1 hypo signal, re-heightening of the signal in T1 after gadolinium injection and T2 hyper signal.

The MRI with an intravenous injection of gadolinium differentiates, in a better way, between a granular tissue, and an abscess, in the making, inside the extra bone extension. In the granulation tissue, the re-heightening of the signal is homogenous. On the contrary, when there is an abscess, in the making, only the signal of the peripheral part, corresponding to the shell of the abscess, is re-heightened after the gadolinium.

The MRI has showed that the paravertebral abscesses are almost constant and often voluminous. The MRI brings out, perfectly, the sub-ligament abscesses. The infection of the posterior arch appears quite frequently.

Differential Diagnosis

The vertebral tuberculosis diagnosis should be suspected each time there is a spinal pain, with or without neurological signs, especially when the field favors it. If the clinic feature is that of an infectious spondylodiskitis, the differential diagnoses are the spondylodiskitis with banal germs and the brucellian spondylodiskitis. If the feature is that of a lesion of a spondylitis type,

the spondylitis with the banal germ, and the tuberculous vertebral lesion should be both discarded.

In countries with a relatively frequent hydatid endemic disease, one should think of the vertebral hydatidosis, characterized by a parasitic osteitis which hits the whole of the vertebra, resulting in a multilacunar image of the vertebral body and the posterior arch.

Evolution and Complications

Before the antibiotics era, the tubercular spondylodiskitis of the adult used to evolve quite slowly towards a bone fusion, contrarily to what happens to the child and which used to necessitate a surgical treatment.

With a well followed antibiotic treatment, the evolution leads to a bone fusion, with, generally, the stabilization of the kyphotic deformation, thus the rate of recovery, without any relapse of the vertebral tuberculosis is of at least 95%.

The bad prognosis factors of the vertebral tuberculosis are an age over 70 and the existence of paraplegia.

Radiologically, the lesions can go on evolving during the first 2 months, but get stabilized later on with a condensation, reconstruction, and evolution to fusion (vertebral bloc).

The evolution of paravertebral abscesses should be controlled by TDM or eventually by MRI. The abscess evolves in parallel, but with a certain delay, on the bone lesions; the abscess shell disappears much more slowly than its puriform content. Some abscesses, under treatment, far from decreasing, go on evolving and increasing in volume, a thing which requires a surgical intervention to evacuate the pus.

The late complications of vertebral tuberculosis, bacteriologically healed are inherent to the absence of the bone fusion, to the worsening of kyphotic deformations, a persistent vertebral instability; these mechanical anomalies can engender chronic spinal pains and eventually, a late medullar compression. These late complications should always discard the hypothesis of a set back and can necessitate a surgical treatment.

Pottic Paraplegia

The severe neurological attacks, paralyzing radiculalgias, medullar compressions and the syndrome of the pony-tail are present in 20 to 30% of cases.

The medullar compressions are fairly frequent in both of the cervical and dorsal rachis and the sciatic or crural radiculalgias are fairly frequent in the sacrolumbar rachis.

Usually, the Pott's paraplegia has a progressive installation which takes weeks and often months. The brutal starting, though rare, would be inherent to an acute thrombosis of the medullar blood vessels or of a "concertina collapse".

The appearance of neurological lesions under medical treatment is not rare.

Physiopathology of Medullar Compressions

Laifa, in 1982, distinguished in his thesis about pottic paraplegia, referring to Kassab's experience, three types of paraplegia:

- Type I: Paraplegia occurring before the diagnosis or during the 1st two months of its evolution. They are most often due to a tubercular epiduritis granular and/or purulent.
- Type II: Early paraplegia, mainly mechanical, with a bone origin compression, inherent either to the posterior wall recession (Bouvier's bone ridge) or to the expulsion of the intra duct fragments.
- Type III: Late paraplegia, occurring months or years after healing. They have a degenerative cause, an important kyphotic angulation with sometimes vertebral instability.

Surgical Indications for Pottic paraplegia

The surgical treatment is necessary in following cases:

- Sudden paraplegia
- Hypotonic paraplegia
- Ponytail syndrome
- Paraplegia of mechanical cause
- Paraplegia that does not retrogress, even, after a well followed anti-tuberculosis 3 months' treatment.
- Paraplegia occurring during medical treatment
- Paraplegia, with both respiratory and deglutition troubles, occurring after cervico-medullar compression.

The best treatment for this dreadful complication of the vertebral tuberculosis is prevention. An early diagnosis, a long-standing polyvalent treatment, rigorously followed, reduces considerably the happening of Pott's disease.

JOINT TUBERCULOSIS

The tubercular peripheral attack is rare, representing 1 to 5% of tubercular cases.

There is a relative decrease of the coxalgia number in favour of knee's and upper limbs' attacks. The coxalgia concerns young adults whereas the shoulder's attack people over 60. These attacks can be explained by the role micro-traumatism play in their favour. The attack is generally isolated; however 15% of multifocal forms are reported.

Clinical Findings

Hip, tarsal-tibia and foot lesions are generally detected at a late destructive stage, but knee lesions have often been spotted at an earlier stage, in particular at the tubercular synovitis stage.

Imaging

Contrary to Pott's disease whose conventional iconography is evocative, joint tuberculosis arthritis has no specific radiological signs except for its former or evolutive forms. Globally, the chronological apparition of the images follows that of articular-anatomic lesions.

Standard Radiographs

Chausse classifies the lesions in 4 radiological stages:

- Stage I: Early stage of pure synovitis without any bone

lesions. The X-rays are not that eloquent, showing, at best, a regional demineralisation and a thickening of the soft parts. This aspect, wrongly reassuring, contributes to a late diagnosis

- Stage II: Apparition of erosions and geodes which prove the aggressiveness of the tubercular "pannus" in the bone and chondro structures. The erosions are particularly found at the peripheries, opposing the joint zones of the synovial capsula. A slight interline pinching is usually present. The abscesses are often visible on the floppy snapshots.
- Stage III: The whole articulation is invaded. The cavities are numerous. The inter-line is strongly pinched or has even disappeared. The soft tissues show opacities corresponding to abscesses and fistulae. The osteoporosis is important, but the articulation anatomy is still recognizable.
- Stage IV: The articular architecture is totally upside down. There are deformations. The articular surfaces are destroyed, denuding the epiphyses, which is a prelude for an ankylosis more or less total.

Bone Scintigraphy

Its interest lies both with the early diagnosis of the articular attack, even before the first radiological signs, and the recognition of multifocal localisations.

The scintigraphy is progressively negative at the sequel's stage.

Ultrasonography

It is used for the recognition of abscesses and the puncture guidance.

CT and MRI

Use of CT and MRI in soft tissues analysing is unique. These exams permit to evaluate anatomic relations of abscesses and fistulae and to guide the samplings. They also allow an early approach of the tubercular synovitis and the osteochondral lesions unseen by radiography. These new techniques overpass arthrography and fistulography formerly extensively used for the check up of the peri-surgical lesions.

Hip Tuberculosis = Coxalgia (Fig 7)

The clinical feature is that of a painful claudication during walking. The mobility is preserved for a long time, the abduction being limited at first. It is rare to observe a thickening of the inguinal region. It is in the retrocrural region that a satellite adenopathy should be carefully looked for.



Figure 7 Coxalgia resulting from extension of pottic psoas abscess



The radiological alterations are however observed with some delay in comparison with the clinic beginning. After the global pinching of the interline with a decalcification of the head and cotyloidian region, there are, in the long run, the erosions of the cephalic contour, and the alterations of the acetabulum. Then, the remodelling affects, in a variety of images, either the head with a partial or a complete lysis (caries) or the acetabular geodes- even with a protrusive deformation because of the supero-intern push of the head, resulting in rare ballooned aspects, surrounding thus a reduced femoral head. Quite often, there is a periosteal apposition at the lower part of the neck or even along the upper portion of the intern-cortical of the femoral diaphysis.

The quadricipital and gluteal amyotrophy contrasts with a bulky articulation achieving "a mutton-leg" aspect. The importance of the articular damages is often worsened by functional sequella with frequent ankylosis that can sometimes be fractured.

The peri-articular forms represented essentially by a tubercular trochanteritis, represent more frequently the coxofemoral than the juxta articular focus (femoral head, neck and acetabulum) whose seat favours the intrusion into the nearest articular cavity.

Knee Tuberculosis = White Tumour

The clinical signs, ordinarily early, start, usually with not only a progressive constitution of hydrarthrosis, not that painful, but even with a real synovitis erasing protrusions and flat parts. The quadricipal amyotrophy is rapid.

The first radiographic signs are summed up in an opacity of the soft parts with the disappearing of the sub-quadricipal pouch associated with the bone demineralisation. The radiological evolution is quite slow, requiring from 6 months to 2 years before resulting in a total articular destruction.

This superficial destruction facilitates the diagnostic investigation and gives hope for a functional prognostic, provided the investigation is undertaken at an early stage.

Abscesses are not rare in their advanced forms, with a propliteal or tricripital developments.

Tuberculosis of Ankle and Foot (Fig 8)

It represents 6 to 8% of localisations. The ankle is the most affected (50%).

Ankle osteoarthritis would be secondary to talus osteitis.

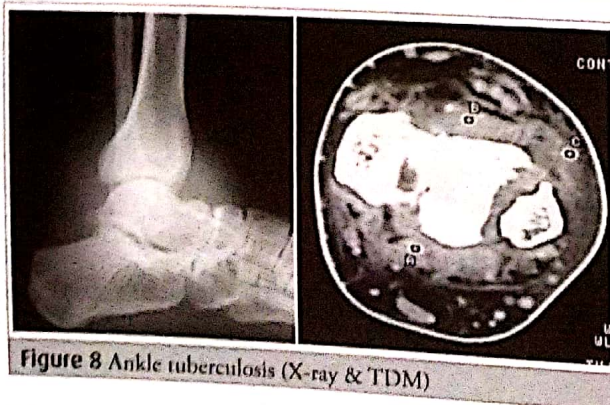


Figure 8 Ankle tuberculosis (X-ray & TDM)

Tuberculosis of Upper Limbs

It represents 7 to 14% of the entire localizations. But recently, this frequency seems to have been increased.

Shoulder

Nowadays, it concerns the elderly people. It frequently takes the aspect of a banal "periathritis" whose consequences can be disastrous in case of a cortisone infiltration.

Elbow

Its localization is fairly rare, and its diagnosis is rather difficult. In the cases of stiff and painful elbow, it is recommended to look for a synovitis, on both sides of the tricripital tendon and the olecranon, plus a satellite epitrochlean adenopathy.

In the historic forms (BOUKER), the destruction prevails over the sigmoiditis of the cubitus, in a "bowl shape", too large for a less hit humeral palette, taking then the classic aspect of a "monkey wrench".

Wrist and Hand

Far from being exceptional, it is at the hit parade of the upper limb attacks. The carpus attack represents the majority of cases. The tubercular tenosyovites of the flexors'sheath are responsible for a carpal canal syndrome. The localization in the fingers hit in particular the MCP and can wrongly lead to inflammatory rheumatism in case of a recurring attack.

Other Localisations

Apart from the limbs, some articulations can be the matter of a tubercular arthritis

Sacroiliac joint

It is less frequent. The radio-clinical feature is that of a unilateral sacro-ilitis whose interpretation is difficult, and that should be differentiated from an infectious sacrocoxitis with a banal germ, or a spondylarthropathy with the young adult. In case of an uncertain diagnosis, a washing out puncture with a needle, or even a biopsy of the sacroiliac trocar should be made.

The sacroiliac attack is often misinterpreted as it is witnessed by the unforeseen discovery of fixed alterations, even a unilateral ankylosis, during a routine's radiological examination of the basin (Fig 9).

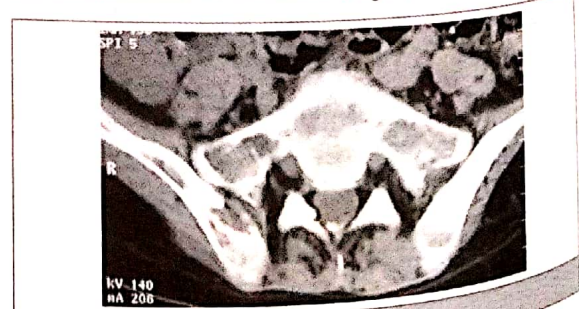


Figure 9 Sacroiliac tuberculosis (CT)

Pelvic and sterno-acromio-clavicular localizations are exceptional.

Evolution and Complications

If chemotherapy is administered before any macroscopic destruction (stages 1 & 2), the joint will be healed

with normal or subnormal anatomically and functionally results.

If the chemotherapy is administered at the destruction stage (stages 3 & 4), the joint will be healed with more or less destruction and vicious attitude. All these troubles being more or less compatible with an acceptable function of the joint, but causing a certain orthopaedic problem.

TUBERCULAR OSTEITIS (Fig 10)

It represents 10 to 19% of the osteoarticular attacks. All the bones can be hit but the affection prevails over the long bones (80%), the epiphyses are mostly hit (50%) and the lesion of the great trochanter is most frequent. The beginning of a tubercular osteitis is always achieved inside the bone. Bone necrosis, and pus formation lead more or less quickly to the formation of an abscess which appears on the skin and becomes a fistula.

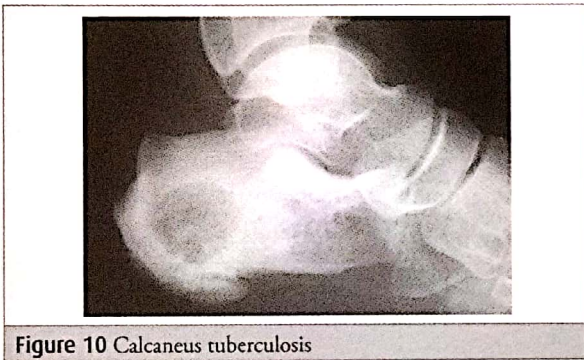


Figure 10 Calcaneus tuberculosis

If the seat is a joint articular lesion, the abscess finds an issue toward the articulation and perforates the cartilage, thus, creating an osteoarthritis.

At the level of the child's hand and foot little bone, the evolution is different. This is due to the fact that nourishing arteries of these bones' dyaphyses are terminal, their thrombosis, in the course of the tubercular process, engenders the sequestration of the whole dyaphysis. A bone cuffing, reactionally periosted, will quickly surround that cankered dyaphysis, achieving a radiological aspect of a blown bone, hence, the spina-ventosa term used to describe this lesion.

Finally, sometimes the attack of the neighbouring epiphysis cartilage can engender troubles of bone growth with a shortening, lengthening, or unbalance type.

There are 4 schematically possible radiological aspects and the first 3 remind of the tubercular osteitis.

- 1- The lacunar image: slightly circled with osteocondensation described by Jungling, in 1920, under the title of tubercular osteitis both multiple and pseudocystic.
- 2- The presence of bone sequestrum in the shape of "small bells" image that can lead to a bone tumour.
- 3- The classic spina-ventosa corresponds to the image of the sequestered dyaphysis surrounded by stratifications of a reaction periosted bone.
- 4- These cavitory images can however be considerably

radiographically reshaped: the presence of a precavitary sclerous reaction, of an intense periosted reaction and even cortico-sequestra can turn the classic image of tubercular cavitation into that of a hematogenic chronic osteomyelitis.

But, whatever the aspect of the lesion can be, if it is found in a (juxta) joint-articular area, it is always better to verify that the cavity does not communicate with the articulation and that it is the case of a genuine osteitis and not that of an already tubercular arthritis whose diagnosis is pretty different.

The anti tuberculosis chemotherapy stops all these destructions. When started early, it is followed by a rehabilitation of the sequestra and thus by a genuine bone reparation.

The surgical use is exceptional and limited to bulky abscesses and debridement of obstinate fistulae because of a persistent super infection.

MULTIFOCAL TUBERCULOSIS

Its frequency is approximately of 10%. It is preferably found among youngsters, in countries where tuberculosis is endemic, the elderly people over 60 in developed countries, and the immune depressed category.

Among the factors prone to this particular type, the role of prolonged corticotherapy is of great importance, often wrongly administered in clinical feature supposed to be rheumatism's polyarthritis with the lengthening of the diagnosis delay (1 to 4 years), but above all the particular conditions of the tuberculosis, with people having undergone an organ transplant

The scintigraphy is then useful to account for the hit places some of which can remain asymptomatic.

LABORATORY

Biology

All the authors agree on the fact that the different routine biological examinations have no serious value in the diagnosis of the tuberculosis. In the suppured lesions, the study of the sedimentation rate (SR) of the leukocytosis and lymphocytosis does not help at all the diagnosis to differentiate between a pyogenic infection and another with a tubercular bacillus.

Intra-Dermal Reaction (IDR)

IDR to tuberculin (10 units) is most often positive, and sometimes phlyctenular. But in about 10% of the cases, IDR to the tuberculin is negative; a thing which does not exclude the diagnosis, notably among the elderly people or the immune-depressed.

The test of lymphoblastic transformation to the tuberculin is a delicate undertaking, but it allows appreciating, in a much varied way, the hypersensitivity to the tuberculin.

Bacteriology

Bacteriological study is done from liquids from articular punctures, abscesses, synovitis, and satellite adenopathy. The direct examination of these liquids, often disap-

pointing, should be completed by their culture in the appropriate milieu (Lowenstein- Jensen- Coletsios). A lapse of 6 to 8 weeks is usually necessary before any evaluation of the seeding results.

Histological Study

Fragments of surgical biopsies, under arthroscopy or scope control or TDM show often tubercular granulation combining an epithelioid and gigantocellular granulation with a caseus necrosis.

POSITIVE DIAGNOSIS

The research of the tubercular origin of the infection is based on:

- Certitude arguments with the identification of the tubercular bacillus, yielded by the pathology and / or bacteriology,
- Presumption arguments by the critical appreciation of the patient's antecedents.

The Bacteriologic Proof is based on the bringing out of the acido-alcoholo-resistant bacillus (AARB), straight and /or on the positive cultures of KB. This bacteriological proof is more rarely obtained than in the case of the pulmonary tuberculosis because of the specific characteristics of OAT.

The negativity of these different investigations more or less invasive does not exclude at all a tubercular origin when there is a non classed osteoarticular infection.

Presumption Arguments are in favour of the diagnosis of tuberculosis:

- Existence of an antecedent or a contagious contact
- Existence of endemic region or country
- Sub-sharp/chronic characteristics
- Absence of hyperleukocytosis
- Existence of other bacillus focuses active and contemporary of the osteoarticular attack
- Phlyctenular IDR to Tuberculin.
- Destructive lesions through imaging examinations with a weak osteocondensation reaction
- Bulky character and / or calcified of the abscesses in the soft tissues

RESEARCH FOR OTHER ACTIVE BACILLUS FOCUSES

- Pulmonary X rays: It is systematic in all osteoarticular attacks having an inflammatory form.
- KB research in the sputum and urines.
- Ophthalmologic examination to research Bochet's tubercles.
- Gynaecological examination

TREATMENT

Antibiotics

They represent the major element of the medical treatment. The four anti tubercular of the front line are isoniazid, (INH), rifampicin, (RIF), pyrazinamid (PYR), and ethambutol (ETH). The INH and RIF are the two major anti-tuberculosis. They are bactericide and active both against KB's intra and extra cellular.

The therapy regimen comprises 3 phases:

First phase

It should compulsorily include four anti tuberculosis, for 4 months. The INH, RIF, ETH, and PYR are administered in a unique take, in the morning, before breakfast, in order to obtain the highest serous peak. The ETH is stopped at the 3rd month, and the PYR at the 4th. After 2 or 3 months' initial treatment, there is the KB antibiogram, eventually isolated in the culture and thus, the response of the treatment can be evaluated. If the initial response is satisfactory and the KB sensitive to INH and RIF, the biotherapy, based on the latter, can be continued. In a primary resistance to INH, association of RIF, ETH and PYR is suggested followed by a therapy with RIF and ETH (or PYR) for at least 12 months.

Second Phase

It associates, from the 5th through the 9th month, the INH and the RIF which are daily taken.

Third Phase

It lasts 3 months and comprises the taking of INH and RIF, three times per week.

The whole duration of the treatment lasts 12 to 18 months (Fig 11).

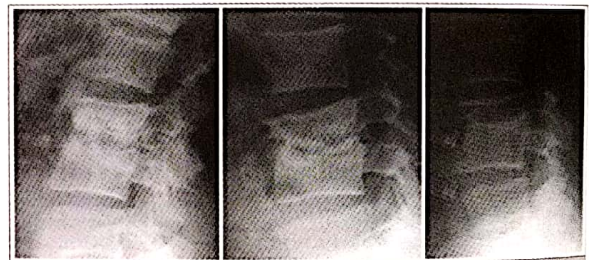


Figure 11 Vertebral fusion after 7 years of treatment

The regular watching of the treatment will concern patient's acceptance of the treatment and its toxicity.

Adjuvant Means

The rest which remains vital for the initial phase of the treatment.

Immobilisation with a plaster is forbidden for joints because mobility should be preserved at best but its necessary in cervical tuberculosis, vertebral tuberculosis with neurological complications or vertebral instability.

In case of abscess persistence, under antibiotics, a needle evacuation of pus, can be undertaken.

Surgery indications in the OAT treatment have considerably diminished owing to an earlier recognition of the infection and the efficient anti tubercular treatments. Arthroplasties in the old OAT is marked by the potential risk of a bacillus reactivation. A prophylactic treatment, started 3 weeks before surgery and prolonged 6 to 8 months, can be discussed.

In Vertebral tuberculosis, surgery can be indicated if there is a medullar compression. In the absence of neurological signs, the surgery can be indicated. Either

because of a compressive paravertebral abscess or an abscess which does not regress in spite of the medical treatment or because of the severe destructive vertebral lesions resulting in a kyphotic deformation and / or an important instability/ unsteadiness.

In major cases, the vertebral tuberculosis is a surgery via anterior ways. It comprises the following:

- A large approach,
- An evacuation of abscesses
- The most possible complete excision of necrosed tissues, the disc and bone sequestra
- An eventual neurological decompression
- A correction or stabilisation of the kyphosis,
- A solid anterior arthrodesis with bone grafts. In some cases of important kyphosis, with plural-staged destructive attacks, a double arthrodesis, both anterior and posterior can be necessary.

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