

# Tuberculose synoviale du poignet chez une ouvrière dans l'industrie des saucisses

## Synovial tuberculosis of the wrist in a sausage worker

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**Résumé:** La tuberculose synoviale est une forme rare de la tuberculose extra-pulmonaire. En dehors de l'inoculation intra-articulaire directe, quelques rares cas de tuberculose synoviale d'origine professionnelle ont été signalés. Nous rapportons dans cet article un cas de tuberculose synoviale du poignet d'origine professionnelle chez une ouvrière de l'industrie du saucisson.

**Observation:** Une femme de 28 ans, ouvrière dans l'industrie de la saucisse de salami, consulte pour des acroparesthésies des trois premiers doigts de la main gauche suite à l'apparition d'un kyste synovial au niveau du poignet gauche. L'électromyogramme, a fait preuve d'un syndrome du canal carpien qui a nécessité une libération chirurgicale du nerf médian par synovectomie. L'examen histologique de la résection tissu synovial a révélé des granulomes épithélioïdes de type inflammatoire et a mis en évidence dans le tissu synovial des cellules géantes de type Langhans très évocatrices de tuberculose. L'intradermo réaction à la tuberculine a révélé une réaction positive de 22 mm. Le reste des explorations se sont révélés négatifs, aucune autre localisation secondaire n'a été retrouvée. Le diagnostic de tuberculose synoviale a été retenu. La patiente a été traitée avec succès par les anti-tuberculeux, d'abord avec l'association de 600mg de Rifampicine, 300mg d'Isoniazide 2,5 g Pyrazinamide et 1,5 g Ethambutol par jour pendant trois mois, suivie par la Rifampicine et l'Isoniazide pendant neuf mois. L'étude du poste de travail a montré la possibilité de contact direct avec la carcasse de bovins malades au cours du temps de travail dans la charcuterie. Les conditions de

reconnaissance de la tuberculose synoviale en tant que maladie professionnelle au titre du tableau N°63 étaient réunies, nous avons pu déclarer cette tuberculose synoviale comme une maladie professionnelle. Elle a été reconnue et dédommée comme telle.

### Introduction:

*Tuberculosis is a chronic bacterial infection caused by Mycobacterium tuberculosis principally affecting the lungs. It forms granulomas with caseous necrosis due to the cell response of involved tissues<sup>1</sup>. It is a major public-health problem causing around 9 million new cases and 2 million deaths each year in the world and 1200 new cases and 300 deaths each year in Tunisia<sup>2, 3</sup>. Many factors lead to an increased incidence of tuberculosis: the increased prevalence of HIV infection, an increased incidence of people living in poor social and economic conditions, increased resistance to anti-tuberculosis drugs, the development of resistant bacilli, drug dependency, diabetes and alcoholism<sup>1</sup>.*

*Mycobacterium bacilli can enter human hosts by ingestion, aerosol inhalation or direct contact with mucous membranes and skin abrasions<sup>4</sup>. The mucosal and the cutaneous transmission are extremely rare these days, at least in industrialized countries. In fact, cutaneous or mucosal transmission were an occasional source of localized skin, tendon and lymph node lesions, otitis and conjunctivitis in milkers regularly dressing carcasses of tuberculous animals. Veterinarians may also*

*be exposed during surgical interventions or necropsies*<sup>4</sup>.

The authors report the case of a patient with synovial tuberculosis and working in a deli industry and discuss the occupational origin of her illness.

### Observation:

A 29-year-old workwoman, without any significant medical history, attended to the neurology consultation for tingling radiating into the territory of the left median nerve. Neurological examination objectified positive sign of Tinel and Phalen on the left arm and showed a soft and painless cyst located on the front of the left wrist. The electromyogram concluded a carpal tunnel syndrome secondary to left cyst. The patient was then sent to the service of hand surgery for synovectomy and received a release from the median nerve at the carpal tunnel with synovectomy (fig1).

Histological examination of the synovial resection tissue specimen revealed epithelioid granulomas inflammation and Langhans giant cells in the synovial tissue, so it was very evocative of tuberculosis (fig 2). We interviewed the patient-worker and reviewed her medical history to determine her previous exposures to TB. Her exploration in search of other tuberculous locations was ensured: The examination revealed a weight loss of seven pounds in four months. Chest radiography was normal, the tuberculin skin test with 5 units of purified protein derivative was positive with an induration of about 22mm (fig3). The research of BK in sputum was negative. Liver function tests, blood urea, serum creatinine concentrations and urine microscopic examination were normal. The research of the bacilli type: mycobacterium bovis or tuberculosis was not done. Diagnosis of tuberculosis has been retained.

The patient was successfully treated with anti-tuberculosis drugs, initially with 600 mg Rifampicin\* daily, 300 mg Isoniazid\* daily, 2.5 g pyrazinamide\* daily and 1.5 g Ethambutol\* daily for three months, followed by Rifampicin\* and Isoniazid\* for further nine months.

The environmental investigations and the observation of Work practices and safety procedures have shown the possible direct

skin contact with sick cattle during deli work time. The conditions of recognition of the Tunisian occupational disease (table N°63) were satisfied; so the patient received a declaration of her synovial tuberculosis as an occupational disease.

### Discussion:

**Epidemiology:** TheWorld Health Organization estimates that third of the world population or some two billion people are infected with mycobacterium tuberculosis<sup>5</sup>. Nine million people will develop every year active tuberculosis disease, and two million will consequently die<sup>2</sup>. Even in the European Region, there are 49 new TB cases and 7 deaths secondary to TB estimated every hour. China and India contribute together nearly to three million cases per year. The rest of high burden countries are those with limited resources to devote to tuberculosis or health care in general. The annual incidence of active tuberculosis in high burden countries ranges from 100 to 1000 per 100 000. In contrast, in industrialized countries it's in the range of 15-35 per 100 000. As for the USA, the incidence rate in 2006 was of 4.6 per 100 000<sup>5</sup>.

Overall, the prevalence of tuberculosis worldwide was declining for several years. The DOTS (Directly Observed Treatment = Short-course treatment short-course directly observed) introduced in the 1990s by WHO, gave a broad framework for this fight for a better efficacy against tuberculosis<sup>6</sup>. In France, TB epidemic was marked by several decades of steady decline in its incidence. In 2006, the reporting rate was about 8.5 cases/100 000 inhabitants with disparities between regions: higher incidence in the Isle of France (27 cases /100 000) and Guyana (27/100 000)<sup>6</sup>. In the USA, thanks to increased controls by the ATS (American Thoracic Society) and CDC (Centres for Disease Control and Prevention), the incidence of tuberculosis has significantly lowered by 44% from 1993 to 2003, reaching a historical rate of 14/100 000 inhabitants in 2003<sup>7</sup>.

For several years the incidence of tuberculosis in Tunisia had been continuing to decrease from 27 cases / 100 000 inhabitants in 1995 to about 20/100000 in 2008. Tunisia aims to further reduce these numbers by half from 2006 to 2015 due to "the Global Plan to

Stop TB "of the WHO. In 2007, 1.3 % of the whole cases of tuberculosis in Tunisia were HIV+<sup>3</sup>.

The prevalence of TB in the workplace is difficult to evaluate globally. An American team published in 2006 about 42 articles describing 52 studies, of transmission of *Mycobacterium tuberculosis* from patients with personal care in developing countries. It was used to estimate the prevalence of latent tuberculosis infection LTBI (54%) and the incidence of TB disease among health workers. It was ranging from 69 to 5780/100000 in individual studies<sup>8</sup>. A retrospective study conducted from 1991 to 2000 in a university hospital in Istanbul, in Turkey, reported an incidence of TB disease of 96 / 100 000 health workers, including 79 / 100 000 for physicians, 14 / 100 000 for nurses and 121 / 100 000 for other hospital professionals. The incidence of the disease in the general population was then 35.4 / 100 000, representing an incidence of tuberculosis among health personnel about 2.2 times that of the general population<sup>9</sup>.

In Tunisia, several studies have been conducted over the last 10 years, they reported incidences in health workers varying from 52 to 290 / 100 000 and with an average annual incidence which was 2.5 times higher than that observed in the general population.

In French public sector, the public assistance of Paris hospitals (Assistance Publique des Hôpitaux de Paris (AP-HP)) reported 6 cases per year from 1997 to 2001 of TB disease among health staff physicians. In the private sector, the national fund health insurance (Caisse Nationale d'Assurance Maladie), announced 30 to 50 cases / year from 1989 to 2000 of TB disease<sup>1,4</sup>.

The primary infections were not recognized before 1998: in fact, 2 cases were reported in 1998, 10 in 1999 and 23 in 2000<sup>10</sup>. It is likely that all these figures are largely undervalued, because there is an underreporting of active tuberculosis as LTBI among independent doctors, medical students, paramedics, who are also unevenly repaired in France as in Tunisia. The number of tuberculosis not related to their professional background may not be negligible when we know that TB disease can develop decades after primary infection, the agent no longer at risk and sometimes retired, especially since according to a 2004 study, health workers are

less likely to treat LTBI in comparison to the general population<sup>11</sup>.

The Institute of Occupational Medicine of Frankfurt (Germany), proposed in 2005 a list of professionals particularly vulnerable to TB from a review of the literature since 1966, it included Hospital Employees in charge of TB patients, Nurses at the hospital, Nurses caring for HIV patients and drug addicts subjects, Laboratory staff, Physical Therapists, doctors internists, anaesthetists, surgeons and psychiatrists, Employees of non-hospital nursing homes, Personal transport, Personal funeral homes and Employees in prison<sup>12</sup>.

Moreover, an Irish study raised in 2007, underlined the significant risk faced by health personnel working in autopsy room<sup>13</sup>. An American team had also reported the case of two deaths secondary to tuberculosis with the same bacilli DNA typing. The survey undertaken showed that the patient in the source had been embalmed by the patient in the second case one month before becoming ill<sup>14</sup>. Moreover, health workers should be especially attentive. It was, in fact, demonstrated that *Mycobacterium Tuberculosis* infection was significantly higher among community health workers than among the control group<sup>15</sup>.

To our knowledge, three cases of primary tuberculosis secondary to an accidental needle stick injury were described in the literature, one case of tuberculosis of the soft parts of the left hand and wrist with a surgeon who pricked himself with a needle used to drain a paravertebral abscess in a patient who died later of disseminated tuberculosis. The surgeon was treated with anti-tuberculosis drugs with rapid improvement<sup>16</sup>. Another case has been reported in a 37-year-old female medical doctor, accidentally exposed to a needle stick injury while performing a pleura biopsy<sup>17</sup>. Finally, a third case has been reported in Beirut, it was a b.Calmette-Guerin-itis on the extensor surface of the left ring finger of a surgical resident following an accidental prick with a contaminated syringe while installing intravesical. Calmette-Guerin to a patient being treated for a bladder tumour<sup>18</sup>.

Moreover, to our knowledge, up to now, two cases of professional tuberculous otitis media in medical doctors were reported. For one case, the theory of a hematogenic transmission from a pulmonary tuberculosis located in the right apex and the left base site

was privileged. In the second case, we believe that the transmission could be from the nasopharynx through the auditory tube or the lymphatic vessels or externally by tympanic membrane perforation. No information about statements have been reported<sup>1</sup>

On the other hand, professional transmission of *Mycobacterium tuberculosis* was reported as a result of processing medical waste in three patient – workers<sup>19</sup> and in another case in a pathologist after performing an autopsy while a postgraduate medical examination<sup>20</sup>.

#### **Pathogenesis:**

**Transmission modes:** Transmission by airborne spread of infected respiratory secretions from person to person is the main route of dissemination of tuberculosis infection. A patient with pulmonary active untreated tuberculosis, spreads in the air mycobacterium suspended in droplets, also called "droplet nuclei" in his coughing, sneezing, laugh or speaking. The mycobacterium, very sensitive to ultraviolet rays do not survive long outside the body of the patient, unless they are present in secretions dried unexposed to light. The transmission of bacteria through contaminated objects (bedding, cutlery ...) is almost excluded. In countries where cattle are still infected with bovine tuberculosis, consumption of unboiled milk or milk products can cause intestinal tuberculosis from which releases are possible to other body organs<sup>21</sup>.

In Tunisia, it was estimated that 13.8% of cattle were infected in 2006. Accidental bites or direct contact of abraded skin with infected material may be exceptionally contaminants and source of localized tuberculosis as it is in our report case. The exogenous re-infection from an infected person, by a tuberculous patient is possible. But if the person is immuno-competent, he will have little chance of developing active tuberculosis. These re-infections are however quite high and can reach 36% in high prevalence countries for tuberculosis and HIV<sup>21</sup>.

**Become of tubercle bacilli in the body:** In about half of cases, the tubercle bacilli inhaled by a healthy individual are removed mechanically by airways cilia or destroyed by the effect of innate immunity through phagocytosis by alveolar macrophages. When they are not destroyed the bacilli are growing at the periphery of the lungs and are

causing small inflammatory lesions. In 90% of cases, this primary infection will have no manifestation of disease or any abnormal chest radiograph<sup>21</sup>. But the bacteria can survive for years in the lungs or lymph nodes. Neither macrophages nor T lymphocytes fail to eradicate the bacteria that are "under control" as long as the infected remains immuno-competent. This latent tuberculosis infection (LTBI) results in an incomplete acquired immune resistance against tuberculosis and the development of hypersensitivity against antigens of the tubercle bacillus. This hypersensitivity appears after a period till-Allergic of 3 to 8 weeks and can be searched by injecting diluted tuberculin into the skin. This is the tuberculin skin test (TST) or intra-dermal reaction (IDR). The complete sequencing of the genome of *Mycobacterium tuberculosis* has made possible the recognition of specific antigens. They become measurable in vitro by assaying interferon gamma (INF) secreted by T cells in response to stimulation by specific antigens. New immunological tests for tuberculosis are currently available: *THE QUANTIFERON TB GOLD* and *T SPOT-TB*<sup>22</sup>. In 10% of cases<sup>21</sup>, active tuberculosis develops within less than two years after primary infection for 5% of cases, and for the remaining 5%, tuberculosis disease develops after an interval of several years when for one reason or another, the immune resistance of the body is weakened (endogenous reactivation): age, viral infections including HIV, severe prolonged doses of corticosteroids, malignant diseases, pneumoconiosis, smoking, under nutrition, chronic alcoholism or severe emotional stress. When active tuberculosis follows a latent tuberculosis infection (LTBI), the symptoms spread out rapidly or insidiously. Tissue necrosis with cavity formation occurs most often in the lungs. The infectivity of the patient becomes possible because of the issue, primarily by coughing droplets of high concentration of mycobacterium that will find themselves suspended in the patient's environment. Tuberculosis can also reach other organs through haematogenous dissemination and reach the lymph nodes, musculoskeletal system, kidneys, genitals, meninges and brain. These extra pulmonary forms are more common in patients with severe immune disorders (AIDS). Then, in most cases, they are not contagious.

When active pulmonary tuberculosis is not discovered early and treated properly, an infectious tuberculosis patient can infect on average more than 20 people <sup>21</sup>. Early diagnosis and prompt treatment and proper follow-up reduce the number of infections. In countries where health structures are adequate, up to 4 to 6 people can be infected by the index case. Under proper tuberculosis treatment, the infectivity decreases rapidly except in cases of resistance. According to the study of Min Jae Kim in Korea, in 2006, 12.5% of patients with pulmonary tuberculosis had extra pulmonary involvement. In 10% of the cases it was a bone and joint localisation. <sup>23</sup> In addition, tuberculous bacilli may enter the body from the gastrointestinal tract following ingestion of contaminated foods and from skin through a recent cut or abrasion on exposed surfaces<sup>16</sup>. Furthermore, it is well known that ingestion, as opposed to inhalation, is a far less efficient route of transmission of tuberculosis, as it requires the administration of thousands of viable bacilli to initiate infection<sup>4</sup>.



**Figure 1:** Release of the median nerve at the carpal tunnel

The cutaneous transmission may be the cause of topical (skin) or regional (lymph nodes, tendons) release of the bacillus<sup>4</sup>. In our observation, the synovial tuberculosis had probably resulted from the contact with the tuberculous bacilli through a cutaneous cut or abrasion while manipulating a tuberculous sausage.

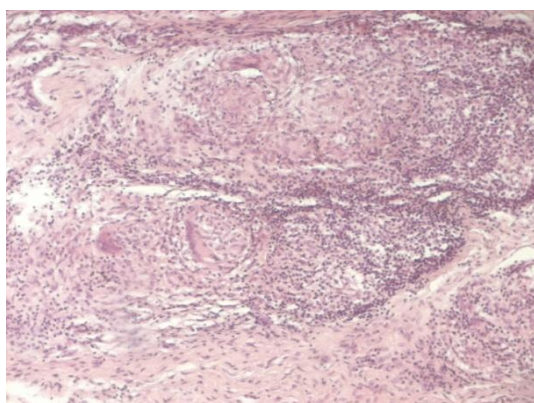
### Conclusion:

Despite a good knowledge of TB for decades, the early recognition of disease, particularly among some occupations, such as in food industry, encounters some difficulties. These latent forms are the main reservoir of *Mycobacterium tuberculosis*. Moreover, prevention is based on the control of the bovine chaptel tuberculosis.

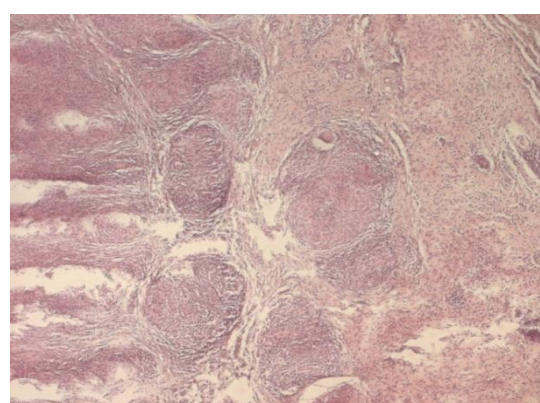
New immunological tests, particularly QuantiFERON TB Gold and T SPOT-TB should be a part of our diagnostic arsenal as it is currently being evaluated through numerous studies Worldwide.



**Figure 3:** Tuberculin reactivity of 22mm



**Figure 2:** synovial tissue with numerous épithéloïdes granulomas and giant-cell confluent. These granulomas are centered by a thin eosinophilic material suggestive of caseous necrosis



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