Clinical Study of 566 Cases of Senile Spinal Tuberculosis

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Abstract

Objective: To summarize the clinical characteristics of 566 patients with senile spinal tuberculosis, and to explore the efficacy and clinical value of paravertebral puncture injection in the treatment of senile spinal tuberculosis. Methods: The clinical data of 566 elderly patients with spinal tuberculosis were retrospectively analyzed. All patients underwent Mycobacterium tuberculosis smear and culture, T-SPOT test (T-Spot.TB), CT and MRI. Combined with oral anti-tuberculosis drugs for 1.5-2 years. Results: 498 patients (88%) were treated with oral antituberculosis drugs and paravertebral puncture, the clinical symptoms were improved significantly, no pain, tuberculosis poisoning symptoms disappeared, activity limitation disappeared or relieved, and clinical cure was achieved. Sixty-eight patients (12%) with severe limb paraplegia, obvious neurological impairment, spinal instability and other patients who met the indications for surgery underwent debridement and fixation after 2-4 weeks of paravertebral injection. Conclusion: Regular paravertebral puncture and local drug injection is beneficial to improve the cure rate of senile spinal tuberculosis. Compared with surgery, it is more simple, safe and effective. It is suitable for clinical application and can be regarded as a good strategy for conservative treatment in internal medicine.

Keywords

Spinal tuberculosis, Mycobacterium tuberculosis, paravertebral puncture, local injection elderly

The incidence of tuberculosis in China is among the highest in the world, and the incidence of tuberculosis in the elderly is increasing [1]. Spinal tuberculosis is mainly caused by tuberculosis bacilli infection, which leads to vertebral bone damage and vertebral collapse [2], and its disability rate is high. For elderly patients with spinal tuberculosis with atypical early symptoms, it is difficult to diagnose, which is easy to cause missed diagnosis and misdiagnosis in clinical practice, and oral anti-tuberculosis therapy is not effective. Most patients lack surgical conditions, and surgical operation is difficult to carry out. This article retrospectively analyzed the clinical characteristics of 566 elderly patients with spinal tuberculosis and the curative effect of minimally invasive paravertebral puncture in the pulmonary department of Changsha Central Hospital, to explore its clinical application value.

1. Data and Methods

1.1 General Information

A total of 566 patients with spinal tuberculosis admitted to our hospital from August 2014 to August 2019 were
selected. All the patients were newly treated or recurred after surgery, including 450 males and 116 females, with an average age of 71.6 years (range, 60-88 years). All patients were diagnosed according to the following comprehensive diagnosis: (1) Clinical symptoms + signs: different degrees of chest, waist and back pain and activity limitation, fatigue and symptoms of tuberculosis poisoning; (2) Imaging examination: including CT, MRI, etc. (3) BCG-PPD, T-SPOT.TB, etc.; (4) Acid-fast staining smear of paravertebral abscess puncture fluid, rapid culture of Mycobacterium tuberculosis, and pathological biopsy of diseased vertebral tissues; (5) Pulmonary tuberculosis and other extrapulmonary tuberculosis (lymph nodes, chest wall, limbs, joints, kidneys, meninges, abdominal cavity, etc.; (6) Diagnostic antituberculosis therapy is effective.

1.2 Methods

566 cases were treated by oral anti-tb drugs combined CT mediated by the regular vertebral puncture injection medicine, operate (see Figure 1), the specific steps are as follows: (1) patients in prone position, accurate positioning under CT intervention level, selected the best puncture position after vertebral puncture needle into the next direction, sagittal Angle and depth (see Figure 1) is to determine the puncture site; (2) Local disinfection and local anesthesia puncture point: puncture site is divided into two parts, the first is the site of the primary lesion, the second is the site of the secondary abscess; (3) A 9-gauge puncture needle was used to extract pus from the puncture point and inject medicine (isoniazid injection 0.2g or streptomycin injection 0.5g or amikacin injection 0.2-0.4g); (4) Paravertebral drainage of pus and drug injection at the designated site were performed regularly 3-5 times a week; (5) The total treatment time was (75±45) days. Systemic antituberculosis treatment regimen was 2-3HR (or L) EZ(S or Amk)/10-16HR(or L)E, and the regimen for patients with liver disease was 3HES (Amk)/15HE, (R-rifampicin, L-rifapentine, H-isoniazid, Z-pyrazinamide, E-ethambutol, AmK-amikacin needle, S-streptomycin), combined with nephropathy protocol :3HR(or L)E/15HR(or L), drug resistance patients according to the drug sensitivity results to select the appropriate treatment plan.

![Figure 1. Operation diagram of paravertebral aspiration and injection under CT localization.](image)

1.3 Observation Indicators

(1) Improvement of clinical symptoms; (2) Imaging review: CT and MRI were regularly reviewed at 1, 3, 5, and 12 months after treatment to evaluate the improvement of lesions; (3) Laboratory examination: dynamic detection of blood routine, liver and kidney function, CRP, erythrocyte sedimentation rate and other indicators.

1.4 Statistical treatment

SPSS 22.0 software was used for data analysis. T-test was used for measurement data, and chi-square (X2) test was used for enumeration data. P < 0.05 indicated statistical significance.
2. The Results

| Table 1. Therapeutic effects and adverse reactions of paravertebral puncture local injection |
|------------------------------------------|---------------------------------|---------------------------------|-----------------------------------|---------------------------------|---------------------------------|---------------------------------|---------------------------------|---------------------------------|---------------------------------|
|                                          | Puncture side effects            | Drug side effects                |
| cure No cure                             | pneumothorax                     | bleeding                        | Gastrointestinal tract reaction  | Liver function injury            | Allergic dermatitis              | Leukopenia and thrombocytopenia | Peripheral neuritis             | Renal function injury            |
| Number of cases (example)                | 498                             | 6                               | 18                               | 45                              | 39                              | 22                              | 18                              | 16                              |
| Percentage (%)                           | 88                              | 1.05                            | 3.2                              | 7.9                             | 14.51                           | 5.1                             | 3.9                             | 3.2                             | 2.8                             |
| Total number (example)                   | 24                              | 169                             |

The patients were treated with paravertebral puncture and local injection for 4 weeks to 3 months, and oral antituberculosis drugs for 12 to 18 months. 498 patients (88%) were treated with oral anti-tuberculosis drugs and paravertebral puncture, and their clinical symptoms were significantly improved without pain. The symptoms of tuberculosis poisoning disappeared, and the activity limitation disappeared or relieved. A small part of patients with neurological impairment also basically recovered, and achieved clinical cure according to the drug withdrawal criteria of Jiang [3]. CT scan after 6 months to 1 year of treatment showed that the paravertebral abscess of the spine was well absorbed, the inflammation of the vertebral body basically subsided, and the vertebral body was osteosclerosis (see Figures 2, 3 for some typical cases). 68 patients (12%) with severe limb paraplegia, obvious neurological impairment, spinal instability and other indications underwent paravertebral puncture injection 2-4 turnover spine surgery and debridement and fixation. The puncture process was successful in most of the patients, with pneumothorax in 6 cases (1.06%) and local puncture bleeding in 18 cases (3.18%). During the treatment, 68 cases of adverse drug reactions occurred in some patients, including 45 cases of gastrointestinal reactions, 39 cases of drug-induced liver damage, 29 cases of allergic dermatitis, 22 cases of leukopenia and thrombocytopenia, 18 cases of peripheral neuritis and 16 cases of renal dysfunction. After a certain time of drug withdrawal observation, timely adjustment of oral anti-tuberculosis drug regimen and symptomatic treatment such as liver, stomach and kidney protection, the adverse reactions returned to normal. All patients were followed up regularly for 1.5 to 3 years (mean, 2 years), and no recurrence was found during the follow-up.

Figure 2. T4 vertebral bone destruction, blurred lesion margins, and paravertebral abscess formation before treatment.
3. Discussion

Spinal tuberculosis is one of the common extra-pulmonary tuberculosis, with the highest incidence of bone and joint tuberculosis [4]. The affected vertebrae of senile spinal tuberculosis may exhibit bone destruction and necrosis, which may easily lead to vertebral collapse and vertebral compression fracture, etc. Most patients have atypical early symptoms, which are difficult to distinguish from suppurative spondylitis and vertebral degeneration [5]. CT and MRI are commonly used in the examination of spinal tuberculosis. The imaging changes of elderly patients have their own characteristics. Lesions on lumbar vertebral bodies, this study followed by thoracolumbar, in the upper thoracic and lumbosacral vertebral, with 2 ~ 3 vertebral involvement is the most common, often for borderline, namely by the adjacent vertebral body bone destruction with vertebral abscess, boundary is not clear, the intervertebral disc is easy affected, intervertebral disc can be affected, no hard edges, part of the vertebral abscess by smaller or not obvious, part of the vertebral side only soft tissue swelling. In severe cases, kyphosis and spinal instability may occur. CT examination has obvious advantages in determining spinal canal involvement, size of paravertebral abscess and puncture location of vertebral abscess, while MRI examination can reflect pathological changes of diseased vertebral bodies at different stages earlier, which is conducive to early diagnosis of the disease [6]. This study found that the detection rate of dural and spinal cord compression and subligamentous dissemination by MRI was significantly higher than that by CT, while the detection rate of dead bone and calcification was significantly lower than that by CT. However, there was no significant difference in the detection rate of paravertebral abscess and bone destruction compared with CT. CT and MRI can respectively reflect the different characteristics of spinal tuberculosis, and the combined examination of the two can accurately reflect the condition of senile spinal tuberculosis, reduce the rate of misdiagnosis and missed diagnosis, and provide a reliable basis for clinical diagnosis and treatment [7]. At the same time, T-SPOT test is used to diagnose whether there is tuberculosis bacillus infection.

Because the clinical treatment of spinal tuberculosis by oral anti-tuberculosis drugs is often long cycle, most of the curative effect is not good, easy to lead to the disease is not cured, easy to form the sinuses and cause the spread of tuberculosis. At present, the main surgical treatments are lesion removal, internal fixation and bone grafting [10], which take a long time and cause great trauma. There are also many complications, such as damage to the stability of the spine, postoperative fistula, nerve injury [11] and high recurrence rate. Elderly patients with malnutrition, osteoporosis, cardiopulmonary and renal insufficiency and other multi-system diseases are often unable to tolerate long-term anesthesia and surgery. Most of them do not have the conditions for surgery or refuse surgery. From the perspective of safety, medical paravertebral puncture minimally invasive treatment has become the first choice [12]. In this study, paravertebral minimally invasive treatment under CT localization (Figure 1) can be applied to: (1) spinal tuberculosis complicated with paravertebral abscess; (2) Active stage of spinal tuberculosis with mild spinal nerve function injury (Frankel grade C or D); (3) Complicated with serious systemic diseases; (4) Recurrence of spinal tuberculosis after surgery; (5) Spinal tuberculosis with sinus tract formation. Paraverte-
bral puncture is not suitable for patients with extremely severe cardiopulmonary insufficiency, peripheral blood plate count less than 5.0×10^9/L and abnormal coagulation function.

Vertebral side minimally invasive local lesion within the isoniazid drug concentration significantly higher than that of blood drug concentration, to destroy the living environment of n/med tuberculosis bacterium, joint sensitive effective anti-tb drugs to control the spread of n/med tuberculosis bacterium, improve the therapeutic efficacy of spinal tuberculosis in resistance, prevent complications and reduce the secondary resistance has an important clinical practical significance [13], and relative surgical operation is simple, convenient, Without intravenous anesthesia, the incidence of pneumothorax was only 1.06%, and the incidence of local puncture bleeding was only 3.18%. As a minimally invasive treatment, it is clinically safe and easy to operate. Local puncture administration 5 times a week is similar to daily anti-tuberculosis administration regimen, which can achieve the purpose of killing tuberculosis bacteria quickly. For active spinal tuberculosis patients with spinal cord injury or kyphosis, paravertebral puncture and injection of pus 2-4 weeks before operation create favorable conditions; Provide the best time after the improvement of the condition, increase the safety of surgery, reduce postoperative recurrence or complications; For patients with liver and kidney dysfunction, the dose of oral antituberculosis drugs can be reduced to reduce the toxic side effects of drugs and shorten the total cycle of oral antituberculosis drug treatment. In this study, for patients with postoperative recurrence and surface sinus tract, local minimally invasive treatment and repeated local lavage of anti-tuberculosis drugs in the sinus tract are beneficial to control infection and promote the healing of diseased bone and sinus tract, effectively curb the proliferation and spread of mycobacterium tuberculosis, while preserving the skeletal function of dead bone and maintaining the stability of spine. In this study, about 88% of elderly spinal tuberculosis patients can achieve clinical cure and drug withdrawal without invasive surgery, reducing the pain of patients and saving medical costs [3], which has become a new trend and effective way to treat active spinal tuberculosis in the elderly.

Although this study still needs to be improved, such as repeated puncture and long hospitalization period. However, regular paravertebral puncture and local injection are beneficial to improve the cure rate of senile spinal tuberculosis, which is more simple, safe and effective, and suitable for clinical application. It is a good strategy for conservative treatment in internal medicine.

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