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Results of hip replacement with tuberculosis coxitis in elderly patients: A case study of Uzbekistan

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Abstract

Objective. Comprehensive study of the effectiveness of total hip replacement in patients experiencing tuberculous coxitis by taking into account the patients' age.

Materials and Methods. During 2013-2020, 62 operations of total arthroplasty were performed for patients undergoing tuberculosis of the hip joints at the Republican Specialized Scientific and Practical Medical Center of Tuberculosis and Pulmonology.

Results and Discussions. According to the results, the clinical manifestations of the disease in a group of elderly patients were characterized by deep disorders or a complete lack of joint function. The remaining patients, who addressed at a young or working age, showed partial preservation of joint function with a limited range of motion. Clinically, the disease is characterized by a protracted and gradual onset of 12-14 months from the onset of the first symptoms until the height.

Conclusions. Based on the obtained results, it can be affirmed that elderly patients with tuberculosis lesions of the hip joint have a relatively deep and extensive destructive disorder, a complicated clinical course, and correspondingly, there is increased recovery time.

Keywords: Tuberculosis, Tuberculosis Coxitis, Hip Joint, Total Arthroplasty.

[SJIF 2020: 6.224](#)
[IFS 2020 4.085](#)

1. Introduction

Tuberculosis of bones and joints occurs as an independent disease, and in combination with other pathological processes. In a morphological study, bone tuberculosis is determined by a combination of numerous signs: scattered foci of caseous-like necrosis, few epithelioid-cell granulomas, giant multinucleated macrophages, Pirogov-Langhans cells, lymphoid infiltration, and the presence of leukocytes [1, 2].

Babhulkar and Pande [3] reported that tuberculosis of hip joint accounts for about 10 or 15 % of all patients of osteoarticular tuberculosis, and according to Caparos et al. [4], it is considered as the second most common site of osteoarticular involvement after the spine. One of the crucial factors is to make early diagnosis and treatment; otherwise it results in severe bone and cartilage destruction causing deformity, pain and instability, as well as its treatment can be confronted with huge challenges.

Despite the successes achieved in the fight against osteoarticular tuberculosis in Uzbekistan, the problem of medical and social rehabilitation of patients with the consequences of tuberculous coxitis remains acute. The traditional use of conservative treatment or various types of osteoplastic operations in patients with the consequences of specific coxitis is not effective enough due to relapse of the pathological process in 55.2% of cases [4-6]. In the studies carried on hip joint arthroplasty with the consequences of tuberculous coxitis, single observations or cases of complications using this technique are described. Currently, due to the introduction of new surgical technologies and complex specific therapeutic treatment, it is possible to replace the hip joint after undergoing tuberculous coxitis.

Every year endoprosthetics of joints finds more and more widespread use in phthisio-orthopedics. This surgical intervention saves the patient from constant pain, and restores movement in the joint. However, a significant number of complications are revealed with an increase in the number of these interventions, which forces leading orthopedists to investigate this problem and to develop ways to prevent possible negative consequences from the operation [7-9].

Hip arthroplasty is performed for patients of different ages, while it should be borne in mind that up to 70% of patients are older than 50 years and they have concomitant diseases that require correction. The pathology, which the affected joint is replaced with an implant, is also different, and affects the result of treatment [6, 10].

[SJIF 2020: 6.224](#)

[IFS 2020 4.085](#)

Therefore, despite some successes achieved in the treatment of tuberculosis and other destructive diseases of the musculoskeletal system, the incidence of disability in patients with bone-tuberculosis remains quite high, according to various authors, it makes up an average of 50.6% of patients. The main reasons for the lack of effectiveness of treatment and disability of patients should be considered late diagnosis of the disease at the prehospital stage, unreasonably long periods of conservative orthopedic treatment, low proportion of patients undergoing surgical treatment, suboptimal timing, and increased drug resistance of mycobacteria tuberculosis (MTB) with bone articular tuberculosis. All this once again indicates the priority of radical reconstructive surgery for tuberculosis of bones and joints [11-13].

The aim of this medical research is to study the effectiveness of total hip arthroplasty in patients who experienced tuberculous coxitis, taking into account the age of the patients as well.

2. Materials and Methods

During 2013-2020, 62 operations of total arthroplasty were performed for patients undergoing tuberculosis of the hip joints at the Republican Specialized Scientific and Practical Medical Center of Tuberculosis and Pulmonology. All patients were divided into 2 groups to achieve the aim of this research.

The 1st group included 22 (35.5%) elderly patients $50 \leq$ years old and the 2nd group included 40 (64.5%) patients of a young and working age (from 20 to 50 years old). The sex ratio of patients was 53.3% (N = 33) males, and 46.7% (N = 29) female cases. The age of the operated patients was from 18 to 62 years (42.8 ± 12.5 years). The complex examination of patients included x-ray tomography of the affected joint, assessment of orthopedic status, clinical and biochemical analyzes, and chest x-ray.

A panoramic radiograph of the pelvic bones and both hip joints and MSCT or MRI of the affected joints were compulsory study for patients with a hip joint lesion. All patients were prescribed a regimen of anti-tuberculosis therapy (isoniazid 5-10 mg / kg, rifampicin 15-25 mg / kg, ethambutol 15-25 mg / kg and pyrazinamide 15-20 mg / kg body weight) in order to prevent relapse against the pathogenetic agents before surgery.

The right hip joint was affected by tuberculosis in 35 (56.4%) cases among the examined patients, and a specific process was in the left hip joint in the remaining patients (43.5%).

[SJIF 2020: 6.224](#)

[IFS 2020 4.085](#)

The frequency of contractures, characterizing the degree of functional failure of the joint, was studied. Given the amount of flexion contracture, we distinguished 3 degrees of contracture: mild, moderate and severe. The extension deficit did not exceed 10° with a mild degree of contracture, $10-15^\circ$ with a moderate, and the extension restriction was more than 15° with a severe degree. Contractures of the hip joint of various degrees were noted in 20 (90.9%) patients of the 1st group and in 34 (85%) patients of the 2nd group: mild degrees were detected in 10% and 29.4%, moderate was 35.0% and 50.0%, and severe contracture was found in 50% and 20.6% of patients. The presented data indicated that contracture with a severe degree is relatively more common in elderly patients.

Consequently, the process has a deeper functional impairment of the joint in old age. The total amplitude of joint mobility was $59.12 \pm 5.6^\circ$ and $67.3 \pm 5.9^\circ$, respectively, hip hypotrophy 2.91 ± 0.98 cm and 1.74 ± 0.82 cm. The data analysis showed that tuberculosis process in elderly patients is accompanied by a more severe decrease in mobility along with significant dystrophic disorders.

All 62 patients underwent total arthroplasty of the affected hip joint. The specific nature of the process in 28 patients (45.1%) was proved by histological examination of surgical material; tuberculosis was confirmed in one of the operated patients (1.6%) by bacteriological studies (genetic-molecular methods, such as Gene-Xpert MTB/Rif, HAIN test). The study did not include patients who had two or more localizations of active common tuberculosis of the skeletal system, which naturally extended the duration of anti-TB treatment. A combination of respiratory tuberculosis was diagnosed in 3 patients operated on for tuberculous coxitis (4.8%), a subsided form of tuberculous spondylitis was revealed in 6 (9.7%) patients, and 1 (1.6%) of the patient had inactive tuberculosis of the shoulder joint.

3. Results and Discussions

The results from general clinical studies in elderly patients (group 1) showed deviations from the norm: hemoglobin decreased to 108.3 ± 9.5 g/l, ESR - 21.7 ± 8.7 mm/h, transaminases: (AST - 0.65 ± 0.25 mmol/L; ALT- 0.72 ± 0.27 mmol/L; total bilirubin - 13.5 ± 4.86 μ mol/L), fibrinogen on average up to 5.98 ± 2.1 g/l. In the second group, the results of general clinical studies showed the following: hemoglobin 118.9 ± 12.4 g/l, ESR - 18.98 ± 8.3 mm/h, transaminases: (AST - 0.33 ± 0.14 mmol/l; ALT- 0.46 ± 0.16 mmol/L; total bilirubin - 11.4 ± 4.47 μ mol/L), fibrinogen on average up to 3.94 ± 1.72 g/l.

[SJIF 2020: 6.224](#)
[IFS 2020 4.085](#)

A clinical diagnosis supported by radiographs is adequate for starting the treatment and it is highly recommended by number of international experts [14-16]. Hence, clinical and radiographic manifestations of the disease in elderly patients (group 1) (N = 22) were characterized by deep anatomical and functional disorders or a complete lack of joint function. According to the X-ray results, the lesions of the acetabulum were noted in 8 (36.3%) patients, destruction in the femoral head in 5 (22.7%), in the rest (40.9%) - complete loss of joint function due to complete resorption of the femur bones' head and neck with sequestration of the acetabulum, infiltration and the formation of abscesses and fistulas.

3.1. First Clinical Case

Patient named I., 28 years old, being sick for the last 18 months, within 15 months was treated by a neurologist by a neurologist and vertebrologist for osteochondrosis and intervertebral hernia of the lumbar spine.

Diagnosis: Tuberculosis of the right hip joint; arthritic stage, active phase. Complications: Paraarticular abscess of the right hip joint with fistula, flexion contracture, impaired joint function, and pain.

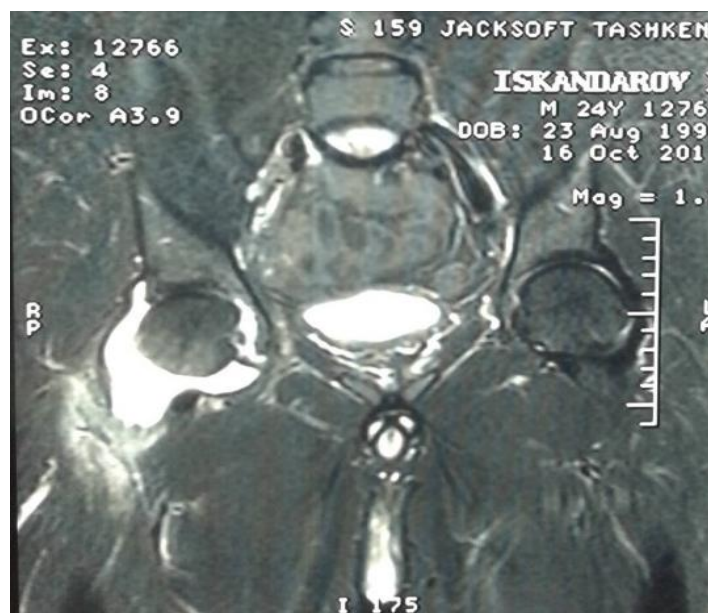


Fig. 1. MRI scan of the pelvic bones (before surgery)

[SJIF 2020: 6.224](#)

[IFS 2020 4.085](#)

According to the results obtained via MRI scan (Fig. 1), the patient had tuberculosis of the right hip joint, arthritic stage - active phase, and complications: paraarticular abscess of the right hip joint, fistula. Wherein, the duration of the disease varies from 2 to 18 months from the moment of pain in the joint to the peak, when the patient experiences unbearable pain that is poorly controlled by taking analgesics (NSAIDs), while the appearance of a fistula in 8 patients is the reason for seeking medical help.

Regarding the MRI, it is also a sensitive test to detect soft tissue abnormalities in and around the joint. According to Midiri et al. [17] MRI is not specific for tuberculosis of hip. MRI may display varying degree of bone edema and synovial effusion, minimal areas of bone destruction in early stages. Shanmugasundaram [18] stated that the tissue diagnosis may be indicated in such instances. A massive number of the literature on the subject agrees that the diagnosis in endemic regions can be identified on the basis of clinical features supported by plain X-ray findings alone. Nevertheless, additional investigations in the form of ultrasound or MRI of the hip may be necessary in the countries where disease is rare.



Fig. 2. Post-surgery condition (PSC) - prosthetics of the right hip joint

Partial preservation of joint function with limited range of motion is noted in the remaining (2-group) patients. Clinically, the disease is characterized by a protracted gradual onset; 12-14 months

[SJIF 2020: 6.224](#)

[IFS 2020 4.085](#)

are noted from the onset of the first symptoms to the pick. Herewith, the destruction in the joint was of a limited nature despite the antiquity.

3.2.Second Clinical Case

Patient named K., 53 years old, being sick for 9 years, was treated by an orthopedist for nonspecific arthritis of the right hip joint and several times in a phthisio-orthopedic clinic for tuberculous coxitis.

Diagnosis: Tuberculosis of the right hip joint; post-arthritic stage, remission phase; weakened flexion contracture; shortening of the right lower limb by 4 cm; impaired joint function and pain.

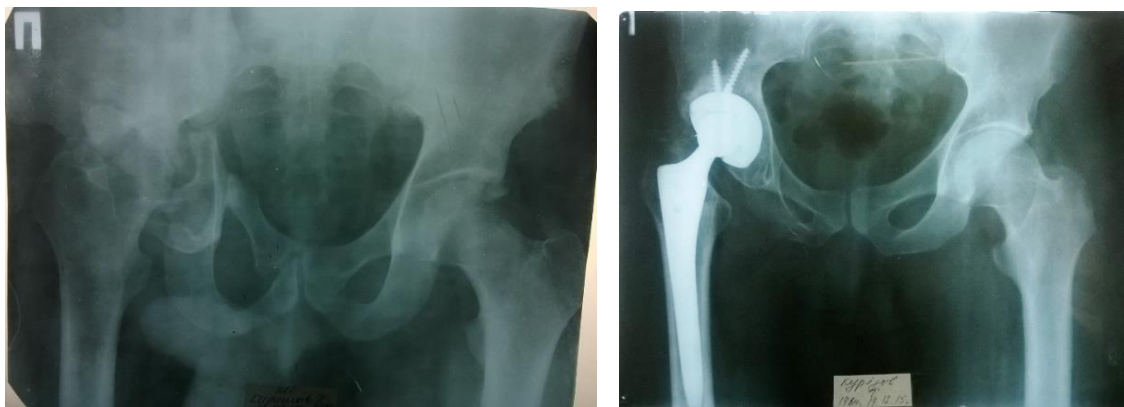


Fig. 3. Panoramic x-ray of the pelvic bones before (left image) and after (right image) operations of total endoprosthetics of the right hip joint

Taking into consideration the long-term stabilization and the absence of a specific process recurrence due to anti-tuberculosis therapy, patients underwent total hip arthroplasty with lateral access using bipolar endoprostheses (DePuy 7 cases, Johnson & Johnson-America 5 cases, Zimmer-Germany 7 cases, Aesculap 2 cases, B.Braun 1 cases, Stroped 1 cases and Chinese-made endoprostheses (TitanMed, IRENE, STAYKER 39 cases). The selection of a proper type of endoprosthesis was carried out taking into account the destructive changes in the joint, a state of the bone structure, material and somatic state, age and weight of the patient.

In order to analyze the effectiveness of total hip arthroplasty, we studied the frequency and nature after surgical complications, the amount of movement in the area of the operated joint, and pain while walking. Total hip arthroplasty in young patients is characterized by fewer complications and with good mobility of the operated joint from the first postoperative day. Suppuration of post-surgical wound was observed in 4 (18.2%) and 1 (2.4%) patients of the 1st and 2nd groups

[SJIF 2020: 6.224](#)

[IFS 2020 4.085](#)

respectively. Due to severe hypotension of the thigh muscle, partially limited and painful movement was observed in 3 (13.6%) and 2 (4.8%) patients of the 1st and 2nd groups respectively. In addition, 3 (13.6%) patients of the 1st group experienced some complications in cardiovascular system.

Thus, the results from analysis of total hip arthroplasty allowed the criteria determining the indication for surgery. These criteria include: stage of the disease, process activity in the joint, complication of specific arthritis, the age of the patient and the presence of concomitant diseases.

4. Conclusions and Recommendations

1. Patients with tuberculosis of the hip joint in old age have a comparatively deep and extensive destructive and functional joint disorder, and complicated clinical course.

2. Total hip arthroplasty in elderly patients with tuberculous coxarthrosis can restore the musculoskeletal function of the lower limb and significantly improve the quality of life of patients.

To sum up, it is preferable to use osteoplastic techniques to compensate the deficiency of bone structures of the acetabulum due to the need to deposit anti-tuberculosis drugs in bone grafts during hip replacement in patients with the consequences of tuberculous coxitis.

Practical recommendations:

- Hip replacement with tuberculous coxitis with abdominal and segmental defects of the acetabulum should be performed with a fading tuberculosis process;

- Pre-surgery X-ray examination of the affected hip joint should be supplemented by CT scan, which allows determining the presence and localization of cavity and segmental defects of the acetabulum;

- In the pre-surgery period, in all cases, it is mandatory to conduct anti-tuberculosis therapy with 3 drugs for at least 1 month for the prevention of relapse of the tuberculosis process;

- Cavity and segmental defects of the acetabulum during hip replacement should be replaced by a bone autograft, which allows restoring the continuity and integrity of the acetabulum, to obtain a rigid attachment of the implant cup and reduce the risk of development of acetabular insufficiency;

- Rehabilitation measures in the post-surgery period should be carried out in a gentle manner, in order to create optimal conditions for the restructuring and consolidation of the autograft.

[SJIF 2020: 6.224](#)
[IFS 2020 4.085](#)

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[SJIF 2020: 6.224](#)

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