



Specificity of Treatment for Prosthetics of Large Joints in HIV- Infected Patients

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ABSTRACT

There are a limited number of publications that present the results of primary end prosthetics of large joints in patients with human immunodeficiency virus (HIV). We could not find any works devoted to revision end prosthetics in patients with periprosthetic infection. During the period from 2015 to 2019, 13 HIV-positive patients with periprosthetic infection of the hip (10 cases) and knee (3 cases) joints were treated at the clinic. The patients' condition was assessed using clinical, laboratory, and radiological methods. The Harris Hip Score and Knee Society Score were evaluated before and after surgery. Despite compliance with international protocols for the treatment of implant-associated infection, the frequency of relapses in HIV-positive patients in the asymptomatic stage remains very high. The effectiveness of two-stage treatment using an antibacterial spacer in our group of patients was only 15.4%.

Keywords:

Periprosthetic infection, revision end prosthetics, HIV infection

The total number of Russians infected with the human immunodeficiency virus (HIV) as of 30.06.2019 was, according to Rospotrebnadzor monitoring data, 1040040 people*. HIV-infected patients have a higher risk of developing primary or secondary degenerative joint disease [1]. The consequence of the prevalence of HIV infection among the population is an increase in the number of HIV-positive patients who require replacement of a large joint. Many orthopedists performing hip and knee arthroplasty ask themselves the question: "Does HIV infection affect the frequency of periprosthetic infection?". The number of published studies devoted to this problem is small, and experts' opinions differ. According to C.R. Lehmann and co-authors, J. Parvizi and co-authors, and Q. Naziri and co-authors, the incidence of complications, in particular infectious, in this group is higher than in the group of patients without HIV [2, 3, 4]. On

the contrary, the data of N. Snir with co-authors, B.A. Shilnikova with co-authors and L.Yu. Voevodskoy and co-authors indicate a relatively low proportion of septic complications after arthroplasty of large joints in patients with HIV [1, 5, 6]. However, most studies analyze the results of primary endoprosthetics. We could not find individual publications containing the results of revision endoprosthetics in this group of patients. Nevertheless, the very fact of performing revision intervention, regardless of the patient's immune status, is the strongest risk factor for periprosthetic infection [7].

The purpose of the study. To evaluate the short-term results of revision endoprosthetics in HIV-positive patients with periprosthetic infection of the hip and knee joints.

Material and methods. Using an electronic database, we found that in the period from 2015

to 2019, 13 HIV-positive patients (13 joints) with periprosthetic infection of the hip and knee joints were treated at the clinic. The criterion for inclusion in the study group was the presence of an infected implant at the time of admission to the clinic and HIV positive status. Patients with septic arthritis without a previously installed implant (endoprosthesis or spacer) were not included in the study group. The study group consisted of 9 men (69%) and 4 women (31%), whose average age was 38.1 ± 1.1 years (from 35 to 53 years). The average body mass index was 24.3 ± 1.2 (from 18 to 40.7). At the same time, 10 patients (77%) had an infection after hip replacement and 3 patients (23%) had a knee joint. Nine patients (69%) admitted the fact of intravenous administration of narcotic drugs in the anamnesis. The most frequently diagnosed concomitant diseases were viral hepatitis C (69%) and B (23%), secondary anemia of mild degree (38.5%). Laboratory examination. All but one of the patients (virus markers were detected for the first time after surgery) were observed and treated at the AIDS prevention and control center at their place of residence. The course of HIV infection was assessed using the V.I. Pokrovsky classification (2001) [8] and the widespread classification of the US Centers for Disease Control (CDC 1993) [9]. The average level of CD4 lymphocytes was 656 ± 51 /ml (from 218 to 1134), the viral load was determined in 77% of patients.

At the time of admission to the clinic, the average hemoglobin level in the blood was 119 ± 3 g/l (from 98 to 143), the erythrocyte sedimentation rate was 71.8 ± 7.83 mm/h (from 20 to 120) and the C—reactive protein was 49 ± 6.6 mg/l (from 14.4 to 89). Radiographic assessment. To assess the position and stability of the endoprosthesis or spacer components, a series of anteroposterior, lateral and other radiographs of the joints were performed. To assess the biomechanical axis of the lower limb in patients with knee joint pathology, telerentgenograms of the lower limb were performed, which determined the type of implant fixation, its stability, the presence of bone defects, as well as the localization of fistulas and purulent congestion by introducing a contrast agent through a fistula or wound.

In the anamnesis, most patients had repeated surgical interventions in the area of the affected joint (from 1 to 7), the average number of surgical interventions was 3.9 ± 0.5 (see Table 3). The onset of the disease in 8 (61.5%) patients was septic arthritis, in 5 (38.5%) cases the infection developed after replacement the joint. All patients were diagnosed with periprosthetic infection according to the recommendations of the International Conciliation Conference on Periprosthetic Infection [11]. The technique of the operation. After preoperative planning, access to the infected joint was performed: in patients with infection localization in the hip joint, direct lateral Harding access was used, in the case of infection localization in the knee joint, medial parapatellar access was used. When performing knee arthrodesis, a horseshoe-shaped access along the front surface was used. With the help of revision tools, all components of the spacer or endoprosthesis were carefully removed, radical treatment of the focus of septic inflammation was carried out. Then the implantation of a preformed or block-shaped cement spacer of the appropriate size was carried out. In all cases, bone cement with antibacterial drugs (vancomycin and/or gentamicin, and/or cefazolin) was used. During the operation, the material was taken for microbiological examination.

The results of the study. According to the classification of D.T. Tsukayama, acute postoperative infection was detected in one case (7.7%), late chronic — in four patients (30.7%). In most cases (61.5%), the infection was classified as a positive intraoperative culture [12]. The interval between the manifestation of infection and admission to the clinic in all patients was more than 4 weeks, which was an absolute indication for the removal of the components of the endoprosthesis. In addition, a contraindication for surgical treatment with the preservation of the implant was that in 5 out of 6 cases, signs of instability of the components of the endoprosthesis were revealed. After clinical examination, fistulas were detected in 12 patients (92.3%), edema and hyperemia in the

postoperative scar area — in one (7.7%) patient. To systematize bone defects in the admission of patients with periprosthetic infection of the hip joint, the classification of W.G. Paprosky was used [13]. Acetabulum defects of type 3 were observed in 5 cases (38.5%), types 2B and 2C were registered in two patients, respectively (15.4%). One patient (7.7%) had a type 2A defect. Femoral defects of type II were detected in 5 patients (38.5%), types III and III - in 3 (23%) and 2 (15.4%) cases, respectively. Among three patients with localization of infection in the knee joint, two (15.4%) had an AORI F3/T3 defect [14], one (7.7%) had an F2B/T2B type.

As a result of microbiological examination of biomaterials of 13 patients, conducted according to clinical indications, pathogenic microflora was detected in 12 cases (92.3%) out of 13. In all cases, the gram-positive pathogen *Staphylococcus aureus*, sensitive to oxacillin, was identified. Removal of the infected endoprosthesis was performed in all 7 patients (54%) admitted to the clinic with periprosthetic joint infection (6 hip and 1 knee joint). Hip joint spacer implantation (two articulating and two block-shaped) was performed in 4 patients during the operation. Subsequently, one of them successfully underwent two-stage treatment with the installation of an endoprosthesis. Resection arthroplasty was performed in two cases. In one patient with localization of infection in the knee joint (7.7%), an articulating spacer was installed after removal of the components of the endoprosthesis. Of the 6 patients (46%) admitted with an infected spacer, three underwent resection arthroplasty of the hip joint. One patient underwent successful two-stage treatment: spacer resetting and revision endoprosthetics. In one patient with a relapse of the purulent-inflammatory process after removal of the spacer, knee arthrodesis was performed. In one case, there was a complication in the form of a relapse of infection, which required repeated operations.

Thus, two (15.4%) of 13 HIV-positive patients with periprosthetic infection successfully underwent two-stage treatment. After infection control was achieved, 5 patients

(38.5%) refused to replace the spacer with an endoprosthesis. Resection arthroplasty was performed in 5 cases (38.5%), and arthrodesis was performed in another (7.7%). Of the 9 patients who had previously taken drugs, 5 had a recurrence of periprosthetic infection. Prior to surgical treatment, the functional state of the hip joint according to HHS was estimated at an average of 45.3 ± 2.2 points (min — 38 points, max — 60.5 points). The average score after treatment differed slightly from the baseline ($p = 0.2$) and amounted to 52.2 ± 4.15 points (from 35.5 to 81.5 points). In one patient (7.7%), after successful two—stage treatment, the result was regarded as good, in two more cases (15.4%) - as satisfactory. In patients with periprosthetic infection of the knee joint, the KSS score on admission to the clinic averaged 31 ± 0.7 points, on the Function Score scale — 36.3 ± 2.9 .

Only in one patient after performing knee arthrodesis, the score on the scales increased, amounting to 61 and 41 points on KSS and Function Score, respectively. Repeated operations and complications. One 34-year-old patient had a relapse of infection 4 months after the knee joint spacer was reinstalled. The course of periprosthetic infection was complicated by spondylodiscitis, epidural abscess at the level of Th9-Th10 and spastic paraplegia with impaired pelvic organ function. Infection control was achieved after the rehabilitation of an epidural abscess and resection arthroplasty of the knee joint. The patient was discharged for outpatient treatment at the place of residence, but a fatal outcome was registered 14 months after the operation.

Conclusions. Two-stage revision endoprosthetics using an antibacterial spacer is the most common treatment option for periprosthetic infection. Despite compliance with international protocols for the treatment of implant-associated infection, the frequency of relapses in HIV-positive patients in the asymptomatic stage remains very high. The effectiveness of two-stage treatment in our group of patients was only 15.4%. Taking into account all of the above, it is necessary to think about the expediency of revision

endoprosthetics for HIV-positive patients with periprosthetic infection.

Recommendations

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