

© A group of authors, 2018

DOI 10.18019/1028-4427-2018-24-1-81-85

**Outcome of bilateral periprosthetic hip infection management****N.M. Kliushin, A.M. Ermakov, A.V. Kaminskii, Iu.V. Ababkov, E.V. Gorbunov, K.V. Kudinov**

Russian Ilizarov Scientific Center for Restorative Traumatology and Orthopaedics, Kurgan, Russia

**Introduction** Infection is a devastating complication after joint arthroplasty. In most cases of purulent infection, surgeons are forced to perform revision of the artificial joint. This is caused by the ability of microorganisms to adhere to the surface of implants. Periprosthetic infection is a heavy burden both for patients due to a significant level of the disease recurrence and for medical institutions because of high medical treatment costs. **Methods** The analysis of the treatment outcome in a female patient with bilateral periprosthetic hip infection was conducted. One- and two-stage revisions were performed. **Results** The treatment measures stopped the purulent inflammatory process (according to Delphi) and restored the functional state of both hip joints (HHS of 79 points on the left and 93 points on the right side). **Discussion** Treatment of periprosthetic infection is a complex clinical task, which requires a personalized and comprehensive approach that includes implementation of the basic principles of diagnosis and treatment of the disease, understanding of this pathology, and teamwork. One and two-stage revisions provide a successful arrest of periprosthetic infection and functional restoring in the affected joint.

**Keywords:** revision arthroplasty, hip joint, periprosthetic infection

Infection is a devastating complication after joint arthroplasty [1]. In most cases of purulent infection, surgeons are forced to perform revision arthroplasty. It is associated by the ability of microorganisms to adhere to the surface of implants [2, 3]. Periprosthetic infection is a heavy burden both for patients as the disease recurs frequently and for medical institutions because of high medical treatment costs of such patients [4, 5, 6].

We bring to your attention a case of bilateral hip infection which was successfully treated.

Female patient K., 38 years old, was admitted to the Clinic for Purulent Osteology of the FGBU RISC for RTO in August 2014 with the diagnosis of late chronic periprosthetic infection of both hip joints (according to Tsukayama). She suffered chronic post-traumatic osteomyelitis in hip joints, fistulous type, combined contracture of both hip joints with a 4-cm left lower limb discrepancy (**Fig. 1**).

At admission, the patient complained of sinuses that discharged in the upper thirds of both thighs, difficulties with weight-bearing, left limb length discrepancy and limitation of motions in

the left hip.

*Anamnesis of the disease* An open reduction of congenital bilateral dislocation of the hips was performed when she was small. In 2005, both hip joints were replaced of at her residence hospital. A sinus appeared in the right hip joint 2 years after. Revision was carried out without changing the implant components. In 2011, the left hip joint implant was removed and a spacer for an unstable infected joint was placed. Sinuses with a purulent discharge developed in both thighs. The patient underwent 6 operations on the hip joints by the time of the admission to our clinic.

Upon arrival, the patient moved with crutches, had severe pain in the region of the left hip joint and atrophy of the left thigh was 6 cm. The relative shortening of the left lower limb was 4 cm. At the time of admission, the functional condition of the left hip joint as estimated according to Harris Hip Score (HHS) was 26 points and 88 points on right side.

X-ray manifestations were: a cementless im-

 Kliushin N.M., Ermakov A.M., Kaminskii A.V., Ababkov Iu.V., Gorbunov E.V., Kudinov K.V. Outcome of bilateral periprosthetic hip infection management. *Genij Ortopedii*. 2018. T. 24. No 1. pp. 81-85. DOI 10.18019/1028-4427-2018-24-1-81-85. (In Russian)

plant on the right side (osteolysis at the border of the pelvic component), type I defect of the femur and type I defect of the acetabulum according to Paprosky; a spacer (hemiprosthesis) on the left side, type II femoral defect and type III A acetabular defect according to Paprosky (**Fig. 1**).

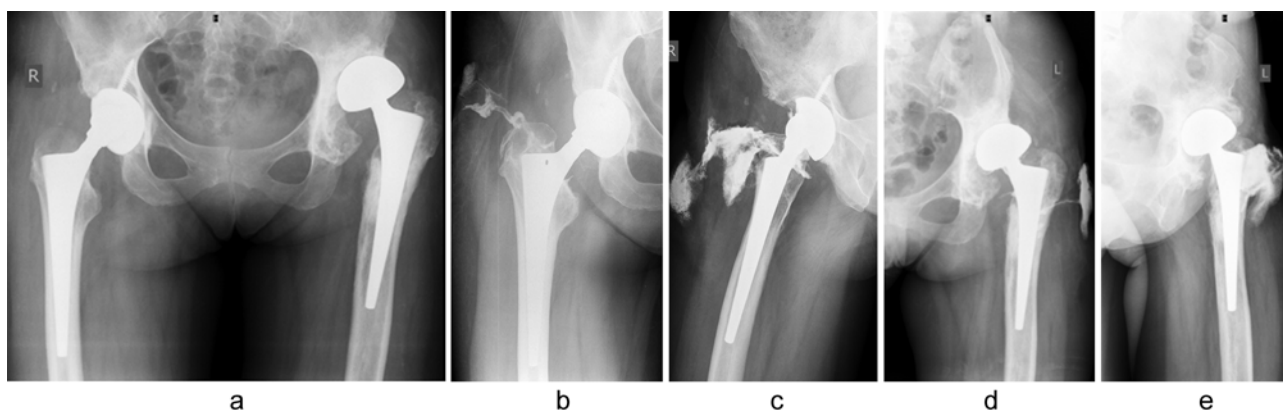
Hematological findings on admission: leukocytosis (10.0), mild anemia (Hb-107, Hct-32.1), increased ESR (81) and CRP (98.1), significant hyperfibrinogenemia (FMC-27.0).

The first stage of a two-stage revision of the left hip joint was in August 2014: implant removal,

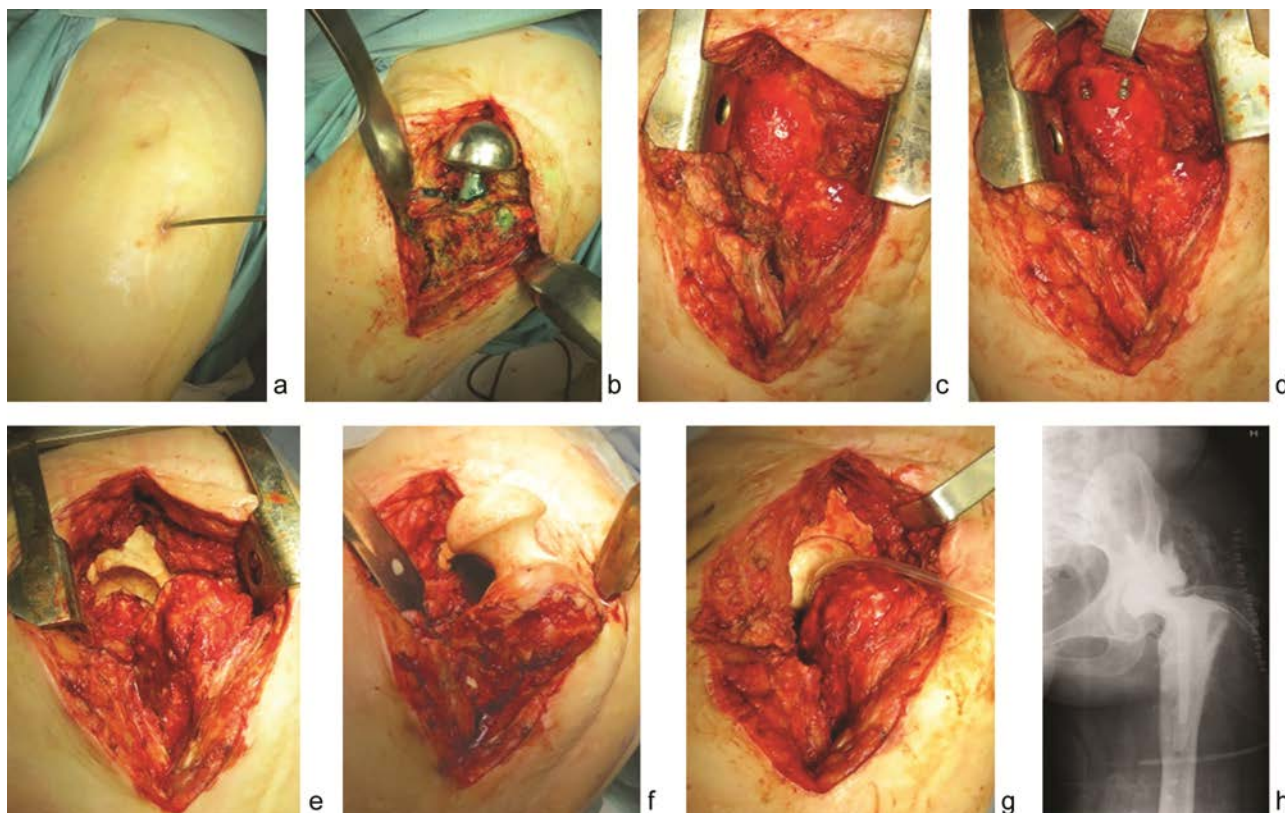
debridement, placement of a preformed spacer, acetabular defect plasty with a cement augmentation (**Fig. 2**).

Study of intraoperative microbiological culture from the left hip joint detected *Serratia marcescens*  $10 \times 5$ .

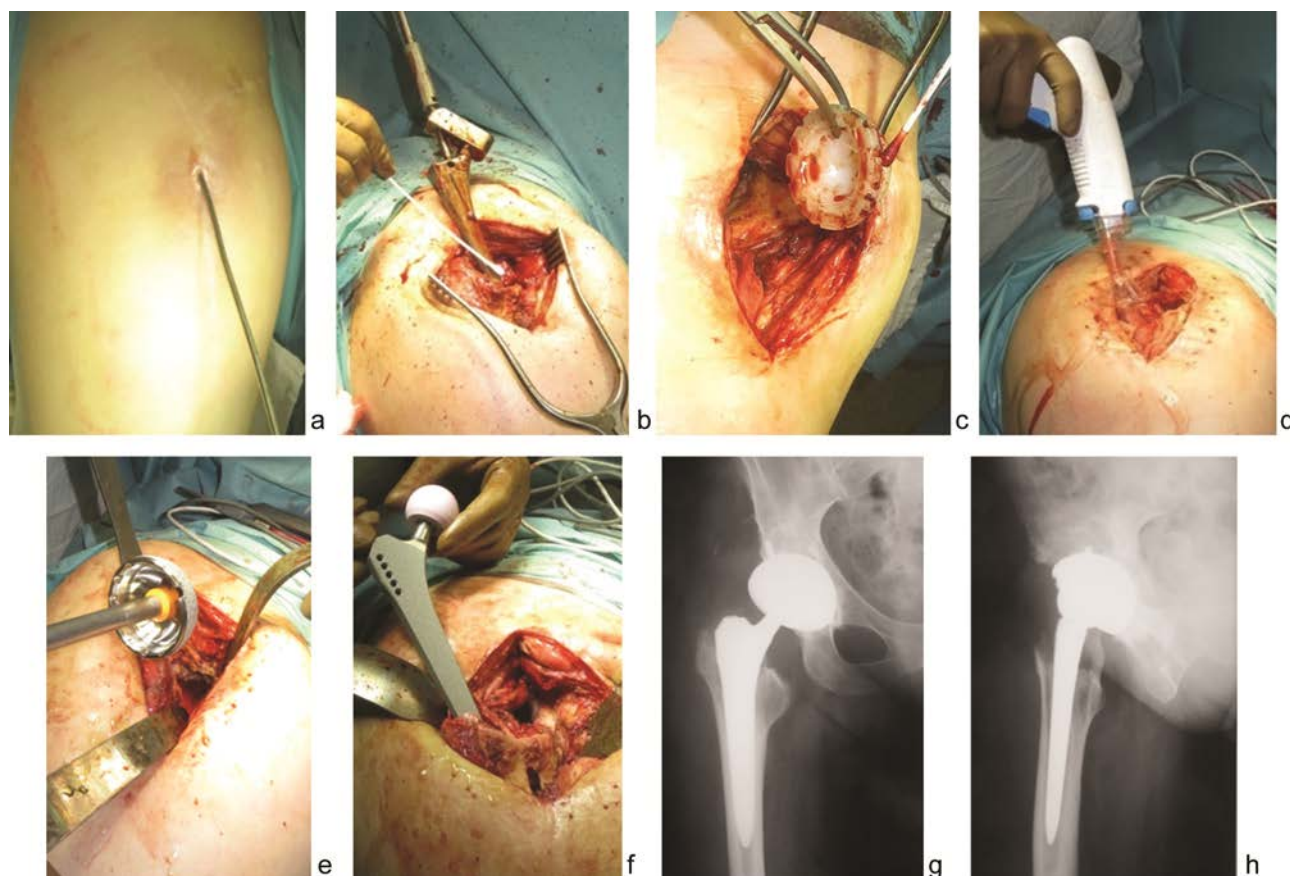
The right hip joint was replaced with the technique of one-stage revision in April 2015: implant removal, debridement, a new implant placement (**Fig. 3**). This type of intervention had two objectives: 1) elimination of the purulent process and 2) restoration of the functional state of the limb.



**Fig. 1** a AP X-ray of the pelvis before treatment; b, c fistulagrams of the right hip joint; d, e fistulogram of the left hip joint



**Fig. 2** a Sinus revision and its contrasting; b dislocation of the spacer head; c joint tissues after debridement; d preparation for augmentation of the acetabulum; e augmentation of the acetabulum with bone cement; f implantation of the preformed spacer; g reduction of the spacer head; h post-op radiograph of the joint



**Fig. 3** **a** Revision of the sinus and its contrasting; **b, c** removal of the components of the infected implant; **d** irrigation of joint tissues; **e, f** implantation of components; **g, h** post-op radiographs of the right hip joint

The first phase of this operation included removal of all implant components with a set of revision tools and a radical debridement of the infection focus. Next, the wound was washed with antiseptic solutions and temporarily sutured. Then, the patient was transferred to another operating room where the second phase of the operation continued with implantation of new components. At the same time, surgical instruments and surgical uniform were changed. Given the good condition of the bone tissue of the joint and minimal defects, standard components (a highly integrated cup and a rectangular stem) were used. Biomechanics of the joint was restored.

Study of intraoperative microbiological culture agents in the right hip joint detected *Staphylococcus aureus*  $10 \times 6$ .

The second stage of a two-stage revision of the left hip joint was performed in May 2016: removal of the spacer, debridement, adjustment of new implant components (**Fig. 4**). Removal of the preformed spacer ran with technical difficulties and resulted in a B3 type femoral fracture (according to Duncan and Masri) which was reduced with a circular wire.

Due to this intraoperative fracture, a long revision stem with a distal type of fixation was used which jammed in the middle third of the diaphysis. A significant defect in the roof and edges of the acetabulum determined the need for reconstruction of the supporting structures of the acetabulum. The posterior left column tantalum augment was successfully used and shaped the roof and the back edge of the acetabulum. The remaining defects were tightly impacted with allogenic bone chips. All of the above measures allowed the cementless high-integration cup to be placed in the projection of the true acetabulum and restore the hip rotation center.

Results of an intraoperative microbiological test were negative.

After each surgery, an antibacterial (for 6 weeks), symptomatic and restorative therapy was performed. The patient was mobile out on the second day after the operation with the assistance of an exercise instructor. Wounds healed with primary intension. Drainages were removed 3-4 days after the operation.

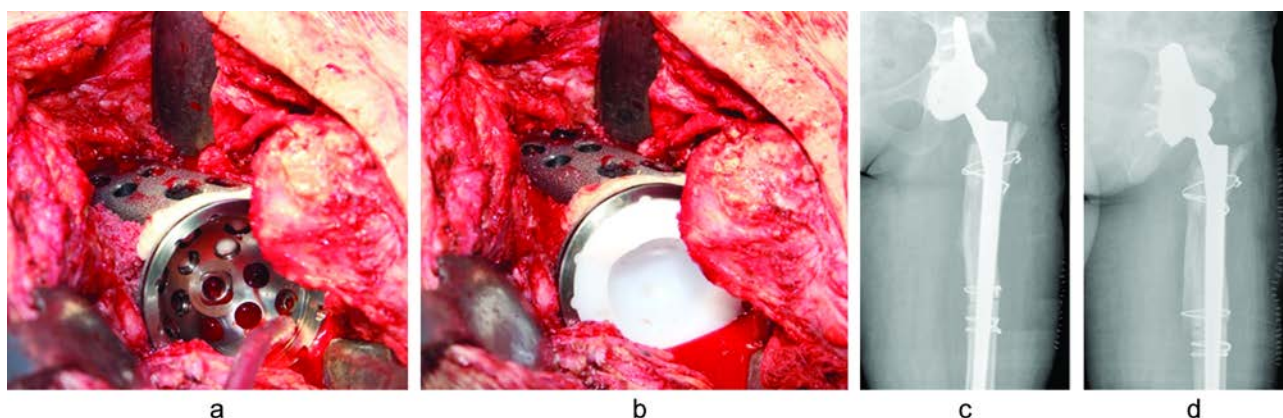
On a follow-up examination after one year, purulent and inflammatory process manifestations were not

detected (according to Delphi). Clinical and radiographic signs of infection progression were not observed. The markers of inflammation were within the norm (leukocytes – 7.6, ESR – 11.0, CRP – 5.38). The functional condition of the left hip joint was 79 HHS points and of the right one - 93 HHS points (**Fig. 5**).

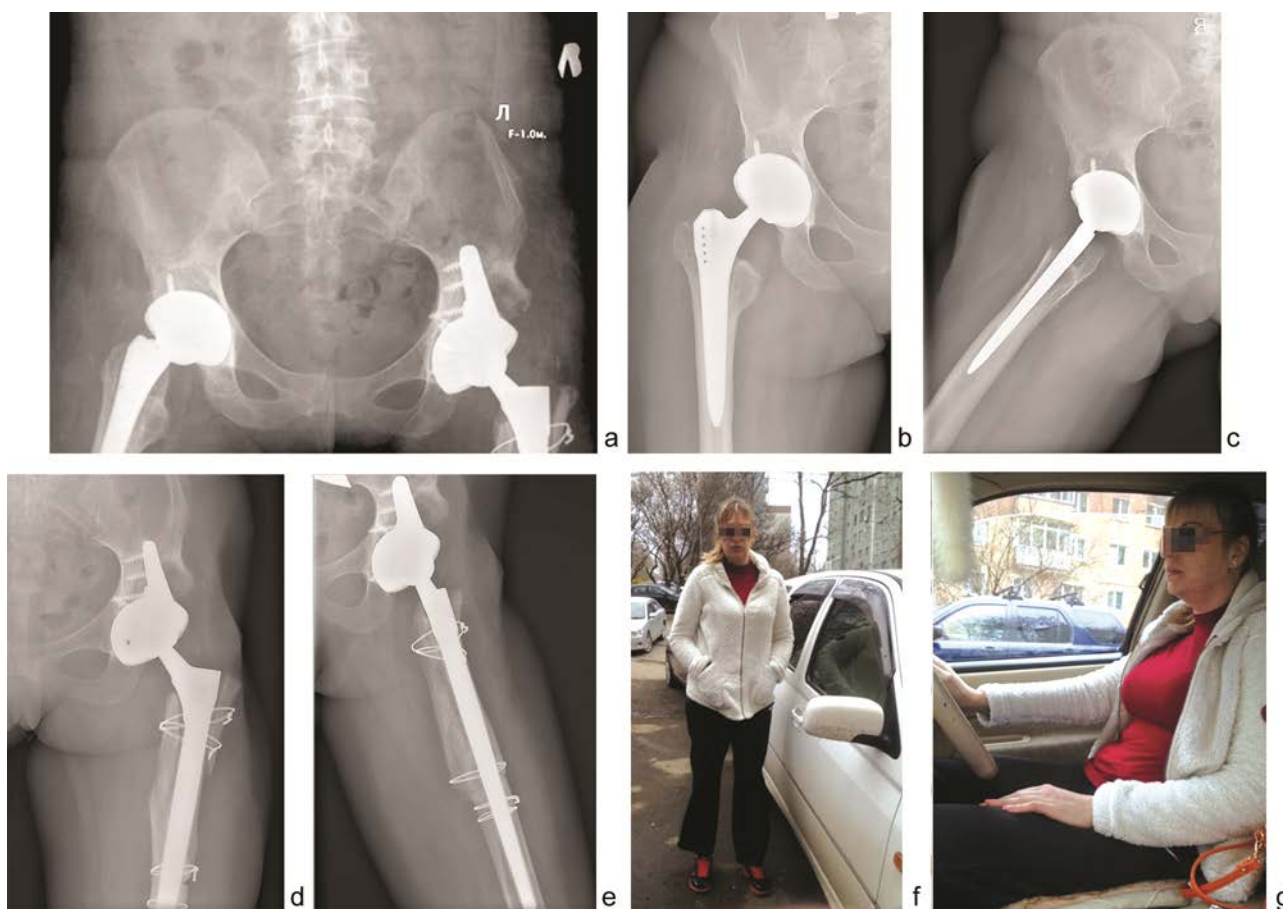
The patient is happy with the result of treatment. She walks without additional means of support with full load on both limbs, drives a car, and

returned to work and daily activities.

Management of periprosthetic infection is a complex clinical task which requires an individual and complex approach that includes the implementation of the basic principles of diagnosis and treatment of the disease, an understanding of this pathology, and teamwork. One- and two-stage revision surgeries successfully arrest periprosthetic infection and restore the functions of the affected joint.



**Fig. 4** Implantation of the augment and pelvic component and acetabulum plasty of the with allogenic bone **a, b**; **c, d** radiographs of the left hip joint after surgery



**Fig. 5** X-ray of the pelvis in a direct projection **a** year after treatment **a**; **b, c** radiographs of the right hip joint one year after treatment; **d, e** radiographs of the left hip joint one year after the treatment; **f, g** functional result one year after treatment

## REFERENCES

1. Soares D., Leite P., Barreira P., Aido R., Sousa R. Antibiotic-loaded bone cement in total joint arthroplasty. *Acta Orthop. Belg.*, 2015, vol. 81, no. 2, pp. 184-190.
2. Gristina A.G., Naylor P., Myrvik Q. Infections from biomaterials and implants: a race for the surface. *Med. Prog. Technol.*, 1988-1989, vol.14, no. 3-4, pp. 205-224.
3. Zimmerli W. Infection and musculoskeletal conditions: Prosthetic-joint-associated infections. *Best Pract. Res. Clin. Rheumatol.*, 2006, vol. 20, no. 6, pp. 1045-1063. DOI: 10.1016/j.berh.2006.08.003.
4. Garrido-Gómez J., Arrabal-Polo M.A., Girón-Prieto M.S., Cabello-Salas J., Torres-Barroso J., Parra-Ruiz J. Descriptive analysis of the economic costs of periprosthetic joint infection of the knee for the public health system of Andalusia. *J. Arthroplasty*, 2013, vol. 28, no. 7, pp. 1057-1060. DOI: 10.1016/j.arth.2013.02.012.
5. Vrgoc G., Japjec M., Gulán G., Ravlić-Gulan J., Marinović M., Bandalović A. Periprosthetic infections after total hip and knee arthroplasty – a review. *Coll. Antropol.*, 2014, vol. 38, no. 4, pp. 1259-1264.
6. Zhang A.L., Feeley B.T., Schwartz B.S., Chung T.T., Ma C.B. Management of deep postoperative shoulder infections: is there a role for open biopsy during staged treatment? *J. Shoulder Elbow Surg.*, 2015, vol. 24, no. 1, pp. e15-e20. DOI: 10.1016/j.jse.2014.04.007.

Received: 01.08.2017

### Information about the authors:

1. Nikolai M. Kliushin, M.D., Ph.D., Russian Ilizarov Scientific Center for Restorative Traumatology and Orthopaedics, Kurgan, Russia, Head of the Clinic of Purulent Osteology, traumatologist-orthopedist of the Highest Category, Department of Purulent Traumatology and Orthopaedics No 1, Tumen Medical Academy, Department of Postgraduate Education, professor; Email: klyushin\_nikolay@mail.ru
2. Artem M. Ermakov, M.D., Ph.D., Russian Ilizarov Scientific Center for Restorative Traumatology and Orthopaedics, Kurgan, Russia, Department of Purulent Traumatology and Orthopaedics No 1, traumatologist-orthopedist; Email: ema\_cab@mail.ru
3. Andrei V. Kaminskii, M.D., Ph.D., Russian Ilizarov Scientific Center for Restorative Traumatology and Orthopaedics, Kurgan, Russia, Head of the Clinic for Reconstructive Bone and Joint Surgery in Children and Adults, Head of the Department of Traumatology and Orthopaedics No 8, traumatologist-orthopedist of the Highest Category
4. Iurii V. Ababkov, M.D., Russian Ilizarov Scientific Center for Restorative Traumatology and Orthopaedics, Kurgan, Russia, Head of the Department of Purulent Traumatology and Orthopaedics No 1, traumatologist-orthopedist of the Highest Category; Email: purulentortho1@mcvto.ru
5. Eduard V. Gorbunov, M.D., Russian Ilizarov Scientific Center for Restorative Traumatology and Orthopaedics, Kurgan, Russia, Department of Traumatology and Orthopaedics No 8, traumatologist-orthopedist
6. Konstantin V. Kudinov, M.D., Russian Ilizarov Scientific Center for Restorative Traumatology and Orthopaedics, Kurgan, Russia, Department of Traumatology and Orthopaedics No 8, traumatologist-orthopedist