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# Periprosthetic Joint Infection after High-Dosage Cortison-Therapy

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**Abstract**

Periprosthetic joint infections are a serious complication after total knee replacement. By now there are no common guidelines or recommendations regarding the handling of a high-dosage cortisone therapy after total knee replacement. In this case we present a periprosthetic knee infection likely caused by a high-dosage cortisone therapy or an intravenous drip infection resulting in revision surgery. A sufficiently long-time interval between total knee replacement and immunosuppressive therapy of at least 3-6 months is requested.

**Keywords:** Periprosthetic joint infection; Nosocomial infection; Cortisone therapy; Intravenous infection

**Abbreviations:** CRP: C Reactive Protein; i.v.: Intravenous

## Introduction

A periprosthetic joint infection is defined as an infection of periprosthetic tissue of an artificial joint implanted into the body [1]. Factors which increase the risk of a periprosthetic infection are for example obesity (BMI>40), diabetes, nicotine abuse, alcohol abuse, surgery time > 120min [2-4], immunosuppression, joint plastic pre-operation, pre-operative anemia [5,6].

## Case Report

We present the case of a 69-year-old male patient with total knee replacement on both sides (PFC Sigma, right side 02/16, left side 08/18). 9 weeks after surgery on the left side, he presented himself at our department with pain and restriction of movement of his left knee. The postoperative process in the operating clinic has been inconspicuous. After rehabilitation, the patient had been symptom-free.

Because of a known sensomotoric neuropathy the patient presented himself at a neurological clinic 8 weeks after the total knee replacement. After exclusion of an infect (laboratory control, x-ray thorax, abdominal sonography), a high dosed, immunosuppressive, intravenously cortisone therapy (500mg Methylprednisolone for 3 days) was carried out. This had been done 4 months after total knee replacement on the right side without complications, too. The patient reported an intravenous drip infection with pain, swelling and redness at his forearm.

The clinical examination 3 days after discharge from the neurological clinic showed a distinct swelling, effusion, redness and overheat of the left knee joint, stable vital parameters and a body temperature of 37,8° Celsius. Laboratory chemistry showed a CRP of 234mg/l (norm: <5mg/l) and a leukocytosis of 12770 leukocytes/µl (norm: 4600/9500/µl). Radiological findings (Figure 1) showed a regulary implanted total knee without signs of loosening of the implant.

We punctured the knee and aspirated 80ml of a cloudy, yellowish liquid. The punctual was examined microbiological, for cell number, differentiation, glucose and cristalls. The results showed 150300cells/µl (>2000cells/µl is indicative for a periprosthetic infect [7]) so there was a suspicion of a periprosthetic infect.

At time of the examination, we could not define either the infection was an early infect after total knee replacement 8 weeks before or if it was an acute early infection after the immunosuppressive i.v. cortisone therapy with intravenous drip infection 3 days before. Because of the lack of symptoms till the

beginning of the cortisone therapy, we assessed the infection as an acute early one.

After patient education of the non-septic patient, we planned on doing revision surgery with preservation of the prosthesis dependent on the pathogen spectrum. The next day our patient became septic and we had to change our therapy regime. We explanted the prosthesis and started a two-stage change of the total knee replacement. Intraoperatively it showed greasy slips, cloudy and purulent joint fluid. There was the urgent suspicion of a periprosthetic joint infection. We took 5 samples for microbiological and 1 sample for histopathological examination. An antibiogram of the punctual was not available at the time of surgery. We implanted a gentamycin and vancomycin containing spacer and began a calculated i.v. antibiosis with 4x2g flucloxacillin. The microbiological examination showed staphylococcus aureus in all of the 5 samples. It was tested sensible towards flucloxacillin. Histopathological findings described a florid granulocytic inflammation with small sclerosed bone fragments. This finding was consistent with a periprosthetic infection. An infection focus outside the knee joint was excluded throughout an echocardiogram and multiple blood cultures. Because of steadily decreasing inflammation values and a clinical improvement of medical condition we explanted the spacer 4,5 weeks later and implanted a total knee replacement again. At this surgery too, we took 5 samples for microbiological examination. No pathogen could be detected. The i.v. antibiosis with flucloxacillin was added with rifampicin after the wound condition was dry (450mg 1-0- 1). 8 days after surgery we exchanged the flucloxacillin i.v. with Levofloxacin oral (500mg 1-0-1). This double antibiosis was continued till 11 weeks after explantation of the total knee replacement. The patient's clinical conditions were steady, the wound was healing primary, the left knee showed a range of motion of flexion/extension 95-0-0. Radiological findings showed a regulary implanted total knee without signs of fracture or loosening (Figure 2).

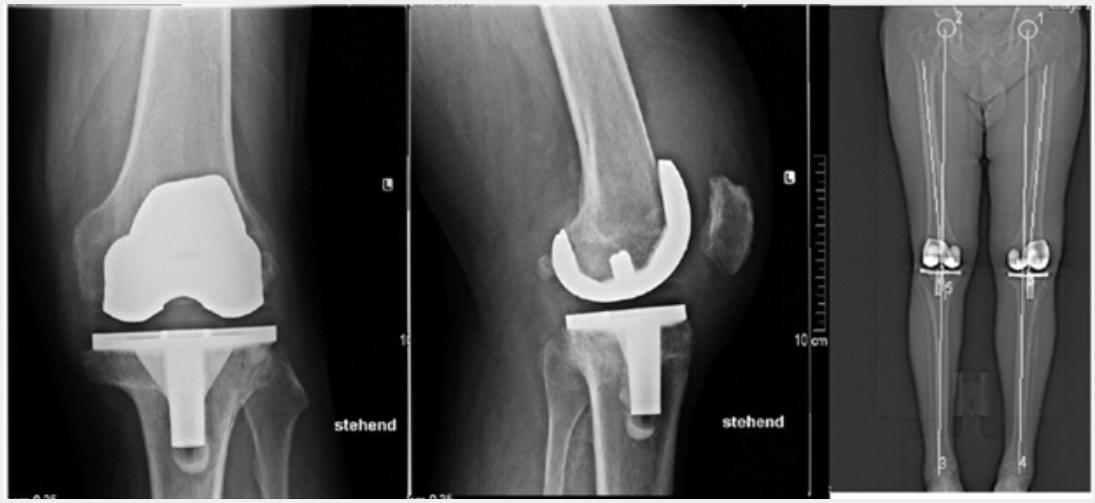


**Figure 1:** Knee in two planes and CT topogram at admission.

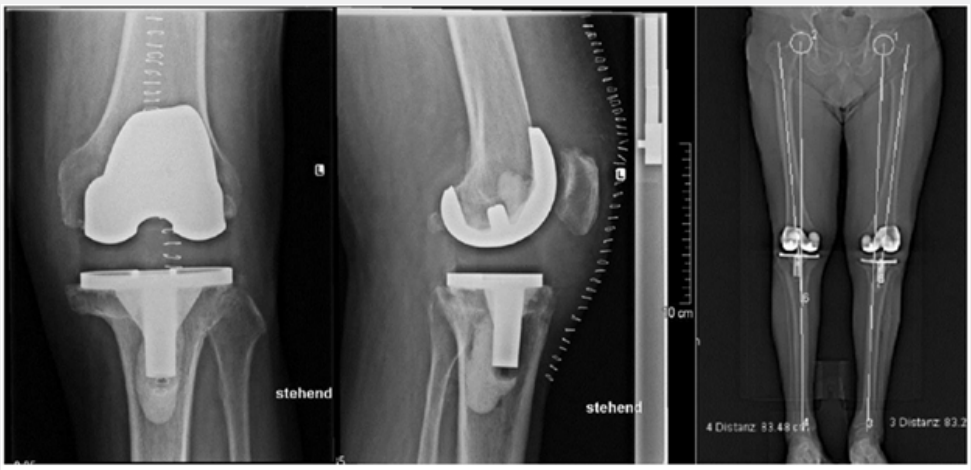


**Figure 2:** Knee in 2 planes and CT topogram after reimplantation.



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## Discussion

Most of the time the underlying pathogen of a periprosthetic joint infection is a coagulase negative staphylococcus, staphylococcus aureus, a streptococcus, an enterococcus, or a gram-negative bacterium [7]. One differentiates between an early-, delayed- or late infection. An early infection shows symptoms up to 3 months after surgery, a delayed infection between 3 months to 2 years and a late infection shows symptoms > 2 years after surgery [4]. But a bigger therapeutic relevance possesses the differentiation between an acute and a chronic infection. In this classification the time between onset of symptoms and beginning of therapy is decisive [7], a period between 2-4 weeks between onset of symptoms and beginning of therapy is defined as an acute infection, a period of >4 weeks between onset of symptoms and beginning of therapy is defined as a chronic infection. One assumes in case of acute infection; biofilm formation is not completed. This biofilm out of polymer substances protects the pathogen against most of antibiotics. Therefore, in case of acute infection a preservation of the implant is possible.

In chronic infection on the other hand, the biofilm formation is completed, and the pathogen cannot be targeted with usual antibiotic therapy anymore [8]. An implant preservation is not recommended.

As stated earlier there a factor which increase the risk of a periprosthetic infection. In this case a surgery on the patients left knee had been done (conversion osteotomy 17 years before) and an immunosuppressive therapy with intravenous drip infection was conducted.

The pathogen identified was staphylococcus aureus, a common pathogen in periprosthetic infections. Staphylococcus aureus is judged as part of the transient skin flora and can be temporary located on skin without causing a disease [9]. But is one of the most common cause of hospital-acquired infections.

One of the most common triggers of nosocomial infections is a bacterial colonization of intravenous drips, as maybe in our case [10].

Periprosthetic infections with staphylococcus aureus are typically distinguished by an acute course of disease with rapid progression [7]. It is difficult to differentiate if our patient endured an acute or chronic infection.

The absence of symptoms postoperatively and in rehabilitation, the good range of motion, normal inflammation levels in blood, an irritation-free scar, increasing subjective freedom from complaints, the isolated staphylococcus aureus, and at least the missing signs of implant loosening speak for an acute infection. The time 9 weeks after primary surgery speak for a chronic infection [7].

At first, we assumed an acute early infection which was triggered by the immunosuppressive cortisone therapy and/or the intravenous drip infection. Only the acute course, and the missing of an isolated pathogen forced us to change our planed therapy regime (preservation of the implant).

Since the risk of an infection is increased during high dosage cortisone therapy an interval of 3-6 month after implantation of an artificial joint should be kept. As we know from guidelines regarding the basic therapy with biologica, the risk of an infection in the first 6 month is increased.

Regardless of the usage of intravenous drips should be highly monitored in order to avoid an infectious spread.

## Conclusion

As we know from the guideline regarding basis therapy with biologica, the general risk of an infection is increased throughout immunosuppressive therapy. Therefore, an interval of 3-6 month between surgery and therapy should be kept. The usage of intravenous drips must be highly monitored.

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