



16<sup>th</sup> EFORT Congress – 27 to 29 May 2015, Prague

## **Periprosthetic knee infections: major drain on health systems, new therapeutic approaches**

*Infections following total knee replacements are responsible for significant healthcare costs. Contrary to established theory, single-stage revision surgery shows virtually no disadvantages over two-stage procedures. New antibacterial coatings and the increased use of biomarkers pave the way for key advances in prevention and diagnostics for periprosthetic knee infections.*

**Prague, 28 May 2015** – Periprosthetic infections are among the most serious complications in the field of endoprosthetics. They not only mean potentially devastating emotional and financial tolls for patients, but are also associated with high costs for public health systems. “In the United Kingdom the total burden caused by infections has risen by 92 percent over the past five years and will continue to increase exponentially. Treating infections in total knee replacements (TKR) can cost up to 70,000 pounds in each case, exposing the British healthcare system to costs of around 160 million pounds or 220 million euros each year,” noted Dr William Jackson (Oxford University Hospitals NHS Trust) at the 16<sup>th</sup> EFORT Congress.

The EFORT Congress is the most important conference for orthopaedists and trauma surgeons at the European level, and is held by the European Federation of National Associations of Orthopaedics and Traumatology. „Infections in orthopaedics“ is the main theme of this major scientific event, which attracts more than 7,000 participants from all over the world to the Czech capital.

According to the expert, infection rates in TKR procedures is an increasing problem. He attributes this situation to a combination of factors, including the growing numbers of hip and knee replacement surgeries performed, an increasing rate of obesity in the general population, higher life expectancy and a steady decline in the age of patients receiving treatment.

### **DAIR and antibiotic cement as treatment options**

If an element of the knee endoprosthesis is infected, in many cases the only certain way to entirely eradicate the infection is to completely remove all of the prosthetic material. This usually calls for a two-stage revision operation which “comes at huge cost both financially and often with functional limitations for the patient,” noted Dr Jackson. In Oxford specialists have been taking another approach for several years with the aim of preserving the prosthetic components to the fullest possible extent. Dr Jackson: “This approach allowed us to achieve new levels of infection control, an 80% survival rate on components after eight years and the functional outcome is akin to that of a complication-free joint replacement surgery.” He is urging orthopaedic surgeons to consider surgical debridement, antibiotics and implant retention (DAIR) as potential treatment options, even when the infection is chronic, in situations where implants are well-fixed and functional.

A recent US-study, which was presented in Prague, has demonstrated that adding antibiotics to the bone cement is an efficient way of combating prosthesis infection. According to the study’s findings, antibiotic bone cement reduces the re-revision risk in knee endoprosthetics by around 45%.

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## **Advantages of two-stage revision less clear cut than originally thought**

The latest chapter in the long-term debate on the relative merits of one-stage and two-stage revision operations – presented at this year's EFORT Congress – casts fresh doubt on the two-stage surgical approach's reputation as the gold standard. "The difference in infection rates between one-stage and two-stage procedures is lower than previously thought. As recently as three years ago we still believed that protection from infection was around 10% higher with a two-stage approach", said Prof. Carlo Romanò, immediate past-President of the European Bone & Joint Infection Society (EBJIS) and Professor of Orthopaedics at the University of Milan. But a new review, containing the results of studies completed up to March 2015 and passed by a group of knee reconstruction surgery experts headed by Prof Romanó and Prof Fares Haddad in London, showed that the actual difference is just 4%.

## **Single-stage revision can cut costs**

These results do more than raise the status of single-stage revision as an option for knee surgery. "This approach reduces the amount of time spent in hospital and reduces the financial burden on the healthcare system. What's more, the availability of antibacterial coatings such as DAC hydrogel support the use of cement-free implants in single-stage revision, meaning that implants can be removed more easily in the event of malfunction than long-stem cemented revision implants, which had until now been required for single-stage revisions," explained Carlo Romanò.

However, preference should still be given two-stage revisions in certain circumstances. Under this approach, first the infected prosthesis is removed before an interval spacer is implanted. Reimplantation is carried out in a second operation after several weeks. Prof. Romanó added: "This approach may still be preferable when the pathogen is unknown or in particularly long lasting and diffuse infections, since a double procedure may be better suited for removal of all infected tissue."

## **Infection the main cause of knee endoprosthetic issues**

Periprosthetic knee infections occur in around 2% of endoprosthetics patients. "These are among the main cause of complications in knee endoprosthetics. In high risk patients, particularly those with diabetes, renal impairment or peripheral vasculopathy, the incidence of complications is considerably higher and increases once again when multiple risk factors converge," Prof Romanó continued.

It should be noted that "a significant proportion of aseptic loosening of implants is attributable to low-grade infections, difficult to diagnose and caused by slow-growing microorganisms. In light of this, it is essential that all medical facilities involved in revision surgery put high microbiological laboratory standards in place and subject implants to precise microbiological analysis after removal," he concluded.

## **Highly effective new antibacterial-loaded coatings**

In terms of preventing periprosthetic knee infections, specialists have high hopes for new antibacterial coatings. "These can cut bacterial growth on the implant by more than 90%. The rapidly resorbing hydrogel DAC has been available in Europe for more than a year, which is designed to be intraoperatively loaded with antibiotics and to be applied on the surface of any cementless joint prosthesis or osteosynthesis material. Use of hydrogels has been approved as safe and does not lead to impairment of implant osseointegration. In-vivo studies demonstrate its effectiveness in reducing implant-related infection even in animal models with high bacterial contamination," confirmed Prof Romanó.

Diagnostic advances are also to be expected: use of biomarkers in joint fluids in tandem with esterases and monitoring of leucocytes could lead to highly accurate diagnosis of periprosthetic knee infections. "Moreover, new antibiofilm agents, used to rid implants of bacteria, have the potential to completely change our sampling activities and procedures surrounding non-functional prostheses. This technology is at the heart of microDTTect, a new medical device based on an antibiofilm compound – dithiothreitol, DTT - which will soon be available in Europe," said Prof Romanó.

### **Calls for pan-European certification process**

Periprosthetic infections also pose a serious problem from a socio-economic perspective. "We estimate that the direct costs for orthopaedic surgery alone in Europe total some EUR 2 billion. The indirect costs and medical and legal effects are hard to quantify, but you have to start at somewhere around double that figure," Prof Romanó confirmed.

One of the EBJIS Board key priorities is to bring about the introduction of a pan-European certification process for medical facilities that focus on treating periprosthetic infections, with EFORT's support. Prof Romanó: "Since surgical treatment of periprosthetic infections is highly complex and quite expensive, it calls for specially trained medical experts and dedicated facilities. At the moment there is no European standard in place, and operations are often conducted by surgeons who only encounter one or two such cases each year. This raises the risk of incorrect diagnosis and treatment, which in turn leads to the additional costs associated with managing complications."

### **About EFORT**

The European Federation of National Associations of Orthopaedics and Traumatology (EFORT) is the umbrella organisation linking Europe's national orthopaedic societies. EFORT was founded in 1991 in the Italian Marentino. Today it has 45 national member societies from 42 member countries and twelve associate scientific members.

EFORT is a non-profit organisation. The participating societies aim at promoting the exchange of scientific knowledge and experience in the prevention and treatment of diseases and injuries of the musculoskeletal system. EFORT organises an annual congress, seminars, courses, forums and conferences within Europe. It also initiates and supports basic and clinical research.

**Sources:** 16<sup>th</sup> EFORT Congress. Symposium "Infected TKR", 28 May 2015; EFORT 2015 Abstract Bini et al. Antibiotic Cement Decreases Re-Revision Risk by 45% in 1.154 Aseptic Revision Total Knee Arthroplasties