

## RESULTS AND COMPLICATIONS IN TOTAL KNEE ARTHROPLASTY

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**Abstract.** *The Knee Arthrosis is a chronic, degenerative, less or more evolutive disease. It is characterized by cartilage degeneration, synovial fluid alterations, articular surface deformations, changes in the bony structure and architecture, osteophytosis and movement restriction.*

*Thus far, the medical treatment is only palliative, by diminishing the pain and partially improving the mobility. Until a new, biological mean of stopping the cartilage degeneration will be found, the only appropriate treatment is the surgical one. Among the surgical procedures attended for this condition, total knee arthroplasty proved to be the best option, being widely accepted as the gold standard in treating the advanced osteoarthritis.*

*Its main indications are knee osteoarthritis with varus or valgus deformity greater than 10°, flexion deformity greater than 20° and a range of motion less than 90°. The surgical principles included: re-establishing the normal alignment of the lower limb, joint line preservation, maintaining the articular stability and extensor mechanism and rigid implantation of the prosthetic hardware.*

*In this study we aimed to show the results of our experience in total knee arthroplasty, with regard to the international progress in this field (indications, patients' selection, early- and midterm results).*

*A number of 64 patients aged 52-84 years were assessed during a mean period of 18 months, all having documented advanced knee osteoarthritis, treated with total cemented, posteriorly stabilized knee prosthesis (Zimmer NexGen).*

*The outcome was assessed according to the joint mobility, pain decrease, full weight-bearing, patient satisfaction, prosthesis tolerance and pre- and postoperative X-rays.*

*Complications following total knee arthroplasty were deep venous thrombosis (4 cases), intraarticular infections (3 cases), aseptic loosening (2 cases) and 1 patello-femoral complication.*

*The results (considerable improvement in joint motion, pain decrease, full weight-bearing) entitle us to still use this method, despite its high costs.*

**Keywords:** *knee, osteoarthritis, total arthroplasty, complications.*

**Rezumat.** *Gonartroza reprezintă o afecțiune cronică, degenerativă a articulației genunchiului cu evoluție mai mult sau mai puțin rapidă, caracterizată prin leziuni*

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*degenerative cartilaginoase, modificarea calitativă a lichidului sinovial, deformarea epifizelor articulare, modificarea structurii și arhitecturii osoase, osteofitoză și limitarea mișcărilor.*

*În prezent, tratamentele medicale sunt doar paleative, reducând durerea și ameliorând parțial funcția articulară.*

*Până la găsirea unei modalități biologice de oprire a procesului de degradare a cartilajului articular, abordarea chirurgicală rămâne singura opțiune viabilă de soluționare a problemei.*

*Dintre intervențiile chirurgicale practicate, artroplastia totală de genunchi s-a dovedit a fi cea mai eficientă, având cele mai bune rezultate și întrunind acceptul majorității serviciilor de ortopedie ca tratament de elecție în fazele avansate ale gonartrozei.*

*Artroplastia de genunchi este indicată în principiu în gonartroze cu dezaxare în varus sau valgus mai mare de 10°, deformare în flexie peste 20° și un arc de mișcare sub 90°. Principiile chirurgiei pentru artroplastia totală de genunchi au inclus: restabilirea aliniamentului normal al membrului inferior afectat, conservarea liniei articulare, menținerea stabilității articulare și a funcției mecanismului extensor și fixarea rigidă a componentelor.*

*În acest studiu ne-am propus să prezentăm rezultatele experienței noastre în artroplastia totală de genunchi, în contextul progresului din acest domeniu de pe plan internațional, cu urmărirea indicației și selecției pacienților pentru operație, precum și a evoluției postoperatorii a acestora, pe termen scurt și mediu.*

*Au fost evaluați un număr de 64 pacienți diagnosticați cu gonartroză avansată, pe o durată medie de 18 luni de la operație cu limită de vârstă între 52-82 ani. S-au utilizat proteze totale cimentate, cu stabilizare posterioară, de tip Zimmer(NexGen).*

*Stabilirea eficienței intervenției chirurgicale s-a bazat pe aprecierea mobilității articulare, dispariția durerii, posibilitatea mersului, satisfacția pacientului, tolerabilitatea protezei și aspectul radiografic pre- și postoperator.*

*Complicațiile post artroplastie totală de genunchi au fost tromboza venoasă profundă 4 cazuri, infecții articulare 3 cazuri, decimentare aseptică 2 cazuri și o complicație patelo-femurală.*

*Rezultatele obținute: ameliorarea considerabilă a mobilității genunchiului, diminuarea durerii, precum și posibilitatea mersului și sprijinului pe membrul inferior afectat, ne îndreptătesc să utilizăm în continuare această metodă, chiar dacă costul implantului este destul de ridicat.*

**Cuvinte-cheie:** gonartroză, artroplastie totală, complicații.

## Introduction

Knee osteoarthritis is a chronic, degenerative disease, which in its advanced forms can be surgically treated by total knee arthroplasty. This is the best surgical treatment, enabling the damaged joint surfaces to be replaced and properly aligned. Total knee arthroplasty is a modern mean of treatment, mainly indicated in the presence of severe pain and motion restriction, especially in the patients aged after 65 years, with low functional demands, previously failed treatments and without need for other surgical procedures such as osteotomy or arthroscopic repair (1).

The damage of joint surfaces leads to pain and motion restriction.

Total knee arthroplasty is the best treatment of advanced knee osteoarthritis, mainly indicated with severe pain, important joint surface damage and motion limitation.

### Material and Method

During the previous 3 years we assessed a number of 64 patients, aged between 52-82 years, all having documented advanced knee osteoarthritis, during a mean period of 18 months since surgery. We used total cemented, posteriorly stabilized implants (Zimmer NexGen). The diagnosis and the indication for a total knee arthroplasty were made after an interview, a clinical and X-ray examination.

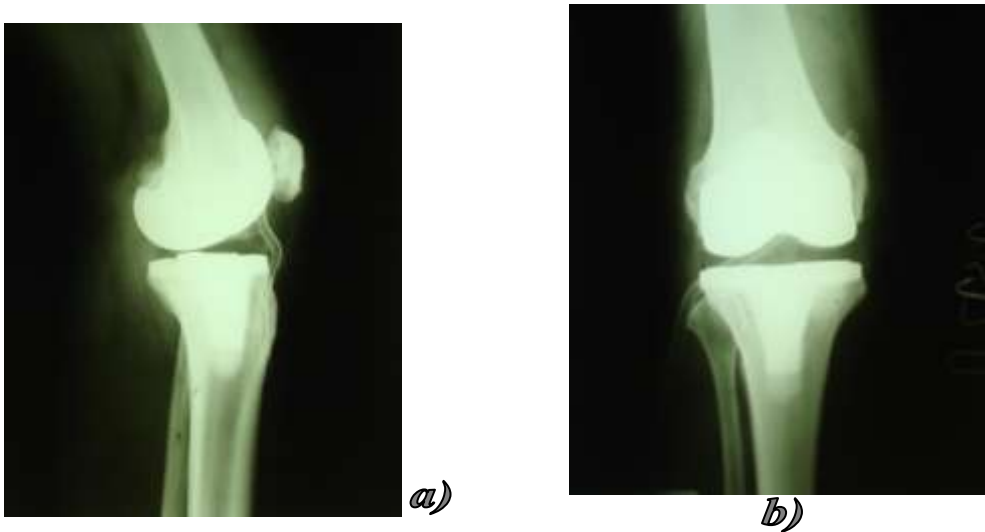
The interview revealed the patients age and sex, uni- or bilateral onset, symptoms and timing, potential triggers, associated conditions.

The clinical examination revealed limb deformation, functional impairment, motion restriction, joint instability, the presence of pain, swelling and articular crackles.

The main paraclinical examination was represented by the X-ray exam of the affected knee, AP and LL (**figure no. 1**), pre- and post-surgery (**figure no.2**).



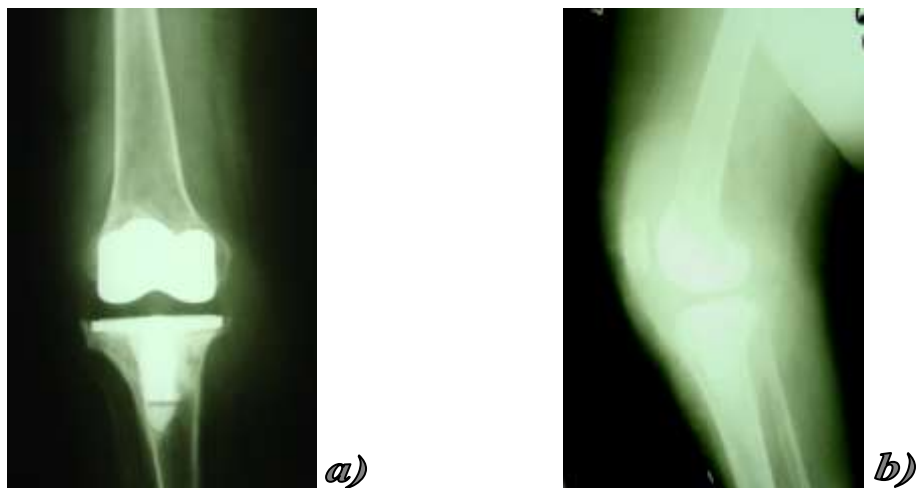
**Figure no. 1 (a, b):**  
*X-ray Ap and LL of the knee with gonarthrosis*



**Figure no. 2 (a, b):**  
*Arthroplasty of the knee after gonarthrosis*

The outcome of the surgery was assessed by the joint mobility, pain decreasing, full-weight bearing, patients' satisfaction, prosthesis tolerance and the pre- and post-operative X-rays.

Complications following total knee arthroplasty were: deep venous thrombosis (4 cases), intraarticular infections (3 cases), aseptic loosening (2 cases) (**figure no. 3**) and 1 patello-femoral complication.



**Figure no. 3 (a b):**  
*Aseptic loosening*

The results (considerable improvement in joint motion, pain decrease, full weight-bearing) entitle us to still use this method, despite its high costs.

### **Results and Discussion**

Knee osteoarthritis is a chronic, disabling degenerative disease, which never leads to bony ankylosis, but allows a certain degree of motion, which maintains the pain. Thus, the functional capacity of the patients decreases, with serious social and professional consequences. The results showed preponderance towards the female sex, possibly related to menopause. In these papers 78 % of patients were considered to have primary knee osteoarthritis, 17 % post-traumatic and 5 % associated with rheumatoid arthritis (2, 3). The physical exam revealed flexion and extension limitation, genu varus in 25 % and genu valgus in 10%, mostly unilateral.

We used total cemented, posteriorly stabilized prosthesis (Zimmer NexGen) (4).

Most of the elderly patients had primary knee osteoarthritis, usually associated with other joint arthrosis. Still, one must not forget that the interview might have not been conclusive about some triggers (5, 6, 7).

The first symptom was always local pain, uni- or bilateral, worse on morning, during rest or movement, weather-dependent, usually with little response to minor anti-inflammatory drugs, sometimes eased by movement. Other symptoms included various degrees of functional impairment and articular swelling. Early postoperative, all patients required major pain killers. All patients received antibiotic therapy for 5-7 days. Anticoagulant therapy (low molecular weight heparines) lasted for a mean period of 3 weeks. Sutures were removed after a mean of 12 days postoperative.

The hospitalization period is relevant to the rehabilitation, the discharge criteria being the wound healing and full weight-bearing on the affected knee. Preoperative, the mean period of hospitalization was 2-3 days and postoperative it was 10-12 days. Active motion at the bed was begun after 3-5 days postoperative. Full weight-bearing was allowed after 7-8 days postoperative.

### **Complications**

Total knee arthroplasty, like any other surgical procedure involves certain risks, with regard to the patients biological status, the compliance of the patient and the surgical technique.

One of the most important complications after total knee arthroplasty is deep venous thrombosis and pulmonary embolism (8, 9, 10). This is correlated with age

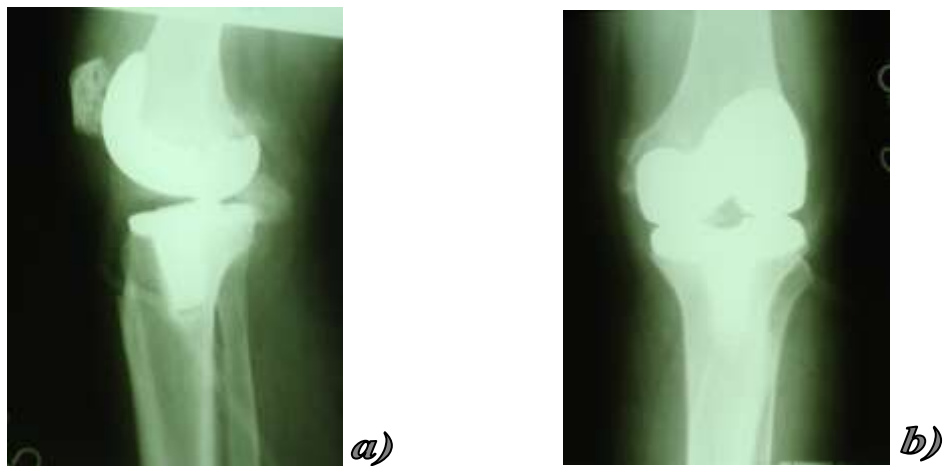
after 40 years, previous oestrogen therapy, cerebral ischaemic disease, nephrotic syndrome, cancer, prolonged immobilization, previous thrombembolism, cardiac failure, obesity, varicous veins, smoking, increased blood pressure, diabetes mellitus and myocardial infarction (10, 11, 12).

The clinical exam is inconcluent in deep venous thrombosis. Venography is considered the gold standard in detecting this problem, but has the risc of anaphilaxy and a small risc of inducing DVT. Eco Doppler has been reported as an alternative option. Prophylaxy using aspirin has not been shown to be effective.

LMWH benefits include a standard regime and lack of need of laboratory monitorization. The disadvantages include the fact that they are more expensive, require subcutaneous injection and can increase bleeding. The prophylaxy is continued for 6 weeks at patients with a previous history of trombembolism.

### Infection

This is one of the most feared complications (**figure no. 4**). Preoperative factors associated with a higher risk this include reumatoid arthritis, skin ulcerations, previous knee surgery, obesity, urinary tract infections, steroids, renal failure, diabetes mellitus, cancer. Prevention of infection begins preoperatively with aseptic techniques. Laminary flux and antibiotic use have decreased postoperative infection rates. The most frequent microorganism was Staphylococcus aureus, S. Epidermidis, Streptcoccus. Infection should be considered at any patient with a painful, previously normal TKA. Swelling, pain, redness and warmth may suggest infection (13, 14, 15).



**Figure no. 4 (a, b):**  
*Infection after arthroplasty of the Knee*

Radiologic lucencies at bone-cement interfacem cysts and new bone formation, periosteal reaction may be present, usually in severe infections. Scintigraphy may be useful if the clinical exam, radiological and laboratory tests are inconclusive. Treatments options include antibiotics, debridation while keeping prosthesis, revision arthroplasty, knee arthrodesis, with regard to the patients' status, bone stock, soft tissues and extensor mechanism. Knee arthrodesis may produce a stabile, usually painless, but shorter lower limb. Arthrodesis is indicated in young fit patients (**figure no. 5**), extensor deficit, lack of soft tissues, immunodeficiencies and highly virulent microorganisms. Most authors recommend a two step technique, with debridation and hardware removal, followed by iv antibiotics for 4-6 weeks. Postoperative, full weight-bearing is allowed immediately.



**Figure no. 5 (a, b):**  
*Arthrodesis of the Knee*

Revision arthroplasty in one or two steps offers the best rehabilitation chances after an infected TKA. Mostly, it is done in two steps, debridation and hardware removal followed by antibiotherapy and revision arthroplasty. Antibiotic-PMMA spacers are used to maintain soft tissue tension between debridation and reimplantation (fig.6). Other benefits include high local levels on antibiotic, improved surgical exposure during revision, partial weight-bearing (16, 17).



**Figure no. 6 (a, b):**  
*Antibioc-PMMA spacer*

### **Patello-femoral complications**

These include: patello-femoral instability, patella fracture, patellar component malfunction and loosening, patellar clunk syndrome and extensor mechanism deficiency. Improvements in design and surgical techniques lowered these incidences, which are still best avoided by paying attention to details (18).

Patello-femoral instability may be caused by several factors, including an extensor mechanism imbalance, where the lateral retinaculum is too tight or medial soft tissues are too permissive. If the lateral retinaculum is tight, lateral release with regard to the superior genicular artery is advised. Medial retinaculum laxity may be due to postoperative rupture of sutured medial capsule. Malposition of patellar, femoral or tibial components may also lead to patellofemoral instability. Excessive resection of the lateral patellar facet is possible due to its normal asymmetry. Frequently, the resection level of the lateral facet has to be less deeper the medial in order to avoid patellar component reclining. Malposition of the tibial component in internal rotation increases the Q angle, which leads to lateral subluxation. The Q angle is an important predictor of biomechanical abnormality throughout the lower limb. It is a measurement of the angle between the Quadriceps (Rectus Femoris is usually used) and the patella tendon. This provides useful information about the alignment of the knee joint, which if outside of normal ranges, can be a precursor for overuse injuries. Internal rotation and medial translation move the trochlea medially to the extensor mechanism, leading to lateral subluxation.



Patellar fracture post TKA is unusual and related to excessive patellar resection, vascular impairment related to lateral release, malposition of the patellar component, excessive articular line height, more than 115 flexion, trauma, thermic necrosis by PMMA polymerization and revision arthroplasty.

Lack of consolidation and patellar component failure are more frequent after internal fixation. Periprosthetic patellar fracture has been classified according to the integrity of the extensor mechanism and implant stability. If the extensor mechanism is intact and the implant stable (Type I) conservative treatment should be applied, by a 6 weeks cast immobilization. Displaced fractures and extensor mechanism injury (Type II) should be treated surgically. Transverse fractures in the middle third should be treated by a figure eight wire and retinaculum repair. Loosed patellar components should be removed, not replaced, as they impair fracture healing. Stable patellar components that impair fracture healing should also be removed. Proximal or distal polar fractures should be excised and sutured. Postoperative mobility depends upon the intraoperative stability. Patellectomy and extensor mechanism repair are indicated in severe comminution or bone deficiency.

Patellar clunk syndrome was associated with posteriorly stabilized prosthesis. A fibrous node develops on the posterior face of quadriceps tendon, above the patella, and may be trapped in intercondylar fossa and may produce a specific sound in 30-40 flexion. Arthroscopic debridement is advised.

Quadriceps tendon tears is rare, but severe. It may be due to poor vascularization or anterior extension of releasing incision. In partial tears conservative treatment is advised, and in complete tears surgical treatment is advised, though the results are suboptimal (reduced mobility, weakness, secondary tear).

Patellar tendon tear is related with previous knee surgery, knee manipulation and distal realignment procedures for the extensor mechanism. Several procedures have been described, including direct repair, hamstring tendon repair, artificial ligaments, gastrocnemius graft and extensor mechanism graft, none with constant results.

### **Neurovascular complications**

Arterial lesions are rare, but devastating and appear in 0.3-2%, resulting in 25% amputations. When vascularization is uncertain, the tourniquet is not advised. The only possible nervous lesion following TKA is peroneal nerve lesion, especially after the cure of valgus and flexion deformities (rheumatoid arthritis). Minor lesions heal spontaneously and may remain unnoticed. If the

lesion in seen in postoperative, the dressing should be removed and the calf put in flexion.

### **Periprosthetic Fractures**

Supracondylar fractures are rare. The risk factors are: osteoporosis, reumatoid arthritis, steroids, female sex, revision arthroplasty and neurological diseases. The treatment is variable, in the past the conservative one being preferred. Nowadays surgical treatment is advised (blade-plate, condylar plate, buttress plate and bone grafts, Rush nails, locked supracondylar nail). In osteoporotic or noncompliant patients cast immobilization is advised. Good results have been reported with the LISS plate, including in osteoporotic patients. Periprosthetic fracture classification:

- ⇒ Type I: undisplaced fracture, stable prosthesis
- ⇒ Type II: displaced fracture, stable prosthesis
- ⇒ Type III: unstable prosthesis, displaced or undisplaced fracture

If the fracture extends towards the fixation surface or if there is femoral loosening, revision arthroplasty is required, with a stemmed femoral component, and eventually bone graft.

Tibial fracture after TKA are rare. If associated with loosening, they are treated by revision arthroplasty (eventually stemmed components) and bone graft. Undisplaced fractures, with a stable prosthesis are treated non surgically. Displaced fractures with stable prosthesis are treated by osteosynthesis. The function of the prosthesis depends upon restabilising the alignment, stability of the implant and early mobilization.

### **Conclusions**

Total knee arthroplasty is increasingly used as the first option in the surgical treatment of degenerative joint diseases;

The good results are generally correlated with patients aged > 65 years and low demands. Medium and long term results are very good due to restoration of joint mobility and lack of pain, with minimal complications;

The results were good, the rehabilitation of joint being improved.

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