Complications of Total Knee Arthroplasty Cases in 8 Years Follow-Up

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ABSTRACT
Total knee arthroplasties have a significant place among the orthopedic approaches in arthroplasty surgery. The purpose of our study is to share the complications observed in our primary total knee arthroplasty surgeries and in general. We included a total of 320 patients on whom we performed total knee arthroplasty on different dates (2005-2013) in our study. Same preoperative preparation and planning, surgical technique and postoperative rehabilitation were performed on all patients. Superficial wound infection was observed in 1.12% of our patients, fatal pulmonary embolism in 0.18% of them, symptomatic pulmonary embolism in 1.25%, symptomatic deep vein thrombosis in the operated leg in 6.25%, wound site sero hematoz discharge in the first five days in 0.62%, peroneal transient nerve paralysis in 2.18%, prosthesis infection in 0.62%, patellofemoral instability in 14.6%, periprosthetic fracture in 1.25%, heterotopic ossification in 6.87%, limitation of movement in 10.3%, patella fracture in 2.81%, patellar chunk syndrome in 3.75%, unexplained pain in 0.62% and loosening in 0.93% of them, peroperative posterior cruciate ligament rupture in 0.31%. In this study, in primary total knee arthroplasty; preoperative patient selection, surgical planning and preparation, success implementation during surgery and administered after surgical treatment as well as rehabilitation program implemented in the very important that has been conclusion reached.

INTRODUCTION

The diseased joint tissues are replaced with plastic and metal materials in arthroplastic surgery [6, 13, 33]. Knee joint has the feature of both ginglymus and trochoid joint [21]. The most frequent indications of total knee arthroplasty (TKA) are osteoarthritis, rheumatoid arthritis and traumatic arthritis [5, 18, 20, 35, 40].

Absolute contraindications are stable and painless arthrodesis, active sepsis, unrecoverable injury of extensor mechanism [5, 43]. Simpler interventions like osteotomy must be preferred for younger patients at first [13, 6, 48].

Complications of TKA practices are bleeding, wound problems, thromboembolism, deep joint infection, loosening, instability, limitation of movement, fractures, periprosthetic fracture, patellar tendon rupture, injury of extensor mechanism, neurovascular injuries, medial collateral ligament injury, misalignment, stiffness, corrosion on surfaces of prosthesis, osteolysis and tibial insert fracture [28, 47, 25, 26], 90° flexion at least is required for function [5, 22]. Two important factors affecting the long-term success of TKA are osteolysis and polyethylene corrosion [5, 11]. The complications of TKA are:

Infection:

The rate of infection has been stated between 0.5% and 10% [32]. The rate of infection in revision arthroplasties have been stated between 4% and 32% [48, 17, 44, 31]. Methicillin-resistant staphylococcus aureus and vancomycin-resistant enterococcus faecium is the most frequent factors [17, 30]. Clinical, laboratory, radiology and scintigraphy are used in the diagnosis of infected TKA [17, 49]. If diagnosed in early period, antibiotic suppression and debridement can be sufficient in the treatment. However, the most common practice in late infections is reimplantation. Resection arthroplasty, arthrodesis and amputation are other treatment methods [37, 17, 52, 2, 44].

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Deep Vein Thrombosis and Pulmonary Embolism:
It is an important complication due to the risk of pulmonary embolism [5]. Oral anticoagulant treatment is continued for 3 months at least following the heparin treatment lasting for 5-10 days in case of DVT or pulmonary embolism [5, 1, 32, 17, 34, 38].

Insufficient Wound Healing:
Obesity, diabetes mellitus, anemia, hypoproteinemia, smoking and steroids have negative effects on wound healing [5, 17, 24, 7].

Neurovascular Complications:
Arterial occlusion, arteriovenous fistula and arterial aneurysm are the complications. Tourniquet is loosened in any suspicion during the surgery [48, 1, 32, 17, 7, 8].

Nerve Injuries:
The most frequent one is peroneal nerve injury [32]. If healing isn’t observed within 3 months, nerve decompression and exploration must be performed [5, 32, 17, 10, 8, 36, 29, 23].

Patellar Problems:
The frequency of patellofemoral complications has been stated between 1-50% in the changing series [17].
- Patellofemoral Instability: Increased Q angle is a risk factor [37].
- Patella Fracture: Excessive bone resection, misalignment, single and wide central hole, avascularity due to lateral genicular artery injury, excessive flexion, rise in joint level, thermal necrosis due to the cement are the factors paving the way for patella fractures [17, 7, 8, 27].
- Polyethylene corrosion: Metal back causes a decrease in thickness of the polyethylene component and quickens the corrosion [17, 32, 53, 4].
- Patellar Tendon Rupture: The treatment results are not good and the rate of rerupture is high [48, 32, 9].
- Patellar Aseptic Loosening,
- Patellar Clunk Syndrome [32, 17, 7, 50, 53].

Periprostatic Fractures:
It is seen with a rate of 0.5-2%. Such conditions as crenation in frontal femoral cortex, osteoporosis, revision arthroplasty, arthrofibrosis, total hip prosthesis on the same side are risk factors [5, 16, 46]. Neer united the fractures around femoral component under 3 groups [5, 15].

Heterotopic Ossification (HO):
It begins to be observed in the 3rd month radiologically. It is not progressive after two years [32, 4, 3, 12].

Limitation of Movement [5, 1, 32]:
Unexplained Lasting Pain:
The most common reason is the subclinical infection. Arthroscopy can be recommended for the patients with no pathology detected despite examinations [17, 32, 7, 50, 53].

Loosening:
As gamma sterilization of polyethylene causes oxidation and reduces strength. The sterilization with ethylene oxide is recommended [17, 51].

Methods:
Pre-operative two-sided orthoroentgenography of the entire leg was performed on all patients, nasal swab examination and urinalysis were carried out, use of prophylactic oral antibiotic was ensured, heparin with low molecular weight was applied 1 day before the operation and body cleaning was made.

Some patients were applied epidural and others were applied general anesthesia by using operating rooms equipped with laminar flow and experienced assistant teams. Prophylactic 2gr cefazolin sodium flk was used. The leg was wrapped with esbach bandage, and tourniquet was applied. The leg was wrapped with sterilized drapewithioban. Arthrotomy was performed by tilting patella to lateral with anterior incision. All intra-articular soft tissues (meniscus, anterior cruciate ligament, synovial tissues etc.) were excised. All osteophytes were cleaned. Soft tissue balance was ensured. Patella was shaved and corrected, it was desensitized with cautery and forage was performed. Joint surfaces were cut with electric motor and prepared appropriately. Pressure washer system was used. Implants detected during the surgery were implanted with cement. An decided inserts were implanted. Intra-articular and subcutaneous drains were placed. All surgical layers were closed. Posterior cruciate ligament was protected in all patients and polyethylene inserts allowing rotation were used.
All our patients were introduced rehabilitation in their beds after 24 hours, drains (subcutaneous and intraarticularly putted) were taken out after 48 hours. They were mobilized following the direct graphy control on the post-operative 2nd day, they were discharged on the post-operative 4th day and they were put to polyclinic follow-up. Post-operative analgesic tablets, prophylactic antibiotic, heparin with low molecular weight and antiembolic socks were used in our patients. Rehabilitation program was provided to all patients.

All our patients were periodically called to invite to our polyclinic; detailed physical examination, history, required laboratory examinations and graphy controls were performed.

Results:
We included a total of 320 patients on whom we performed total knee arthroplasty between 2005-2013 in our study. Our patients are tricompartmental arthritic patients yielding no results in various conservative methods and arthroscopic surgery. Bilateral total knee arthroplasty was applied to 74 patients on different sessions (each operation of those patients was included in the study as separate patient). Bilateral total knee arthroplasty was applied to 22 patients on the same sessions. 42 of our patients are male and 278 is female.

Median age of our patients is 58.9.

In our patients; Superficial wound infection was observed in 1.12% of our patients, fatal pulmonary embolism in 0.18% of them, symptomatic pulmonary embolism in 1.25%, symptomatic deep vein thrombosis in the operated leg in 6.25%, wound site serohematoz discharge in the first five days in 0.62%, peroneal transient nerve paralysis in 2.18%, prosthesis infection in 0.62%, patellofemoral instability in 14.6%, periprostatic fracture in 1.25%, heterotopic ossification in 6.87%, limitation of movement in 10.3% (range of movement less than 90 degrees), patella fracture in 2.81%, patellar clunk syndrome in 3.75%, unexplained pain in 0.62% and loosening in 0.93% of them, peroperative posterior cruciate ligament rupture in 0.31%. Our patients are generally satisfied with the operation they have been gone through.

Discussion:
It has been proved that total knee arthroplasty and hip prosthesis are the most effective treatment methods in relieving the pain and increasing the functional status and quality of life [28, 18]. Many complications can be observed in knee arthroplasties. These are bleeding, wound healing problems, thromboembolic conditions, deep joint infection, loosening, instability, limitation of movement, fractures around the prosthesis, periprosthetic fractures, patellar tendon rupture, extensor mechanism injuries, neurovascular injuries, medial collateral ligament injury, inappropriate array, hardness, patellofemoral dislocation, tibiofemoral dislocation, corrosion on the surfaces of prosthesis, osteolysis and tibial insert dislocation [28, 25, 39, 26].

The rate of superficial infection that develops following the total knee arthroplasty is %0.5-2 [5, 16] in literature. It is 1.12% in our patients and that is because of antibiotic profilaxis, control of nasal and urinary flora for infection.

Fatal pulmonary embolism rate is 0.3–1% in the literature [32]. It is 0.18% in our patients. It is lower than literature rate. Prophylaxis reduces thromboembolism risk to 22-57% [17]. Risk factors are tourniquet application, surgery, epidural anesthesia and long bed rest [32], advanced age, sedentary life, pre-existing venous stasis, congestive heart disease, malignancy, obesity, hormone replacement therapy, hyperlipidemia, use of tourniquet, extended operation time and long immobilization thromboembolism in post-operative period [17]. We used short tourniquet time, do prophylaxis with low molecular weight heparin at least 12 hour before surgery, usually used general anesthesia, short bed rest, and selected suitable patient. Because of these reasons, we succeed lower rate of fatal pulmonary embolism in literature.

Symptomatic pulmonary embolism rate is 0.5-5% in the literature [32]. It is 1.25% in our patients. It is same with literature rate.

Serous or serohematoz discharges may be observed in 0.5% of primary arthroplasties within the first 5 days [32, 17] in the literature. It is 0.62% in our patients. It is slightly more than literature rate. This can be because of early mobilization and short usage of bandages.

The frequency of nerve injury varies between 0.3-3% [32] in literature. It is 2.18% in our patients (Figure 4). It is parallel to the literature.

Infection rates have decreased to 1%. It is 0.62% in our patients. We used better operating room conditions, the necessary emphasis sterility, used prophylactic antibiotic and used the cement with antibiotic in high-risk patients, these are done in literature [5, 52]. Adding to these, we said to patient taking bath before surgery, applied iodine to legand packaged leg with sterile dresses, opened sterile implants immediately before implantation during operation. Because of added methods, better result was succeed.

Patellofemoral instability is observed at a rate of 29% approximately in the literature. It is 14.6% in our patients. Patellofemoral instabilityis because of excessive valgus position of knee (Q angle increases), placement of tibial component in internal rotation, asymmetric patella resection, change of joint level, malperformance of medial capsular repair cause patellofemoral instability [48, 32, 17, 50, 53].
We place implants correctly, not change joint level, do medial capsular repair correctly, because of these reasons we succeed better results than literature rate.

Periprosthetic fracture rate is seen with a rate of 0.5-2% in literature [5, 16]. It is 1.25% in our patients. It is parallel to literature rate.

The incidence of heterotopic ossification following the total knee arthroplasty changes between 4-42% [5] in literature. It is 6.87% in our patients. It is parallel to literature rate among lower limit. It can be because of low soft tissue damage during our operations.

Age, sex, surgical technique, the type of prosthesis used, pre-operative tibiofemoral array, etiology and post-operative rehabilitation are the other factors affecting the knee joint’s range of motion [5, 1, 32]. Limitation of motion is 10.3% in our patients. It can be because of post-operative rehabilitation problems in our clinics.

The incidence of patellar fracture following the total knee arthroplasty is % 0.3 and % 11 [32] in the literature. It is 2.81% in our patients. The result is near to lower limit of literature. We didn’t change patellar surface, just clean osteofites and correct soft tissue balance and didn’t damage blood circulation, because of these reasons we succeed good result.

Patellar clunk syndrome, unexplained pain [32, 17, 7, 50, 53] and loosening [5] after our total knee arthroplasty surgeries are similar to literature rates.

In one of our patients’ total knee arthroplasty surgery, we ruptured posterior cruciate ligament (PCL) during the surgery after implanting PCL protecting type prosthesis. We sutured the PCL and support it by a flexible wire.

Successful results which we obtained from our 320 patients on whom total knee arthroplasty was performed and our low complication rates make us think that it is highly important for all stages of application from patient selection, operation planning, patient preparation, surgery to post-operative follow-up to be performed by the same surgeon. We are of the opinion that in cases when different doctors take control in patients’ treatment and follow-up stages of total arthroplasty in several training hospitals, this causes an increase in the rates of problems and complications. It can be considered that our study has a positive contribution to the result as average age of patients is not high in our study.

Conclusion:

In the treatment of degenerative disorders which cause pain and limitation of movement in knee joint and don’t yield successful results with other treatments, total knee arthroplasty is the best one among the orthopedic surgical approaches with its efficiency proved. Many complications can be observed in knee arthroplasties. These are bleeding, wound healing problems, thromboembolic conditions, deep joint infection, loosening, instability, limitation of movement, fractures around the prosthesis, periprosthetic fractures, patellar tendon rupture, extensor mechanism injuries, neurovascular injuries, medial collateral ligament injury, inappropriate array, hardness, patellofemoral dislocation, tibiofemoral dislocation, corrosion on the surfaces of prosthesis, osteolysis and tibial insert dislocation. The success of total knee arthroplasty depends on appropriate patient selection, sufficient pre-operative preparation, selection of appropriate prosthesis for the patient and delicate surgical technique. Moreover, a conversation should be made with the patient about her/his expectations, and she must be warned about the possible complications and the things waiting her/him after the operation. The patient should be trained about pre and post-operative rehabilitation, prosthesis indication must be reviewed in case of low patient compliance.

In our study, we shared various complications detected in 320 patients on whom we performed primary total knee arthroplasty on different dates. Our patients are tricompartmentalarthrosic patients yielding no results in various conservative methods and arthroscopic surgery.

Our patients’ total knee arthroplasty surgeries’ complications are superficial infection (1.12%), fatal pulmonary embolism (0.18%), symptomatic pulmonary embolism (1.25%), serous or serohematoz discharges (0.62%), peroneal nerve injury (2.18%), infection (0.62%), patellofemoral instability (14.6%), periprosthetic fracture (1.25%), heterotopic ossification (6.87%), limitation of motion (10.3%), patellar fracture (2.81%), patellar clunk syndrome (3.75%), unexplained pain (0.62%), loosening (0.93%) and ruptured posterior cruciate ligament (0.31%).

Among our complication; superficial infection, symptomatic pulmonary embolism, peroneal nerve injury, periprostetic fracture, heterotopic ossification, patellar fracture, patellar clunk syndrome, unexplained pain, loosening are similar to the literature rate. Our fatal pulmonary embolism, infection, patellofemoral instability complication rates are better than the literature rate. Our serous or serohematoz discharges complication rate is a little higher than the literature.

It is highly important that all stages of treatment including patient follow-up, wound dressing and removal of sutures must be performed by the same experienced surgeon, not by assistants.

With successful results which we obtained in total knee arthroplasty and our low complication rates, we have put forth that pre-operative patient selection, operation planning and preparation, success of surgery, post-operative treatment and rehabilitation program are highly important.