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Assessments of infection after total knee replacement with three years follow up period

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ABSTRACT

Background: Knee replacement surgery also known as knee arthroplasty can help relieve pain and restore function in severely diseased knee joints. The aim of the study was designed to determine the current incidence and outcome of infected total knee arthroplasty (TKA) in our unit.
Methods: Present study was performed at department of orthopedics, Gujarat Adani institute of medical science, Bhuj, Kutch, Gujarat. Questionnaire was designed as per our needs and we explained the study to all the individuals who had undergone knee replacement surgery in three years. In the questioner the patient were asked whether they had any suspicion of infection in the joint or wound after the knee surgery. If there reply was found to be affirmative than next they were asked if they had any reddened wound area, any inflammation area, readmission to the hospital due to infection, pus discharge from the wound, any further debridment or resurgery was planned for their infection and whether they were asked to take antibiotics to rule out infection.
Results: Infection was identified in 20 patients of the study. All the cases underwent culture media for detection of microorganisms. *Staphylococcus* and *E. coli* were identified in majority of the cases. Six patients had undergone revision of their primary TKA for deep infection; four were having a two-stage revision with no sign of residual infection at the latest review; the oxford knee score when calculated were found to be 35, 38, 45, 48 respectively.
Conclusions: During this study period, infection after primary TKA was rare but devastating and invariably led to a poor outcome.

Keywords: Bhuj, *E. coli*, Knee Replacement, *Staphylococcus*

INTRODUCTION

Knee replacement surgery also known as knee arthroplasty can help relieve pain and restore function in severely diseased knee joints. During knee replacement, a surgeon cuts away damaged bone and cartilage from your thighbone, shinbone and kneecap and replaces it with an artificial joint made of metal alloys, high-grade plastics and polymers.[1]

The first artificial knees were little more than crude hinges. Now, you and your doctor can choose from a variety of designs that take into account your age, weight, activity level and overall health. Most knee replacement joints attempt to act like your knee, with its ability to roll and glide as it bends.[2]

The most common reason for knee replacement surgery is to relieve severe pain caused by osteoarthritis. People who need knee replacement surgery usually have problems walking, climbing stairs, and getting in and out of chairs. Some also have moderate or severe knee pain at rest.[3]

Total knee replacement is considered to be an effective treatment for end-stage knee osteoarthritis. The number

of total knee replacements performed each year in the United States has increased dramatically, from 31.2 per 100,000 person-years during the period 1971–1976 to 220.9 during the period 2005–2008. In 2012, more than 670,000 total knee replacements were performed in the United States alone, with corresponding aggregate charges of $36.1 billion. The number of total knee replacements is expected to increase as the average age of the population increases, which highlights the associated future economic burden.[4, 5]

TKA infection has been correlated with a number of risk factors: diabetes, malnutrition, smoking, use of steroids, poor control over anticoagulation, obesity, cancer, alcoholism, urinary tract infections, multiple blood transfusions and revision surgery. The current guidance is that such factors should be identified and multidisciplinary intervention should be implemented before performing any procedure, with the aim of getting the patient into a better condition.[6]

Use of antimicrobial prophylaxis, care in preparing the patient's skin before the operation and use of laminar flow in surgical theatres have reduced the intraoperative contamination rates. Forty years ago, for every 10 patients who underwent TKA, one would develop infection.[7]

Malinzak et al reported that the infection rate was 0.51% among 8494 hip and knee arthroplasty procedures. They found that the risk factors for infection were obesity, early age and diabetes mellitus. Patients with body mass index greater than 40 and those with diabetes presented a 3.3 and 3.1 times greater chance of TKA infection, respectively. Glycaemic control has been a topic greatly discussed. The benefits of rigorous control, both before and after the operation, were reported by other authors too.[8]

Obesity is a risk factor and is also correlated with wound complications, as demonstrated by Winiarsky et al in a study in which 22% of the obese group of patients presented infection of the surgical wound and higher prevalence of deep infection. Obesity is not necessarily synonymous with nutrition, and evaluating transferrin, albumin and leukocytes has been important in these cases.[9]

Persistence of drainage during the postoperative period and wound complications are also factors associated with infection. Galat et al reported that the infection rate was higher in the group of patients in whom there was hematoma formation. This was also reported by Parvizi et al who indicated that the infection rate was higher in cases with persistent drainage through the surgical wound and in patients.[10] Hence taking into consideration of all factors the following aim of the study was designed to determine the current incidence and outcome of infected total knee arthroplasty (TKA) in our unit.

METHODS

Present study was performed at department of orthopedics, Gujarat Adani institute of medical science, Bhuj, Kutch, Gujarat. Duration of the study was between October 2012 to September 2015. Ethical clearance was taken from the institutional ethics board and informed consent was obtained from all the participants. We designed the questionnaire as per our needs and we explained the study to all the individuals who had undergone knee replacement surgery in three years. Those who were not present in the city where contacted on phone and the questioner were sent to them through post of email as per their convenience. Minimum of three years of follow up was kept in mind before selecting the patients. Some of the patients who did not responded well or were deceased were excluded from the study. In the questioner the patient were asked whether they had any suspicion of infection in the joint or wound after the knee surgery. If there reply was found to be affirmative than next they were asked if they had any reddened wound area, any inflammation area, readmission to the hospital due to infection, pus discharge from the wound, any further debridment or resurgery was planned for their infection and whether they were asked to take antibiotics to rule out infection. Each of the data was tabulated and noted nicely. For further confirmation the telephonic conversations were made also.

RESULTS

During the period of the study 400 primary TKAs were performed on 350 patients. We were able to contact 300 patients by questionnaire or telephone. Of the remaining 50 patients, 20 had died and 30 were lost to follow-up or had changed the hospital for follow up for one or the other reason. Follow-up assessments were completed for 300 of the 350 patients with a mean follow-up of 2 years (1 to 3 years). Infection was identified in 20 patients of the study. So the further questions were asked to them. All the cases underwent culture media and the organism *Staphylococcus* and *E. coli* were identified in majority of the cases. Culture was done with the help of cotton swab. *Staphylococcus* identified patient were found to be sensitive to Flucloxacillin and *E. coli* sensitive patients were found to be sensitive to Chloramphenicol. Six patients had undergone revision of their primary TKA for deep infection; four were having a two-stage revision with no sign of residual infection at the latest review; the oxford knee score when calculated were found to be 35, 38, 45, 48 respectively. Two of the patients undergo the total debridement but all of them were infection free in the latest stage of the review. Three patients refused for the surgery and so were kept on antibiotic for long period of time for treating the infection, at the end of the treatment they were found were not eliminated but the knee score were reduced. Rest of all the patients out of 20 just got healed by taking oral and intravenous antibiotics. There knee score was found to be normal at the end of treatment.

Table 1: Demographic distribution of the patient in the study

Demograph of the patients	No. of patient
Total Knee replacement performed	400
Total patient included	350
Total patient contacted	300
No. of patient died in follow up period	20
Lost in follow up period	30

Table 2: Distribution of the infected patients.

Characteristics features of infected person	No. of cases
Total no. of infected patients	20
Culture was done	20
Patient with deep infection	6
Patient with two stage revision	4
Total debridement	2
Refused to undergo surgery	3
Got treated with antibiotics	5

DISCUSSION

Knee infections can be divided into three types: acute, subacute and chronic. The time period varies for all the types of infection. The time period relates to the start of the infectious condition and is important so that the treatment can be planned accordingly.[11] The acute and subacute stages of infections are related to the surgical procedures and the last is one for the bacteria infection, related to skin. Acute infections are characterized by pain, edema, heat, erythema and fever, commonly caused by virulent germs such as *S. aureus* and Gram-negative bacilli. Patients with subacute conditions usually have signs and symptoms that are non-evident and may present persistent pain, implant loosening or both, which makes aseptic loosening a differential diagnosis. The chronic condition has variable presentation, with signs and symptoms that are similar to those reported in the acute and subacute conditions. From the assessment and the clinical history, it can be defined whether the patient has high or low likelihood of infection, which is important for the subsequent propaedeutics.[12]

In our questionnaire we might have failed to detect patients with latent infection which developed beneath well-healed wounds leading to a poor outcome. Lesions infection treated with the help of clinical signs understanding and wound swabs from all revision cases would have participated in the question. Our known infection rates of 2% after primary TKA are comparable with published reports. A similar study carried out at our unit a decade ago showed an infection rate of 5.8% after primary TKA. In the mean time period we have adopted the following measures of laminar flow ventilation in the operating theatres, chlorhexidine lavage and occlusive clothing for all theatre personnel to decrease the chance of infection. Many studies have been quoted saying that such measures when taken can reduce the risk of contamination. The outcome of patients with deep infection after primary TKA, was poor with only four out of 20 patients retaining their prosthesis free from infection. Bengtson reported similar results in a much larger cohort of patients from Sweden, with only 20% recovering from infection with a functioning prosthesis.[13]

Arthroscopic washout was an ineffective method of treatment. Waldman et al observed that arthroscopic washout was less effective than open debridement.[14] Our four infected primary TKAs who were treated with early radical debridement retained their prostheses and had no sign of infection at their latest follow-up. Our policy now is to proceed to early radical debridement and not to perform arthroscopic washout. Patients who underwent arthrodesis did no worse in terms of their Oxford knee scores than those who underwent two-stage revisions and did better with regard to eradication of infection. Wilson et al compared various modalities of treatment for infected TKA. Four of their patients underwent arthrodesis and in all cases the patients were free of both pain and infection, but mobilised poorly.[14]

Our follow-up of between 1 to 3 years is shorter one and we recommend that more. During this study period, infection after primary TKA was rare but devastating and invariably led to a poor outcome. We recommendation that all infected TKAs should be treated initially by radical debridement. If that fails, than only complete revision procedure should be planned.

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