

## Degree of Osteoarthritis and the Results of Total Knee Arthroplasty

Research Article

S El-Sallakh<sup>1\*</sup>, I Barouni<sup>2</sup>

<sup>1</sup> Orthopaedic Surgeon, Tanta University Hospital, Tanta, Egypt.

<sup>2</sup> Orthopaedic Surgeon, Ninewells Hospital, Dundee, UK.

### Abstract

**Objective:** Osteoarthritis of the knee is one of the leading causes of pain and disability. The primary goal of the total knee arthroplasty is to relieve the pain and to improve the patient's quality of life. The aim of the study is find any correlation between the preoperative radiographic degree of osteoarthritis and the results in primary total knee arthroplasty.

**Study Methods:** It is a retrospective study. 160 patients, 203 knees were included in the study. Patients were between the ages of 31 to 90 years of age (69.4). 62% were females and 38% were male. An x-ray was taken for all patients in order to grade the damage of each knee according to the radiographic grading system of Kellgren and Lawrence. After the operation each patient was assessed after 1, 5 and 10 years.

**Results:** In general the benefit of surgery was obvious among all x-ray Osteoarthritic grades, which was obvious by the improvement in the post-op scores among all four groups in the first year after surgery, although early stages grades (I&II) showed better improvement in function scores than the late two stages within the same period. In 5 and 10 years, however, all grades' outcomes went down in both knee and function scores.

**Conclusion:** These results prove delaying surgery in symptomatic early stages is of no benefit. It has also showed that the outcome of the surgery is of high benefit to all patients regardless their pre-op x-ray grades.

**Keywords:** Knee; Arthroplasty; Osteoarthritis.

### Introduction

Osteoarthritis of the knee is one of the leading causes of pain and disability. Total joint replacement is the most common treatment for advanced osteoarthritis of the knee, with the primary goal of the procedure to relieve the pain and improves the patient's quality of life. Also it is among the most successful, highest volume procedures in medicine [1-3]. Because the prevalence of radiographic osteoarthritis in asymptomatic patients is common (60%) [4], the radiograph is used primarily to confirm the diagnosis of OA when considering TKA. Patients with more severe and less severe radiographic changes of knee OA may be candidates for TKA. An orthopaedic survey revealed that surgeons believed patients with more severe pain and associated OA had a higher likelihood of an excellent outcome [5].

Some surgeons will hesitate to perform TKR in symptomatic patients with early osteoarthritic changes, regardless of their ages.

In this study we tried to find out any differences in the knee pain and function scores between early and late radiographic OA changes according to the Kellgren-Lawrence grading system [6] used in the post-operative knee arthroplasty.

### The aim of the study

The aim is to compare the pre-operative grades of tibiofemoral joint damage with the post-operative scores. The outcome should help to determine if one grade benefit more from the surgery over the others, which can in future help in deciding when to go ahead with the surgery or when not to do.

### Patients and Methods

This retrospective study was done on the patients undergoing total knee replacement collected for this analysis was part of a

#### \*Corresponding Author:

Dr Sameh El Sallakh,  
Orthopaedic Surgeon, Tanta University hospital, Tanta, Egypt.  
Tel: 00442083612081  
Fax: 00442083612081  
E-mail: saelsallakh@hotmail.com

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long-term follow-up of patients. Patients used in this study were randomly chosen from patients with osteoarthritis booked for primary total knee replacement surgery in a district Hospital. 160 patients, 203 knees were included in the study. Patients were between the ages of 31 to 90 years of age (average 69.40). 62% were females and 38% were male. An x-ray was taken for all patients in order to grade the damage of each knee according to the radiographic grading system of Kellgren and Lawrence (K&L) (Figures 1 to 4). We excluded the patients who had evidence of loosening, instability, malalignment, infection, or extensor mechanism dysfunction. After the operation each patient was assessed using Tayside Knee Replacement study Data (knee and function score form) form after 1, 5 and 10 years. Unfortunately, only few patients included in the study have 10 years scoring data and not all of them had 5 years post-operative. From the 203 knees included in this study only 171 had 5 years scoring data and 32 had 10 years' data.

Scores for the year 1, 2 and 10 were collected separately, and then divided into 4 groups according to the pre-op x-ray grades. Mean values were calculated for knee and function scores for each grade in each year.

## Results

Knee score represent the pain, range of movement, stability and alignment but function score represents walking, and stairs [7] both represent the Tayside Knee Replacement study Data Form.

### Year 1

203 knees were assessed one year after the operation using Tayside Knee Replacement study Data Form.

Grade I: 5% (n=10), Grade II: 21 % (n=42), Grade III: 45 % (n=91) and Grade IV: 30 % (n=60).

#### *Knee scores:*

Grade I: between 84 to 99 and the mean was 92.90

Grade II: between 52 to 100 and the mean was 91.05

Grade III: between 27 to 100 and the mean was 91.19

Grade IV: between 54 to 100 and the mean was 93.25

#### *Function scores:*

Grade I: between 30 to 100 and the mean was 92.90

Grade II: between 15 to 100 and the mean was 68.10

Grade III: between 0 to 100 and the mean was 71.21

Grade VI: between 15 to 100 and the mean was 73.42

### Year 5:

171 of the previous 203 knees had post-op 5 years score.

Grade I: 5% (n=9) knees, Grade II: 18 % (n=30), Grade III: 46 % (n=79) and Grade IV: 31 % (n=53).

### Grade 1. (Figure 1).



Some loss of articular cartilage  
If severe loss of cartilage, joint space narrows  
Osteophytes may be seen

### Grade 2. (Figure 2).



. More activity in the bone under the cartilage  
. Increased activity can lead to bone hardening (sclerosis) and cysts  
. Change in bone density (whitening of bone on x-ray). Joint space is unimpaired

**Grade 3: (Figure 3).**

- Some deformations on edge of bone
- . Rough edges
- . Moderate loss of joint space

**Grade 4: (Figure 4).**

- . Complete loss of joint space
- . Subchondral bone sclerosis
- . Changes in joint shape mean the bone contour has been altered.

***Knee scores:***

Grade I: between 50 to 98 and the mean was 73.67  
 Grade II: between 44 to 100 and the mean was 81.30  
 Grade III: between 50 to 100 and the mean was 86.08  
 Grade IV: knee scores' were between 40 to 100 and the mean was 88.98

***Function scores:***

Grade I: between 10 to 100 and the mean was 64.44  
 Grade II: between 10 to 100 and the mean was 67.00  
 Grade III: between 0 to 100 and the mean was 67.15  
 Grade VI: between 10 to 100 and the mean was 68.30

**Year 10**

32 of the total 203 knees had 10 years post-op scores.  
 Grade I: 0% (n=0) knees, Grade II: 16 % (n=5), Grade III: 47 % (n=15) and Grade IV: 38 % (n=12).

***Knee scores:***

Grade I: between 0 to 0 and the mean was 0  
 Grade II: between 50 to 98 and the mean was 82.00  
 Grade III: between 50 to 98 and the mean was 82.60  
 Grade IV: between 40 to 100 and the mean was 62.00

***Function scores:***

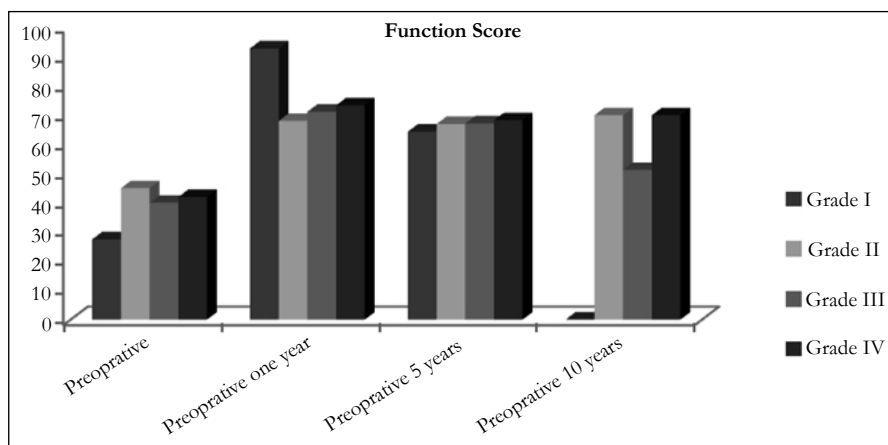
Grade I: between 0 to 0 and the mean was 0  
 Grade II: between 40 to 100 and the mean was 70.00  
 Grade III: between 5 to 100 and the mean was 51.33  
 Grade VI: between 0 to 100 and the mean was 70.00

**Discussion**

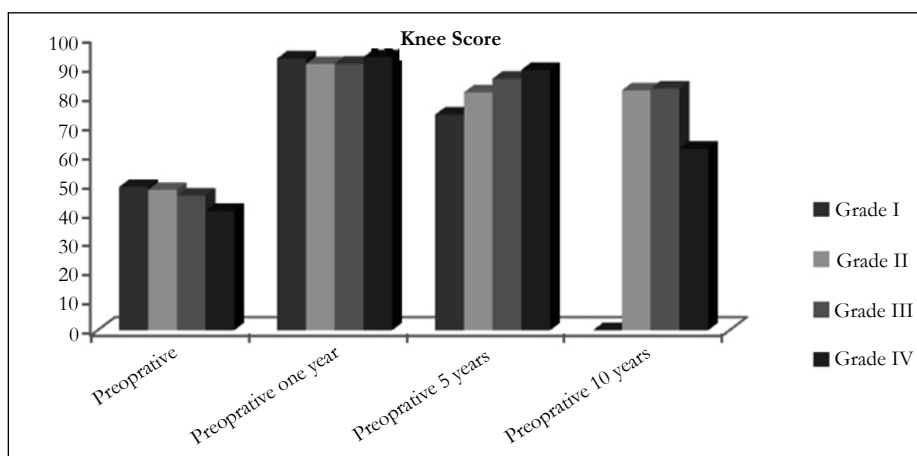
We found that knee replacement surgery significantly improved the health-related quality of life of patients with osteoarthritis. Before surgery, the patients had poor knee & function scores. After surgery, the scores in all groups improved significantly (Table 1&2), a clear reflection of the importance of TKR in improving quality of life, as a whole, and knee's pain and function in specific.

Although, the study showed similar improvement rates in knee scores for all x-ray grades, the function scores of Grade I were better than other grades in year one after the surgery. The function score of Grade I preoperatively was the lowest and showed the greatest improvement 1 year after the surgery from a mean of 27.50 to 92.90. This was against the hypothesis that said the patients with less severe radiographic OA changes experience less pain relief and lower function scores after TKA compared with more severe radiographic OA [8]. Polkowski et al., 2013 [9] showed in their study a high percentage of patients referred for

**Table 1. Showing the function score pre and postoperatively.**



**Table 2. Showing the knee score pre and postoperatively.**



unexplained pain after TKA had early-grade osteoarthritis preoperatively. Also they [9] stated patients undergoing TKA for less than Grade 3 or 4 OA should be informed that they may be at higher risk for persistent pain and dissatisfaction. Valdes et al., [10] stated in their studies with over 900 knees that individuals with lower preoperative radiographic OA severity undergoing TJR are more likely to experience high pain post-TJR. Also Keurentjes et al., [11] concluded in their study that patients with severe OA have a better prognosis after THR and TKR than patients with mild OA. These findings might help to prevent dissatisfaction after THR and TKR by means of patient selection or expectation management.

Knee scores in the first year also showed slightly better improvement in grade IV scores than the other grades from a mean of 40.78 knee score preoperatively to 93.35 postoperatively. Meding et al 2001[8] in their study, they found Patients with severe and mild radiographic changes of OA eventually experienced the same degree of function and pain relief after TKR. This is compatible to our final outcomes in all grades after 5 and 10 years follow up.

Although, the study showed a great improvement in both knee and function scores in the first year after the surgery, a slight decline in 5 and 10 years amongst all grades. This decline can be explained by, either; the surgery effect is wearing out or part of the aging process which affects the whole body. Many patients did not have a 5 or/and 10 years review scores, which might have affected the result of the study if they were available.

The fact that, the study showed a similar figures of mean post-operative scores in all grades, suggests that there is no need to rush patients into surgery in early osteoarthritis damaged knees if the outcome is going to be the same. On the other hand, patients with all grades of OA damaged knees should be considered for TKR.

### Conclusion

In general the benefit of surgery was obvious among all x-ray Osteoarthritic grades, which was obvious by the improvement in the post-op scores among all four groups in the first year after surgery, although early stage grade I showed better improvement in function scores than the other grades within the same period.

In 5 and 10 years, however, all grades' outcomes went down in both knee and function scores.

These results proves delaying surgery in symptomatic early stages is of no benefit. It has also showed that the outcome of the surgery is of high benefit to all patients regardless their pre-op x-ray grades.

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