

# Total Knee Replacement in King Abdullah University Hospital, Early Results

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## Abstract

**Objectives:** To look at the early results of total knee replacement in King Abdulla University Hospital (KAUH), and decide whether we should continue offering this service or not?

**Methods:** We retrieved the files of all patients who underwent total knee joint replacement in KAUH since its commissioning on 2002. We looked at certain epidemiological factors such as age, sex, weight and risk factors. We explained our preoperative plan, surgical techniques, types of prosthesis inserted, and the complications encountered.

**Results:** The number of patients was 210, while the number of knees replaced were 267 joints. 80% of our patients were females, right and left side knees were replaced equally. The mean age of patients was 63.3 years, while the mean weight was 84.6 kgms. Only thirty patients were free of any co-morbidity, and the rest of them had at least one symptom of co-morbidity. The vast majority of patients have advanced primary osteoarthritis. Mobile bearing prosthesis were mostly used. The complications rate was 20%, most of which were in the form of superficial wound infection.

**Conclusions:** Total knee replacement is a thriving surgery in Jordan, to keep going we must stick to the sound principles. Such a major surgery should be done in specialized centers. So far, we think that our results are satisfying and we will continue doing this type of surgery.

**Keywords:** Joint replacement, cruciate sacrificing, Knee prosthesis.

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## Introduction

Total joint replacement in the western world is established as a very successful operation in treating degenerative diseases of the knee when conservative measures fail to alleviate symptoms.<sup>1,2</sup> In Jordan, and over the last few decades, this procedure was badly reputed.

But, recently one could notice some changes in the beliefs of our society towards the acceptance of such procedure. The reason for this is probably the improvement in the surgical techniques; better implant design and better medical care. As far as we know, we are not aware of any published local studies to document how frequent

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such a procedure has been done. According to the suppliers, there are almost 800 artificial knee joints being implanted per year in Jordan and one can see long waiting lists created in specialized centers, so one can conclude that this procedure is certainly a thriving one. We believe that every effort must be made to keep to the other nations pace, and orthopedics surgeons must keep to the high standards when performing such a surgical exercise. In this paper, we are presenting our early results of total knee replacement in KAUH hoping that it will be a help to the local community of orthopedic surgeons.

### **Materials and Methods**

From Jan.03 till Jan.07, the medical records of all patients who underwent total knee replacement in KAUH were retrieved and analyzed for the following variables: age, sex, weight, side, type of arthritis, indication of surgery, type of anesthesia, surgical approach, usage of tourniquet, usage of CPM machine, length of stay, blood transfusion, complications and type of prosthesis. The past medical history was looked at carefully to pick up risk factors. The risk factors we looked at were: diabetes mellitus, hypertension and overweight. The main indications of surgery were sever pain that disturb sleep, gross varus or valgus deformity, difficulty in walking, and difficult praying and toileting.

The preoperative protocol includes measures such as medical and cardiac consultation, routine lab. work, DVT prophylaxis, prophylactic I.V antibiotic, anesthetic evaluation, and lately calculating and documenting Knee Society Score (KSS).

In the operating room, the patient is anesthetized either generally or spinally. We have no experience with epidural anesthesia or tri-nerve block. Regarding tourniquet application, some patients had it applied after limb elevation while the knee is extended, others while the knee is flexed while the third group had no tourniquet applied.

The pressure in the tourniquet is ranging between 300 to 400 mmHg according to the thigh circumference. Thigh and heel supports are applied then cleaning and draping is done as usual.

The surgical approach is either the classical midline incision with medial parapatellar arthrotomy, or transvastus arthrotomy without everting the patella, and recently we have started to use the MIS instruments with the classical mid line incision to gain experience with MIS technique The routine of surgery was as follows: Joint debridement, Femoral preparation, Tibial preparation, Sizing, Gap balancing, Synovectomy only for patients who are having inflamed synovium, No patellar resurfacing (only debridement). The aim at the end of surgery was restoration of the mechanical axis of the lower limb. In the beginning we use to preserve the cruciate then we start sacrificing the cruciates for better range of movement. Fixed bearing prosthesis was used for certain patients, but most of our patients had mobile bearing prosthesis. Frequent irrigation with normal saline with gentamycin, cemented prosthesis and antibiotics containing cement.. Lateral release is done for specific indications and finally wound closure while the knee is flexed. Routine dressing with one or two drains.

The immediate postoperative protocol includes, pain management (Regular Pethidine for 48 hrs), immediate CPM (continuous passive machine), removal of drainage system within 48 hrs, blood transfusion when needed, IV Antibiotics for one week. Intensive course of physiotherapy is applied so that by the 5<sup>th</sup> day the patient is able to bend his knee up to 90 degrees and mobilize independently PWB. All patients are discharged on oral antibiotics for one week, DVT prophylaxis (clexane) for 5 weeks and appointments with physiotherapy and OPD.

Patients satisfaction was measured by using a very preliminary ways such as : demands to do the other side, decrease the use of NSAIDS, increase of the walking distance, climbing stairs, kneeling and returning to work ( drivers, and shop keepers).

**Results**

The distribution of cases according to age, sex, side, laterality, diagnosis, weight and the risk factors is shown in Table (1). Two hundred and sixty seven artificial knees implanted in 210 patients. Their age ranged between 20 to 91 years with a mean of 63.5 years (SD9.7), most of them were above 50 years. The weight of our patients range was 52 - 125 kgs, with a mean of 84.6 kgs. (SD13.8). Nineteen patients had no record of their weight. It was noticed that 64% patients have a weight of more than 80 kgm. Because we had no records of patients' heights to calculate the BMI we presumed that any patient with a weight of 80 kg and above is an overweight patient The majority of our patients are females who are suffering mostly from osteoarthritis. Sixty tow percent of our cases had positive past medical history (hypertension, diabetes, others). But, when we consider over weight as a risk factor we will find, that only 30 (12%) of our cases are free from any risk factors.

**Table 1: Distribution of cases according to sex, side, age, weight, diagnosis, risk factors and laterality**

<i>Variables</i>	<i>Number</i>	<i>Total</i>
<b>Sex</b>		
Male	43 (20%)	
Female	167 (80%)	210
<b>Laterality</b>		
Unilateral	153(73%)	
Bilateral	57 (27%)	210
<b>Side</b>		
Right	134	
left	133	267
<b>Age</b>		
>50 years	16 (6%)	
<50 years	251 (94%)	267
<b>Weight</b>		
> 80 Kgm	77 (29%)	
<80 Kgm	171 (64%)	
Unknown	19 (7%)	267
<b>Diagnosis</b>		
OA	250 (94%)	
RA	17 (06%)	267
<b>Risk Factors</b>		
Hypertension	65 (25%)	
Diabetes	13 (5%)	
HPT + DM	44 (16%)	
Others	44 (16%)	
None	101 (38%)	267

Table (2) shows the relation between overweight and the risk factors.

**Table (2): Distribution of risk factors in relation to the weight.**

	<i>Hypertension</i>	<i>DM</i>	<i>HTN+DM</i>	<i>Others</i>	<i>Free PMH</i>	<i>Total</i>
<i>Wt &lt; 80 Kg</i>	43	09	23	34	62	171
<i>Wt &gt; 80 Kg</i>	18	04	18	07	30	77
<i>Unknown WT</i>	04	00	03	03	09	19
<b>Total</b>	65	13	44	44	101	267

Table (3) shows the distribution of cases according to surgical approach, anesthesia type, tourniquet, prosthesis used, blood transfusion and CPM usage. Most of our cases had spinal anesthesia and medial parapatellar arthrotomy. Tourniquet and CPM machine were used frequently. The prosthesis, which was used most, is the mobile bearing one. Blood transfusion was used infrequently.

The overall complication rate was 20%, the distribution of complications is shown in Table (4). Obviously, the most common postoperative complications were superficial wound infection and unresolving pain. The commonest intraoperative complication was distal femoral notching.. The average length of stay was 8 days.

**Table (3): Distribution of cases according to surgical approach, anesthesia, tourniquet, prosthesis used blood transfusion and CPM usage.**

<b>Variables</b>	<b>Number</b>	<b>Total</b>
<b>Anesthesia</b>		
General	128	
Spinal	133	
Epidural	06	267
<b>Tourniquet</b>		
Kn Flexed	100	
Kn Extended	94	
Without	73	267
<b>Surgical approach</b>		
Parapatellar	246	
Transvastus	21	267
<b>Prosthesis</b>		
Fixed Bearing	60	
CR	30	
CS	30	
Mobile Bearing	207	267
<b>CPM Use</b>		
Yes	148	
No	119	267
<b>Blood Transfusion</b>		
Needed	44	
Not needed	223	267

**Table (4): Distribution of complications.**

<b>Complications</b>	<b>Number</b>	<b>Total</b>
<b>Intraoperative</b>		
Periprosthetic fractures	00	
Notching	05	
MCL damage	01	
Lateral parapatellar arthrotomy	01	07
<b>Postoperative</b>		
Synovial leak	02	
Wound infection	17	
Symptomatic DVT	04	
Unresolving pain	17	
Peroneal nerve injury	01	
Deep infection	01	42

**Discussion**

Total knee arthroplasty (TKA) is one of the most successful reconstructive procedures in orthopedic surgery. <sup>1,2</sup> Relief of pain and restoration of function can be obtained in the majority of cases to a level, which is satisfactory to both the patient and the surgeon. <sup>3</sup> Since we in Jordan are at the beginning of the learning curve we must look carefully at the pros and cones of this procedure.

We know that due to cultural and religious reasons primary OA of knee is an endemic disease among the old age orientals.

This could explain why the vast majority of our patient's age (94% patients) is over 50 years, and those are suffering from end stage primary OA which represent 94% of patients. Rheumatoid arthritis is not a common disease in this area, <sup>4</sup> that's why we only have 17 patients with rheumatoid arthritis, most of which have their knees replaced while they were less than 50 years old. Five patients in their twenties have their knees replaced because of sever traumatic secondary OA; these patients refused other ways of treatment. Females represent 80% of our patients. A positive association between obesity and BMI, and OA of the knee has been observed in cohort studies, <sup>5,6</sup> this is confirmed by the fact that almost 64% of our patients are weighing more than 80 kgm, with the majority of them being females.

The main indications of surgery <sup>7</sup> were sever pain, which disturbs sleep, and difficulty of praying and toileting. What we could not explain is that in spite of marked OA, some patients retain full range of movement and they were able to sit for praying and toileting, this means that restricted range of movement does not reflect the severity of OA.

The three main risk factors we looked at are hypertension, diabetes mellitus, and overweight. We found that only 12% of patients in this series are free from any risk factors, the rest of them are having at least one risk factor. The early effect of this is not clear, and we have to wait to see the long-term effects of these factors on the survival of the implanted prosthesis. Indeed published data suggests that over a third of all total hip and knee replacements are performed in obese patients. <sup>8,9</sup>

We should not forget that the vast majority of the patients we are operating on are elderly, so we have to give them the safest possible anesthesia. In our case, the type of anesthesia was left to the anesthetist, half of the patients were given general anesthesia while the other half was given

spinal anesthesia. We have no experience with epidural or tri-nerve block. We noticed that early rehabilitation with spinal anesthesia is much smoother than with general anesthesia.

Regarding the usage of tourniquet, we used it in three ways, each with significant number of cases. We noticed that quadriceps functions recover more quickly when no tourniquet is used, and if it has to be used, it is better to inflate it while the knee is flexed. Moreover, we noticed that the need for blood transfusion is almost the same whether we use the tourniquet or not.

Whatever surgical approach is used, it is mandatory to achieve proper soft tissue balancing and re-align the mechanical axis of the lower limb. We believe that probably for the beginners the easiest surgical approach is the midline incision and medial parapatellar arthrotomy with or without everting the patella, this will give the surgeon a better chance to realize the anatomy, do a proper soft tissue release, proper bone cuts, and accurate gap balancing, other surgical approaches such as transvastus approach and subvastus approach will follow, especially if the MIS instruments become available then we can use these instruments with classical approach, and once we develop the experience we can cut down the length of the incision.

Numerous successful implant designs are currently in use, including implants that retain or substitute the posterior cruciate ligament (PCL), implants that can be inserted with or without the use of cement, with a mobile or fixed bearing insert, as well as many other variables. The theoretical advantage of mobile bearing knees is due to the fact that increased conformity of the articulating surfaces is possible without increasing the constraint of the system, with less polyethylene wear as the end result.<sup>7</sup> We believe that the most satisfying prosthesis is the cemented fully flexed mobile bearing prosthesis with cruciate sacrificing, tow hundreds and seven of our patients have this type of prosthesis. We think that patellar replacement is still controversial, and in fact we didn't replace any.

A recent meta-analysis of the existing literature showed that those knees with replacement of the patella generally performed better than knees without patellar replacement on most of the outcome variables.<sup>10</sup> Wound closure is best done while the knee is flexed and the quadriceps muscle is stretched.

The immediate rehabilitation program is very important;<sup>11</sup> that's why we implement an intensive course of rehabilitation. To have compliant patients we have to keep them pain free by offering them regular analgesia during the immediate postoperative period. The benefits of CPM are well established.<sup>12</sup> We used this machine in 148 patients, and we noticed that patients can tolerate this machine if they are pain-free; at the same time, we noticed that using this machine will raise the confidence of these patients in the success of surgery.

The overall complication rate is 20%. Fortunately we had no serous intraoperative complications such as periprosthetic fractures, (its incidence is 0.6%),<sup>13</sup> but we did have damage to the MCL in one occasion, and injury to the common peritoneal nerve in another occasion. We noticed femoral notching in 5 patients, a well-known complication the significance of which is still to be seen. Infection after total knee replacement (TKR) is a potentially devastating complication and is one of the most common reasons for revision TKA.<sup>14</sup> The reported rate of infection following TKR is 1-2.5%.<sup>15</sup> We believe that our deep infection rate is low and the reason for this is the measures we implement to prevent infection, measures such as pre operative antibiotics, proper surgical preparation, pulse lavage with normal saline and gentamycin, and postoperative antibiotics. As Table (4) is showing, the most common postoperative complication is wound infection, which was superficial and treated by dressing and the appropriate antibiotics. Deep prosthetic infection was encountered in one occasion. Synovial leak (deep wound dehiscence) was seen in tow cases, no doubt such a complication is due to technical mistake and it is due to improper wound closure.

DVT is a common complication after TKA,<sup>16</sup> but symptomatic DVT is much less, we had 4 cases of symptomatic DVT, which needed treatment. Our routine is to start UHMWH the night before surgery and continue this for five weeks, whether this has a role in decreasing the incidence of symptomatic DVT in our series or not? We don't know. Significant number of patients continue to complain of pain, the reasons of this is probably due to technical mistakes, refraining from resurfacing patella, instability, deep infection or because we are at the beginning of a learning curve. We are following these patients closely.

TKA has been shown to be a cost-effective medical intervention that is associated with significant improvements in quality of life. Resumption of physical activity after TKA leads to an overall improvement of cardiovascular fitness and general health.<sup>17,18</sup> Significant patients satisfaction was noticed, this was confirmed by demands to do the other side 27%, decrease the use of NSAIDS, increase of the walking distance, climbing stairs, and returning to work ( drivers, and shop keepers).

We believe that this study is not without shortcomings these could include: accurate incidence of DVT, measuring satisfaction by using KSS, and determine the causes of post operative pain. So far we didn't encounter any cases which need revision, the reason for this is that we are still in the beginning and the follow up period is very short.

The conclusions from this study are:

- TKA is a thriving procedure in Jordan, to keep the pace we must stick to the sound principles of arthroplasty.
- Before embarking on doing such a surgery we should make sure that there is a right setup in operating room, physiotherapy department, and the ward.
- We must select our patients.
- The worst (which is revision) is coming and we have to prepare ourselves for it.
- There is always a learning curve that we have to go through.

- All in all we think that our results are satisfying and we will continue doing this procedure taking in consideration all the new developments in this regard.

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## زراعة مفصل صناعي لمفصل الركبة في مستشفى الملك المؤسس عبد الله الجامعي: نتائج أولية

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### الملخص

**الهدف:** دراسة نتائج زراعة مفصل صناعي لمفصل الركبة، وهل نستمر في تقديم هذه الخدمة للمرضى في مستشفى الملك المؤسس، إربد، الأردن؟

**الوسائل:** لقد قمنا بمراجعة ملفات المرضى الذين أجريت لهم عملية زراعة مفصل صناعي للركبة في مستشفى الملك المؤسس منذ عام 2002، وأخذنا بالاعتبار عوامل دراسية معينة، مثل: العمر، والجنس، والوزن، والمخاطر المرضية الموجودة لدى المرضى.

تناقش هذه الدراسة خطة ما قبل العمل الجراحي، والطرق الجراحية المتبعة، ونوع المفصل الصناعي المستخدم والمضاعفات التي حصلت.

**النتائج:** لقد أجريت زراعة على 267 مفصلاً صناعياً لـ 210 مريضاً، 80% منهم إناث و 20% ذكور، وكانت نسبة المفصل الأيمن إلى الأيسر متساوية، كما كان معدل العمر 63.3 سنة، ومعدل الوزن 84.6 كغم، ولم يكن لدى 30 من المرضى فقط أية عوامل خطر سابقة، في حين أنه كان لدى 70% منهم على الأقل عامل خطر واحد. فضلاً عن أنه كان لدى الغالبية العظمى من المرضى تنكس في مفصل الركبة، كما كانت نسبة المضاعفات 20%، أكثرها خمج الجرح السطحي.

**الخلاصة:** زراعة مفصل صناعي للركبة في الأردن هي عملية حيوية ويجب المحافظة على مبادئها، بحيث لا تُجرى إلا في مراكز متخصصة، ونحن نعتقد أن النتائج التي حصلنا عليها في مستشفى الملك المؤسس مرضية وتستمر في إجراء مثل هذه العمليات.

**الكلمات الدالة:** زراعة المفصل الصناعي، تنكس في مفصل الركبة، خمج الجرح السطحي.