



## Total Knee Arthroplasty : Scandinavian Register. What can we learn?

## Prothèse totale du genou : Qu'apprend-t-on du registre scandinave ?

Nouisri L., Bahri N.

Department of Orthopaedic Surgery - Military Hospital of Tunis. Faculty of Medicine of Tunis - University of Tunis El Manar. Tunis - Tunisia

CORRESPONDENCE: **Dr. Lotfi NOUISRI**

Department of Orthopaedic Surgery - Military Hospital of Tunis. 1008 Tunis - Tunisia.

E-mail: lnouisri@yahoo.com

### I. INTRODUCTION

National Arthroplasty Registers in Scandinavia have proved to be an important and valid instrument to assess the long term performance of joint arthroplasty procedures and to lead an improvement in the long-term outcome of arthroplasty<sup>[1]</sup>.

Improved quality of joint arthroplasty effects a reduction of costs in public health care by avoiding revision surgery. Starting with the Swedish National knee Register (Lund 1975)<sup>[2]</sup> they have had a high impact on Orthopedic procedures in Scandinavia and world wide.

The aims of a register are :

- Registration of all primary and revision operations in a definite area in a central database
- Follow the implant until it has to be revised, the patient dies or emigrates

Definition of revision (failure) has to be considered when at least one part of the implant has to be revised

### II. HISTORY

In the early seventies, endoprosthetic surgery of the knee was a relatively uncommon procedure restricted for those with severe disability.

Professor Göran BAUER was the head of the Department of Orthopaedics in Lund 1969–1989. The story goes that a failed surgery in the early 1970s, in which a left knee implant was inserted in the right knee (or vice versa), triggered his interest in monitoring the results of knee arthroplasty, which at the time was being performed with a variety of implants.

Bauer regarded knee arthroplasty as a large-scale human experiment and he thought it should be monitored. Who would benefit from these implants? Were they safe? What was the outcome? What were the types and rates of failure, and could they be managed? Thus, he became the major promoter of initiating a nationwide registration and in 1974, in collaboration with the Swedish Orthopaedic Society, a meeting was held in Uppsala to decide on the

matter. A group of about 20 interested surgeons attended and the majority voted for the project.

With monetary contributions from the Swedish Medical Research Council (MFR), the first national arthroplasty register was started in 1975 with its office located in Lund. Initially, not all operating units joined and although participation steadily grew, it was not until the early 1990s that the whole of Sweden was covered.

Initially, the information was entered via a modem to a mainframe computer with limited power, with the data stored on tapes. Information about each procedure was coded to fill one printed line including identification number, hospital, diagnosis, date of surgery, side, type of surgery, implant type and brand, and early complications. In an attempt to evaluate the case mix, preoperative radiographs were studied and classified according to AHLBÄCK at Saint Göran's Hospital in Stockholm.

There was an ambitious follow-up program with an individual clinical follow-up form sent to each surgical unit at 1, 3, 6, and 10 years after surgery. These forms were used to validate previously recorded data and they also included a few outcome questions as well as surgeon and patient satisfaction. Thus, the registry used patient-reported outcome measures from the start.

Due to the increase in the number of operations, however, the workload of follow-up examinations was considered to be too laborious, resulting in a large number of incomplete forms. It was thus abandoned in 1989.

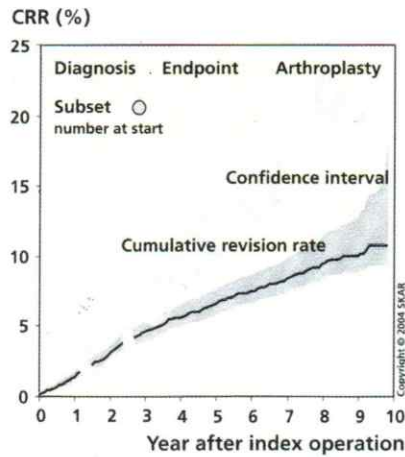
A part from this regular gathering of data, the registry has acquired data for specific projects by sending questionnaires to patients. In this way, in 1997, 94% of all living registered arthroplasty patients responded to a questionnaire about possible unreported revisions and patient satisfaction. The registry also became one of the first registries to use validated health questionnaires in 1998 when it evaluated what questionnaires were the most suitable for use after knee arthroplasty.

By the end of 2010, 170,000 primary knee arthroplasties and 11,000 revisions have been recorded.



### III. HOW THE REGISTER COMPARE THE IMPLANTS?

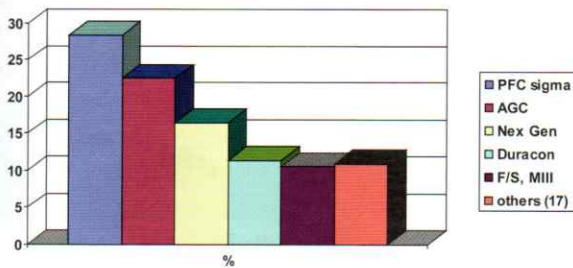
Survival analysis are used for graphical presentation of data. The curves shows the Cumulative Revision Rate (CRR) which describes that percentage of the operated patients was expected to become revised with time. The calculation is based on the sum of all the revisions and expresses the rate for surviving patients.



CRR curve example.

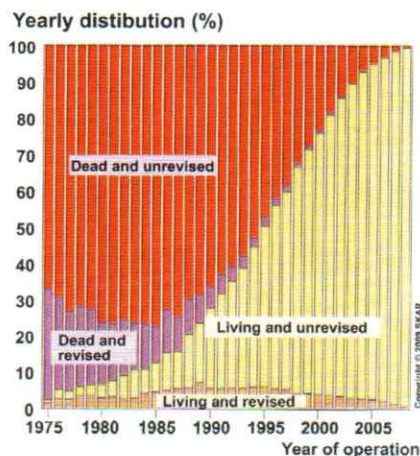
### IV. DISTRIBUTION OF TYPES OF IMPLANTS (%)

Distribution of types of implants for primary surgery implants for primary TKA (1975-2010) Scandinavian countries is shown in this diagram.



### V. YEARLY AGE DISTRIBUTION

It's important to note that as the individual patient also is at risk of dying, the real proportion of revisions is lower than the CRR.



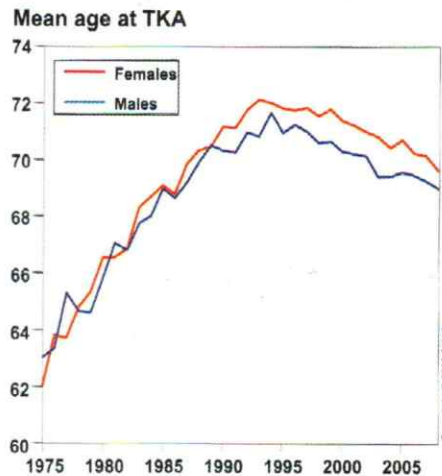
The status in 2008 for each yearly batch of patients operated since 1975.

As the figure shows, more than 3/4 of the patients that were operated in 1980 deceased without having been revised. Half of those still aliver have suffered revision.

### VI. AGE AND GENDER DISTRIBUTION

Between 1975 and 1994, the mean age at primary operation increased from 65 to almost 72 years.

The main reason was the relatively large increase in number of operations for the older groups. Probable explanations are improvements in anesthetic techniques.

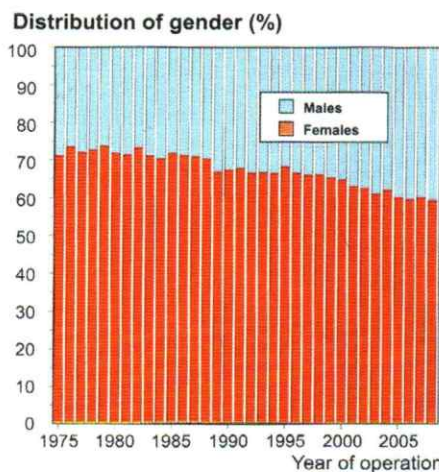


The mean age at surgery was lower for TKA than UKA when TKA was introduced in the seventies (cp the figure above).

Knee arthroplasty is more common in females than in males.

At the start, females accounted for about 70% of the operations

As the figure above, the proportion of men has been slowly increasing so at the present they account for 41%

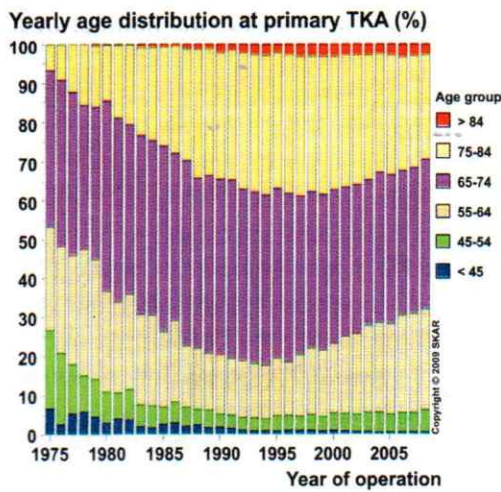


The proportion of males has increased slightly over the years.

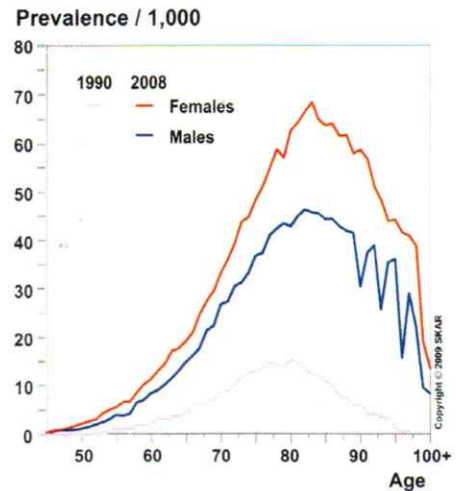
### VII. YEARLY AGE DISTRIBUTION AT PRIMARY OPERATION (%)

This figure shows the relative number of operations performed on the different age groups over a period of more than thirty years.

The actual number of patients 45-65 years of age having a TKA tripled. This can be explained by an increased confidence that knee arthroplasty is a benefit for younger patients.



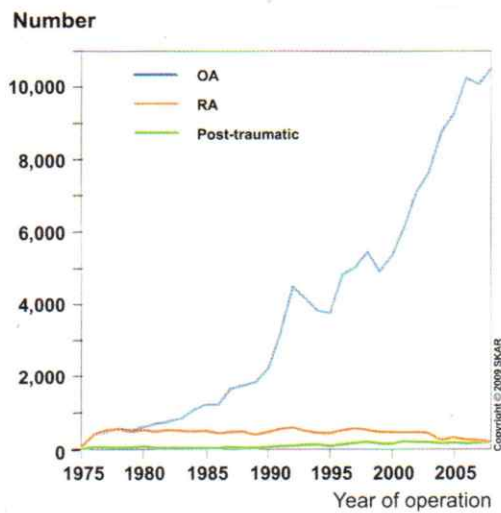
The relative distribution of primary TKA arthroplasties among different age groups.



The prevalence of knee arthroplasty in 1990 and 2008. One of fifteen elderly women has a knee arthroplasty..

### VIII. THE YEARLY NUMBER OF TKA FOR DIFFERENT DIAGNOSES

In the 80's, the use of TKA really started to increase for osteoarthritic (OA) patients. The number of operations for rheumatoid arthritis (RA) lessened may be explained by the advance of new types of medical treatment. During the last decade, OA RA and posttraumatic conditions were stated as the reason for surgery in 98% of cases.

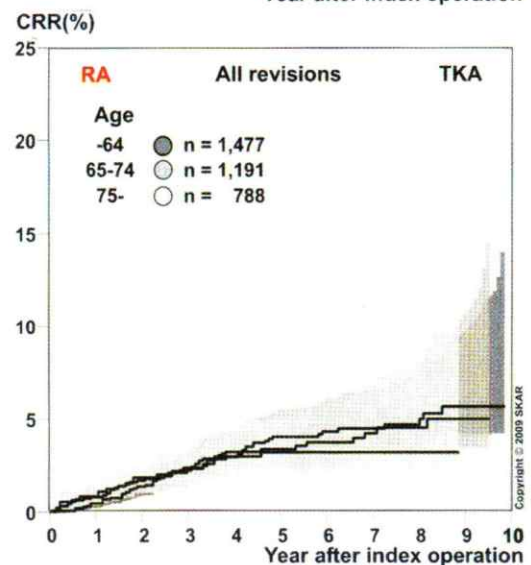
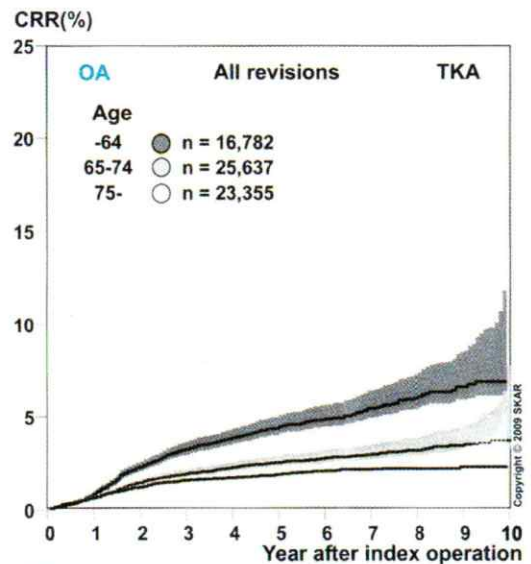


The yearly number of arthroplasties for different diagnoses..

### IX. INCIDENCE AND PREVALENCE

The increase in incidence which started in the late 80's has still not cuminated. As this is the incidence for the whole population, (all ages) a small of a part of the increase in incidence reflects aging of population over time. Comparing the prevalence in 1990 and 2008, it can be seen how fast the progress has been during the last 18 years. In 1990, 1.6% of all older women and 0.9% of the men had at least one knee arthroplasty. In 2008, the numbers were 6.9% and 4.7% respectively, an increase by 4-5.

In the future this will be reflected in the need for revisions and the risk of periprosthetic fractures.



### X. FACTORS THAT INFLUENCE THE REVISION RATE

#### A- Primary disease

It became evident early that patients with primary disease, e.g. rheumatoid arthritis (RA) and osteoarthritis (OA) also differ with respect outcome



The differences in CRR (1998-2009) between the 3 age groups <65, 65-75, >75 were significant for OA operated on with TKA and UKA but not for RA operated on with TKA

**B- Year of operation**

For the TKA there has been a constant reduction in risk of revision over the time, it can't be only explained by an increasing mean age of patients at surgery.

Comparing the CRR of different time, one finds for TKA periods, that the revision rate has decreased over the years

Comparing the CRR of operations performed during different time periods, using only revision for infection as end-point, we find improvement for TKA

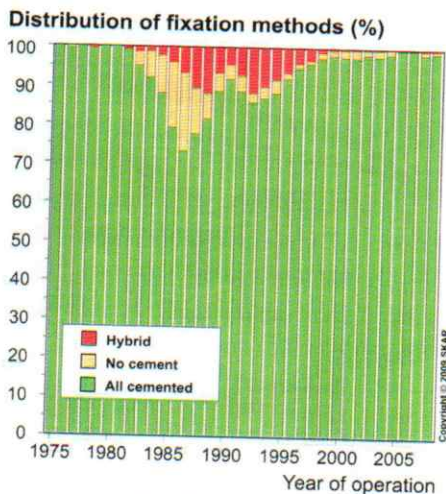
When analysing OA in the period 1998-2009 (Cox regression), no significant difference in CRR was found between the sexes.

It confirmed that RA patients have a greater risk of infection which has been ascribed to the effect of corticosteroid and immunosuppressive medications.

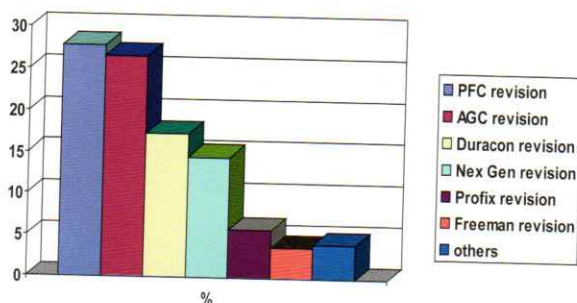
**C- Use of bone-ciment**

Bone ciment has been used In the majority of TKA

However, for the period 1985-1994, when uncemented implants were relatively common, we found that the risk of revision was higher if the tibial component was left uncemented.



The relative yearly distribution regarding the use of cement for fixation.



Revision Models for primary TKA (1975-2010) Scandinavian countries

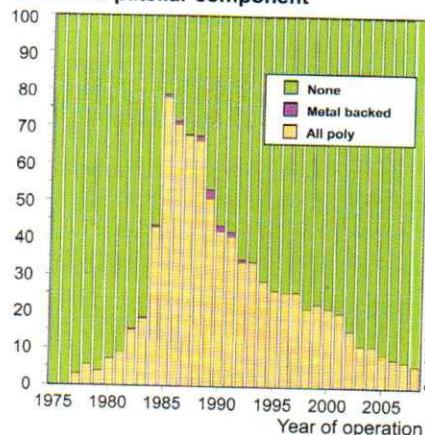
Type of revision/primary indication[3]	TKA/OA in %	TKA/RA in %
Total KA revision	26.1	32.8
Exchange femur comp.	1.4	1.8
Exchange tibia comp.	6.9	3.8
Patella addition	28.6	15.1
Patella exchange	1.5	0.6
Patella removal	0.4	0.6
Total implant removal	13.3	14.8
Arthrodesis	1.5	2.4
Amputation	0.7	3.6

**XI. PATELLAR BUTTON IN TKA**

Patellar Button is performed for less than 10% since 2007. Estimating how the use of a patellar button affects the revision rate is complex.

The use varies with the brand of prosthesis used and its use also has lessened in recent years. During the 80's, patellar button were used in half of the cases, its use had a negative effects.

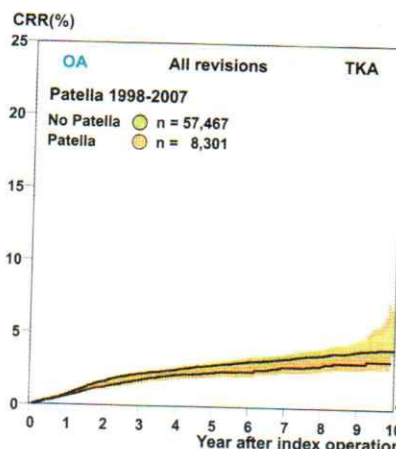
Distribution (%) of TKA with and without a patellar component



The figure shows the yearly distribution regarding the use of patellar button in TKA.

However, it has to be kept in mind that revisions for femoropatellar symptoms generally performed relatively soon after primary operation while revisions for wear or loosening of the patellopatellar component occur later on.

For the current period (1998-2009) we found that OA patients that underwent surgery using TKA without patellar button were at 1.23 (1.5-1.44) times higher risk for revision than the patients operated with a button.



CRR during the current 10-year period for all TKA OA, with and without patellar component respectively.



For RA, we also found significantly higher risk when not using a button (times 1.81 (1.05-3.12)). The increased frequency of revisions is caused by the need of secondary patellar resurfacing because of femoropatellar pain.

The risk of revision in one of the many measures of outcome

- For TKA inserted for OA, the implants with significantly lower or higher risk than the reference implant AGC are the same as in last 2 annual reports : PFC-sigma and Nex Gen have the less risk
- In OA , but no RA, the risk of revision significantly decreases with increasing age
- Finally , arthrodesis and amputation have respectively higher risk (at 2 times and 5 times ) for TKA inserted for RA.

## XII. RÉFÉRENCES

- 1) Robertson O. Knee Arthroplasty Registers. J Bone Joint Surg 2007; 89B:1-4.
- 2) Robertson O., Lewold S., Knutson K., Lidgren L. The Swedish Knee Arthroplasty Project. Acta Orthop Scand 2000; 71:7-18.
- 3) The Swedish Knee Arthroplasty register - annual report 2011.