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Original Research Article

First outcome results after total knee and hip replacement from the Lithuanian arthroplasty register

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ABSTRACT

Background and objective: In 2010, the Lithuanian Association of Arthroplasty was established and on January 1, 2011, initiated a national study of all reoperations after total knee (TKR) and total hip replacement (THR) in Lithuania. The aim of the study was to investigate the revision rates after TKR and THR at two years follow-up.

Materials and methods: Lithuanian patients undergoing primary TKR and THR from January 1, 2011, to December 31, 2012, were included in the study. The patient, surgery and prosthetic implantation data were collected via internet database. For reoperations we recorded the reason and type of revision, primary implantation date. We analyzed implant survival rates using any revision as an endpoint on included primary procedures, performed until September 1, 2013.

Results: The completeness of the register verified with state patients fund data reached 85% of all replacements. Out of 3823 primary TKR during the study period 25 revisions were performed with overall implant survival rate 99%. The main reason for knee revision was infections. During the inclusion period we registered 6072 primary THR and 149 revisions with overall implant survival rate 97%. Recurrent dislocation of prosthetic component was the main reason for hip revision. Significantly inferior survival results for femoral neck fracture patients were observed as compared with patients operated for osteoarthritis. Posterior approach as compared to others significantly affected inferior implant survival rates for femoral neck fracture patients.

Conclusions: The overall survival after total knee and hip replacements revealed a high treatment quality of this surgery in Lithuania.

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1. Introduction

The number of total hip and knee replacements is increasing in Lithuania and worldwide. Number of European Union countries have introduced Arthroplasty Registers to investigate outcome after hip and knee replacements [1]. The aim of the Registries is to compare the effect of multiple factors on the outcome of joint replacement, and make impact for changing the clinical practice in a beneficial manner. An Arthroplasty registry is an ongoing quality improvement study that is designed to identify and monitor differences in comparative outcomes within the country or region [2,3]. As the Arthroplasty registers have a different purpose, their approach to data collection and analysis is different from a clinical trial. They aim to collect all necessary data and there are no exclusions. In the ideal situation all hospitals, surgeons, patients, surgical techniques, and implants used are included.

Until 2011 there was no standardized arthroplasty data collection in Lithuania. Some data were collected by State Patients Fund, but not particular implants, preoperative diagnoses, surgery related variables and reoperations. In 2010 Lithuanian Association of Arthroplasty was established and initiated a national study of all reoperations after total knee (TKR) and total hip replacement (THR) in Lithuania. The aim of this scientific project was to learn more about severe complication after joint replacements and eventually improve results.

The aim of the study was to investigate the revision rates after total knee and total hip replacements at two years follow-up on national level.

2. Materials and methods

Lithuanian patients undergoing primary total knee and total hip replacement from January 1, 2011, until December 31, 2012, were included in the study. The prosthetic implantation data was collected via internet database and was based on minimal data set from European Arthroplasty Register (EAR) [1]. All the orthopedic surgeons in participating hospitals were filling the electronic registration form. The registration of the implantation data was based on volunteer participation in the project and was not obligated by law. All implants used were recognized using unique part number, from the created database.

Patients related registration data included preoperative diagnosis, previous surgeries, cementing techniques, incision. For reoperations (revisions) we recorded the reason of revision, primary implantation date, the type of revision. Revision was defined as addition, exchange, or removal of one or all components. We analyzed implant survival rates using any revision as an endpoint. The revision rates were estimated. We recorded all revisions performed until September 1, 2013, which were conducted on included primary procedures. Separate analysis was performed to identify factors affecting revision rates for both, hips and knees.

The Lithuanian State Patients Fund provided information about deceased patients. For the purpose of validation the registration results were compared to data from State Patients Fund, regarding the completeness of the register.

Table 1 – Distribution preoperative diagnosis for total knee replacements.

Preoperative diagnosis	n	%
Primary arthritis	3455	90.4
Post traumatic arthritis	116	3.0
Aseptic bone necrosis	109	2.9
Rheumatoid arthritis	94	2.5
Unicondylar arthritis	17	0.4
Other	32	0.8

The study was approved by the Ethical committee of the institution (BE-2-17).

2.1. Statistical analysis

For implant survival calculations, the Kaplan–Meier method, which is based on the assumption that competing events occur independently, i.e. the risk of revision is the same in patients who die before the end of follow-up as in those living to the end of follow-up, was used. Cox regression model was applied to adjust for age and gender. In addition separate Cox proportional hazard models were used to analyze 3 type of incision in respect to revision rates. All statistical calculations were done with STATA software for Windows. A P value <0.05 was considered significant.

3. Results

During the study period 17 out of 20 hospitals were participating in the study. The completeness of the register verified with state patients fund data reached 85% of all performed hip and knee replacements.

3.1. Knee replacement

During the inclusion period 3823 total knee replacements were registered. The distribution of diagnosis is presented in Table 1. There were 3055 women with a mean age of 68.8 years and 768 men with a mean age 67 years. Of the 3823 primary total knee replacements during the study period, 25 revisions were performed. The main reason for revision was infections. The distribution of revision diagnoses is presented in Table 2. Overall implant survival for all diagnoses and all reasons for revision was 99% (Fig. 1). Additional comparison analysis was performed to investigate the effect of gender on survival

Table 2 – Distribution of total knee revision diagnoses.

Reasons for revision	n (%)
Infection	12 (48)
Loosening	2 (8)
Periprosthetic fracture	3 (12)
Patella revision	1 (4)
Instability	2 (8)
Other	5 (20)
Other	25

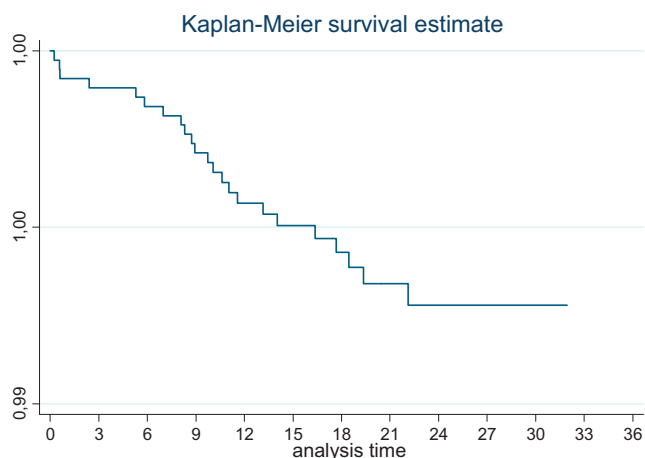


Fig. 1 – Total knee survival (all preoperative diagnoses and all reasons for revision).

showed that female patients had slightly better survival, although it was not statistically significant (Fig. 2).

3.2. Hip replacement

During the inclusion period we registered 6072 primary total hip replacements. 86% of total hip replacements were cemented. The distribution of THR in respect to diagnoses and fixation concept is presented in Tables 3 and 4. During the inclusion period there were 3896 women with mean age of 70 years and 2176 men, with mean age of 63 years. Majority of hip joint replacements (80%) were performed via posterior approach, remaining patients were operated either using lateral or direct anterior approach. Out of 6072 primary total hip replacements until the end of the follow-up there were 149 revisions. Recurrent dislocation of prosthetic component was the main reason for revision. The distribution of revision diagnosis is presented in Table 5. Overall implant survival rate for all diagnoses and all reasons for revision was 97% (Fig. 3). Similar survival results as in total knee replacement were observed when comparing males and females, i.e., although

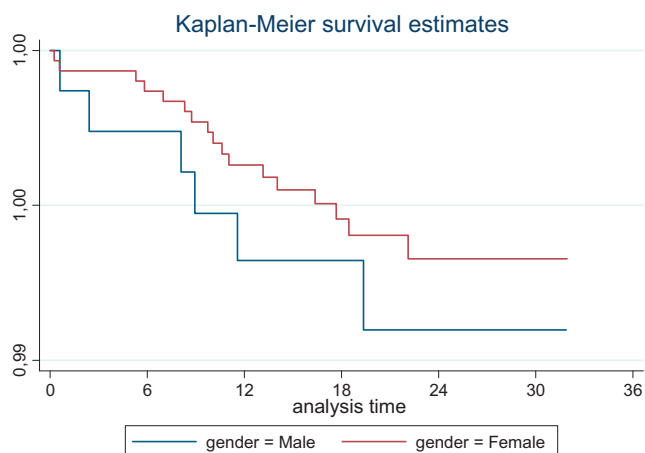


Fig. 2 – Total knee survival for males and females.

Table 3 – Distribution preoperative diagnosis for total hip replacements.

Preoperative diagnosis	n	%
Primary arthritis	4193	69.0
Femoral neck fracture	1140	18.8
Aseptic necrosis	282	4.6
Dysplasia	199	3.3
Post traumatic arthritis	132	2.2
Rheumatoid arthritis	51	0.8
Perthes disease	3	0.1
Other	72	1.2

Table 4 – Fixation concept of all investigated THR.

Implant type	n	%
Cemented	5242	86.3
Uncemented	499	8.2
Hybrid	132	2.2
Reversed hybrid	136	2.3
Other	63	1.0

Table 5 – Reasons for revision after primary total hip replacement.

Reason for revision	n	%
Infection	12	8.1
Cup loosening	18	12.2
Stem loosening	3	2.0
Both components loosening	1	0.7
Cup wear	1	0.7
Periprosthetic fracture	13	8.7
Recurrent dislocation	98	66.2
Other	2	1.4

nonsignificant but slightly superior survival was observed in female patients (Fig. 4). Implant survival rates for patients operated due to femoral neck fracture and primary osteoarthritis were compared and significantly ($P < 0.001$) inferior survival results for femoral neck fracture patients were observed (Fig. 5). Cox proportional hazards regression was performed to investigate additional factors affecting failure

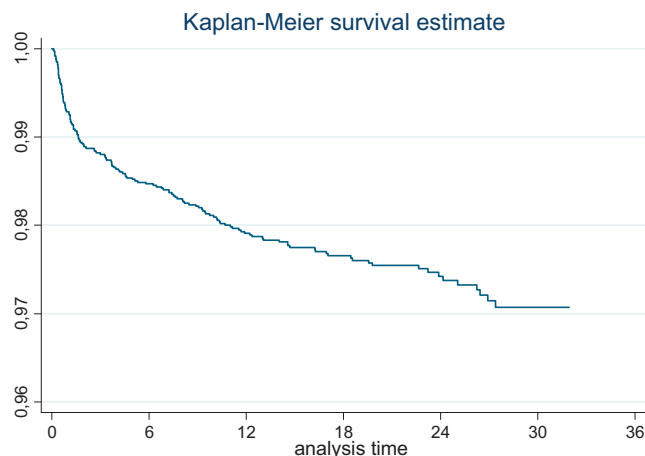


Fig. 3 – Total hip survival (all preoperative diagnoses and all reasons for revision).

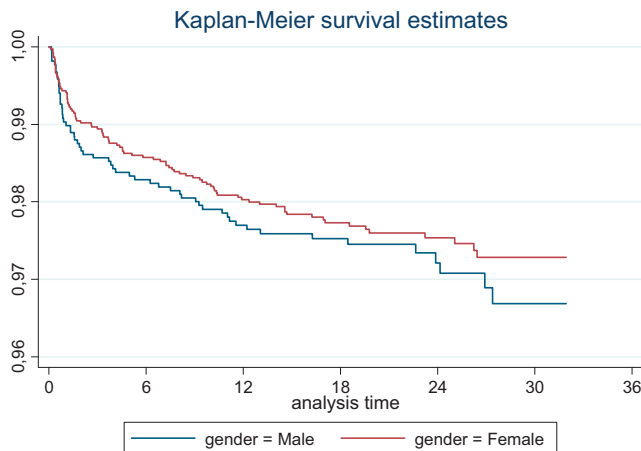


Fig. 4 – Total hip survival for males and females.

rates for osteoarthritis and femoral neck fracture patients. We found that patients operated via posterior approach had greater risk for reoperation ($P < 0.001$) (Fig. 6).

The comparison between survival of different prostheses fixation concepts was performed, but no statistically significant ($P = 0.4$) difference between cemented and uncemented implants was observed.

4. Discussion

In our study on a national level we investigated the revision rates of total knee and total hip replacement patients followed for a period of two years. Longer follow-up such as 5- or 10-year survival illustrates long-term results regarding chiefly aseptic loosening [4,5]. Reoperations within two years more refer to all forms of further surgery to the joint following the insertion of prosthesis. This variable mainly reflects early and serious complications such as deep infection and dislocations and can be considered as faster indicator and easier to use for clinical improvement work than is 10-year survival, which is important, but it is slow and partly historical indicator. Reoperations within

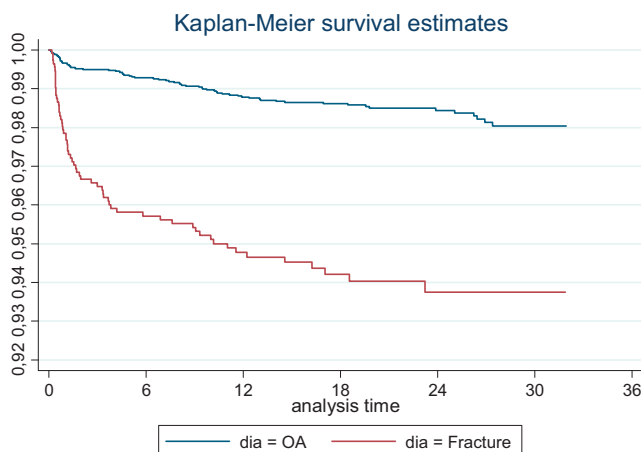


Fig. 5 – Implant survival rates for osteoarthritis and femoral neck fracture patients.

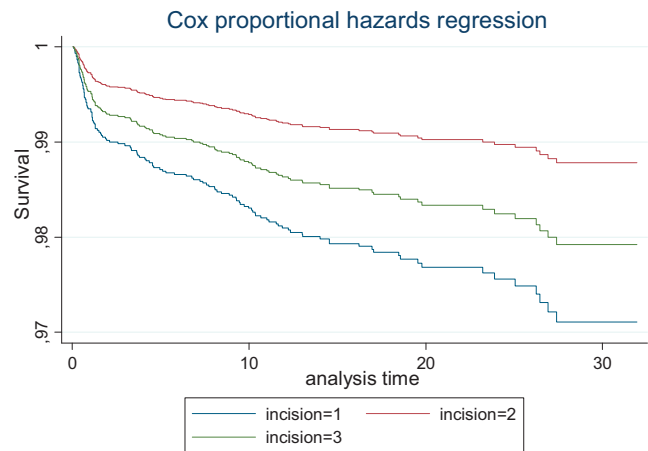


Fig. 6 – Cox proportional hazards regression for arthritis and femoral neck fracture patients, analyzing the effect of incision for implant survival (1 – posterior approach, 2 – lateral approach, 3 – anterior approach).

two years has been selected in Sweden as a national quality indicator for this type of surgery, which is one of most important and most easily influenced result measure [4,5].

Investigating the results after total knee replacement we observed 99% implant survival rate with infection as the main cause for revision. The results from Scandinavian Knee Arthroplasty Registers indicate 98–97% survival after total knee replacement [5]. Superior Lithuanian survival results could be explained as underreporting or by some differences in treatment methods choice for joint infection. Patients with infected total knee replacement are not always offered revision arthroplasty and are treated conservatively with antibiotics, thus they are not register as failure in register database.

Analyzing the results after total hip replacement we observed 97% survival rate at two years follow-up. Swedish Hip register in 2010 reported the national mean value of 98.2% survival after total hip replacement. In Sweden the hospitals reporting the highest reoperation frequency during the two years follow-up had by turns a predominance of infection or dislocations [4]. The problem of revisions due to dislocations dominated a decade ago, but now more common for revisions due to infections to dominate. This was not the case in Lithuania there the revision due to dislocations had high predominance especially in femoral neck fracture patients group. The main factor affecting increased revision rates in cox proportional hazards regression analysis was the posterior approach as compared to other incisions used to perform a surgery. It is known that posterior incision may give better access to the femur and may facilitate stem positioning but it also has been associated with increased frequency of instability and dislocations [6–8]. A meta-analysis of clinical trials did not find any convincing evidence that either the posterior approach or the lateral/anterior approaches was superior in THA for osteoarthritis [9]. However, in femoral neck fracture patients' group, higher dislocation rates in posterior approach group was observed [10] and it is in concordance with our findings. The reduction of revisions due to dislocations may be achieved either using less prone to dislocate implants [11] or not operating high risk patients via posterior approach.

5. Conclusions

The overall survival after total knee and hip replacements revealed a high treatment quality of this surgery in Lithuania. High dislocation rates, especially in femoral neck fracture patients groups, indicate the changes in surgical technique especially in choice of incision.

Conflict of interest statement

The authors state no conflict of interest.

Acknowledgment

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