INCIDENCE OF REASONS FOR REVISION HIP SURGERY: PRELIMINARY STUDY

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(Abstract). Aim: To analyze the main causes and short/mid-term clinical outcomes of revision total hip arthroplasty. Material and Methods: All patients treated over a period of 36 consecutive months at the Orthopedic Clinic of the Iasi Rehabilitation Hospital were analyzed. The causes for total hip arthroplasty (THA) failure were grouped into one of the six categories: aseptic loosening, infection, dislocation, component wear, periprosthetic fracture, and pain. Results: The rate of risk for THA failure is differently influenced by factors such as age, weight index, associated comorbidities, gender, and physical activity level. Most revisions (72.4%) were for aseptic loosening. Age group distribution showed that most patients who required revision, regardless of age group, were women. Conclusions: Although the risk of infection is higher in the first six weeks after surgery, early infections rarely require partial or total replacement of the prosthesis. Infections that require prosthesis revision are late and deep, but the incidence of such complications is low. Loosening is the most common cause of THA failure. Keywords: ARTHROPLASTY, CAUSES OF FAILURE, LOOSENING, INFECTION.

Most studies on the success rate of primary hip arthroplasty show that this surgical procedure provides early resumption of joint mobility and normal functioning of the articular and periarticular structures that control the movement of the coxofemoral joint. Even though primary THA ensures restoration of hip biomechanics, complications affecting the quality of reconstruction, which lead to THA failure and require partial or total revision may occur with time (1).

Several authors have reported success rates of about 90% for primary THA 10 years after surgery, increasing to 95% in patients over 75 years (2). As to the incidence of causes for revision arthrotic reconstruction the reported values relatively differ from one study to another, depending on the geographical area and prevalence of risk factors (3, 4, 5).

A study aimed at assessing the indications for revision and understanding the mechanisms and timing of primary THA failure revealed that high activity level is an important risk factor especially in
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younger patients (6).

The aim of this study was to analyze the main causes and short/mid-term clinical outcomes of revision THA in the Orthopedic Clinic of the Iasi Rehabilitation Hospital.

The overall objective of this study was to identify and rank the causes of primary hip arthroplasty failure in order to optimize joint reconstruction.

The study had the following subjacent goals: to identify and analyze the reasons for primary THA failure, to evaluate the mid-term clinical outcomes of revision THA, and to compare our results with those of similar studies.

MATERIAL AND METHODS

The study protocol included:

• collection, centralization and grouping of clinical data and information on the prosthetic materials used in revision hip arthroplasty;

• statistical processing of clinical data in order to determine the level of significance of the findings regarding the reasons for revision hip arthroplasty;

• creating a database on revision hip arthroplasties in view of evaluating and correct selection of the prosthesis and arthroplasty technique for a reduction in the failure rate of endoprostheses.

The retrospective observational study was conducted on a total of 29 cases operated at the Orthopedic Clinic of the Iasi Rehabilitation Hospital in the interval 2011-2014.

For this study we used information from the medical records and records of surgical procedures of a consecutive series of 29 revisions performed in 24 patients. The mean postoperative follow-up was 12 months (range 6 to 24 months).

Detailed clinical and demographic data were extracted for each patient: age at first intention hip arthroplasty, sex, diagnosis, prosthesis survival time, and the exact cause/causes for primary hip arthroplasty failure.

The primary data sources included peri-operative charts, operative notes, discharge summaries and relevant radiographs.

The primary diagnosis was grouped into the following categories: osteoarthritis, inflammatory arthritis (including rheumatoid arthritis and ankylosing spondylitis), osteonecrosis, hip dysplasia, post-traumatic arthritis and a miscellaneous group of other causes.

Harris hip scores were used to quantify clinical outcomes. Patients were scheduled for clinical and radiological follow-up at 3, 6 and 12 months and annually thereafter. The mean postoperative follow-up was 1 year.

In each case, the reason for failure was classified into one of the following six categories: aseptic loosening, infection, instability, component failure, periprosthetic fracture, or pain. In 3 cases in which there were multiple reasons for failure these were equally considered in systematizing the data.

RESULTS AND DISCUSSION

To analyze the incidence of reasons for revision the information on the 29 revision total hip arthroplasties included in the study were systematized. The causes of failure were:

- component loosening (septic and aseptic) of total hip prosthesis (21 cases; 72.4 %),
- periprosthetic fractures (5 cases; 17.2% - 3 cases Vancouver type B2 and 2 cases Vancouver type B3)
- luxation of hip prosthesis (2 cases; 6.9 %),
- deterioration of the femoral stem (1
Of the 24 patients, two thirds were women and only one third were men.

The mean age of the study patients at the time of revision was 64 years (range 46-84 years).

Age group distribution of the study patients showed that regardless of age group most of the patients who required revision were women (fig. 1).

The analyzed data showed that in the study group aseptic loosening, with an incidence of 72.4%, is the most frequent reason for revision (fig. 2).

Analyzing the data on the 2.107 first intention THAs performed in France from January 1, 2010 to December 31, 2011, Delaunay et al. (7) showed that the reasons for revision in order of priority were: mechanical loosening (42%), periprosthetic fracture (12%), infection (11%) wear/osteolysis (11%), dislocation (10%), surgical technique error (6%), implant deterioration (3%). The revision procedure used in half of the cases (49%) was all-component revision. The study also revealed that although dislocation was not the main cause for primary THA failure, it remains the most common early complication after revision.

Katz et al. (8) conducted a retrospective cohort study of patients who had elective total hip replacement for osteoarthritis in the United States between July 1, 1995, and June 30, 1996, and a 12 year follow-up period. The data showed that the risk of revision THA for the surviving patients was approximately 2% per year for the first eighteen months and then 1% per year for the remainder of the follow-up period. The absolute risk of death over the follow-up period (12 years) exceeded the risk of revision THA by 10 times (59% vs. 5.7%) in patients...
older than 75 years at the time of primary THA and by 3 times (29% vs. 9.4%) in patients aged 65 to 75 years at the time of primary surgery.

In multivariate Cox proportional hazard models, the relative risk of revision was higher in men than in women. In patients aged 65 to 75 years at the time of primary THA the relative risk of revision was 1.23 (1.15, 1.31, CI = 95%) and in those over 75 years of 1.47; (1.37, 1.58) CI = 95%.

Corbett et al. (9) identified in the literature a number of population-based studies assessing the 10-year revision risk (2000-2010). The analysis of data in the national THA registries from England and three Scandinavian countries (Sweden, Finland and Norway) suggests revision risks stratified by age and fixation technique of 5% to 20% at ten years after surgery. Kaplan-Meier estimates showed that cemented implants had ten-year revision-free implant survival rates of 88% to 95% and the uncemented implants of 80% to 85%. In patients under 60 years at the time of primary surgery revision-free implant survival rates ranged from 72% to 86% and in those older than 60 years the rates ranged from 90% to 96% (9).

Mobilization of the hip prosthesis may be due to periprosthetic loosening or polyethylene wear. These phenomena, often due to uneven distribution of forces involved in hip biomechanics, cause unnatural tribological couples generating very small particles. The composition of such particles, polyethylene, acrylic cement, ceramic or metal, depends on the endoprosthesis type (10). Patient's immune system will recognize such particles as a foreign body and will generate an immune response. A strong response to wear particles may result in biological bone resorption (osteolysis) and loosening (fig. 3).

![Hip X-ray image](image)

**(Collection of Iasi Rehabilitation Hospital – Orthopedic Clinic)**

**Fig. 3.** Hip X-ray image of a 68-year-old patient operated upon 9 years earlier with an osteolytic area and acetabular and femoral loosening on hip x-ray; intraoperative view, seropurulent discharge at the proximal femur
Loosening is more likely as the physical demand that will be placed on the joint after surgery is higher. This accounts for the higher incidence of this cause of HTA failure in younger and more physically active patients (fig. 4).

Although multiple dislocations are rare, some elderly, debilitated patients, or those with other locomotor deficiencies are prone to this complication. The risk of dislocation is higher during the first months after surgery. In case of repetitive dislocations revision surgery is necessary (Fig. 5).

A study by the Mayo Clinic (11) on 10,500 THAs reported a 3 times greater risk of dislocation with the posterolateral approach (4.3%) compared to the anterior (1.8%) and anterolateral (1.7%) approaches.

Dudda et al. (12) found a 6 times greater risk of dislocation with the posterior approach compared with the anterolateral approach or lateral approach with trochanteric osteotomy.

CONCLUSIONS
In our study, data analysis shows that loosening is the most common reason for revision exceeding by one order of magnitude any of the other immediate or late complications.

The rate of the risk of revision THA differ with respect to the mechanism of failure and is influenced differently by such factors as age, weight index, associated comorbidities, gender, physical activity level.

Revision surgery for recurrent dislocations requires repositioning or even replacing of the prosthetic components.

Infection after THA can occur at any time after surgery. Although the risk of infection is higher in the first six weeks after surgery, immediate infections rarely require partial or total replacement of the prosthesis. Infections that require prosthesis revision are late and deep, but the incidence of such complications is low.

REFERENCES

NEWS

ANTIMICROBIAL ROLE OF FILAGGRIN-2 PROTEIN

Filaggrin-2 (FLG2) is a water-insoluble 248 kDa S100 fused-type protein found in the upper epidermis and eccrine sweat glands. A study by Hansmann et al. tested the antimicrobial activity of filaggrin-2 against Pseudomonas aeruginosa and other Pseudomonads and found that recombinant FLG2 C-terminal protein fragments have potent antimicrobial activity against P. aeruginosa and after cultivation of P. aeruginosa on stratum corneum, antimicrobially active FLG2 fragments are released from insoluble material by the bacteria themselves. These FLG2 C-terminal fragments have an alternative mode of action different from most other antimicrobial peptides, as they do not induce pore formation, but membrane blebbing. According to Hansmann et al., FLG2 fragments interfere with bacterial replication, inhibit their growth on skin surfaces and contribute to the skin’s antimicrobial defense, explaining why Pseudomonas infections of healthy skin are very rare. Also, the absence of filaggrin 2 at certain body surfaces and in the case of burned skin seems to be responsible for the higher susceptibility to these infections. The study concluded that FLG2 C-terminal fragments could represent new Pseudomonas-targeting antimicrobials (Hansmann B, Schröder JM, Gerstel U. Skin-Derived C-Terminal Filaggrin-2 Fragments Are Pseudomonas aeruginosa-Directed Antimicrobials Targeting Bacterial Replication. PLoS Pathog. 2015;11(9):e1005159. doi: 10.1371/journal.ppat.1005159).

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