

# Complications of Total Joint Arthroplasty: An Epidemiological and Clinical Observations Outcomes Data

*Complicaciones de la artroplastia articular total:  
una observación epidemiológica y clínica de los datos*

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Received: 14 - III - 2023

Accepted: 11 - IV - 2023

doi: 10.3306/AJHS.2023.38.05.48

## Abstract

**Introduction:** Nowadays, total hip replacement is a highly effective surgical procedure in healthcare systems. Even though this procedure provides very effective outcomes, complications in many times are inevitable.

**Methods:** This observational study focused on the collection of data regarding the complications that occurred in patients who underwent Total Joint Arthroplasty for a period of 5 years. The data are collected from the arthroplasty registry in the University Trauma Center Hospital. All the major and minor procedure complication findings are analyzed by SPSS software 20.0. The logistic regression was used to identify some of the risk factors for complications. A p-value of <5% was statistically significant.

**Results:** Overall of 812 patients, over 50 years old, who underwent total hip arthroplasty, about 62.9% were women, and the most predominant age 71-80 years old was. Women were more likely to be older and to have hypertension, anemia, and kidney disease compared to men ( $P < 0.02$ ). The rate of major and minor complication procedures was reported at 2.4% and 5.5% respectively. A significant association was seen between risk factors such as BMI, syndrome metabolic, and previous THA. The most predominant complications were dislocations 1.8%, infections 2.5%, leg length discrepancy 1%, nerve damage 0.2% and muscle weakness 5.5%. Readmission as a consequence of postoperative complications was reported only in 1.2% of patients.

**Conclusion:** The findings of this study, suggest a minor rate of postoperative complication procedures among patients who underwent the intervention for total joint arthroplasty. Furthermore, studies are recommended to clarify the risk factors that influence postoperative complication procedures in total joint arthroplasty patients.

**Keywords:** replacement of total joint arthroplasty, complication, procedure.

## Resumen

**Introducción:** Hoy en día, la artroplastia total de cadera es un procedimiento quirúrgico muy eficaz en los sistemas sanitarios. Aunque este procedimiento proporciona resultados muy eficaces, en muchas ocasiones las complicaciones son inevitables.

**Métodos:** Este estudio observacional se centró en la recogida de datos relativos a las complicaciones ocurridas en pacientes sometidos a artroplastia total de articulación durante un periodo de 5 años. Los datos proceden del registro de artroplastias del Hospital Universitario Trauma Center. Todos los resultados de las complicaciones mayores y menores del procedimiento se analizan mediante el programa SPSS 20.0. Se utilizó la regresión logística para identificar algunos de los factores de riesgo de complicaciones. Un valor p de <5% fue estadísticamente significativo.

**Resultados:** En total de 812 pacientes, mayores de 50 años, que se sometieron a artroplastia total de cadera, alrededor del 62,9% eran mujeres, y la edad más predominante era 71-80 años. Las mujeres tenían más probabilidades de ser mayores y de padecer hipertensión, anemia y enfermedad renal en comparación con los hombres ( $p < 0,02$ ). La tasa de procedimientos con complicaciones mayores y menores fue del 2,4% y el 5,5% respectivamente. Se observó una asociación significativa entre factores de riesgo como el IMC, el síndrome metabólico y la ATC previa. Las complicaciones más predominantes fueron las luxaciones (1,8%), las infecciones (2,5%), la discrepancia en la longitud de las piernas (1%), las lesiones nerviosas (0,2%) y la debilidad muscular (5,5%). El reingreso como consecuencia de complicaciones postoperatorias sólo se registró en el 1,2% de los pacientes.

**Conclusiones:** Los resultados de este estudio, sugieren una tasa menor de procedimientos de complicaciones postoperatorias entre los pacientes que se sometieron a la intervención para la artroplastia total de la articulación. Además, se recomiendan estudios para aclarar los factores de riesgo que influyen en los procedimientos de complicaciones postoperatorias en pacientes con artroplastia articular total.

**Palabras clave:** sustitución de artroplastia articular total, complicación, procedimiento.

## Introduction

Total joint replacement surgery is a widely performed procedure in orthopedics with a high success rate and cost-effectiveness. This intervention is undertaken for patients suffering from an advanced level of degenerative hip osteoarthritis or traumatic arthritis, Rheumatoid arthritis, malignancy, etc. The main outcomes of total joint replacement are to relieve pain and improve the function and quality of life of the patients (1,2). Unfortunately, total arthroplasty surgery may be accompanied by certain complications. Patient health status affects the level of risk that might be faced. According to statistical data, the percentage of complications in adults undergoing hip replacement surgery is only 4% (3).

Some of the complications are not specific to this type of procedure and they may occur with any surgery. Patients may present complications such as respiratory problems after surgery; heart attack or stroke during or after surgery; lung, urinary tract, or joint infections. Bleeding from operator wounds is also a concern. Fatality cases are strongly associated with lower respiratory tract infection and renal failure (4-6).

Some major complications that can be encountered after total joint arthroplasty replacement include clots in the legs known as Deep Vein Thrombosis or in the lungs known as Pulmonary Emboly. About 1% of people can face this complication. Other concerns related to prosthesis are postoperative dislocation, fracture, and aseptic loosening. Less than 2% of people are subject to dislocation. Breakage of implants can happen in less than 0.5% of patients (7). Heterotopic ossification can be observed by imagery as early as 3 weeks after surgery and patients complain of pain and stiffness (8). Rarely during the surgery, the blood vessels (0.1%), or the nerves (1%) may get damaged. and if these problems will not resolve they would bring about the death of the patient (9). Being aware of perioperative and postoperative complications should help to focus on reducing the risk of total joint arthroplasty. The purpose of this paper aims to shed light on the frequency of complications in order to adverse outcomes and to have better results from procedures.

## Methods

All the major and minor procedure complication findings are analyzed by SPSS software 20.0. The logistic regression was used to identify some of the risk factors for complications. A p-value of <5% was statistically significant.

### Methods

#### Study design

This is an observational study focused on the collection of data regarding total joint arthroplasty replacement (total

hip THA and total knee arthroplasties TKA). The data are collected from the arthroplasty registry in the University Trauma Center Hospital for a period of 5 years.

#### Study population

The inclusion criteria were all patients over 50 years old admitted to the Trauma Hospital center during the periods January 2013 to December 2018, and undergoing total joint arthroplasty replacement. The exclusion criteria were all patients admitted to the hospital under 50 years. We have prepared a questionnaire, which is completed for each patient. We analyzed the sociodemographic data (such as age, gender, place of residence, co-morbidities according to the ASA score (American Society of Anesthesiologists score), mobility, and type of injury), as well as clinical data and those operators and post-operator (such as data related to the process, the type of prosthesis used, the result obtained after the intervention, days of hospital stay, and complications encountered, mobility in 120 days and mortality).

Outcomes Complications were collected in two categories. In the first category, we have classified the 'major' complications, and in the second one, we have classified 'minor' complications. Major complications we have defined as those requiring complex medical intervention, meanwhile in minor all other complications.

#### Statistical data

The obtained data were analyzed with the statistical program SPSS (Inc, Chicago, Illinois), version 23.0. Data were presented in frequency, percentage, mean, and standard deviation. Continuous variables of socio-demographic characteristics of patients were analyzed using descriptive statistics followed by independent Student's t-tests, and the chi-squared ( $\chi^2$ ) test, while Fisher's exact test was used to analyze categorical variables comparing the changes of the variables and the results obtained from the intervention. To compare the data obtained where gender was taken as an independent variable, we used an in-depth analysis of logistic regression. Odds ratios (OR) and intervals were evaluated 95% confidence level (95% CI), and a p-value of <0.05 was considered statistically significant.

## Results

Overall of 812 patients, over 50 years old, who underwent total hip arthroplasty, about 511 (62.9%) were women, and 301 (37.1%). In this study, the mean age resulted in  $71.15 \pm 4.09$  With a minimum age of 53 and as well as a maximum age of 91, the study's mean age was 71.15.40. If we quickly compare the ages of the patients, we see that there are, respectively, 62 (7.6%) and 99 (12.2%) fewer patients in the extreme age groups who need a full joint arthroplasty replacement. However, the largest percentages were found among 297 (36.6%)

people aged between 60 and 70 and 354 (43.6%) those aged between 71 and 80. Regarding residency, there were more patients among those residing in urban regions 559 (68.8%), compared to those in rural regions 253 (31.2%). Furthermore, more than half of patients undergoing TJA, were from Tirana's capital city 438 (53.9%), and 374 (46.1%) are from other cities such as Elbasan, Durrës, Vlorë, Fier, etc.

Based on the married status, we classified patients into two categories which are no-married and married. In the no-married category, we included all patients who were referred as single, widow, or divorced, while in the second category we included all patients who were referred that were married at the time undergoing TJA. More than ¾ of patients 630 (77.6%) resulted married, and 182 (22.4%) were single/widows/divorced. Out of 182 patients classified as no married category, 124 (68.1%) were widows, 36 (19.8%) were divorced, and 20 (11%) were single.

Patients with body mass index (BMI) classified in the category overweight and /or obese are seen as a negative predictor for many diseases included here and problems with the joints. More than half of the patients 464 (57.1%) resulted with BMI of overweight and /or obese, while 348 (42.9%) were underweight/normal weight. We have also evaluated the patient's living habits.

Based on statistical analysis data collected by each patient, about 219 (27%) had been or were alcohol users, 305 (37.6%) were smoking users and 490 (60.3%) used drugs. **Table I** shows the epidemiological baseline characteristics of patients who underwent total joint arthroplasty.

**Table I:** The epidemiological baseline characteristics of patients who underwent TJA.

Variables	Total number
<b>Mean age (St.D)</b>	71.15±4.09
<b>Age groups</b>	
50-60 years old	62 (7.6%)
61-70 years old	297 (36.6%)
71-80 years old	354 (43.6%)
≥ 81	99 (12.2%)
<b>Gender</b>	
Female	511 (62.9%)
Male	301 (37.1%)
<b>Residence regions</b>	
Rural	253 (31.2%)
Urban	559 (68.8%)
<b>City</b>	
Tirana	438 (53.9%)
Other Cities	374 (46.1%)
<b>Marital status</b>	
Singel/Widow/Divorced	182 (22.4%)
Married	630 (77.6%)
<b>Body mass index (BMI)</b>	
Underweight/normal weight	348 (42.9%)
Overweight and /or obese	464 (57.1%)
<b>Living habits</b>	
Alcohol use	219 (27%)
Smoking	305 (37.6%)
Use of drugs	490 (60.3%)

Before the intervention, all patients were assessed for pre-anesthesia medical co-morbidities based on the ASA score (The Physical Status Classification System). Approximately 142 (17.5%) patients were assessed in the first category of ASA score, 441 (54.3%) in the second and third categories, and 229 (28.2%) in the fourth category. Regarding the comorbidities of patients, nearly 348 (42.9%) are treated for hypertension, 215 (26.5%) have CVD, 184 (22.7%) have DM, and anemia was present in 52 (6.4%). Moreover, 67 (8.2%) have kidney diseases, 237 (29.2%) have osteoarthritis or degenerative joint disease, 290 (35.7%) have connective tissue-rheumatoid arthritis and other rheumatic diseases, and 49 (6%) have chronic pulmonary disease. To others 102 (12.6%) we have included dyslipidemia, hypothyroidism, etc.

In this stud, we have evaluated the WOMAC score based on three subscales such as pain with 5 questions, stiffness with 2 questions, and physical function with 17 questions. The mean Womac score evaluation among our patients resulted in 78.50 ±5.18.

Related to the procedure type of 812 patients undergoing total joint arthroplasty replacement, 376 (46.3%) underwent THA while 436 (53.7%) underwent TKA. Despite the procedure typically used in the replacement, contralateral articulation which is included but is not operated results in 241 (29.7%) patients, contralateral articulation included and operated results in 164 (20.2%) of patients, and not contralateral articulation included results in 407 (50.1%). Cemented-type prostheses were applied in 168 (20.7%) of the patients who underwent total joint replacements while most of them 644 (79.3%) applied cementless-type prostheses. **Table II** shows the clinical pre-operative conditions, comorbidities, and procedures used in total joint replacements of patients.

**Table II:** Clinical conditions, comorbidities of patients, and procedures used in replacement.

Variables	Total number
<b>ASA score</b>	
First category	142 (17.5%)
Second & third categories	441 (54.3%)
Fourth category	229 (28.2%)
<b>Comorbidities</b>	
Hypertension	348 (42.9%)
Cardio Vascular Diseases (CVD)	215 (26.5%)
Diabetes Mellitus (DM)	184 (22.7%)
Anemia	52 (6.4%)
Kidney diseases	67 (8.2%)
Osteoarthritis or degenerative joint disease	237 (29.2%)
Connective tissue- Rheumatoid arthritis and other rheumatic diseases	290 (35.7%)
Chronic pulmonary disease	49 (6%)
Other comorbidities	102 (12.6%)
<b>Procedure Type</b>	
Total hip arthroplasty (THA) or Total knee arthroplasty (TKA)	376 (46.3%)
Womac score evaluation (mean ± StD)	78.50 ±5.18
<b>Contralateral articulation</b>	
Included but not operated	241 (29.7%)
Included and operated	164 (20.2%)
Not included	407 (50.1%)
<b>Type of prostheses</b>	
Commented prostheses	250 (30.8%)
Cementless prostheses	562 (69.2%)

The rate of major and minor complication procedures was reported at 0.25% and 5.5% respectively. We have separated the complications into major and minor. Major complications included reoperation, dislocation, deep vein thrombosis, and pulmonary embolism. Minor complications include bladder, infection, joint stiffness, unexpected pain, nerve damage, leg length discrepancy, muscle weakness, and readmission. In THA, the percentage of complications was 1.35% bladder, 2.6% infections, 1% leg length discrepancy, 3% unexpected pain, 0.25% nerve damage, 5.54% muscle weakness, and 1.5% joint stiffness. Readmission as a consequence of postoperative complications was reported only in 2.46% of patients. While in TKA, 1.1% bladder, 2.2% infections, 0.73% leg length discrepancy, 2.2% unexpected pain, 0.1% nerve damage, 3.80% muscle weakness, 0.90% joint stiffness, and 0.61%. **Figure 1** shows the minor complications of THA and TKA replacement arthroplasty. There is found a significant association between minor complications between TKA and THA,  $\chi^2=14$ , 95% CI [5.3-21.7], p-value=0.001.

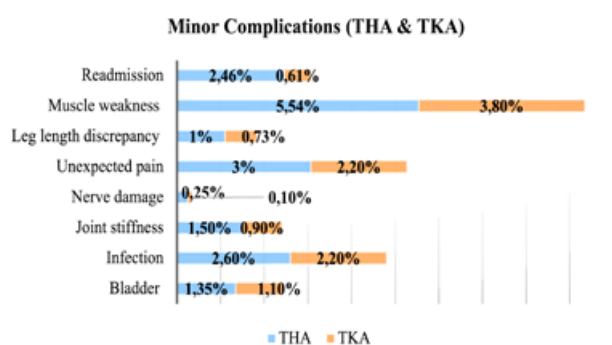
Major complications in THA replacements resulted in 0.5% reoperation, 1.85% dislocation, 0.6% deep vein

thrombosis, and 0.37% pulmonary embolism. TKA major complications resulted in 0.36% reoperation, 2% dislocation, 0.73% deep vein thrombosis, and 0.25% pulmonary embolism. There is found a significant association between major complications between TKA and THA,  $\chi^2=5.2$ , 95% CI [1.9-11.6], p-value=0.02 (**Figure 2**).

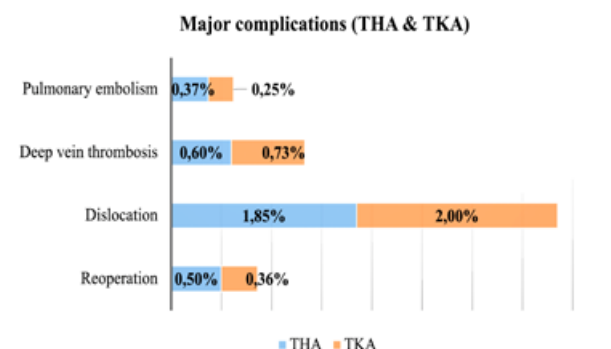
**Table III** shows the logistic regression between THA and TKA. A significant association was seen between some of the risk factors such as age, gender, marital status, living habits, BMI, comorbidities including syndrome metabolic, and minor and major complications for THA. P-value resulted <0.05 in these risk factors, while for Asa score, contralateral articulation, and type of prostheses there was not found a significant association in patients undergoing THA replacements.

In contrast with THA, in patients undergoing TKA, a significant association was found for gender, marital status, living habits, BMI, comorbidities, contralateral articulation, and minor and major complications. There was no found significant association only for age and type of prostheses with p-value>0.05.

**Figure 1:** The minor complication of THA and TKA replacement arthroplasty.



**Figure 2:** The major complication of THA and TKA replacement arthroplasty.



**Table III:** Logistic regression THA versus TKA.

Variables (risk factors)	Reference -1	THA		TKA	
		Odds ratio 95% CI	p-value	Odds ratio 95% CI	p-value
Age	Per 10 years each age group	1.2 [0.4-4.6]	0.04	1.08 [0.5-3.8]	0.051
Gender, female	Male	1.8 [1.1-5.2]	0.02	2.1 [1.4-4.7]	0.01
Marital status, no married	Married	2.4 [1.3-7.5]	0.002	1.7 [1.02-5.1]	0.03
Living habits, Yes	No	1.6 [0.9-4.1]	0.03	1.4 [0.5-3.9]	0.04
BMI, overweight, obese	Underweight, normal weight	2.1 [1.4-6.3]	0.004	2.3 [1.7-5.9]	0.008
Asa score II-IV category	I category	0.9 [0.1-2.07]	0.8	1.6 [0.8-4.05]	0.04
Comorbidities Yes	No	3.5 [1.3-11.6]	<0.0001	2.8 [1.7-6.4]	0.009
Contralateral articulation included	No included	0.5 [0.02-2.05]	0.6	1.02 [0.4-3.4]	0.048
Type of prostheses, Cementless prostheses	Commented prostheses	0.7 [0.2-3.3]	0.8	0.5 [0.09-2.5]	0.09
Minor complications Yes	No	11.8 [6.4-19.9]	0.001	9.4 [2.5-15.7]	0.005
Major complications, Yes	No	6.03 [1.3-13.5]	0.01	4.03 [1.2-8.4]	0.03

## Discussion

Total joint arthroplasty is a treatment that helps patients for relieving pain and restore function in these patients when medical therapy fails<sup>10</sup>. In this study, we have analyzed data from 812 patients who underwent arthroplasty over 5 years. The prevalence of total hip arthroplasty among patients resulted in 46.3% while total knee arthroplasty replacements resulted in 53.7%.

Even though many studies have highlighted the predominance of females who underwent total joint arthroplasty replacements compared to males<sup>11-14</sup>, other researchers reported that no existing difference related to gender and total joint replacements. In general, females often postponed opting to undergo total joint replacement and require help only when there have substantial pain and functional limitations of the joints. In our study, we found a predominance of females in 62.9% compared to males in 37.1%. There is found a significant association between gender and total joint arthroplasty  $\chi^2= 2.4$  95% CI [0.7-5.3], p-value =0.03. These findings are similar to other studies<sup>15-18</sup>.

The application of arthroplasty replacements in patients with joint problems has improved their vital function, reduced pain, and most importantly improved quality of life for these patients<sup>19,20</sup>. In the next 10-20 years, joint arthroplasty replacement rates will substantially increase based on previsions. This will happen in two ways. The first way, the increased rate will come as the aging population consequence, and the other way increasing use in patients younger than age 60 years, who currently represent 15% of the entire population undergoing surgery. This will increase the rate of joint arthroplasty replacement necessity in the future for people under 60 years old<sup>19,21</sup>. Milanovic et al and Van der Willik et al, highlight in their study that the age-related decline in physical function is commonly experienced in older people. They further continue to say that the impact of joint arthroplasty replacement on functional outcomes needs to be considered exactly in elderly people<sup>22,23</sup>. In this study, the largest percentages were found among 297 (36.6%) people aged between 60 and 70 and 354 (43.6%) those aged between 71 and 80.

Many studies have reported more than one comorbidity among patients undergoing total joint arthroplasty replacements<sup>24-26</sup>. According to the comorbidities of our patients, 42.9% have hypertension, 26.5% have CVD, 22.7% have DM, 6.4% have anemia 29.2% have osteoarthritis or degenerative joint disease, 35.7% have connective tissue-rheumatoid arthritis and other rheumatic diseases. Women were more likely to be older and to have hypertension, anemia, osteoarthritis, rheumatoid arthritis, and other rheumatic diseases compared to men, p-value <0.02. Piano et al. in a study

reported a high percentage of hypertensive patients submitted to HTA, 45.9% were hypertensive. This finding was almost similar to our study<sup>27</sup>. Moreover, the previous study conducted by Woo-Yong et al reported a high rate of osteoarthritis and rheumatoid arthritis among patients Undergoing Total Hip Arthroplasty in Korea, which was almost the same as our findings<sup>26</sup>.

Related to the complications that happened as a consequence of joint arthroplasty replacements, we have recorded a low rate with a range from 0.25% to 5.5%. In many studies, factors such as gender, elderly people, BMI, comorbidities, Bleeding disorders, and anemia play a critical predictors role in post-operative complications overall in both THA and TKA patients<sup>28-33</sup>. Based on logistic regression between complications that happened during THA and TKA replacements and some of the risk factors, we found a significant association was seen between age, gender, marital status, living habits, BMI, and comorbidities, with a p-value <0.05. Approximately 20% of patients used the cemented prosthesis, belonging to the age of over 65 years. Total arthroplasty significantly improves function and quality of life and reduces pain in 89.2% of patients.

## Conclusion

The findings of this study, suggest a minor rate of postoperative complication procedures among patients who underwent the intervention for total joint arthroplasty. Furthermore, studies are recommended to clarify the risk factors that influence postoperative complication procedures in total joint arthroplasty patients.

## Ethics approval

Due to the lack of an Ethical Committee in the University Trauma Center Hospital during the years of this study, the consent of the head of the institution was requested for data collection. In this survey, no personal data were recorded, and all questionnaires were completed anonymously. Participation in the study was voluntary and participants could withdraw at any moment. We warrant that all ethical guidelines for medical research were strictly respected.

## Funding Source

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors. No financial or any other reward was offered to students who completed the survey. There was no control group, as all participants in the study completed the same survey.

## Acknowledgments

First, the acknowledgments go to my colleagues and my co-authors for their support, assistance, and contribution

during the preparation of this paper. And finally, but not less importantly would like to acknowledge all patients who were part of this study. Without their help, this work would be difficult to accomplish.

### Conflict of interest

The authors declare that there is no financial or non-financial conflict of interest. All the data presented in this paper have been collected on my part and the participant's anonymity is preserved.

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