



Research Article

20-Year Experience in Total Primary Hip Arthroplasty in Patients Under 50 Years with Inflammatory Rheumatic Diseases: Functional Results, Complications and Survival

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Citation: Borjon ED, Barba LDM, Juan VM, Jirjis MSG, Hazel HRC, et al. (2023) 20-Year Experience in Total Primary Hip Arthroplasty in Patients Under 50 Years with Inflammatory Rheumatic Diseases: Functional Results, Complications and Survival. J Orthop Res Ther 8: 1286. DOI: 10.29011/2575-8241.001286

Received Date: 04 April, 2023; **Accepted Date:** 07 April, 2023; **Published Date:** 10 April, 2023

Summary

Introduction: Total Hip Arthroplasty (THA) is an option in young patients with comorbidities of inflammatory rheumatic diseases such as juvenile idiopathic arthritis, rheumatoid arthritis, femoral avascular necrosis, among others. Currently, approximately 280,000 cases of primary THA and more than 50,000 revision surgeries are reported annually in the United States. It is expected that the demand for THAs will continue to increase due to the improvement in the quality of life.

Objective: Evaluate the survival of THA in patients under 50 years of age with rheumatic diseases who attend “The National Institute of Medical Sciences and Nutrition Salvador Zubiran” in a period from 2000 to 2020, as well as to explore their sociodemographic characteristics.

Methods: Information was collected retrospectively through the clinical records of 295 patients who received total hip arthroplasty between 2000 and 2020. The sociodemographic characteristics of the population were evaluated, as well as comorbidities, complications of the intervention, and functionality using: Visual Analogue Scale (VAS), Harris Hip Score (HHS), Western Ontario McMaster Universities Osteoarthritis Index (WOMAC), Oxford Hip Score (OHS), and Total Hip Arthroplasty Survival.

Results: We were able to observe that the probability of survival for THA is 98% at five years, 93.8% at ten years, 81% at fifteen years, and 61% at twenty years.

Conclusions: In a retrospective cohort of 171 patients, the outcomes of THA, such as the prevalence of comorbidities and survival, are comparable to what has been previously reported in the literature.

Keywords: Comorbidities; Complications and survival; Functionality; Total hip arthroplasty; Under 50 years of age

Introduction

Orthopedic surgery is an option in young patients, who present with pathologies such as Leg Calve Perthes disease, osteonecrosis, slipped proximal femoral epiphyseal, hip dysplasia and early osteoarthritis present in Inflammatory Rheumatic Diseases (IRD), which historically represents a challenge. Currently, arthroplasty surgical procedures in the United States, approximately 280,000 primary THAs and more than 50,000 revision surgeries are reported annually, the demand is expected to continue to increase, due to the improvement in quality of life, increasing by up to a 137% and 601%, respectively for hip and knee procedures, by 2030. [1-3]. In Europe, the prevalence of THA oscillates between 0.05% and 1% in the general population, according to some studies and guidelines prepared by the Association of the College of Rheumatology and the American Association of Hip and Knee Surgeons, it has been reported that during the development of arthroplasty procedures, 46% of patients with rheumatoid arthritis have received biological agents; 67% nonbiologic disease-modifying antirheumatic drugs; 25% glucocorticoids; 75% of patients with systemic lupus erythematosus received immunosuppressive drugs and 15% received glucocorticoids [4,5], including prior administration of joint steroids, in relation to a periprosthetic infection has little evidence in the literature on complications related to with the reconstruction procedure [6] Periprosthetic infections are one of the main causes of failure after joint replacement; on the other hand, to achieve adequate control of RID activity, some drugs, such as the use of corticosteroids, have shown that they do not increase the risk of periprosthetic infection in these patients [7,8]. Preoperative assessment of patient-related medical risk factors should include: obesity, malnutrition, anemia, hyperglycemia, controlled diabetes mellitus, chronic renal failure, depression, smoking, and alcohol abuse. These risk factors are more relevant for the development of infections even in a general population joint replacement procedure. Also, an increased risk of venous thromboembolism (VTE) has been reported as a consequence of chronic inflammation and endothelial activation, which increase tissue factor expression and inhibit endogenous anticoagulants and fibrinolysis [9,10].

Activity and functional capacity also increase wear related to loosening of the cup or femoral stem, related to polyethylene, osteolysis, and dislocation. This leads to an increased risk of loosening and wear of the prosthetic material [11,12]. Some authors recommend: the use of the most proximal femoral anchorage possible, use of polyethylene-ceramic friction pairs and bone stock, even in patients who suffered post-traumatic osteoarthritis secondary to a fracture; considering that this type of patients will also require revision surgery in the future [13] [14]. In a study carried out in Columbia, it was reported that survival in patients under 50 years of age is 96.5% at 10 years and 96.3% at 12 years; the survival of the materials used at 12 years is 98% and 93% for men and women under 50 years of age respectively, noting

that the survival of implants in women would have an increase of 4% in the follow-up period [15]. The constant evolution of the implants is a factor that increases their survival, in the population of 65-74 years of age, the observed survival is 89.4% at 15 years, 70.2% at 20 years and 57.9% at 25 years, based on the records of patients undergoing THA [16]. Studies in young patients under 20 years of age, with a 20-year clinical follow-up, reported a survival curve, with revision at 97.2% at 10 years, in 138 patients from 1998-2016, according to the Mayo Clinic in 2020 [17]. In Virginia, United States, in 2004 at the Orthopedic Research Institute, they obtained results in patients <40 years, 85% survival at 10 years, and 54% at 15 years [11]. Likewise, with young people <30 years, they reported failures of up to 27% at 10 years and 45% at 15 years [18]. We hypothesize that the survival of CTA in patients with rheumatic diseases is similar to those reported in other countries.

Methods

Study Design

A retrospective cohort study was carried out in the traumatology and orthopedics service of a tertiary level hospital in Mexico. The information was collected from the clinical records and a digital database was created to which only the study participants have access.

Study Population

Men and women between the ages of 17 and 50 who underwent total hip replacement surgery from 2000 to 2020 at The National Institute of Medical Sciences and Nutrition Salvador Zubiran. Only those who were not operated on in our center were excluded. data collection.

Data Collection

Patients were characterized according to their age, sex, body mass index, type of surgery received, comorbidities present, and complications. The collection of information was carried out from the operation until censorship or death.

Variables

The main outcome variable was the survival of the prosthesis in terms of whether it failed. As secondary variables we included the presence of complications, revision surgery, functional outcomes measured by the VAS, HHS, WOMAC and OHS indices, and mortality.

Statistic Analysis

The statistical analysis was carried out with the STATA program version 15 for Macbook. The continuous variables were presented as means and standard deviation and the categorical ones by frequencies and percentages. Differences between groups were determined with a χ^2 test for categorical variables and with a t test for continuous variables. Survival was estimated using the Kaplan-Meier method and the differences were estimated using a Mantel-Cox rank test. The results of the survival analysis were reported with a 95% CI. For statistical significance we consider a

value of $p < 0.05$.

Results

General Characteristics of the Population

Table 1 shows the sociodemographic characteristics of the population. We were able to observe that 70.2% of our population is represented by the female sex, the median age was 32 years with an interval of 17 to 50 years and the average body mass index was 27.9, which corresponds to overweight according to the WHO classification. Regarding the type of surgical intervention received, we were able to observe that 50.9% of the population received right total hip arthroplasty (RTHA) and the other 49.1% received left total hip arthroplasty (LTHA). The most prevalent comorbidities in our population were rheumatoid arthritis (34.6), juvenile idiopathic arthritis (23.4) and systemic lupus erythematosus disease (22.4). We observed in our population as a predominant factor the diagnosis of femoral avascular necrosis (44.8%); In general, 8.6% of our population received revision surgery.

Characteristics	N= 271
Sex*	
MEN	82 (30.3)
WOMEN	189 (69.7)
Age**	32 (17 - 50)
BMI*	27.9 (4.3)
Type of surgery*	
RTHA	137 (50.5)
LTHA	134 (49.5)
Cormobidities*	
Juvenile idiopathic arthritis	63 (23.3)
Rheumatoid arthritis	97 (35.8)
Femoral avascular necrosis	123 (45.4)
Ankylosing spondylitis	36 (13.3)
Systemic lupus erythematosus	60 (22.1)
Psoriatic arthritis	4 (1.5)
Sjogren's syndrome	13 (4.8)
Systemic sclerosis	6 (2.2)
Antiphospholipid syndrome	17 (6.3)
Cushing's syndrome	6 (2.2)
Still's disease	4 (1.5)
Sickle cells	3 (1.1)
Rev surgery *	23 (8.5)

*frequency (%), **p50 (minim - max), * (SD)

Table 1: Sociodemographic characteristics of the population.

In **Figure 1** we can observe the prevalence of comorbidities between the fault groups and does not fail prosthetic. To highlight, we could see that juvenile idiopathic arthritis was more prevalent in the group of patients who presented failure (42.5 vs. 20.4).

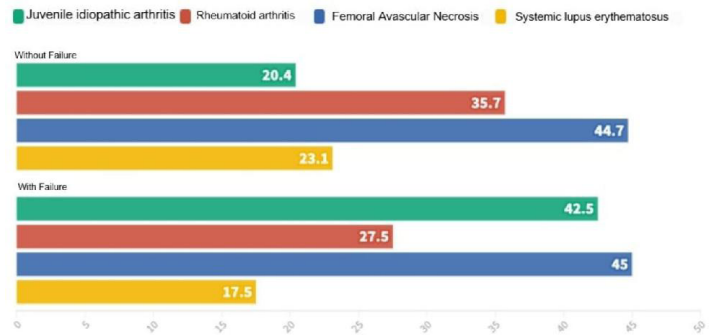


Figure 1: Prevalence of comorbidities per group.

Regarding the complications and review surgery, we could observe some significant differences between the group that presented failure in the prosthesis and those that did not present failure, such as aseptic loosening ($p < 0.001$), polyethylene wear ($p < 0.001$), periprosthetic infection ($p < 0.001$) and chronic residual pain ($p = 0.012$).

The fault in the prosthesis was presented at a greater percentage in those patients who received the intervention in the left hip (57.5) compared to those who received the intervention in the right hip (42.5), however this difference is not statistically significant (Table 2).

Complications	With Failure	Without failure	p
	N=40	N=231	
Septic loosening	1 (2.5)	0 (0.0)	0.016
Aseptic loosening	16 (40.0)	4 (1.7)	< 0.001
Periprosthetic fracture	2 (5.0)	6 (2.6)	0.407
Periprosthetic dislocation	1 (2.5)	3 (1.3)	0.561
Review surgery	16 (40.0)	7 (3.3)	< 0.001
Polyethylene wear	6 (15.0)	0 (0.0)	< 0.001
Periprosthetic infection	8 (20.0)	3 (1.3)	< 0.001
Chronic residual pain	1 (2.5)	0 (0.0)	0.016
Sciatic nerve injury	1 (2.5)	3 (1.3)	0.561
Wound infection	0 (0.0)	1 (0.4)	0.677

The data were presented by means of frequency (%), the value of P was estimated by test of χ^2

Table 2: Presence of complications in groups with and without prosthesis failure.

Outcome of the Functionality After THA

Regarding the changes in functionality evaluations, we could observe through the score change deltas that the group of

patients who did not have a prosthesis failure had better scores after prostheses compared to those who presented failure in the prosthesis. These differences were statistically significant, with a value of $P < 0.001$ for each one (Table 3).

	With failure N=40	Without failure N=231	P
VAS	- 7.2 (2.2)	- 8.2 (1.5)	< 0.001
HHS	+ 49.2 (11.2)	+ 54.9 (7.9)	< 0.001
WOMAC	- 43.9 (18.4)	- 50.9 (10.9)	< 0.001
OHS	+ 23.8 (8.1)	+ 27.1 (3.8)	< 0.001

The value of P was estimated by a T test

Table 3: Delta of change in the scores of the pre and post surgical indexes.

THA Survival

On average the follow-up time was 11.2 - 5.5 years. We could see that the probability of THA survival is 98% to five years (95% CI 1.1 - 2.7), from 93.8% to ten years (95% CI 2.6 - 4.3), from 81% to fifteen years (CI 95 % 5.8 - 7.9) and 61% to twenty years (95% 10.9 - 13.3) (Figure 2).

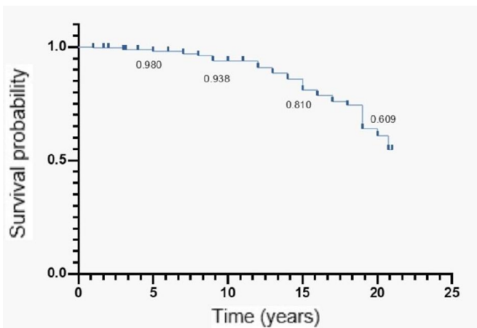
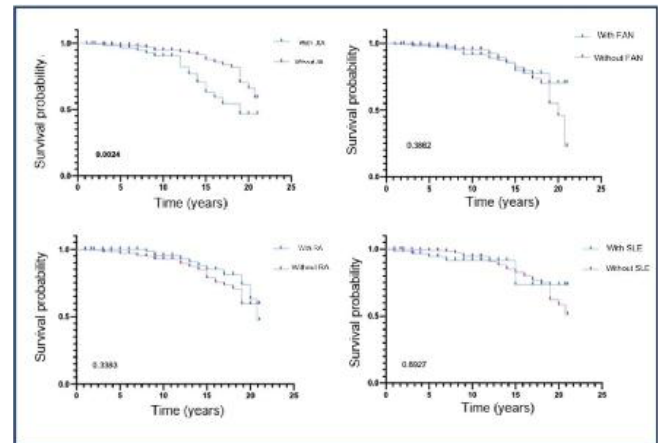


Figure 2: Survival of the THA.

When evaluating the survival of the THA in the most prevalent comorbidities in our population; Juvenile idiopathic arthritis (JIA), femoral avascular necrosis (FAN), rheumatoid arthritis (RA) and systemic lupus erythematosus (SLE), we were able to observe by means of a Mantel and Cox rank test that presence of JIA decreases the probability of survival of the THA, which is statistically significant ($p = 0.0024$). For the rest of the comorbidities, no statistically significant differences were observed (Figure 3).



Figures 3a-d: Survival of ATC according to the presence of comorbidities.

Discussion

THA survival and prevalence of comorbidities

THA is a good treatment option for patients with rheumatic diseases such as: idiopathic rheumatoid arthritis, rheumatoid arthritis and systemic lupus erythematosus. We were able to observe that in our population these comorbidities are present in at least 23% of the patients who received the intervention. In general, our THA survival rates were 98% to five years (95% IC 1.1 - 2.7), from 93.8% to ten years (95% CI 2.6 - 4.3), from 81% to fifteen years (95% CI 5.8 - 7.9) and 61% to twenty years (95% IC 10.9 - 13.3). The FAN was the comorbidity with the highest prevalence in our population (45.4%), those who have it had less survival of the THA compared to those who do not have FAN, with a survival in twenty years of 46.6% (95% IC 18.9 - 21.3) vs. 66.3 (95% IC 12.3 - 16.7), this difference proved to be statistically significant ($p = 0.002$). These results agree with those reported by Nauth et al [18], who reported in a randomized clinical trial, that FAN was more frequently presented in patients who required a surgical reintervention. The second most prevalent comorbidity in our population was rheumatoid arthritis, with a prevalence of 35.8% in our population. When comparing the survival of the THA we could see that twenty years of monitoring the survival is greater in those with ra compared to those who do not have it, however this difference is not statistically significant (63.2 95% IC 18.9 28.9

vs 59.6 12.1 - 14.9). According to those reported by Ashberg et al [19], where through a study of cases and controls they reported an survival of the similar THA in both groups, our results even agree that the follow-up period is greater (20 years vs 2 vs 2 years). Since there is no statistically significant difference, it would be important to consider the benefits that the THA would contribute compared to a conventional pharmacological treatment, for which it would have to be deepened in future studies. As for patients with JIA we could observe a prevalence of 23.3% and one survival at twenty years old in those without the disease compared to those who had it (66.3 IC 95% 12.3 - 16.7 vs 46.6 18.9 - 21.3), without However, this difference is not statistically significant. When comparing our results with what was reported by Malviya et al [20] we could observe the same survival rate in a similar monitoring time, so it can be confirmed that THA is a good treatment option for those who study with this disease. When comparing our survival rates of the THA in general with what Pallante et al [17], with a 97.2% survival to 10 years we can see that our results are consistent with literature. So that a primary treatment option could be considered at THA due to its good long-term evolution.

Outcome in Functionality

Among the conditions caused by rheumatic diseases is the commitment in functionality which in conventional medical treatment is affected in a greater way [16,19]. When evaluating changes in functionality through indexes such as VAS, HHS, WOMAC and OHS, we could see that the deltas of change in the scores were greater in patients who did not present a fault in the THA, as well as reported Hufeland et al [21], in the case of patients with degenerative diseases, it should be taken with caution because the fault of the THA can affect the functionality compared to those patients without these types of diseases present. However, it would be interesting to compare the results of these indices between THA and conventional medical treatment in future studies.

THA Complications

Aseptic loosening was the complication with the highest prevalence in our general population and most frequently in the group of present fault, if we compare our complications rates with those previously reported by Marino et al and Degen et al, they are relatively high, however, one thing to consider is that our population is less, so the proportions vary importantly.

Limitations and Strengths

By extracting our data from the clinical files, there is likely that there is an information bias because we did not have control over the quality of the filling of the data, however, our study has some strengths such as the monitoring time of the population, which which It gives us a greater panorama of the outcome of THA and even our knowledge This type of reports has not been carried out in the Mexican population.

Conclusion

THA in patients with rheumatic diseases has outcomes similar to those reported in other populations, so, despite the

nature of IRD and conventional medical treatment, THA can be a first-treatment option in early age patients.

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