

# Total hip arthroplasty in Pinar del Río. Clinical and surgical results

## Artroplastia total de cadera en Pinar del Río. Resultados clínico-quirúrgicos

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### ABSTRACT

Total hip arthroplasty is considered a viable solution to acute and chronic hip injuries, which significantly improves the quality of life of patients. A descriptive and retrospective study was conducted with the aim of evaluating patients who underwent cemented total hip arthroplasty with a RALCA® total hip prosthesis over a decade (2010-2020) at the “Abel Santamaría Cuadrado” Hospital (Pinar del Río). Variables such as age, sex, etiological diagnosis and incidence of associated diseases were taken into account for the research. The Harris Hip Score was used to evaluate the final results. The study universe consisted of all patients who underwent this procedure during the study period (120) and the sample studied was 90 patients. Theoretical, empirical and statistical methods were taken into account, the information was processed in a microcomputer and the results were entered into tables for better study and understanding. Males predominated with 52 patients, the highest number of cases was found between the ages of 61 and 70 years. Primary coxarthrosis was the etiologically most prevalent with 36 patients, arterial hypertension was the most frequent associated disease in 36 cases, and the most frequent postoperative complication was paralytic ileus. With the use of the RALCA® prosthesis in this study, excellent results were obtained in 71 patients when evaluated at 3 years of evolution, with an average of (89,3) in the Harris score.

**Keywords:** Hip; Coxarthrosis; Arthroplasty.

### RESUMEN

La artroplastia total de cadera es considerada la solución viable a lesiones agudas y crónicas de la cadera, que mejora notablemente la calidad de vida de los pacientes. Se realizó un estudio descriptivo y retrospectivo con el objetivo evaluar los pacientes operados con Artroplastia total de Cadera cementada, con prótesis total de cadera RALCA® durante una década, (2010-2020) en el Hospital “Abel Santamaría Cuadrado” (Pinar del Río). Se tuvo en cuenta para la investigación variables como edad, sexo, el diagnóstico etiológico y la incidencia de enfermedades asociadas. Para evaluar los resultados finales se utilizó la escala evaluativa de Harris (Harris Hip Score). El universo de estudio estuvo constituido por todos los pacientes con dicho proceder realizado durante el período de estudio (120) y la muestra estudiada fue de 90 pacientes. Se tuvo en cuenta métodos teóricos, empíricos y estadísticos, la información se procesó en una microcomputadora y los resultados se llevaron a cuadros para su mejor estudio y comprensión. El sexo masculino predominó con 52 pacientes, el mayor número de casos se encontró entre las edades de 61 a 70 años. la coxartrosis primaria fue etiológicamente la de mayor incidencia con 36 pacientes, la hipertensión arterial como enfermedad asociada más frecuente en 36 casos, siendo la complicación del post operatorio más frecuente el íleo paralítico. Con la utilización de la prótesis RALCA® en este estudio se obtuvo excelentes resultados en 71 pacientes al ser evaluados a los 3 años de evolución, con una media de (89,3) en la puntuación de Harris.

**Palabras Clave:** Cadera; Coxartrosis; Artroplastia.

## INTRODUCTION

The increase in life expectancy worldwide is increasing, with an average of 77 years, which is why health systems have had to develop new strategies to face this population phenomenon and deal with conditions typical of elderly patients. Conditions of the coxofemoral joint occupy a vital place in all population studies.<sup>(1)</sup> Cuba is no exception; therefore, the national health system has had to focus its efforts on projects and programs aimed at improving the quality of life for older people. In the coming years, a sustained population aging will make acute and chronic conditions of the coxofemoral joint increasingly frequent in adults, which cause mainly pain and significant functional limitation to patients who suffer from it; some of these may be primarily related to logical degenerative processes of age and other secondary induced by overload or diseases such as Rheumatoid Arthritis, osteoporosis, conditions of vascular or traumatic origin that produce severe damage to the anatomy of the joint, also other developmental diseases that not having been adequately treated for different reasons leave irreversible sequelae to the biomechanics of that joint.<sup>(1,2)</sup> For the reconstruction of these seriously damaged joints in adults, the main procedure currently performed is Total Hip Arthroplasty (THA), in which the injured hip is replaced with a total implant. These implants can be classified according to their union to the bone as either cemented or uncemented.

Total hip replacement is one of the most successful and revolutionary surgical techniques developed in the twentieth century, which effectively relieves pain, restores independence, and enables patients to return to work and daily activities while facilitating a quick recovery.<sup>(2)</sup>

Total arthroplasty is indicated in individuals with painful and disabling arthritic or osteoarthritic joints that no longer respond favorably to conservative treatment. Although there are indications for total arthroplasty in younger individuals, especially those with multiple joints affected by a systemic disease such as systemic lupus erythematosus or rheumatoid arthritis, this technique is typically reserved for older individuals and those with sedentary lifestyles.<sup>(3)</sup>

The objectives of total arthroplasty are to relieve pain, improve mobility, and correct deformities. According to both short and long-term follow-up studies, the currently used prostheses, when well implanted, achieve a high success rate.<sup>(4)</sup>

Despite ongoing research to find better implant materials, the classic combination of an articulated metal with ultra-high molecular weight polyethylene is still the most commonly used. Loading surfaces are almost always made of a cobalt-chromium-molybdenum alloy. In contrast, implant components, such as the femoral stem, are sometimes made of a titanium alloy because its modulus of elasticity is closer to that of bone, resulting in less bone dysfunction. In addition, titanium alloys can form a more intimate union with the adjacent bone.<sup>(1,5)</sup>

With the introduction in Cuba of the RALCA Total Hip Prosthesis at the end of the 1990s by Professor Dr. Rodrigo Alvarez Cambras, a true revolution in this advanced surgery as a solution to acute and chronic injuries of the coxofemoral joint began, allowing its application in all provinces of the country. Pinar del Río, with some experience in this procedure since 1986, has systematically performed cemented total replacement surgery since 1999 using the RALCA prosthesis, both in its non-modular and modular models, since 2000.

## Problem Situation

Taking into account the high incidence in patients with severe disorders of the coxofemoral joint, causing a painful and unstable joint with significant functional limitation and having as references that other techniques previously used as osteotomies, interposition arthroplasties have not shown encouraging results, is what justifies the application of this technique of replacement arthroplasty in these patients.

For the reasons mentioned above, the general objective of the research is to characterize the clinical-surgical evolution of patients operated on for acute and chronic disorders of the coxofemoral joint at the “Abel Santamaría Cuadrado” General Teaching Hospital in Pinar del Río province from 2010 to 2020.

## METHOD

An observational, descriptive and retrospective study was carried out.

### *Universe*

It was constituted by all the patients who were diagnosed with acute and chronic affections of the coxofemoral joint (120).

### *Sample*

This purposively determined from 90 patients of whom met the inclusion criteria for the study.

### *Inclusion criteria:*

- Patients with approved consent to participate in the research.
- Patients over 40 years of age with indication for cemented prosthesis.
- Femoral neck fractures older than 55 years and younger than 70 years.
- Primary and secondary coxarthrosis having indications for cemented prosthesis.

### *Exclusion criteria:*

- Patients with neoplasms of the proximal end of the femur.
- For the qualitative evaluation, the Harris evaluative scale with a score of 0-100 was used. Composed of four factors:

pain (40 pts.), degree of mobility (5 pts.), function (47 pts.) and absence of deformity (8 pts.).

- The score between 90-100 considered excellent; between 80-90 good; between 70-80 fair and less than 70 poor.
- Evaluation performed on patients by means of the follow-up protocol with assessment by consultation at one month after surgery, at three months, at six months, at one year and annual follow-up.

#### Methods used:

Theoretical, historical and logical methods of scientific research were used, basically supported by the processes of analysis, synthesis, induction and deduction. An exhaustive and updated search of epidemiological studies was carried out to obtain an international and national overview of the object to be investigated. Among the empirical methods, documentary analysis of individual clinical histories was used.

Summary measures for qualitative and quantitative variables were used for data analysis and processing.

From the ethical point of view, this research complied with the fundamentals of ethics that appear in the Declaration of Helsinki 2008. Its essential objective was scientific, with no environmental impact or predictable risks.

## RESULTS

The greatest number of patients was found between 61 a 70 years of age (52,3 %), the male sex predominated with 52 patients, representing 57,7 %; in relation to the affected side there was a predominance of the left side with 47,7 %.

| Table 1. Associated diseases           |     |      |
|----------------------------------------|-----|------|
| Disease                                | No. | %    |
| Bronchial asthma                       | 2   | 3,6  |
| Arterial hypertension                  | 36  | 43,6 |
| Ischemic heart disease                 | 31  | 37,2 |
| Diabetes mellitus                      | 5   | 8,1  |
| Osteoporosis                           | 9   | 7,2  |
| Severe spondyloarthritis of the rachis | 24  | 26,6 |

Cardiovascular diseases were the most frequent, among which essential arterial hypertension had the highest incidence with 43,6 %, followed by ischemic heart disease with 37,2 % (table 1).

| Table 2. Etiological causes   |     |      |
|-------------------------------|-----|------|
| Etiology                      | No. | %    |
| Primary coxarthrosis          | 36  | 37,1 |
| Avascular necrosis            | 23  | 25,5 |
| Rheumatoid arthritis.         | 4   | 4,2  |
| Post-traumatic arthritis.     | 6   | 6,3  |
| Intracapsular fractures.      | 11  | 11,3 |
| Failure of hemiarthroplasty.  | 6   | 6,1  |
| Failure of osteosynthesis AO. | 2   | 2,06 |
| Ankylopoietic sp.             | 2   | 2,06 |

In relation to the main etiological causes (table 2), it can be seen that primary coxarthrosis is the first cause of indication for this surgery with 37,1 %, followed by avascular necrosis with 25,5 %.

| Table 3. Local complications in patients operated on for conditions of the coxofemoral joint |     |      |
|----------------------------------------------------------------------------------------------|-----|------|
| Local complications                                                                          | No. | %    |
| Dislocation or subluxation                                                                   | 1   | 1,03 |
| Heterotopic calcification                                                                    | 3   | 3,33 |
| Wound infection                                                                              | 3   | 3,33 |
| Loosening of acetabular component                                                            | 2   | 2,06 |
| Femoral component loosening                                                                  | 1   | 2,06 |
| Discrepancy of limbs                                                                         | 7   | 7,77 |

The local complications in patients operated on for conditions of the coxofemoral joint are shown in table 3, where 7,77 % are related to limb discrepancy.

The general complications in patients operated on with conditions of the coxofemoral joint are shown in table 4, showing that 18,1 % presented paralytic ileus as a general complication; however, more frequent complications had a low incidence, such as 1,1 % pulmonary embolism thromboembolism and 0,9 % respiratory infection.

The preoperative evaluation with the Harris Hip Score is reflected in table 5, where 86,6 % had a poor evaluation and 13,4 % had a fair evaluation.

**Table 4.** General complications in patients operated on with coxofemoral joint disorders

| General complications       | No. | %    |
|-----------------------------|-----|------|
| Pulmonary embolism thrombus | 1   | 1,1  |
| Thrombophlebitis            | 2   | 1,8  |
| Paralytic ileus             | 15  | 18,1 |
| Respiratory infection       | 1   | 0,9  |
| Bacterial endocarditis      | 2   | 1,8  |

**Table 5.** Harris Hip Score. Preoperative evaluation

| Preoperative evaluation  | No. | %    |
|--------------------------|-----|------|
| Less than 69 points      | 78  | 86,6 |
| Between 70 and 79 points | 12  | 13,4 |
| More than 80 points      | 0   |      |

**Table 6.** Harris Hip Score. Postoperative evaluation

| Postoperative evaluation   | No. | %    |
|----------------------------|-----|------|
| Excellent (between 90-100) | 71  | 78,8 |
| Good (between 80-89)       | 18  | 20,0 |
| Fair (between 70-79)       | 1   | 1,2  |
| Poor (less than 69)        | 0   |      |

The postoperative evaluation 3 years after surgery (table 6) shows that most of the patients are evaluated as excellent, which represents 78,8 %.

## DISCUSSION

The age over 60 years coincides with the beginning of the third age, where most of the degenerative affections of the hip are presented, being in correspondence with articles published by Vicent,<sup>(8)</sup> eight as well as other reviewed works, besides having 18 patients between 50 and 60 years, 11 with a femoral neck fracture, 8 of them applied to this surgery for presenting intracapsular fractures of the femur. In this same group, 3 cases with presenile osteoporosis, which due to the poor bone quality they offered, surgery was indicated directly, prevailing in this group the female sex, four other patients in which there was the failure of osteosynthesis with a grooved hip screw.

Regarding sex, which does not differ from reports such as those of some series reviewed, it is also noted as an element of interest that 94,4 % of cases with primary coxarthrosis were male, farmers in 83 %, which could show the relationship between agricultural work, unpreferred micro traumatism of everyday life causing coxarthrosis. It is noteworthy that in the group between 50 and 60 years of age, the highest incidence was observed in females, with 16 cases, which constitutes 88,8 %.

Comparing the present study with the reviewed works such as those of Lopreitte and Ramírez Vázquez,<sup>(13,14,15,16,17,18)</sup> the incidence found in these works referring to sex is equal to the studied casuistry, being evident that the male sex is more prone to the affections of the coxofemoral joint in great measure because they dedicate themselves to jobs that imply the realization of more intense physical efforts in comparison with women.

The predominance of the affected left side aligns with the majority of the literature reviewed, which proposes variations that are not very precise regarding this variable.

About the affected side, it can vary indistinctly without there being elements that speak more in favor of one side than the other, so it did not keep a specific pattern in the various studies reviewed, not finding a demonstrable cause for the predominance of one side over the other, but the studies by Perez Rivera and Ceballos Valmaseda,<sup>(19,20,21,22)</sup> coincided with the results of this research.

However, the study by Borne and Rorabeck<sup>20</sup> showed a different behavior from the present study.

In the analysis of associated diseases, it was taken into account that hip joint affections are more frequent in the third age, a period of life when cardiovascular diseases are also prevalent. This coincides with the majority of the cases in the studied casuistry.<sup>(10)</sup>

This highlights the fact of the coexistence of cardiovascular system disorders in this age group since most of the patients are elderly. These conditions are part of the set of conditions to be considered when performing hip replacement surgery, and the importance of diagnosis and compensation before the surgery is performed are determining factors in the success of the surgery.<sup>(1,5,10)</sup>

The affections of the cardiovascular system also exert their influence on this joint through disorders at the level of local circulation and the nutrition of the femoral head.<sup>(1,5,10)</sup>

After reviewing works such as those of Ceballos, Roder, Caval, and Leham,<sup>(22,25,32)</sup> it is evident that they coincide in that patients suffering from hip disorders and carriers of chronic non-communicable diseases presented more than one associated systemic disorder, which aligns with the present study.

Coinciding with some reviewed works, it is observed that primary coxarthrosis is the first cause of indication for this surgery, there being a high incidence of this condition, which has its basis in the articular incongruencies that are presented, giving as a final

result the anomalous distribution of loads with modification of the articular mechanics.<sup>(22,23,24,25)</sup>

In this study, different etiological entities caused secondary articular lesions, such as avascular necrosis. It is essential to highlight that this group of patients had been treated with steroids in the course of systemic diseases, demonstrating the influence of these drugs on the processes of calcification and bone mineralization. These cases were at stages 4 and 5 of the Ficat and Arlett classification for avascular necrosis of the femoral head, characterized by significant osteoarthritic changes and signs of collapse of the femoral neck.<sup>(7)</sup>

Intracapsular hip fractures after a short rehabilitation period, and as the articular biomechanics were intact, the evolution was satisfactory. The evolution presented by these cases coincides with the evolution evaluated in the review by Ramírez Vázquez<sup>18</sup> in the treatment of intracapsular fractures in elderly patients, where due to the low functional demands of these patients and the high risk of necrosis of the femoral head resulting from the neck fracture, treatment with primary arthroplasty proved to be the ideal treatment for these cases, resulting in an early return to life before the fracture.

Hip arthroplasty remains a complex surgery despite the accumulated experience and technological advances of the last few decades, but it is not exempt from local complications. The series studied shows a scarce incidence of local and general complications, with a remarkably low percentage of infections.

Factors such as the prophylactic use of preoperative antibiotic (Cefazolin), the use of suction-irrigation equipment, asepsis of the surgical area, use of suction drainage, as well as the standardization of the surgical process with the participation of the same surgical group, may have influenced the low rate of infection, pointing out that the three cases presented were diagnosed as grade I in the classification of Coventry and FitzGerald and treated according to the protocol, evolving satisfactorily.

When reviewing some series of cases in which this subject is approached and in which are taken into account as predisposing factors, surgical approaches, NSAIDs, as well as prophylactic use of radiotherapy protocols, there is no agreement about the appearance of this complication in the present work it is left as a factor to consider in the low incidence of this complication the use of aspiration drainage in all cases, favoring the evacuation of solid elements of blood as possible substrate of these formations around the implant.

Related to the loosening of the components with primary coxarthrosis, carriers of marked deterioration in the articular biomechanics due to muscular atrophies by disuse and articular orientation disorders, having been operated in advanced stages of the disease that submitted the implant to important tensional forces, these changes appeared eventually around the year of evolution, accompanied by referred pain in the groin and anterior face of the femur, moderate to severe in occasions, in all cases the loosening corresponded to a Grade I of the Paprosky classification.

Discrepancies of less than 2,5 cm were found to be complications related to the fact that in the first two years of the application of this project, there were no modular prostheses (RALCA) ® Also, the sample at the beginning was plagued with cases with inveterate injuries carrying compensatory scoliosis of years of evolution that made it difficult to correct the discrepancies of the limbs.

Paralytic ileus was the most frequent post-surgical complication and was associated with the use of continuous epidural anesthesia in the first cases, later modified according to the patient's conditions. Patients with endocarditis evolved satisfactorily when diagnosed early.

A low incidence of pulmonary thromboembolism was observed; the case above was treated according to the established protocol, with resolution of the condition. This serious complication was prevented in the remaining cases thanks to the use of antithrombotic prophylaxis with low-molecular-weight heparins, following established international protocols. Hence, the results align with other reviewed works, such as Kearon's, which state that pulmonary thromboembolism can only be prevented by using preoperative fraxiparin and maintaining it for one month postoperatively.<sup>(4)</sup>

The Harris scale is a dynamic scale that allows the preoperative evaluation of patients before undergoing CTA. Although several authors criticize the preoperative evaluation systems, the Harris scale is a faithful evaluation element to assess the functional status of the hip joint before surgery; comparing the present work with the work carried out by Killi, Wright, and Jones<sup>34</sup> after the application of the Harris scale, reliable results are obtained of the previous state of the patients when undergoing total hip replacement surgery; these authors demonstrate the validity of this scale over other scales proposed by different authors.

An evaluation of fairness is a criterion for the application of ATC as a treatment method for hip disorders.

The results obtained when applying this scale demonstrated the functional limitations and the presence of pain that are consequences of painful joint and biomechanical imbalances resulting from degenerative changes in processes such as primary coxarthrosis.

The evaluation of excellent outcomes in the postoperative period, 3 years after surgery, shows that once a prosthetic hip replacement is performed, all biomechanical imbalances that caused functional limitations in this joint are corrected, resulting in a functional and pain-free joint. This improvement significantly enhances the quality of life for patients with biomechanically dysfunctional joints.

After comparing the present investigation with the works carried out by Lopretie F and Robador<sup>13</sup>, in which the results after total hip arthroplasty are evaluated, the results were equal to those obtained in the present work, with an optimal degree of satisfaction. When applying the Harris scale, the results were excellent after the surgery.

It is essential to point out that in most of the patients who presented complications related to pain, function, and mobility, there was a relationship with associated diseases such as osteoporosis, severe osteoarthritis of the spine, etc., which corroborates the current tendency to perform this surgery before there is significant biodynamic deterioration of the affected joint, an element of great importance to consider since when performing surgery in advanced stages, the implant will be submitted to greater stresses with early deterioration of the same.

## CONCLUSIONS

Hip arthroplasty constitutes an effective treatment method for acute and chronic injuries of the coxofemoral joint, considerably improving the quality of life of the patients who suffer from it.

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## CONFLICT OF INTEREST

The authors declare that there is no conflict of interest.

## AUTHORSHIP CONTRIBUTION

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