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Case Report

Bilateral Total Hip Arthroplasty in A Young, Short Patient with Sequelae of Legg-Calve-Perthes Disease – Case Report

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Abstract

Legg-Calve-Perthes disease (LCP) occurs due to idiopathic avascular necrosis of the femoral head during childhood. Some children, regardless of the treatment received in their youth, continue to develop early-onset secondary osteoarthritis, which may require total hip arthroplasty (THA). Total hip arthroplasty in young, short patients is a poorly described topic in literature. The limited availability of implants in some countries restricts treatment options and increases the complexity of the procedure.

A 23-year-old female dental student, measuring 145 cm in height, presents with bilateral osteoarthritis secondary to Legg-Calve-Perthes disease, having undergone multiple surgeries on both hips since the age of 4. She seeks specialized consultation in Caracas, Venezuela, where a primary bilateral total hip arthroplasty procedure is performed in two stages (separated by a 5-month interval between each intervention) using a modified Hardinge lateral approach. At one year of follow-up, the patient shows good progress, high satisfaction levels, and symmetrical lower limbs.

THA in young patients with severe, limiting, and painful osteoarthritis secondary to Perthes disease is a suitable option for returning to a low-impact professional life. Thanks to the design and materials of the new prostheses, the procedure can provide additional benefits for these patients. Long-term studies are necessary to determine the timing and causes of revisions in these complex cases.

Key words: total hip replacement; young adult; legg-calve-perthes disease

Introduction

Hip arthroplasty is one of the most successful medical procedures worldwide in terms of pain relief, functional recovery, and improvement in the quality of life for patients with hip arthritis. However, total hip arthroplasty (THA) success rate is significantly lower in younger, more active patients [1-4]. Issues such as prosthetic loosening, wear, osteolysis, and reduced prosthesis longevity have been documented more frequently in younger patients [5,6]. The indications for hip arthroplasty in young adults are the same as those for older patients: significant pain, decreased function, and poor quality of life due to hip arthritis. However, due to the relatively higher risks associated with the longevity of the prosthesis, both patients and surgeons are cautious before proceeding with arthroplasty in such young individuals. Furthermore, these surgical procedures are often technically demanding due to the severe underlying deformity of both the femur and pelvis, as well as prior surgeries [7].

Although arthroplasty is never undertaken lightly in pediatric and very young adult patients (under 30 years), pathological conditions can be so severe that arthroplasty or arthrodesis may be the only viable option. Hip arthrodesis is performed less frequently due to advances in arthroplasty techniques and materials. However, arthrodesis may sometimes be considered for very young patients. The consensus is that hip arthrodesis yields favorable outcomes, often including a nearly regular gait pattern. However, there have not been any studies looking into how hip arthrodesis impacts daily functional activities, which the procedure would significantly restrict. Currently, no case series analyze or compare hip arthrodesis with THA or hip resurfacing arthroplasty [7]. An active patient is unlikely to accept arthrodesis as a viable treatment option.

Despite the known challenges, several studies have reported significant success with THA in young patients. Previous studies on THA´s clinical outcomes and cost-effectiveness have objectively classified it as one of the

most successful interventions in modern medicine. Presently, uncemented components are the cornerstone of most arthroplasty cases, with clinical results demonstrating excellent longevity—multiple reports indicate a documented 10-year survival rate of over 95% [1-6]. Perthes disease is a lesser-known disorder associated with disrupted blood supply to the growing femoral head in children. The typical progression involves epiphyseal growth delay, sclerosis, fragmentation, and reossification. This leads to coxa magna and deformities in the femur and acetabulum, often becoming symptomatic during adolescence and early adulthood [8]. The efficacy of surgical treatment in pediatric patients is still under debate [9,10]. Adults with early-onset symptoms may benefit from treatment techniques for femoroacetabular impingement. Severe deformity necessitates arthroplasty in early adulthood [11].

Case Presentation

This case involves a female patient who has been dealing with Legg-Calve-Perthes disease since the age of 4. She underwent multiple surgeries on both hips at another medical facility, where pediatric orthopedic surgeons successfully preserved her hip joint using femoral and acetabular osteotomy techniques.

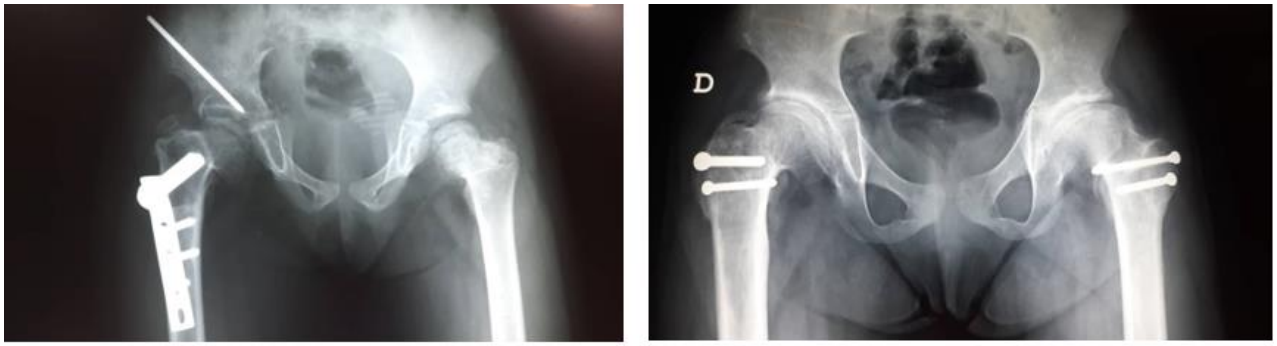

Figure 1: X-rays of both hips during surgical treatments performed in the patient's childhood. Image A, at 4 years of age. Image B, at 9 years of age.

She seeks consultation due to severe pain in both hips, predominantly on the right side, along with a limp since childhood and a discrepancy in limb length. During the physical examination, the patient reports tenderness upon palpation in the bilateral inguinal region and a significant reduction in mobility, particularly in flexion, abduction, and both internal and external rotation. There is a 2 cm discrepancy in length, with the right lower limb being shorter than the left.

Radiographic examination reveals bilateral coxa magna, femoroacetabular impingement, bone deformity of the femoral head, and signs of severe osteoarthritis.

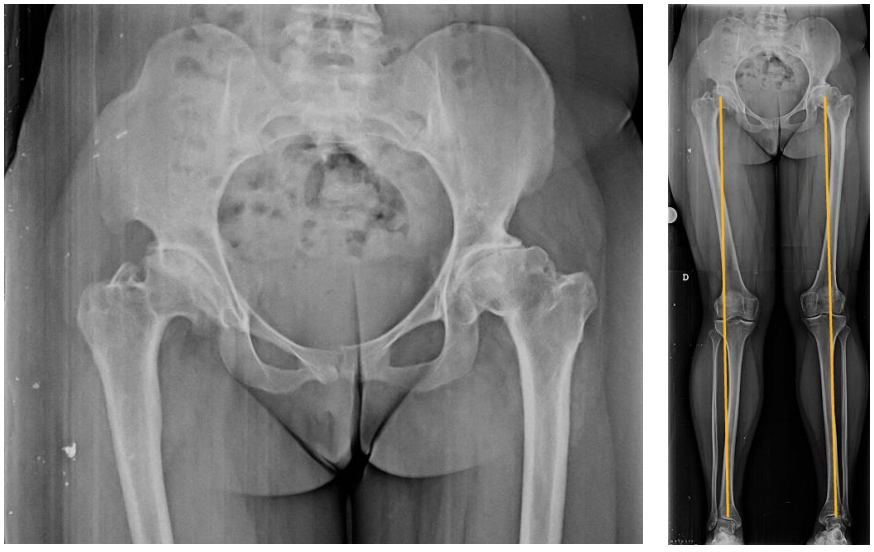

Figure 2: Radiograph of both hips and panoramic view of the lower limbs.
Right lower limb: 65.22 cm. Left lower limb: 64.76 cm.

Due to the complexity of the case, a total hip arthroplasty procedure is planned and subsequently performed on both hips in two separate surgical stages. The first procedure is conducted on the right hip, as it was reported to be the more painful one, and the procedure on the left hip is performed five months later.

Total Hip Arthroplasty – Right Side

- **Approach:** Modified anterolateral Hardinge.
- **Stem:** Uncemented LCU Waldemar Link, 8 mm.
- **Acetabulum:** Uncemented Combicup, 44 mm, screw-fixed.

- **Polyethylene:** Ultra-high molecular weight polyethylene (UHMWPE).
- **Head:** Ceramic, 28 mm. Neck M (0 mm).

Total Hip Arthroplasty – Left Side

- **Approach:** Modified anterolateral Hardinge.
- **Stem:** Uncemented LCU Waldemar Link, 8 mm.
- **Acetabulum:** Uncemented Combicup, 44 mm, screw-fixed.
- **Polyethylene:** Ultra-high molecular weight polyethylene (UHMWPE).
- **Head:** Ceramic, 28 mm. Neck S (-4 mm).

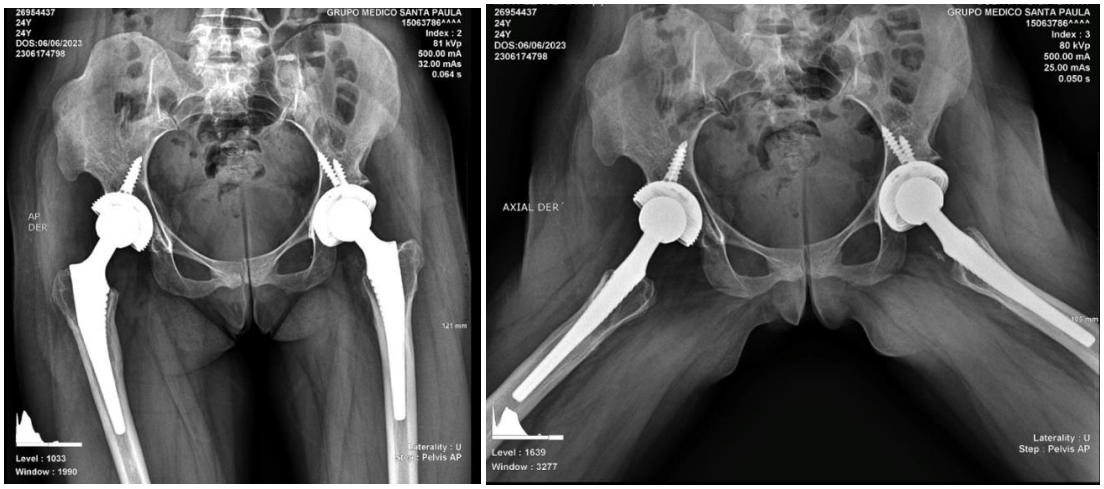

Figure 3: Radiograph of both hips after bilateral total hip replacements.

Both procedures were accomplished, but they posed notable complexities, particularly during the reduction of the prosthesis due to muscle shortening on the left side (in the second intervention). As a result, muscle release of the rectus femoris and psoas was necessary. A radiographic follow-up was conducted with satisfactory results, and a new panoramic view of the lower limbs showed no length discrepancy.

Figure 4: Measurement of both lower limbs after total replacement of both hips. From the anterior superior iliac spine (ASIS) to the medial malleolus the measurement was the same: 74cm.

Postoperative pain was more intense following the second intervention, ranging from 8 to 9 on the Visual Analog Scale (VAS) during the first week, compared to 3 to 4 on the VAS for the right lower limb during the same period. This was due to the need for greater soft tissue release and lengthening to correct the leg length discrepancy. Additionally, wound healing was delayed after this procedure, requiring two weeks of Vacuum-Assisted Closure (VAC) therapy.

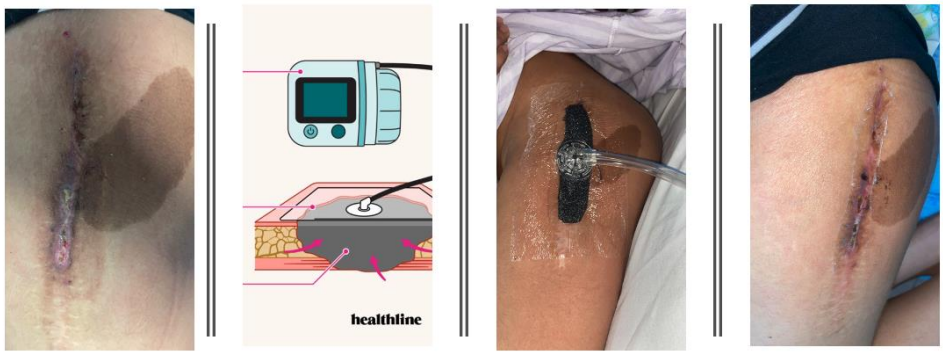

Figure 5: VAC therapy to facilitate wound closure in left hip arthroplasty.

By the third month following the second surgery, the patient showed significant improvement, with no pain and unassisted walking, although she still had a residual limp. At her one-year follow-up after the initial surgery, she showed remarkable progress, engaging in swimming and experiencing muscle fatigue during long walks, mainly affecting the right hip.

Current arthroplasty techniques do not require large skin incisions when using the appropriate materials and instruments. This is evident in the image, where previous osteotomy procedures required incisions that were twice as long.

Regarding functional outcomes, the patient reports satisfaction, with flexion ranges in both hips exceeding 90°, abduction up to 40°, and external rotation allowing her to cross her legs (which was impossible before).

Discussion

Legg-Calve-Perthes disease poses a significant challenge for physicians, as both conservative treatment and early surgical interventions aim for long-term outcomes. Most patients, if not all, experience complications that affect them during adolescence or early adulthood. However, THA in this population can be technically demanding and complex, with potential complications such as femoral fractures and motor nerve paralysis (12-14). Additionally, previous pediatric surgeries often alter the anatomy of the proximal femur, complicating the implantation of components during THA (15, 19). Given the risks and complications associated with THA in patients with Perthes disease, utilizing assistive technologies, along with careful surgical planning, presents a viable option.

In the presented case, detailed preoperative planning was employed to provide data on the position of the acetabular cup and changes in leg length, which were crucial for ensuring both legs were equalized during the surgical procedure. Postoperatively, radiographic analysis confirmed that the length of the legs had been equalized. This planning enhanced the surgeon's ability to accurately place the components, particularly the right acetabulum—which had less acetabular coverage—thereby reducing the likelihood of unsatisfactory postoperative outcomes. Furthermore, if the leg length discrepancy is not corrected accurately during the primary THA, the resulting pain and functional deterioration may necessitate an expensive revision surgery to equalize the length of the legs (20).

Additionally, the high rate of neurological complications associated with THA in this patient population is also a cause for concern (19). These complications are thought to be linked to inadequate soft tissue release or excessive elongation of the limb due to poor preoperative planning (19).

Complications around the surgical site are among the most common concerns during the initial weeks of healing. Therefore, weekly assessments of the wound condition are essential for timely identification and treatment of these lesions. Finally, we recommend early rehabilitation following THA to restore gait patterns and reduce limping.

Conclusion

This report summarizes a case of severe osteoarthritis secondary to Legg-Calve-Perthes disease in a short young adult who underwent bilateral THA in two separate surgical stages. Performing the contralateral surgery within six months facilitated the early restoration of leg length symmetry and significantly improved functional outcomes after one year of follow-up.

The case's complexity was heightened by the patient's height, the discrepancy in the length of the legs, alterations to the hip anatomy from previous surgeries, and the limited availability of smaller-sized prostheses on the market at that time. Therefore, it is recommended to engage in meticulous planning to correct the leg length discrepancy, consider the quality and condition of the bone when positioning the components, explore available implant options and sizes in each region, and use uncemented prostheses to minimize long-term wear. If a staged approach is deemed necessary, it is important to avoid reoperating on the opposite side within a timeframe exceeding 12 months.

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