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# Restoring Hip Symmetry and Its Impact on Outcomes: A Case Series on Megaprosthesis Use in Non-Oncological Patients with Complications After Total Hip Arthroplasty

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**Abstract:** Total hip arthroplasty (THA) is commonly performed for conditions like osteoarthritis, avascular necrosis, hip fractures, and hip dysplasia. Complications following THA can result in major proximal femoral defects (MPFD), which are challenging to manage. Megaprostheses provide a solution, offering stability and early weight-bearing, though they present their own challenges. However, maintaining hip symmetry with megaprostheses is challenging in accurately restoring femoral offset, acetabular orientation, and soft tissue tension. These factors can contribute to instability, altered biomechanics, and functional impairment. Therefore, achieving hip symmetry through femoral and acetabular offset, limb length discrepancy (LLD), and center of rotation (COR) is an important consideration. Achieving proper symmetry may improve gait, quality of life, and overall outcomes. This case series includes 10 patients with non-tumoral pathology treated with megaprostheses for complications after THA between 2014 and 2024. Megaprosthesis conversion was performed for sepsis ($n$ = 2), aseptic loosening ($n$ = 4), and periprosthetic fracture ($n$ = 4). Dislocation occurred in 20%, with one case showing restored hip symmetry but dislocating due to trauma and noncompliance. Another case had an LLD of 3 cm, contributing to dislocation. Periprosthetic infection was observed in 20%, managed with a two-stage approach. Although hip symmetry was not fully restored in all patients, strict follow-up and rehabilitation were essential for improving functionality and quality of life. Megaprosthesis is an effective solution for MPFD in non-oncological patients when performed correctly. Restoring hip symmetry is challenging and depends on patient care and compliance, though it is an important factor influencing outcomes.

**Keywords:** megaprosthesis; major proximal femoral defects; total hip arthroplasty; complications; imaging; pathophysiology; center of rotation; limb length discrepancy; hip symmetry

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Academic Editors: Luigi Nicolais, Gianfranco Carotenuto and Aniello Cammarano

Received: 31 January 2025
Revised: 16 February 2025
Accepted: 19 February 2025
Published: 21 February 2025

**Citation:** Dragosloveanu, S.; Capitanu, B.-S.; Moise, M.N.; Vulpe, D.E.; Josanu, R.; Gherghe, M.E.; Preda, E.M.; Cergan, R.; Scheau, C. Restoring Hip Symmetry and Its Impact on Outcomes: A Case Series on Megaprosthesis Use in Non-Oncological Patients with Complications After Total Hip Arthroplasty. *Symmetry* **2025**, *17*, 322. https://doi.org/10.3390/sym17030322

## 1. Introduction

Total hip arthroplasty (THA) is a reliable and widely used procedure for patients with advanced stages of primary or secondary hip osteoarthritis (OA). The most common afflictions that benefit from THA are avascular necrosis of the femoral head (AVN), hip fractures, and hip dysplasia [1].

Complications associated with THA can vary in severity, from minor wound issues to periprosthetic joint infections (PJI) and death, onset time, occurring either early in the patient's postoperative evolution (within weeks to months) or later (years after the procedure), and means of treatment [2].

A study by Ulrich et al., examining 235 patients who underwent revision surgery following THA, identified aseptic loosening as the most frequent complication (in a little over half of total cases), followed by instability in 16.9% of patients and periprosthetic joint infection (PJI) in under 6% of cases [3]. Recent global arthroplasty registry data reinforce these findings, reporting aseptic loosening as the leading cause of revision in 35.1% of cases, while PJI accounted for 18.2%, dislocation or instability for 15.9%, and periprosthetic fractures for 11.4% [4]. While the incidence of aseptic loosening has decreased over the last decade, PJI rates have risen, highlighting the growing importance of infection prevention and management strategies in THA patients. Structural implant failure can also occur in cases of malpositioning or damage during surgery due to erroneous guide instrument manipulation [5,6].

Managing complications associated with major proximal femur defects (MPFD), particularly those classified as Paprosky type III or IV, poses a significant challenge for both the healthcare system and surgical teams [7,8]. Although these types of defects are usually associated with oncological cases, there is a significant number of other conditions in which they occur [9,10].

Several approaches are available to address these cases, with megaprostheses being one of the options. Megaprostheses offer several benefits, such as providing immediate structural stability, enabling early weight-bearing, and reducing surgical complexity compared to other reconstructive techniques like allografts or the Masquelet technique. Additionally, they are customizable to accommodate varying degrees of bone loss, often featuring modular components. However, they also come with some drawbacks, retaining the potential for long-term complications such as infection, aseptic loosening, implant failure, and dislocations from the standard prostheses and adding to them an economical burden through their high-cost, steep learning curve in terms of surgical technique, as well as a lack of further options in terms of implants in case of failure [11–14].

Proximal femur megaprostheses provide an alternative to limb amputation, offering the potential to preserve limb function and improve quality of life. However, maintaining hip symmetry remains a significant challenge that must be considered as it is postulated that it has a great impact on the patient's quality of life, recovery time, and rate of further complications [15]. Symmetrical hips allow for a smoother, more natural gait, improving the patient's confidence and overall functional outcomes. Maintaining hip symmetry involves addressing femoral and acetabular offset, limb length discrepancy (LLD), and center of rotation (COR) [16].

Femoral offset plays a vital role in hip symmetry. Increasing the offset may provide the perception of a longer limb, while insufficient offset can result in limping, hip instability, and premature wear of components. Another crucial aspect is minimizing limb length discrepancy. Lengthening the limb by more than 10 mm has been associated with complications such as gait abnormalities, pelvic tilt, and the necessity for a shoe lift, leading to increased patient dissatisfaction [17]. As mentioned earlier, megaprostheses are often a last-resort option for limb preservation. Proper technique and attention to maintaining hip symmetry can significantly improve functional outcomes and implant longevity. Geometrical restoration during THA, including precise COR placement, significantly influences postoperative gait patterns. Alterations from natural hip geometry can disrupt gait mechanics, highlighting the importance of COR restoration in facilitating a natural walking pattern after surgery [18].

This case series aims to present our experience in managing complications following THA through the use of megaprostheses and to investigate whether achieving hip symmetry was possible with this approach, as well as its potential influence on patient outcomes.

## 2. Materials and Methods

This case series was compiled from the "Foisor" Clinical Hospital of Orthopaedics, Traumatology, and Osteoarticular Tuberculosis database, between 2014 and 2024. Over this period, 10 patients with significant proximal femoral defects resulting from complications after THA were identified. The retrospective study was approved by the hospital ethics committee (approval no. 312/14 January 2025), and patients agreed to participate by signing an informed consent form. The study aimed to assess the impact on maintaining hip symmetry when using megaprostheses in non-oncological patients since hip symmetry is beneficial for patient comfort and hip mechanics. Knowing that megaprostheses are accompanied by major challenges regarding biomechanical restoration, our goal was to assess these aspects and contribute to a more structured approach in surgical planning and decision-making for complex revision cases.

The inclusion criteria for this study were patients with major proximal femoral defects caused by periprosthetic fractures, previous infections, or aseptic loosening, where megaprostheses were utilized. Patients were excluded if they were diagnosed with oncological conditions or if follow-up evidence at a minimum of 1 year was unavailable.

The revision surgeries included in this case series were performed by different surgical teams, each with varying levels of experience and using specific techniques adapted to individual patient conditions. However, all patients benefited from the Hardinge approach, and the overall surgical management followed well-established, standardized principles, as detailed below.

For PJI, all cases adhered to a two-stage protocol. The first stage included prosthesis removal, debridement, antibiotic-releasing spacer placement, and the initiation of systemic antibiotics based on the microbiological profile. Intraoperative samples were analyzed, and the prosthesis components were sent for sonication. The second stage typically occurred 6–12 weeks later once the patient's clinical and biological condition had stabilized, and the infection was believed to have been eradicated using consistent criteria for infection clearance and local tissue viability. This stage involved spacer removal and, if the local condition supported infection resolution, the placement of a megaprosthesis and bone reconstruction.

For aseptic loosening and periprosthetic fractures, the old femoral stem prosthesis was carefully removed to preserve bone integrity. The local condition was assessed, and the stability of the acetabular component was evaluated. If signs of loosening were detected, the acetabular component was also replaced. A megaprosthesis was then implanted, with additional bone reconstruction performed if necessary.

Complications were recorded using the hospital information system implemented in our clinic, which facilitates documentation of each patient's medical history. Complications were documented during follow-up visits or upon patient presentation to the emergency department and included consultations, imaging, laboratory results, and surgical notes.

The radiographic examinations of each participant were performed on a Digital-Diagnost R3.1 X-ray machine (Philips Medical Systems Nederland B.V, Amsterdam, The Netherlands) and the images were analyzed using mediCAD® 2D Version 7.0 (mediCAD

Hectec GmbH, Altdorf/Landshut, Germany), a specialized orthopedic imaging software, within the hospital's archiving and communication system (PACS), with a calibration factor set to 115%. The following measurements were taken: femoral offset (FO)—defined as the distance between the femoral head COR and a line bisecting the femur's long axis; acetabular offset (AO)—horizontal distance between the femoral head center and the transischiatic line. Horizontal COR—the distance from the femoral head center to the teardrop; Vertical COR—the distance between the femoral head center and the transischiatic line (Figure 1a); LLD—the vertical distance from the femoral head center to the center of ankle joint on each side (Figure 1b); cup inclination angle—angle between transischiatic line and a line across rim of the cup; cup version—arcsin (D1/D2)—Figure 1c.

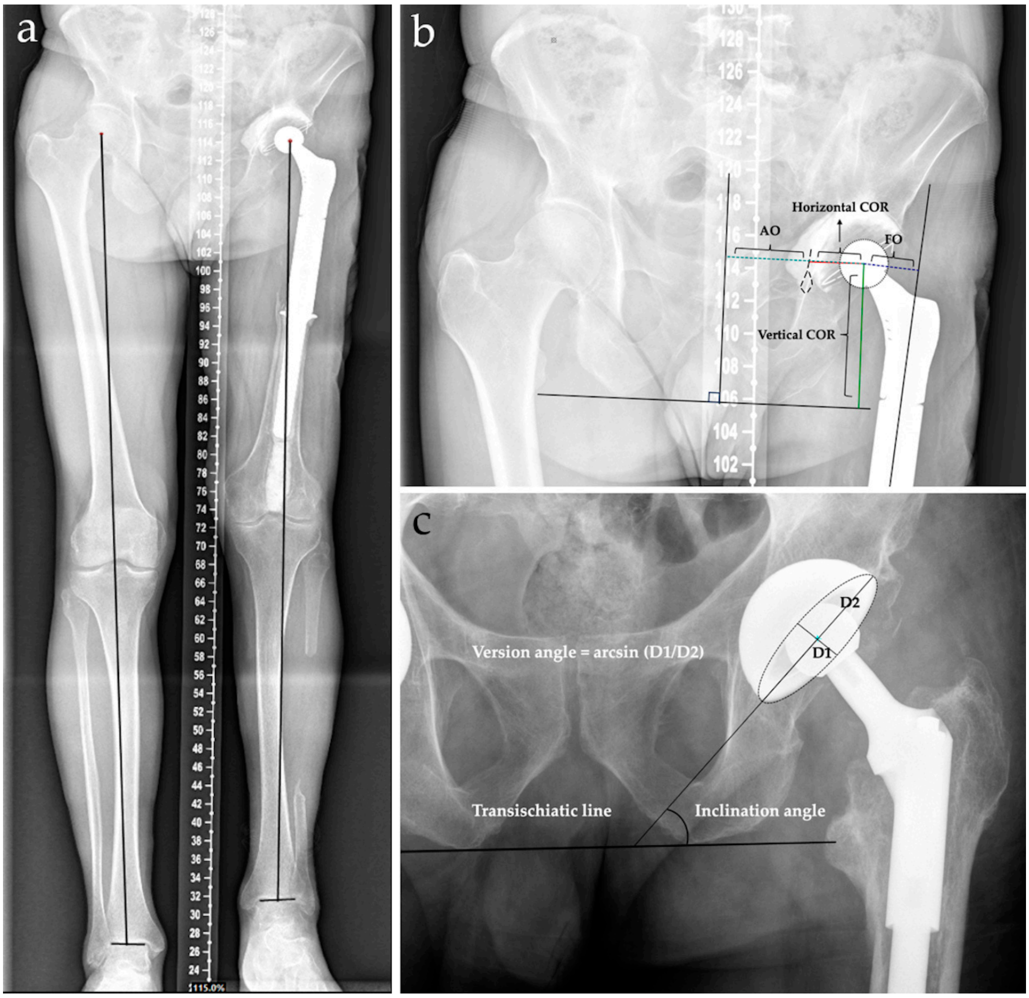


**Figure 1.** Measurements of limb length discrepancy (**a**), hip (**b**), and cup inclination and version angle (**c**).

## 3. Case Series

Ten patients were included in this study. One (10%) patient died of non-surgery-related causes. Two patients (20%) were lost to follow-up after 1 year. The etiologies for megaprosthesis conversion were sepsis (2), aseptic loosening (4), and periprosthetic fracture (4). Tables 1–3 summarize these cases with all features, including demographic parameters, comorbidities, clinical parameters, and specific measurements.

**Table 1.** Demographic parameters and comorbidities of patients.

| Case No. | Sex | Age (years) | Comorbidities |
|---|---|---|---|
| 1 | F | 72 | Class III Obesity |
| 2 | M | 78 | Arterial hypertension, Ischemic Heart Disease |
| 3 | F | 67 | Arterial hypertension |
| 4 | F | 68 | Hepatitis C |
| 5 | F | 64 | Ischemic Heart Disease |
| 6 | M | 72 | NYHA II Congestive Heart Failure |
| 7 | F | 81 | NYHA II Congestive Heart Failure |
| 8 | F | 81 | Arterial hypertension, Dyslipidemia |
| 9 | M | 70 | Arterial hypertension, arteriosclerosis obliterans |
| 10 | F | 73 | Arterial hypertension, Type 2 Diabetes mellitus |

M = male, F = female, NYHA = New York Heart Association.

**Table 2.** Etiology, surgical, and outcome characteristics.

| Case No. | Year | Cause | Revised Components | Complications | Last Follow-Up |
|---|---|---|---|---|---|
| 1 | 2009 | PJI | Both | PJI | 2020 |
| 2 | 2015 | Aseptic loosening | Femur | None | died 2018 |
| 3 | 2015 | Periprosthetic fracture | Both | PJI | 2016 |
| 4 | 2016 | PJI | Both | None | 2024 |
| 5 | 2023 | Aseptic loosening | Both | None | 2025 |
| 6 | 2023 | Aseptic loosening | Femur | Dislocation | 2024 |
| 7 | 2024 | Periprosthetic fracture | Both | None | 2025 |
| 8 | 2024 | Aseptic loosening | Both | None | 2025 |
| 9 | 2024 | Periprosthetic fracture | Both | Dislocation | 2025 |
| 10 | 2024 | Periprosthetic fracture | Femur | None | 2025 |

**Table 3.** Specific measurements of symmetry between limbs in the patient lot.

| Case No. | Femoral Offset [1] (mm) | Acetabular Offset [1] (mm) | Vert COR [1] (mm) | Hor COR [1] (mm) | LLD (cm) | Femoral Offset [2] (mm) | Acetabular Offset [2] (mm) | Vert COR [2] (mm) | Hor COR [2] (mm) |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 47 | 152 | 75 | 33 | 2 | 39 | 121 | 118 | 40 |
| 2 | 48 | 87 | 63 | 27 | 4 | 41 | 74 | 91 | 15 |
| 3 | 42 | 85 | 56 | 31 | 5 | 32 | 78 | 63 | 28 |
| 4 | 31 | 92 | 76 | 30 | 4 | 41 | 92 | 48 | 24 |
| 5 | 36 | 105 | 75 | 45 | 0.2 | 36 | 86 | 58 | 28 |
| 6 | 48 | 97 | 85 | 38 | 0.5 | 40 | 101 | 80 | 30 |
| 7 | 41 | 99 | 71 | 30 | 0.5 | 40 | 90 | 71 | 27 |
| 8 | 36 | 91 | 65 | 27 | 1.5 | 40 | 85 | 78 | 24 |
| 9 | 32 | 81 | 87 | 29 | 3 | 35 | 94 | 67 | 29 |
| 10 | 40 | 100 | 75 | 30 | 0.5 | 35 | 89 | 70 | 28 |

[1] Measurements of the contralateral hip; [2] measurements of the hip with megaprosthesis; COR = center of rotation, LLD = limb length discrepancy.

### 3.1. Periprosthetic Joint Infection

Case no. 1 is an 82-year-old female with a complex medical history who had a primary cemented THA performed in 2007. Within 1 year, the patient developed a PJI, which led to multiple surgical interventions over the subsequent years. Initial management in 2008 included deep tissue debridement, extensive lavage, removal of the implant, and insertion of an antibiotic-loaded polymethylmethacrylate (PMMA) spacer.

In 2009, she underwent hip revision surgery using a megaprosthesis. However, mechanical complications necessitated three additional surgeries between 2009 and 2011, during which a latent infection was diagnosed. From 2011 to 2014, two debridement, antibiotics, and implant-retention (DAIR) procedures were performed. Following a period of apparent infection resolution, the patient underwent femoral revision surgery in 2014, with the implantation of a new megaprosthesis (Figure 2).


**Figure 2.** Radiographic aspect before spacer implantation (**a**); control radiography with spacer in place (**b**); control radiography after megaprosthesis implant in antero-posterior view (**c**) and lateral views (**d**,**e**).

Persistent mechanical issues prompted a cup revision surgery in 2015. Her postoperative recovery was uneventful until 2018 when she sustained a knee fracture. In 2019, the patient had an active fistula over the right hip, and a diagnosis of chronic PJI was established. Although hip disarticulation was recommended, the patient declined and was placed on chronic suppressive antibiotic therapy. At her last follow-up in 2020, the patient's condition remained stable, with no significant improvement or deterioration.

Case no. 3 is another case of PJI in a 67-year-old female who suffered a periprosthetic hip fracture. The hip had shown no complications before the traumatic event. After further imaging, the surgical team decided to revise both components, replacing the femoral component with a megaprosthesis. At the 6-month follow-up, a PJI was identified, and she was started on an antibiotic treatment. She was scheduled for a two-stage hip revision but was lost to follow-up 1 year later.

### 3.2. Dislocation

Case no. 6 is a 72-year-old male with a history of primary left hip uncemented arthroplasty performed in 2004, which had a favorable evolution until 2023. The patient presented to our clinic with complaints of pain and instability in the left hip. Clinical, biological, and imagistic evaluations revealed aseptic loosening of the femoral component.

A full revision of both components was decided, and a megaprosthesis was used for the femoral component. Four months post-revision, the patient experienced a traumatic incident that resulted in dislocation of the prosthesis (Figure 3). The surgical team opted for open reduction and replacement of the femoral head with a larger size. The postoperative evolution was favorable, and at the 6-month follow-up, the patient remained stable with a favorable clinical outcome.

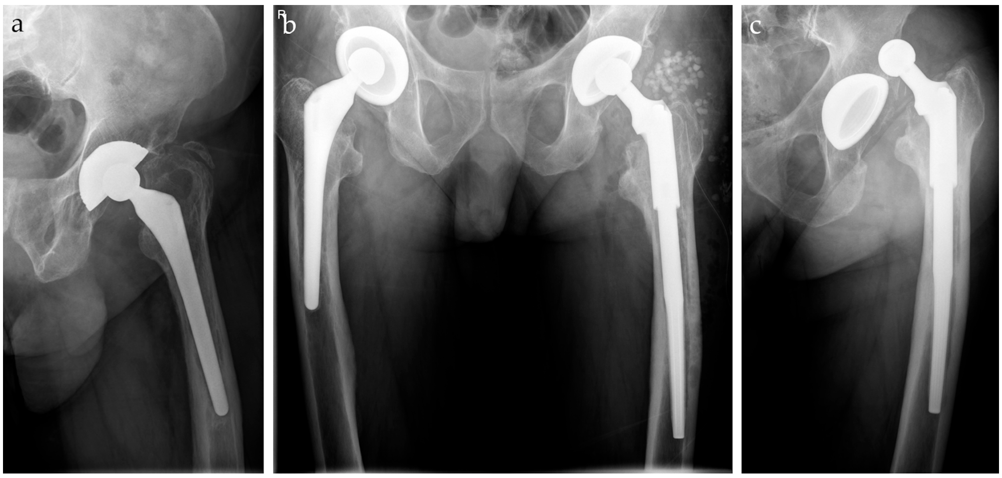


**Figure 3.** Radiography before megaprosthesis (**a**); control radiography after megaprosthesis implanted (**b**); megaprosthesis complicated with dislocation (**c**).

Case no. 9 represents another instance of dislocation occurring in a 70-year-old male with a periprosthetic fracture on a previously implanted hip. After evaluation, the team opted for a revision of both components. The immediate post-operative recovery was favorable until 3 months post-surgery when the patient experienced a dislocation episode. This was successfully managed through closed reduction without requiring further intervention. At the last follow-up in 2025, the patient demonstrated a favorable outcome.

### 3.3. No Complications

Case no. 7 is an 81-year-old female with a history of primary left hip cemented arthroplasty performed in 2006, with an uneventful postoperative course until 2024. The patient sustained a periprosthetic fracture, and imaging revealed severe degradation of the acetabular component, along with significant acetabular and femoral bone stock loss.

A decision was made to proceed with total revision surgery, which included bone grafting of the acetabulum, placement of a cup-in-cage system, and the use of a megaprosthesis for the femoral component (Figure 4). The patient's postoperative evolution was favorable, and she is showing positive progress following the procedure.

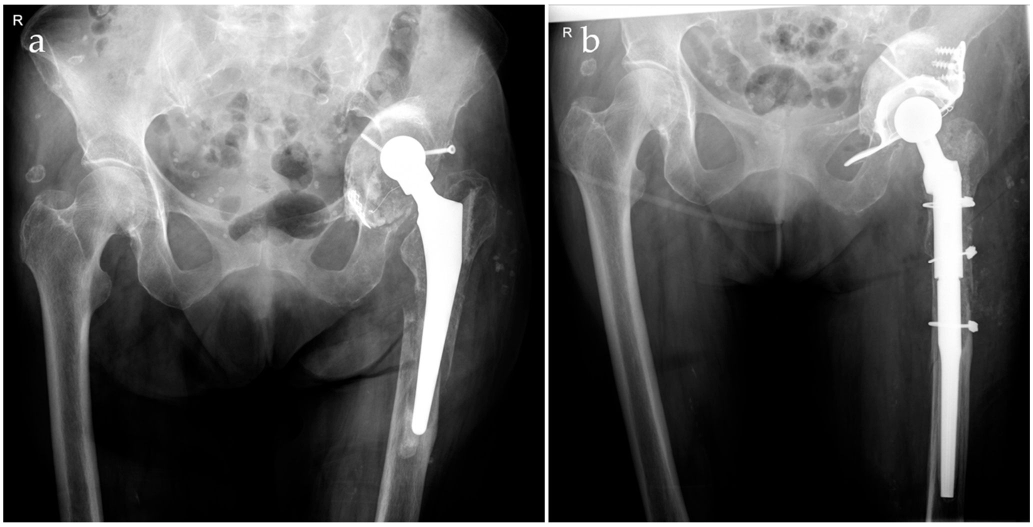

**Figure 4.** Radiography before megaprosthesis (**a**); control radiography after megaprosthesis implantation (**b**).

Case no. 2 involves a 78-year-old male patient who developed aseptic loosening of the femoral component several years after the primary implant. Management included removing the old component via Wagner osteotomy and implanting a megaprosthesis. The recovery was favorable, with no further complications. The patient later passed away due to non-surgical causes.

Case no. 4 presents a 68-year-old female with a PJI developed on a primary hip implant in 2006. The treatment strategy involved a two-stage revision: the first stage in-cluded implant removal, debridement, lavage, and spacer placement, followed by the second stage 6 months later, in which a cemented cup and megaprosthesis were implanted. At her last follow-up in 2024, she exhibited a favorable recovery with a satisfactory quality of life and limb function.

Case no. 5 describes a 64-year-old female with aseptic loosening of an uncemented femoral component implanted in 2024. The revision involved removing the femoral prosthesis and replacing it with an uncemented megaprosthesis while keeping the acetabular cup intact. The patient's recovery was favorable at the last follow-up in 2025.

Case no. 8 features an 81-year-old female with a primary hip implant presenting clinical and radiological signs of aseptic loosening of both the femoral and acetabular components. In 2024, she underwent revision surgery, receiving a new uncemented cup and an uncemented megaprosthesis. At her last follow-up in 2025, her progress remained favorable.

Case no. 10 involves a 73-year-old female who sustained a periprosthetic fracture. Since the acetabular component was stable, it was left in place, and an uncemented megaprosthesis was used for the femoral component revision. The patient demonstrated a favorable recovery post-surgery.

## 4. Discussion

Megaprostheses were initially developed to reconstruct bone loss following tumor resection. Due to their success, their use has expanded to non-oncological patients, particularly those with significant bone defects resulting from complications of THA or trauma surgery [10,19–21]. However, reports and studies on the use of megaprostheses in non-oncological patients with MPFD post-THA complications remain limited. Restoring hip symmetry in such cases is often challenging and, in some instances, impossible, as our experience has shown, significantly impacting the patient's quality of life.

The surgical management of MPFD in non-oncologic patients represents a major challenge when standard revision implants cannot be utilized due to extensive bone loss. Megaprosteses have been successfully utilized in such cases, and their modular design helps orthopedic surgeons personalize the implant to patient anatomy [10]. This feature is particularly useful in complex cases of complications or multiple revisions following PJIs or aseptic loosening.

While megaprostheses are considered a last-resort option before amputation in certain cases, they are not without disadvantages [22]. While most patients still have functional implants at long follow-ups, complications were reported in up to half of cases of megaprosthesis use regardless of indication [23]. Dislocation is a common complication, often arising from soft tissue loss, particularly in septic cases requiring aggressive debridement. Other contributing factors include the malpositioning of implant components, inadequate restoration of femoral offset, and excessive limb length discrepancy. These issues can result in asymmetrical hips, creating biomechanical imbalances that increase the risk of dislocation [19,24–26].

In our case series, two cases (20%) were complicated by dislocation. A review by Vaishya et al., examining outcomes in non-oncological patients undergoing proximal femoral reconstruction with megaprostheses, reported a dislocation rate of 14.6% ($n = 32$) out of 245 patients [19]. Similarly, Zanchini et al. reported dislocation rates of 10% ($n = 4$) out of 39 patients [12]. These findings are consistent with our results. These differences in the reported dislocation rates might be attributed to various surgical techniques, patient selection criteria, or postoperative rehabilitation protocols. Moreover, newer megaprosthesis designs improve FO restoration and soft tissue tensioning and may be associated with lower dislocation rates compared to earlier models [19,27,28].

In our dislocation cases, the megaprosthesis was implanted either for aseptic loosening with significant bone loss following THA (case no. 6), in which only femoral revision was performed, or for periprosthetic fractures, where both components were revised (case no. 9). As shown in Table 1, case no. 6 demonstrated that hip symmetry was restored, and the LLD was only 0.5 cm. Despite these favorable results, the patient suffered a traumatic event that led to prosthesis dislocation. Even when the implant is positioned optimally, patient noncompliance, coupled with traumatic events, can still contribute to dislocation [29–31].

In case no. 9, hip symmetry was roughly restored, with the only difference being the vertical COR (87 mm vs 67 mm), which contributed to an LLD of 3 cm. LLD can lead to dissatisfaction, altered biomechanics, gait abnormalities, and an increased risk of dislocation. While mild LLD, with differences under 1 cm, is typically considered clinically insignificant, discrepancies greater than 1 cm may cause functional problems, and LLD was a possible cause of dislocation in our case [32,33].

To rule out the impact of the acetabular component on dislocation in these cases, we measured the version and inclination angles of the cup. Lewinnek et al. demonstrated that the dislocation rate is higher when cup orientation falls outside the "safe zone", defined as a lateral opening of $40^\circ \pm 10^\circ$ and anteversion of $15^\circ \pm 10^\circ$ [34]. In case no. 6, the acetabular component had a lateral opening of 44° and cup anteversion of 17.1°, while in case no. 9, the acetabular component had a lateral opening of 25.2° and anteversion of 13°. Therefore, in case no. 9, in addition to LLD, the acetabular lateral opening angle could also have been a contributing factor to the dislocation.

Another complication reported in our case series was the periprosthetic infection that occurred in two cases (20%). These cases were reported among patients where megaprosthesis was used for a septic complication following THA and for a periprosthetic fracture. In a systematic review performed by Di Martino et al., which included 27 studies (801 patients), infection was reported in 7.4% of cases ($n$ = 59) [25]. In our case, both patients were managed following the two-stage philosophy.

Other complications reported in studies include periprosthetic fractures, wound issues, and popliteal nerve palsy. However, these complications were not observed in our study [19,22,25,26,35].

In patients without subsequent complications, hip symmetry was not fully restored, and no clear pattern could explain the outcomes. Despite the absence of complications, rigorous follow-up and rehabilitation were essential to improve functionality and quality of life. A study by Taki et al. demonstrated that improvements in the quality of life in revision THA through proximal femoral replacement with megaprosthesis can be achieved, but attention must be provided to implant positioning, symmetry, and a thorough follow-up period [36].

To improve functionality and gait while compensating for LLD, patients with a discrepancy greater than 1 cm were advised to use shoe lifts. A study by Shiwa et al. reported that heel lifts may enhance patient-perceived LLD balance, improve gait symmetry, and optimize lumbar acceleration ratios [12,19,24,26,37].

Postoperative rehabilitation plays a major role in preventing complications and improving patient outcomes. While megaprostheses ensure structural stability, restoring mobility and achieving optimal function relies on structured physiotherapy. Muscle strengthening, gait retaining, and gradual weight-bearing progression are essential elements to consider in establishing an adequate protocol [36,38].

This study has several limitations. First, the small number of cases that fit the inclusion criteria reflects the rarity of situations in which megaprostheses are used and may limit the generalizability of our findings. However, all eligible patients from a 10-year time period that addressed our high-volume orthopedic center were included. Additionally, missing data in our retrospective study potentially affect the completeness and accuracy of our analysis. Furthermore, the short follow-up period for the most recently treated patients may have restricted our ability to thoroughly assess long-term outcomes and complications. Future research with larger patient cohorts, prospective data collection, and extended follow-up periods are necessary to validate these findings and provide more comprehensive insights into the effectiveness of megaprostheses in clinical practice.

Additional research is required to explore alternative approaches that may enhance patient outcomes and implant longevity. One promising direction is the use of personalized megaprostheses, custom-designed to match the joint anatomy and biomechanics, potentially improving implant fit, function, and durability [10,39,40]. Another approach involves a hybrid technique, integrating conventional megaprostheses with advanced 3D printing technologies designed based on preoperative digital planning [41,42]. This could include patient-specific instrumentation (PSI) to optimize surgical precision, as well as custom-printed components using biomaterials that promote better osseointegration and long-term implant stability [43–45]. The fabrication of implants tailored to patient anatomy, as well as the inclusion of scaffold lattices, would enhance the fit and function while also reducing implant stiffness and ensuring better outcomes [46–48]. Moreover, the study of novel biomaterials such as polyether ether ketone has shown that lightweight, patient-specific, biocompatible implants can be successfully 3D-printed and implanted [49,50]. Magnesium alloy scaffolds have been shown to promote bone healing and exhibit strong corrosion resistance and excellent mechanical properties [51–53]. Another future solution for outcome improvement is coating the implants with silver or various biopolymers with antimicrobial properties, thus mitigating the risk of infection by preventing biofilm formation [54,55]. The use of minimally invasive techniques has also been explored in the context of megaprosthesis use, and robotic-assisted surgeries have also demonstrated great benefits in terms of blood loss, postoperative pain, and hospital stay [56–58].

Investigating these innovative solutions through prospective studies and longer follow-up periods could provide valuable insights into their feasibility, safety, and clinical benefits.

## 5. Conclusions

Megaprostheses represent a reliable solution for MPFD cases, even in non-oncological patients, when the proper technique is applied. While restoring hip symmetry with megaprosthesis is possible, it is challenging and heavily depends on patient care and compliance after the procedure. Hip symmetry does influence outcomes, but it is not the only factor to consider in these cases.

**Author Contributions:** Conceptualization, S.D., R.J. and C.S.; methodology, B.-S.C., M.N.M. and M.E.G.; validation, D.E.V., E.M.P. and R.C.; formal analysis, M.N.M., R.J. and M.E.G.; investigation, S.D., R.C. and C.S.; resources, B.-S.C., D.E.V. and E.M.P.; writing—original draft preparation, S.D., B.-S.C., M.N.M., D.E.V., R.J., M.E.G., E.M.P., R.C. and C.S.; writing—review and editing, S.D., B.-S.C., M.N.M., R.C. and C.S.; visualization, M.N.M. and E.M.P.; supervision, S.D., R.C. and C.S. All authors have read and agreed to the published version of the manuscript.

**Funding:** This research received no external funding.

**Institutional Review Board Statement:** The study was conducted in accordance with the Declaration of Helsinki and approved by the Ethics Committee of "Foisor" Clinical Hospital of Orthopaedics, Traumatology and Osteoarticular TB with reference number 312/14 January 2025.

**Informed Consent Statement:** Informed consent was obtained from the subjects involved in the case series.

**Data Availability Statement:** The data presented in this study are available on reasonable request from the corresponding author.

**Conflicts of Interest:** The authors declare no conflicts of interest.

## Abbreviations

The following abbreviations are used in this manuscript:

| | |
|---|---|
| AO | Acetabular offset |
| AVN | Avascular necrosis |
| COR | Center of rotation |
| FO | Femoral offset |
| LLD | Limb length dicrepancy |
| MPFD | Major proximal femoral defects |
| OA | Osteoarthritis |
| PACS | Hospital archiving and communicating system |
| PJI | Periprosthetic joint infection |
| THA | Total hip arthroplasty |

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