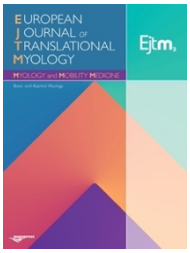
European Journal of Translational Myology



pISSN: 2037-7452 eISSN: 2037-7460

https://www.pagepressjournals.org/index.php/bam/index

Eur J Transl Myol 2026 [Online ahead of print]

To cite this Article:

Tzachev N, Papathanasiou J, Milev R, et al. **From destruction to restoration: total hip arthroplasty in advanced hip joint tuberculosis. A case report.** *Eur J Transl Myol* doi: 10.4081/ejtm.2026.15594

Submitted: 23 April 2026

Accepted: 14 May 2026

Early access: 19 August 2026

From destruction to restoration: total hip arthroplasty in advanced hip joint tuberculosis. A case report

Nedelcho Tzachev,[1] Jannis Papathanasiou,[2,3] Radoslav Milev,[1] Plamen Ivanov,[1] Nikola Hariskov,[1] Petko Ginev,[1] Virna Maria Tsitou[4]

[1]Department of Orthopedics and Trauma-Surgery, Military Medical Academy, Sofia, Bulgaria; [2]Department of Physical Medicine and Rehabilitation, Medical University of Sofia, Bulgaria; [3]Department of Physical and Rehabilitation Medicine, Medical University of Plovdiv, Bulgaria; [4]Department of Medical Microbiology, Medical University of Sofia, Bulgaria

Abstract

Hip Tuberculosis (HTB) is a severe form of extrapulmonary Tuberculosis (TB) that can lead to progressive joint destruction, functional impairment, and reduced Quality Of Life (QoL). Optimal management requires timely Antitubercular Therapy (ATT), appropriate surgical intervention, and structured rehabilitation. This case report aims to present a 57-year-old Bulgarian female with advanced HTB, persisting chronic pain, severe functional limitation, and marked restriction in Range Of Motion (ROM) and Muscle Strength (MS). Baseline assessment revealed a Harris Hip Score (HHS) of 56 and pain intensity of 7/10 on the Visual Analogue Scale (VAS). Microbiological confirmation of *Mycobacterium tuberculosis* was obtained via bone biopsy. Following completion of ATT and normalization of inflammatory markers, the patient underwent Total Hip Arthroplasty (THA) using an anterolateral approach. An individualized Exercise-Based Postoperative Rehabilitation Program (EBRP) was implemented. At 6- Hip Flexion (HF) improved from 25° to 55°, while hip abduction increased from 15° to 40°. MS improved from 2/5 to 4+/5 in key muscle groups (MG). Functional performance improved significantly, with HHS increasing from 56 to 81 (+44.6%), and pain decreasing from 7/10 to 2/10 (−71.4%). No postoperative complications or infection recurrence were observed. This case highlights the importance of appropriate timing of THA after successful infection control with ATT, combined with a structured EBRP. A multidisciplinary approach is essential to optimize functional recovery and minimize complications in patients with HTB.

Key words: hip tuberculosis; total hip arthroplasty; range of motion; muscle strength; Harris hip score; pain.

Hip Tuberculosis (HTB) is a common form of extrapulmonary Tuberculosis (TB), accounting for nearly 15% of the osteoarticular TB.[1] The incidence of this condition in developing countries has been increasing steadily in recent years.[2] HTB leads to progressive joint destruction, deformity, functional impairment, and poor Quality Of Life (QoL) if not diagnosed and treated promptly.[3]

Timely diagnosis and early initiation of Antitubercular Therapy (ATT) are essential for preserving joint function and preventing progressive joint destruction in patients with HTB.[4]

Early initiation of Antitubercular Therapy (ATT) is essential for infection control, preservation of joint function, and prevention of progressive joint destruction, disease reactivation, and systemic dissemination.

In advanced stages characterized by extensive joint damage, Total Hip Arthroplasty (THA) is often required to relieve pain and restore mobility.[2] THA is widely recognized as an effective surgical intervention for alleviating pain and enhancing functional recovery across a broad spectrum of hip pathologies, including HTB.[5] Recent reports indicate a steady increase in the number of THA procedures performed in patients with HTB.[6] This trend reflects growing evidence supporting the safety and effectiveness of THA, even in cases of advanced joint destruction. Zhang *et al*, have consistently underscored the importance of appropriate timing of THA in patients with HTB.[5] Performing THA prematurely may not allow sufficient time for ATT to adequately control the infection, whereas excessive delay may result in further joint deterioration

and increased surgical complexity. Therefore, THA should be considered after adequate infection control has been achieved with ATT. HTB poses significant diagnostic and therapeutic challenges for orthopedic surgeons, Physical and Rehabilitation Medicine (PRM) physicians, and biopathologists, while substantially compromising patients' QoL.[2,7] This case report presents the successful management of a 57-year-old female patient with HTB, highlighting key considerations in treatment strategy and the optimal timing of THA following ATT, in conjunction with an exercise-based rehabilitation protocol (EBRP).[8]

Case Report

A 57-years-old female patient presented to the Department of Orthopedics and Traumatology at the Military Medical Academy, Sofia, Bulgaria, with a history of persistent anterior left hip pain lasting for more than 6 months. The patient described the pain as progressively worsening, significantly impairing her ability to perform activities of daily living (ADL). Anthropometric assessment revealed an endomorphic body habitus, with a body mass index (BMI) of 40.04 kg/m², corresponding to Class III (severe) obesity according to the World Health Organization classification. Vital signs were within normal limits at the time of the preoperative assessment. The clinical examination was conducted with the patient in the supine position. Inspection of the left hip region revealed localized swelling without skin discoloration. Palpation elicited grade 2 tenderness over the anterior and lateral aspects of the hip joint. The affected limb demonstrated approximately 1.5 cm of true shortening, confirmed by measurement of the bilateral malleolar–trochanteric distance. There was evident weakness of the hip abductors, accompanied by a reduced Range Of Motion (ROM). Both external and internal rotation (IR) were limited, with the patient unable to achieve rotation more than 25°, while the abduction was restricted to 20° and adduction to 15° (Table 1). Muscle strength (MS) testing, performed using Manual Muscle Testing (MMT), indicated decreased MS (Table 2). The observed reductions in ROM and MS were primarily attributable to pain-induced limitation of movement. Pain intensity, assessed using the visual analogue scale (VAS),[9] was reported as 7/10 during movement, while the patient's Harris Hip Score (HHS) was 56 (Table 3).[10] Paraclinical investigations revealed elevated inflammatory markers, with an Erythrocyte Sedimentation Rate (ESR) of 60 mm/h and C-Reactive Protein (CRP) level of 113 mg/L indicating an active inflammatory process.[6] Moreover, a bone biopsy was performed to confirm the preliminary diagnosis of hip joint osteomyelitis. Microbiological

analysis of the biopsy specimens was positive for *Mycobacterium tuberculosis*. Anteroposterior pelvic X-rays demonstrated advanced degenerative changes of the left hip joint. Marked deformity and collapse of the left femoral head accompanied by subchondral sclerosis and irregular articular contours were observed. The acetabulum also showed sclerotic changes. The joint space was severely narrowed to absent, findings consistent with advanced secondary (post-traumatic) osteoarthritis of the left hip (Figure 1).[7] Magnetic Resonance Imaging (MRI) of the affected hip joint revealed synovitis, joint effusion, and bone marrow edema. The patient received standard four-drug ATT for 6 months, followed by an additional 4 months continuation phase with isoniazid and rifampicin. [4] This regimen resulted in a significant reduction in inflammatory markers, including ESR and CRP, indicating resolution of the active inflammatory process, along with notable clinical improvement. Despite these favorable outcomes, the extent of joint destruction necessitated surgical intervention. Consequently, a decision was made to proceed with THA of the left hip, after obtaining written informed consent from the patient. The study design was approved by the by the Ethics Committee of the Military Medical Academy in Sofia, Bulgaria, (approval no. UKE-IRBPSY-12.11.23) in accordance with the Helsinki Declaration of Ethical Principles for Medical Research. Written informed consent was obtained from the patient for publication of this case report and accompanying images.

Surgical treatment

The patient underwent THA on 12 November 2024 using a fully hydroxyapatite-coated compaction stem (POLARSTEM™, Smith & Nephew, Baar, Switzerland). THA was performed under general anesthesia by an experienced hip surgery team led by a senior orthopaedic surgeon (N.T.). An anterolateral supine approach was utilized. Following thorough curettage and resection of previously infected tissue, multiple intraoperative specimens were obtained and sent for microbiological and histopathological analysis. Microbiological evaluation included Acid-Fast Bacilli (AFB) staining, mycobacterial culture, molecular testing by Polymerase Chain Reaction (PCR), and histopathological analysis of intraoperative tissue specimens**.** In the absence of intraoperative evidence of active infection, the hip surgery team (N.T., R.M., P.I.) proceeded with definitive THA. No intraoperative or postoperative complications or adverse events were observed throughout the follow-up period.

Postoperative rehabilitation management

An individually tailored, Exercise-Based Rehabilitation Protocol (EBRP) was implemented, focusing on pain management and early mobilization, including assisted weight-bearing using a crutch. During the first three postoperative days, the patient performed gentle range-of-motion exercises combined with gradual weight-bearing to prevent joint stiffness and facilitate tissue healing. From postoperative day 3 to the end of the first week, isometric strengthening exercises and basic mobility training were introduced. Between the second and third postoperative weeks, the EBRP progressed to include active-assisted exercises, balance training, and interventions aimed at reducing dependence on assistive devices. From week 3 to week 6, the EBRP focused on improving endurance, joint stability, and proprioception through dynamic activities and progressively resisted exercises. This EBRP facilitated a safe and gradual return to ADLs while minimizing the risk of postoperative complications. The program was structured into three sequential phases, each comprising approximately 12 sessions.[7,8]

Results

Range of motion recovery

At 1 month postoperatively, a heterogeneous pattern of ROM recovery was observed. While flexion (HF) transiently decreased to 0–20°, likely due to postoperative inflammation, periarticular edema, and soft tissue trauma, other movements such as abduction (0–25°) and rotational components demonstrated early improvement in the left hip joint of the patient.

By 3 months, substantial improvements were evident across all planes, with HF increasing to 0–35°, abduction to 0–30°, and rotational movements to 0–30°. At 6 months, ROM gains reached clinically significant levels, with HF (0–55°), abduction (0–40°), and rotational movements (0–35°; Table 1).

Muscle strength recovery

As shown in Table 2, at 1-month, early restoration of antigravity muscle activity was observed in HF, extension, and abduction (3/5), reflecting the benefits of early mobilization and improved joint alignment post-THA. Although, both adduction and rotational strength remained unchanged (2/5), suggesting selective neuromuscular delay. At 3 months, further improvements were noted, with most Muscle Groups (MG) reaching 3+/5. By 6 months, key MG demonstrated near-normal MS (HF 4+/5, extension and abduction 4/5), supporting functional gait restoration and pelvic stabilization.

Functional outcomes and pain reduction

A progressive and clinically meaningful improvement was observed in both functional outcomes and pain intensity, with the HHS increasing from 56 to 81 points (+44.6%) and VAS scores decreasing from 7/10 to 2/10 (−71.4%) at 6 months postoperatively, indicating successful restoration of hip function and substantial pain relief following THA (Table 3).

Discussion

This case represents the first successfully managed instance of HTB treated at the Department of Orthopedics and Traumatology, Military Medical Academy, Sofia, Bulgaria, demonstrating a progressive and clinically meaningful recovery trajectory. The patient underwent THA followed by an individually tailored EBRP, resulting in substantial improvements in ROM, MS, pain reduction, and overall functional performance.[9]

Evidence from previous studies and case series underscores the importance of appropriate timing of THA in this population.[2,3] Performing THA prematurely may not allow sufficient time for ATT to adequately control the infection, whereas excessive delay may result in further joint deterioration and increased surgical complexity. Therefore, THA should be considered after adequate infection control has been achieved with ATT.[4] Postoperative rehabilitation represents a critical component of recovery in patients with HTB undergoing THA. Nevertheless, the favorable clinical outcome observed in the present case cannot be attributed solely to the THA itself. Adequate ATT remained the cornerstone of treatment, ensuring suppression of mycobacterial activity before definitive surgical treatment and minimizing the risk of postoperative recurrence or systemic dissemination. THA primarily

addressed the irreversible structural destruction of the hip joint, whereas ATT provided the essential biological control of the underlying infection. Evidence suggests that individually tailored EBRP improve joint function and contribute to the long-term success of THA.[6] The management of HTB requires a multidisciplinary approach involving experienced orthopedic surgeons, biopathologists, and PRM physicians. Such collaboration ensures comprehensive care, encompassing accurate diagnosis, effective medical treatment, appropriate surgical intervention, and structured EBRP.[8]

ROM recovery in the present case followed a phased trajectory, characterized by early postoperative limitations, marked improvements at mid-term follow-up, and clinically meaningful gains at 6 months (Table 1). Nevertheless, ROM values remained below normative ranges, suggesting that complete biomechanical restoration may require continued rehabilitation beyond the 6-months period.[7]

The MS recovery of our patient followed a progressive and sequential pattern, with early restoration of antigravity function and near-normal strength achieved in primary locomotor MG by 6 months, whereas adduction and (IR) remained relatively impaired, indicating delayed recovery of deep stabilizing musculature (Table 2). These findings are consistent with previous studies emphasizing delayed recovery of deep stabilizing musculature after THA.[5,7]

Moreover, the patient demonstrated a progressive and clinically meaningful recovery trajectory across biomechanical, neuromuscular, and functional domains, supporting the combined effectiveness of THA and the applied EBRP.[6] The most pronounced functional gains were observed between 1 and 3 months postoperatively, corresponding to the phase of accelerated improvements in ROM and MS. This time-dependent recovery pattern is consistent with the existing THA literature, where early postoperative gains are followed by gradual functional consolidation.

Overall, these findings indicate that recovery following THA is a multifactorial and interdependent process, in which restoration of joint mobility facilitates muscle activation, improvements in MS enhance joint stability and movement efficiency, and pain reduction enables early reintegration into ADLs. The parallel progression observed in ROM, MMT, pain reduction and HHS highlights the importance of a comprehensive and individualized rehabilitation interventions, particularly in complex cases such as HTB.

One of the novel aspects of the present case lies in the integrated multidisciplinary treatment strategy combining prolonged ATT, carefully timed THA, and a structured EBRP in a patient with advanced HTB and severe functional impairment. Unlike many previously published reports that primarily focus on the surgical procedure itself, the present case highlights the importance of sequential and coordinated management involving orthopedic surgeons, biopathologists, and PRM physicians throughout all stages of treatment. In addition, this report provides a detailed longitudinal assessment of ROM, MS, pain intensity, and functional recovery following THA, demonstrating the progressive interaction between infection control, surgical reconstruction, and rehabilitation-mediated functional restoration. Furthermore, the successful outcome achieved despite advanced joint destruction and severe obesity emphasizes the clinical feasibility and effectiveness of combining adequate ATT with individualized postoperative rehabilitation in complex HTB cases.

Limitations

This case report has several limitations that warrant consideration. First, it describes a single patient, which inherently restricts the generalizability of the findings. Second, the absence of a control group precludes direct comparison with standard THA outcomes. Third, functional evaluation was based exclusively on HHS, as other assessment instruments lack sufficient validation and reliability within Bulgarian orthopedic practice. Future studies ideally prospective, controlled, and involving larger HTB cohorts are required to validate these preliminary observations and to assess the reproducibility and external validity of the results in a broader THA population.

Conclusions

This case underscores the importance of multidisciplinary collaboration among orthopedic surgeons, biopathologists, and PRM physicians in optimizing both surgical and functional outcomes in patients with advanced HTB. Careful surgical timing, an appropriate duration of ATT, and continued vigilance for latent or reactivated infection are essential to minimize the risk of postoperative complications.

List of Abbreviations

ADL, activities of daily living

ATT, antitubercular therapy

CRP, C-reactive protein

EBRP, exercise-based rehabilitation protocol

ESR, erythrocyte sedimentation rate

HF, hip flexion

HHS, Harris Hip Score

HTB, hip tuberculosis

IR, internal rotation

MG, muscle groups

MMT, manual muscle testing

MRI, magnetic resonance imaging

MS, muscle strength

PRM, Physical and rehabilitation medicine

QoL, Quality of life

ROM, range of motion

RP, rehabilitation protocol

TB, tuberculosis

THA, total hip arthroplasty

VAS, Visual Analogue Scale

Corresponding Author

Dr. Radoslav Milev, MD

Department of Orthopedics and Trauma-Surgery

Military Medical Academy, Sofia, Bulgaria

ORCID iD: 0009-0000-6940-8280

E-mail: radoslavem@yahoo.com

Tel: +359882550212

List of co authors with emails and orcid

Nedelcho Tzachev: ntzachev@yahoo.com

ORCID iD: 0000-0001-8842-4091

Jannis Papathanasiou: giannipap@yahoo.co.uk

ORCID iD: 0000-0003-2557-5508

Radoslav Milev: radoslavem@yahoo.com

ORCID iD: 0009-0000-6940-8280

Plamen Ivanov: plamen.ivanov2461@gmail.com

ORCID iD: 0009-0005-0748-8525

Nikola Hariskov: nhariskov@abv.bg

ORCID iD: 0009-0001-9637-5821

Petko Ginev: petko_ginev@icloud.com

ORCID iD: 0009-0009-5282-083X

Virna Maria Tsitou: tsitou_vm@medfac.mu-sofia.bg

ORCID iD: 0000-0003-0886-4498

Contributions: Nedelcho Tzachev, Virna Maria Tsitou, conceptualization; Nedelcho Tzachev, Virna Maria Tsitou, and Jannis Papathanasiou, methodology; Radoslav Milev, Nikola Hariskov, and Nedelcho Tzachev, formal analysis; Virna Maria Tsitou and Jannis Papathanasiou, data curation; Plamen Ivanov and Petko Ginev, writing—original draft preparation; Radoslav Milev and Plamen Ivanov, writing—review and editing; Nedelcho Tzachev, Jannis Papathanasiou and Virna Maria Tsitou, supervision. All authors have reviewed the final version to be published and agreed to be accountable for all aspects of the manuscript.

Conflict of interest: the authors declare no potential conflict of interest, and all authors confirm accuracy.

Ethics approval: The study design was approved by the by the Ethics Committee of the Military Medical Academy in Sofia, Bulgaria, (approval no. UKE-IRBPSY-12.11.23) in accordance with the Helsinki Declaration of Ethical Principles for Medical Research.

Informed consent: Written informed consent was obtained from the patient for publication of this case report and accompanying images.

Patient consent for publication: written informed consent was obtained from a legally authorized representative(s) for anonymized patient information to be published in this article.

Availability of data and materials: all data generated or analyzed during this study are included in this published article.

Funding: The authors received no specific funding for this work.

Acknowledgments

The authors sincerely thank the dedicated staff of the Department of Orthopedics and Trauma Surgery at the Military Medical Academy, Sofia, and the Department of Medical Microbiology at the Medical University of Sofia, Bulgaria. Special gratitude is extended to Assoc. Prof. Hristina Milanova, MD, PhD, Head of the Department of Physical Medicine and Rehabilitation at the Military Medical Academy, Sofia, for her valuable support and supervision of the patient's rehabilitation and recovery.

References

1. Bansal A, Sharma S, Dhillon MS. Bone and Joint Tuberculosis. In Textbook of Orthopedic Infections: A Comprehensive Guide to Diagnosis and Management 2026 Feb 1 (pp. 235-255). Singapore: Springer Nature Singapore.
2. Zheng S, Li M, Chen H, Qin Y. Total hip arthroplasty in hip tuberculosis: a systematic review. BMC Musculoskelet Disord 2025;26:46.
3. Li L, Chou K, Deng J, et al. Two-stage total hip arthroplasty for patients with advanced active tuberculosis of the hip. J Orthop Surg Res 2016;11:38.
4. Singh R, Landge S, Goyal S, Goel S, Upadhyay AR. Management of Tuberculosis of the Hip With Antitubercular Therapy and Single-Stage Total Hip Replacement: A Case Report. Cureus 2024;16:e65110.
5. Zhang J, Liang L, Yang B, Li S, et al. Total hip arthroplasty for tuberculosis: a case series. Ann Palliat Med 2021;10:495-500.
6. Viswanathan VK, Patralekh MK, Kalanjiyam GP, et al. Total hip arthroplasty in active and advanced tubercular arthritis: a systematic review of the current evidence. Int Orthop 2024;48:79-93.
7. Kaur G, Gangwani N, Sharath HV. A case report on advanced hip tuberculosis: outcomes of combined surgical and rehabilitative intervention. Cureus 2024;16:e68309.
8. Akkerman OW, Ter Beek L, Centis R, et al. Rehabilitation, optimized nutritional care, and boosting host internal milieu to improve long-term treatment outcomes in tuberculosis patients. Int J Infect Dis 2020;92S:S10-S14.
9. Bulzan M, Cavalu S, Voiță-Mekereș F, Hozan CT. Assessment of pain intensity after total hip arthroplasty using the Visual Analogue Scale (VAS). J Med Life 2024;17:1049-53.
10. Singh JA, Schleck C, Harmsen S, Lewallen D. Clinically important improvement thresholds for Harris Hip Score and its ability to predict revision risk after primary total hip arthroplasty. BMC Musculoskelet Disord 2016;17:256.

Table 1. *Range of motion of the left hip at baseline and postoperative follow-up.*

Joint	**Movement**	**Pre-operative**	**1-month post-operation**	**3-month post-operation**	**6-months post-operation**

Left Hip	Flexion	0–25°	0–20°	0–35°	0–55°
	Extension	0–10°	0–15°	0–20°	0–25°
	Abduction	0–15°	0–25°	0–30°	0–40°
	Adduction	0–20°	0–20°	0–25°	0–30°
	Internal rotation	0–25°	0–27°	0–30°	0–35°
	External rotation	0–25°	0–28°	0–30°	0–35°

Notes: ROM values are expressed in degrees (°) and were assessed using standard goniometric measurement techniques. Pre-rehabilitation measurements were obtained prior to the initiation of the postoperative rehabilitation program following THA. Post-rehabilitation assessments were conducted at 1 month and 3 months after the initiation of post THA-rehabilitation.

Table 2. *Manual muscle testing of the left hip at baseline and and postoperative follow-up.*

Joint Movements	**Pre-operative**	**1- month post-operation**	**3-month post-operation**	**6-months post-operation**
Flexion	2/5	3/5	3+/5	4+/5
Extension	2/5	3/5	3+/5	4/5
Abduction	2/5	3/5	3+/5	4/5
Adduction	2/5	2/5	2+/5	3+/5
Internal rotation	2/5	2/5	2+/5	3+/5
External rotation	2/5	2/5	2+/5	4/5

Notes: Muscle strength was assessed using the Manual Muscle Testing (MMT) scale (0–5). Grade 0: No visible or palpable contraction. Grade 1: Trace contraction without movement. Grade 2−: Partial range of motion (ROM) in a gravity-eliminated position. Grade 2: Full ROM with gravity eliminated. Grade 2+: Less than half ROM against gravity. Grade 3−: More than half ROM against gravity, not full. Grade 3: Full ROM against gravity. Grade

3+: Full ROM against gravity with minimal resistance. Grade 4−: Full ROM against gravity with less than moderate resistance. Grade 4: Full ROM against gravity with moderate resistance. Grade 4+: Full ROM against gravity with near-maximal resistance. Grade 5: Normal strength (full ROM against gravity with maximal resistance).

Table 3. *Functional Outcomes (HHS) and Pain Intensity (VAS) at baseline and postoperative follow-up.*

Time Point	**HHS (points)**	**ΔHHS (abs)**	**ΔHHS (%)**
Preoperative	56	—	—
1 month	65	+9	+16.1%
3 month	77	+21	+37.5%
6 months	81	+25	+44.6%

VAS (0–10)	**ΔVAS (abs)**	**ΔVAS (%)**
Preoperative 7	—	—
1 month 6	−2	−25.0%
3 month 4	−4	−50.0%
6 months 2	−6	−71.4%

Notes: HHS: Harris Hip Score (0–100, higher = better function). VAS: Visual Analogue Scale (0–10, higher = more pain). Progressive increase in HHS corresponds with functional recovery, while decreasing VAS reflects pain

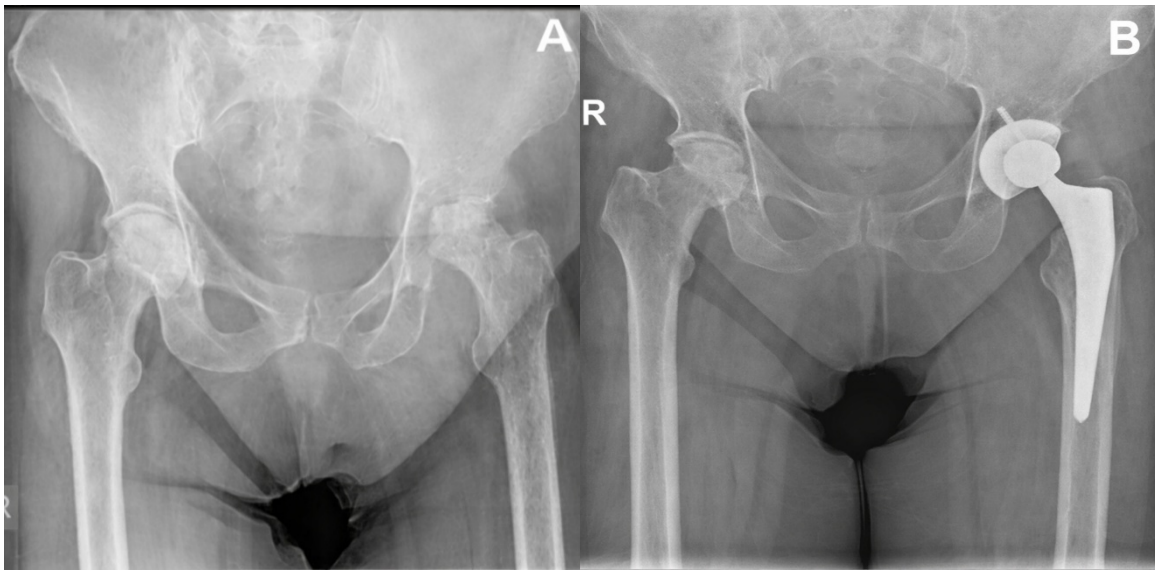


Figure 1. *(A) Preoperative anteroposterior pelvic X-ray. (B) Postoperative anteroposterior pelvic X-ray.*