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RESEARCH ARTICLE

Clinical–Radiographic Dissociation in Early Hip Osteoarthritis in Postmenopausal Women

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Abstract

Background: Pain is often the main trigger for the diagnosis of hip osteoarthritis (OA), typically confirmed by radiographic findings such as joint space narrowing and subchondral sclerosis. However, a small subset of postmenopausal women experience severe hip pain despite minimal changes on radiographs and magnetic resonance imaging (MRI), leading to diagnostic uncertainty and potential treatment delays.

Objective: To describe a series of postmenopausal women with severe hip pain but minimal radiographic findings who underwent total hip arthroplasty (THA), and to report their clinical outcomes.

Methods: We retrospectively reviewed data from 32 patients (mean age: 54 years) with a minimum follow-up of one year. Radiographs and MRI were used to identify patients with Kellgren-Lawrence grade <2 and no clear lesions on MRI. All patients underwent uncemented total hip arthroplasty via an anterolateral approach following a standardized rehabilitation protocol. Clinical outcomes were assessed using the Harris Hip Score (HHS) and WOMAC, both preoperatively and one year after surgery.

Results: Despite limited imaging evidence of OA, intraoperative findings revealed significant cartilage damage. At one-year follow-up, the HHS improved from 48 ± 4.2 to 96 ± 3.8 ($p < 0.001$), and the WOMAC score decreased from 63.2 ± 5.5 to 22.5 ± 4.7 ($p < 0.001$). Patients reported rapid pain relief and returned to their usual activities within an average of 45 days postoperatively.

Conclusions: Total hip arthroplasty provides effective pain relief and functional improvement in postmenopausal women with severe hip pain but minimal findings on radiographs or MRI. These results highlight the importance of clinical judgment when imaging studies do not clearly explain the patient's symptomatic presentation.

Keywords: Hip Osteoarthritis, Clinical–Radiographic Dissociation.

Level of Evidence IV: Case series

1. Introduction

Hip pain is often the starting point in the diagnostic process of hip osteoarthritis (OA), guiding both clinical evaluation and subsequent treatment. In general, the diagnosis of OA is confirmed by characteristic radiographic findings such as joint space narrowing, subchondral sclerosis, or cyst formation (1,2,3). In such cases, surgical intervention is clearly indicated.

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However, there is a small group of patients who present with intense groin pain accompanied by limitation and/or pain on internal rotation—strongly suggestive of hip OA (4)—yet imaging studies, including radiographs and magnetic resonance imaging (MRI), frequently show no significant joint abnormalities. This discrepancy between clinical symptoms and imaging findings creates diagnostic uncertainty and may delay appropriate treatment, negatively impacting the patient's quality of life.

Several studies examining the relationship between hip pain and radiographic evidence of OA have shown that a significant proportion of patients with frequent hip pain do not exhibit radiographic signs of the disease (5,6,7). One study found that the sensitivity of radiographic diagnosis for early OA was only 15.6% (5).

This group of patients, mainly composed of postmenopausal women, is often referred to multiple specialists to rule out other conditions such as spinal disorders or inguinal hernias, due to the lack of conclusive radiographic findings. In many cases, this diagnostic uncertainty delays appropriate treatment. The early onset of OA in young postmenopausal patients suggests a possible link between estrogen deficiency and articular cartilage degeneration.

The objective of this study is to present a series of postmenopausal patients with severe hip pain whose imaging studies (radiographs and MRI) did not support the intensity of symptoms but who underwent hip replacement surgery. Intraoperative findings confirmed underlying joint damage, and the intervention resulted in significant clinical improvement.

2. Materials and Methods

2.1 Study Design

A retrospective, observational, and descriptive study was conducted, including 32 postmenopausal women with severe hip pain but minimal radiographic findings, all treated with total hip arthroplasty (THA). The study took place at two referral healthcare centers between February 2014 and July 2023. Patients with a minimum follow-up of one year were included to assess mid-term clinical and functional outcomes.

2.2 Study Population

Strict inclusion and exclusion criteria were applied to define the study group:

2.2.1 Inclusion Criteria

1. Groin pain of articular (hip) origin.
2. Postmenopausal women (defined as the absence of menstruation for at least 12 months, with an expected mean age >45 years).
3. Radiographs without significant signs of osteoarthritis (Kellgren-Lawrence grade <2).
4. Hip MRI without significant joint lesions.
5. No prior hip surgeries.
6. No history of trauma to the hip region.
7. No history of intra-articular injections.

2.2.2 Exclusion Criteria

1. Male patients.
2. Conclusive radiologic diagnosis of hip OA (Kellgren-Lawrence grade ≥2).
3. Hip pathology of other etiologies (e.g., femoroacetabular impingement, hip dysplasia, slipped capital femoral epiphysis).
4. Clinical follow-up of less than 12 months.

2.3 Patient Selection Process

To minimize selection bias, electronic records from both centers were used to identify all patients who presented with hip pain during the study period. An evaluation committee—comprising two orthopedic surgeons and one radiologist specialized in hip pathology—systematically reviewed medical records, radiographs, and MRI scans, applying the inclusion and exclusion criteria.

- An initial list of potentially eligible patients was formed (n=84); 56 were excluded due to not meeting the clinical or radiologic criteria.
- A total of 28 patients were confirmed eligible, but 3 were lost to follow-up, resulting in 25 patients included in the final analysis.

This consecutive selection method reduced the likelihood of investigator or patient availability bias.

2.4 Data Collection

Data were collected by reviewing medical records (both electronic and paper-based), radiology reports, and surgical records. An independent investigator, not involved in direct patient care, extracted and coded the information into a dedicated database. The following variables were recorded for each patient:

1. *Demographic Data:* Age, body mass index (BMI, calculated as weight/height² in kg/m²), and menopausal status.

2. *Clinical History and Comorbidities:* Including hypertension, diabetes mellitus, dyslipidemia, among others.
3. *Physical Activity Level:* Classified according to activity scale (e.g., inactive, mild, moderate, or intense), based on patient anamnesis and records.
4. *Previous Treatments:* Use of NSAIDs, opioids, oral or intramuscular corticosteroids.
5. *Radiologic Evaluation:* Kellgren-Lawrence classification, MRI findings assessed using the SHOMRI system, minimal degenerative changes, and other relevant abnormalities.
6. *Intraoperative Findings:* Cartilage integrity, presence of delamination or softening, color changes (e.g., from pearly white to ochre).
7. *Outcome Variables:* Time to postoperative ambulation; WOMAC and Harris Hip Score (HHS) preoperatively and at one-year follow-up.

2.5 Bias and Variability Control

- *Independent Radiologic Evaluation:* Two experienced hip pathology surgeons evaluated imaging independently. Discrepancies were resolved by a third specialist through consensus.
- *Standardized Categorical Data:* The same radiographic classification (Kellgren-Lawrence) and MRI scoring system (SHOMRI) were applied to all cases to reduce interpretative variability.
- *Uniform Surgical Protocol:* All procedures were performed by surgeons with comparable experience in hip arthroplasty, following a standardized protocol (anterolateral approach, standardized antibiotic prophylaxis) to reduce technical heterogeneity.
- *External Data Validation:* Statistical processing was performed by a professional unaffiliated with the research team to minimize confirmation bias.

2.6 Prior Treatments

All patients underwent a physiotherapy program focused on:

- Weight loss (when necessary)
- Strengthening of hip musculature
- Reduction of joint reactive forces
- Restoration of normal biomechanics

Additionally, they received NSAIDs or opioids for pain control. Some patients received oral or intramuscular corticosteroids as needed, always following evaluation by joint preservation specialists. In all cases, hip arthroscopy was deemed unlikely to provide symptom relief.

2.7 Radiologic Definitions

1. *AP Pelvis X-ray:* Patient in supine position; X-ray beam perpendicular to the table and centered on the upper pubic symphysis; feet internally rotated 15°–20°.
2. *Lowenstein Lateral View:* Hip flexed and externally rotated; X-ray beam directed anteroposteriorly.
3. *Early Radiographic OA:* Kellgren-Lawrence grade 0 or 1, indicating no or minimal degenerative change.
4. *Hip MRI:* Evaluated using the SHOMRI system to identify cartilage lesions, bone marrow edema, subchondral cysts, labral abnormalities, etc.

2.8 Macroscopic Findings

Cartilage damage was defined as partial or complete loss, softening on palpation with forceps, and color changes from normal pearly white to an ochre tone, as determined intraoperatively.

2.9 Surgical Procedure

All patients underwent uncemented total hip arthroplasty via an anterolateral approach. Antibiotic prophylaxis consisted of intravenous cefazolin (1 g, adjusted to 2 g for patients >70 kg and 3 g for those >120 kg), administered in three doses at 8-hour intervals. Tranexamic acid was used to prevent intraoperative bleeding (1 g IV 30 minutes before surgery, with a second dose postoperatively).

2.10 Study Variables

The following variables were recorded:

1. Age
2. Body Mass Index (BMI)
3. Physical activity level
4. Comorbidities (e.g., hypertension, diabetes, dyslipidemia)
5. Time to postoperative ambulation (in days)
6. Pain and functional outcomes: WOMAC and HHS scores preoperatively and one year postoperatively

2.11 Statistical Analysis

Data analysis was performed using SPSS version 26.0. Descriptive statistics (means, standard deviations)

were used for quantitative variables, and frequencies or percentages for qualitative ones. To compare preoperative and postoperative WOMAC and HHS scores, the paired Student's t-test or Wilcoxon signed-rank test was used, depending on data distribution. A p-value <0.05 was considered statistically significant.

2.12 Ethical Considerations

Informed consent was obtained from all patients, ensuring confidentiality and data anonymization. The study complied with the ethical principles of the Declaration of Helsinki and local regulations on human research. Approval from an institutional ethics committee was obtained before data collection began.

3. Results

3.1 Demographic and Clinical Characteristics

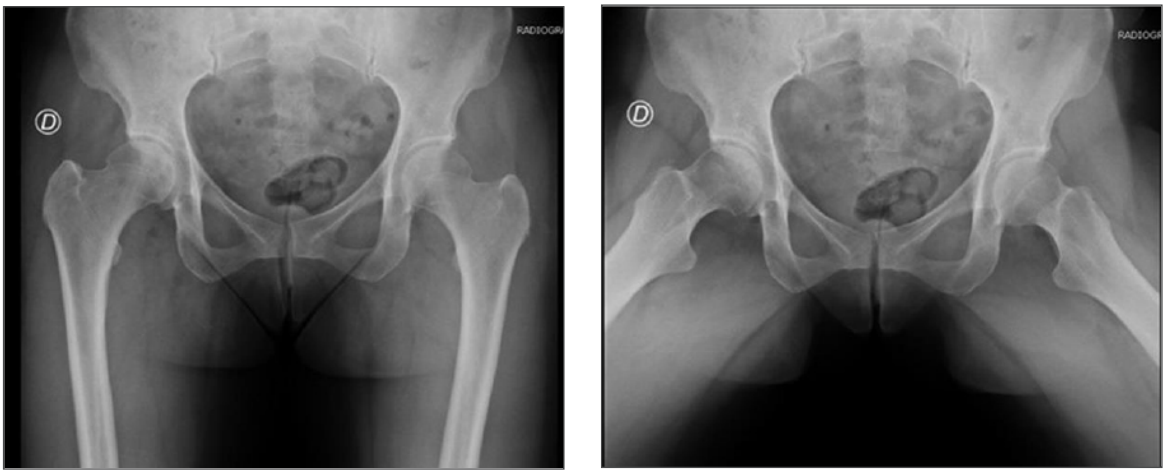
Out of a total of 1,728 primary total hip arthroplasties (THA) performed during the study period, 32 patients (1.85%) met the inclusion criteria. All were postmenopausal women, with a mean age of 54 years (range: 47–61) and a mean follow-up time of 5.2 years (range: 1–9 years). The average body mass index (BMI) was 28.9 (range: 21.7–32.8). Regarding physical activity level, 12 patients (37.5%) were classified as inactive, 7 (21.9%) as mildly active, 8 (25%) as moderately active, and 5 (15.6%) as highly active. As for comorbidities, 2 patients (6.25%) had diabetes, 5 (15.6%) had hypertension, and 14 (43.8%) had dyslipidemia. Twelve patients (37.5%) underwent a diagnostic intra-articular lidocaine injection in the hip, with all showing positive responses (pain relief lasting 6–8 hours). This test was only performed in patients classified as stage 0/1 (bone marrow edema pattern and cartilage damage) according to the SHOMRI criteria (8).

Table 1. *Demographic and Clinical Characteristics (n = 32)*

Variable	Result
Mean age (years)	54 (47–61)
Mean follow-up (years)	5.2 (1–9)
Mean BMI (range)	28.9 (21.7–32.8)
Physical activity level	Inactive: 12 (37.5%) Mildly active: 7 (21.9%) Moderately active: 8 (25%) Highly active: 5 (15.6%)
Comorbidities	2 diabetics (6.25%) 5 hypertensives (15.6%) 14 with dyslipidemia (43.8%)
Positive lidocaine test	12 (37.5% of total sample; 100% of tested cases)

3.2 Radiographic Findings

Six patients were classified as Kellgren-Lawrence grade 0 and twenty-six as grade 1 (Figures 1A and 1B).



1A 1B

Figure 1. *1A – Anteroposterior hip radiograph showing Kellgren-Lawrence grade I OA; 1B – Lowenstein lateral view showing the same classification.*

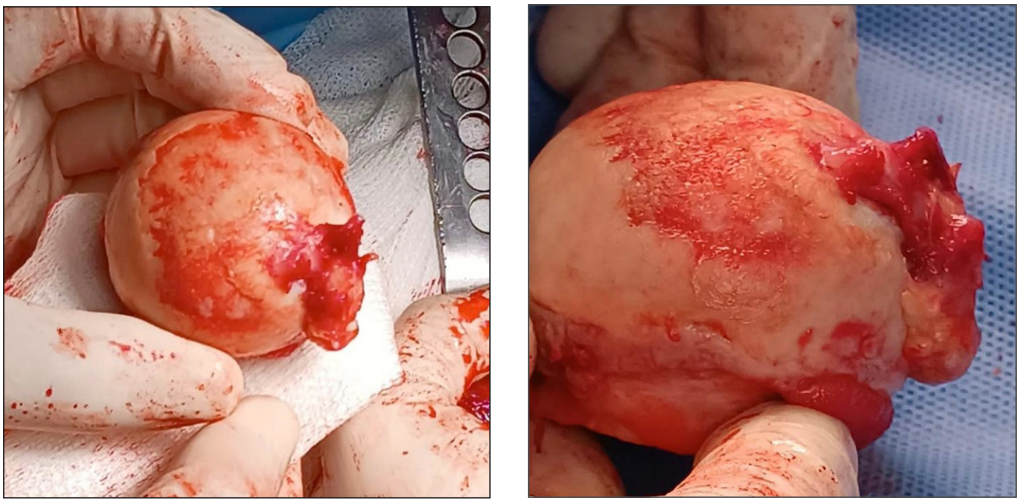
3.3 MRI Findings

Most patients presented with SHOMRI grade 0 or 1 changes (Figure 2). Only two patients showed bone marrow edema pattern grade 2. Additionally, 14 patients had grade 2 labral abnormalities, and one had a grade 3 labral lesion.

Figure 2. *MRI of the right hip showing minimal early OA changes (SHOMRI grade 0 and 1).*

3.4 Intraoperative Findings

All cases revealed significant cartilage damage in the medial pole, the anterosuperior weight-bearing zone of the femoral head, and/or the acetabular weight-bearing region (Figure 3). Lesions included partial cartilage loss, softening, delamination, and yellowish discoloration. The intra-articular soft tissues showed marked inflammation and edema.



A B

Figure 3. *3A and 3B – Femoral head from the same patient showing extensive cartilage damage in the weight-bearing zone and medial pole.*

3.5 Functional Outcomes

Patients demonstrated significant improvements in functional scores (Table 2):

- The Harris Hip Score (HHS) improved from a preoperative mean of 48 ± 4.2 to 96 ± 3.8 at one-year follow-up ($p < 0.001$).
- The WOMAC score decreased from a preoperative mean of 63.2 ± 5.5 to 22.5 ± 4.7 at one year ($p < 0.001$).

Table 2. *Pre- and Postoperative Functional Outcomes*

Variable	Preoperative	Postoperative (1 year)	p-value
Harris Hip Score (HHS)	48 ± 4.2	96 ± 3.8	< 0.001
WOMAC	63.2 ± 5.5	22.5 ± 4.7	< 0.001

Paired sample t-tests were used for statistical comparisons, with significance set at $p < 0.05$.

3.6 Postoperative Recovery

All patients resumed their pre-symptom activity levels within the first 45 days after surgery, with no reported complications.

4. Discussion

Our study highlights the dissociation between severe clinical symptoms and minimal or absent radiographic findings in a small group of postmenopausal women with early-stage hip osteoarthritis (OA), emphasizing total hip arthroplasty (THA) as an effective therapeutic option in this context. This discrepancy, previously acknowledged in international literature, reflects the limitations of plain radiographs in detecting early structural changes in the hip joint (9–14).

Studies such as that by Lidaka et al. (15) have shown that up to 2% of patients with hip pain may lack significant radiological evidence (Kellgren-Lawrence grades 0/1 and 2), underscoring the need for more sensitive diagnostic tools. Although magnetic resonance imaging (MRI) provides information on cartilage status, bone marrow edema, and synovitis, its accuracy is not absolute (16–19); hips with MRI-detected lesions may be asymptomatic, while symptomatic cases may present without clear OA changes (20). Mourad et al. noted the difficulty of relying on validated diagnostic criteria for early-stage hip OA, which hinders timely diagnosis (21).

In our series, all patients were postmenopausal women with a mean age of 54 years, suggesting a possible link between estrogen deficiency and articular cartilage degeneration. Previous research shows that menopause is associated with increased collagen degradation, supported by biomarkers such as CTX-II, and that chondrocytes possess estrogen receptors, indicating a protective role of these hormones on cartilage integrity (22–24).

Regarding postoperative outcomes, we observed significant improvements in both the Harris Hip Score (HHS) and WOMAC scores, with marked pain relief and rapid functional recovery. The average return to pre-symptom activities within 45 days aligns with findings by Nilsdotter et al., who reported that radiographic severity before surgery does not necessarily correlate with postoperative functional response—reinforcing that even patients with normal radiographs but severe symptoms may benefit substantially from THA (25).

However, these findings must be interpreted with caution. First, the small sample size and retrospective nature of the study limit the generalizability of the results, as external factors (e.g., adherence to rehabilitation protocols or individual motivation) cannot be ruled out. Second, the presence of comorbidities (e.g., diabetes, hypertension, dyslipidemia) and variability in physical activity levels may explain differences in outcomes. Additionally, the lack of fully standardized clinical documentation and assessment scales (WOMAC and HHS) may introduce further bias. Finally, the intraoperative discovery of more extensive damage than suggested by imaging highlights the need for more sensitive diagnostic methods to detect early joint deterioration not visible on conventional radiography or, in some cases, MRI.

These limitations reinforce the importance of future studies with larger sample sizes and longer follow-up periods, preferably prospective in design and including comparative groups. Furthermore, multivariable statistical models that control for confounding factors—such as comorbidities or hormonal status—could help determine the actual contribution of THA to functional improvement in patients with minimal radiographic findings. The integration of biochemical markers of joint degeneration or advanced imaging techniques (e.g., T2 mapping or dGEMRIC) may also provide more detailed insights into the early phases of OA (26, 27).

In conclusion, THA is an effective intervention even in patients with inconclusive imaging findings but disabling symptoms. However, the heterogeneity of this patient group and the study design call for caution when generalizing the results. Optimizing diagnostic criteria and developing individualized interventions, along with larger-scale controlled trials, will help better define the indications and benefits of THA in early-stage hip OA.

5. Conclusion

Total hip arthroplasty has proven to be an effective therapeutic option for patients with early-stage hip osteoarthritis and disabling symptoms, even in the absence of conclusive radiographic findings. Patients experienced significant improvements in pain and function—as measured by the Harris Hip Score and WOMAC—and returned early to their usual activities.

Our results underscore the importance of prioritizing clinical presentation in decision-making, especially in postmenopausal women, where hormonal factors may contribute to joint degeneration. In this context, total hip arthroplasty represents a valid solution that improves quality of life, supporting its use in appropriately selected cases.

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Informed Consent (patient/guardian)

Not applicable.

Institutional Ethics Committee

Not applicable.

Author Contributions

All authors equally contributed to the conceptualization, data collection, formal analysis, methodology, project administration, resource provision, software oversight, and drafting of the original manuscript.

Conflict of Interest Statement

None declared.

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