Int. j. adv. multidisc. res. stud. 2025; 5(2):1094-1101

Received: 07-02-2025
Accepted: 17-03-2025

International Journal of Advanced Multidisciplinary Research and Studies

ISSN: 2583-049X

Therapeutic Approaches for Hip Osteoarthritis: An Integrative Review of Conservative and Surgical Treatments

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DOI: https://doi.org/10.62225/2583049X.2025.5.2.3950 Corresponding Author: **Fernanda Grazielle da Silva Azevedo Nora**

Abstract

Objective: This study aimed to analyze the most used treatments for hip osteoarthritis (HOA), comparing conservative management and surgical intervention, particularly total hip arthroplasty (THA). The research sought to evaluate the effectiveness, limitations, and clinical applications of both approaches, emphasizing their impact on pain management, functional improvement, and disease progression.

Methodology: This study followed an integrative literature review approach, analyzing 22 peer reviewed studies published between 2015 and 2025. The databases PubMed, Scopus, Web of Science, ScienceDirect, and SciELO were searched using specific keywords. Inclusion criteria consisted of studies that focused on non-surgical and surgical treatments for HOA, including NSAIDs, viscosupplementation, physical therapy, rehabilitation strategies, and total hip arthroplasty. Articles were evaluated using the Critical Appraisal Skills Programme (CASP) to ensure methodological rigor.

Results: The findings demonstrated that conservative treatment is effective in mild to moderate HOA cases, providing temporary symptom relief and functional maintenance. NSAIDs and opioids (Ulusoy & Kıvrak, 2023) [31] were effective for pain control, while viscosupplementation improved joint lubrication (Sousa *et al*., 2022) [28]. Additionally, physical therapy and cognitive rehabilitation enhanced mobility and neuromuscular adaptation (Linnhoff *et al*., 2025) [18]. However, conservative treatment becomes less effective as the disease progresses, often requiring surgical intervention. Total hip arthroplasty (THA) was identified as the gold standard for severe HOA, offering long-term pain relief, biomechanical correction, and improved quality of life (Cohen *et al*., 2020) [10]. Advancements in prosthetic materials and minimally invasive techniques have contributed to faster recovery and longer implant durability (Santoso *et al*., 2018) [27].

Conclusion: The study confirms that conservative management should be prioritized in the early stages of HOA, while THA remains the most effective solution for end-stage cases. Spinopelvic biomechanics, patient-specific conditions, and functional demands must be considered in treatment decisions. Future research should focus on enhancing conservative treatments to prolong joint function, improving prosthesis materials, and optimizing post-surgical rehabilitation strategies to ensure better outcomes.

Keywords: Hip Osteoarthritis, Total Hip Arthroplasty, Conservative Treatment, Rehabilitation, Prosthesis Biomechanics

1. Introduction

Hip osteoarthritis (HOA) is a progressive degenerative disease that affects the coxofemoral joint, being one of the leading causes of chronic pain and functional disability in adults and the elderly (Jovičić *et al*., 2023). It is characterized by the progressive degradation of articular cartilage, bone remodeling, and inflammation of the synovial membrane, resulting in

limited range of motion and a significant decline in patients' quality of life (Espósito *et al*., 2018). The functional impact of HOA manifests in difficulties performing daily activities such as walking, climbing stairs, and standing for extended periods, highlighting the need for effective therapeutic strategies to manage the disease (Cohen *et al*., 2019).

The etiology of HOA involves a complex interaction between biomechanical and metabolic factors. Population aging, excess body weight, muscle imbalances, and alterations in hip biomechanics are key contributors to disease progression (Zhang *et al*., 2015). Additionally, the relationship between spinopelvic mobility and hip alignment has been widely investigated, as postural misalignments can directly influence joint overload and the progressive degeneration of cartilage (Aqil *et al*., 2016).

The treatment of HOA can be approached conservatively or surgically, depending on disease severity, patient clinical characteristics, and response to initial therapies. Conservative management primarily aims to relieve pain and slow down joint degeneration through non-invasive interventions (Sousa *et al*., 2022) [28]. Strategies such as physical rehabilitation, weight management, and modifications in physical activity are widely recommended to enhance function and reduce joint load impact (Crespo Rodríguez *et al*., 2015) [11].

Physical therapy plays a crucial role in muscle strengthening, improving joint mobility, and reducing biomechanical impacts on the hip. Specific exercises help in postural realignment and coxofemoral joint stabilization, resulting in better movement quality and pain reduction (Linnhoff *et al*., 2025) [18]. Moreover, viscosupplementation has been employed as a therapeutic alternative for patients with mild to moderate HOA, recognized for its ability to enhance joint lubrication and reduce cartilage wear (Sousa *et al*., 2022) [28].

Non-steroidal anti-inflammatory drugs (NSAIDs) and analgesics are frequently prescribed for symptomatic pain relief in HOA. However, prolonged use is associated with gastrointestinal and cardiovascular side effects, especially in elderly patients (Rochi *et al*., 2021). Intra-articular corticosteroid injections can also be used in selected cases, providing short-term pain relief but without altering disease progression (Ulusoy; Kivrak, 2023) [31].

When conservative treatment fails to provide sufficient symptom relief and functional limitation becomes severe, surgical intervention is recommended. Total hip arthroplasty (THA) is considered the gold standard for patients with advanced HOA, significantly improving quality of life and mobility (Clough; Clough, 2021) [9]. The success of THA depends on various factors, including the patient's individual biomechanics, the choice of prosthesis type, and the quality of surgical component fixation (Cohen *et al*., 2019).

Different implant types and prosthetic materials are available for THA, with ceramic prostheses being recognized for their greater durability and lower wear rates compared to traditional metal models (Clough; Clough, 2021) [9]. Minimally invasive techniques have been developed to reduce postoperative recovery time and minimize the risk of complications, allowing for faster and more efficient rehabilitation (Santoso *et al*., 2018) [27].

Gait pattern analysis after THA has shown that, despite biomechanical correction provided by surgery, some functional alterations may persist, especially in patients with preexisting spinopelvic misalignments (Aqil *et al*., 2016). Postoperative rehabilitation plays a crucial role in functional readaptation, aiming to improve gait symmetry and optimize joint stability (Linnhoff *et al*., 2025) [18].

Given the different therapeutic approaches available for HOA, it is essential to understand the benefits and limitations of each treatment modality. Thus, this study aimed to analyze the most used treatments for hip osteoarthritis, considering both conservative and surgical perspectives based on the latest scientific evidence.

2. Methodology

This research was conducted as an integrative literature review, a robust methodology that allows for comprehensive synthesis and critical analysis of scientific studies on a given topic, combining different types of evidence. The choice of this approach was motivated by the need to understand broadly and systematically the therapeutic options for hip osteoarthritis (HOA), comparing conservative and surgical treatments. The review followed a rigorous protocol to ensure the quality, validity, and scientific relevance of the included studies, ensuring that the results provide a reliable and up-to-date overview of best practices for the treatment of HOA.

The review methodology was carefully designed to answer the following research question, formulated based on the PICO strategy (Patient, Intervention, Comparison, and Outcome): What are the most effective treatments for hip osteoarthritis, considering the conservative and surgical approaches? This central question served as a constant guide throughout the process of selecting, analyzing, and interpreting the studies, ensuring that the research remained focused and relevant.

The literature search was conducted comprehensively in indexed and widely recognized databases, including PubMed, Scopus, Web of Science, ScienceDirect, and SciELO. The use of these databases ensures access to a wide range of high-quality scientific literature. To optimize the search, controlled and free descriptors were used, combining terms such as "hip osteoarthritis treatment," "total hip arthroplasty," "conservative management of hip osteoarthritis," "hip prosthesis biomechanics," "rehabilitation after hip arthroplasty," and their equivalents in Portuguese. The search was refined through the strategic use of Boolean operators (AND, OR, and NOT) to combine search terms precisely and optimize results, ensuring that only the most relevant studies were identified.

The selection of articles was carried out based on predefined inclusion and exclusion criteria. Studies published between 2015 and 2025, in English and Portuguese, were included, which addressed the treatment of HOA, comparing conservative and surgical approaches. The prioritization of randomized clinical trials, systematic reviews, cohort studies, and meta-analyses ensured that the review was based on high-quality scientific evidence. Case studies, narrative reviews without a clear methodology, and articles without peer review were excluded, ensuring that only studies with appropriate methodological rigor were included in the final analysis.

The critical evaluation stage of the selected studies was carried out using the Critical Appraisal Skills Programme (CASP) tool. This tool allowed for the analysis of the methodological validity and applicability of the findings to clinical practice, ensuring that only articles with a score

above 7 on the CASP scale were included in the final analysis. This rigorous critical evaluation process ensured that the review was based on reliable and high-quality evidence.

The data extracted from the studies included detailed information on the sample, interventions applied, effectiveness of treatments, clinical outcomes, and biomechanics of the prostheses used in total hip arthroplasty (THA). To facilitate the synthesis of findings, the articles were organized into comparative tables, highlighting the main points of each intervention. This organization allowed for a clearer and more efficient analysis of the data, making it easier to identify patterns and trends.

The analysis of conservative treatments considered the types of medications used, the impact of physiotherapy and occupational therapy, the effectiveness of weight loss in reducing joint overload, and the use of intra-articular injections. In the surgical approach, the prosthetic fixation techniques, the materials of the prostheses, their biomechanics, and the postoperative outcomes were evaluated. This comprehensive analysis allowed for a detailed understanding of each therapeutic approach.

The comparison between treatments was carried out based on indicators of effectiveness, recovery time, complication rate, and impact on patients' quality of life. The findings were discussed considering current recommendations from international orthopedic guidelines, in addition to recent studies investigating advances in surgical techniques and rehabilitation strategies. This comprehensive approach ensures that the review reflects the current state of knowledge and best practices in the treatment of HOA.

In this way, the present integrative review offers a comprehensive and evidence-based analysis of the therapeutic options for HOA, assisting healthcare professionals in clinical decisionmaking and in improving treatment strategies. The rigorous methodology used ensures the quality and reliability of the results, making this review a valuable tool for clinical practice.

3. Results

Table 1 provides a comprehensive overview of key studies addressing conservative treatment strategies for hip osteoarthritis (HOA). The interventions analyzed include viscosupplementation, pharmacological treatments, physical therapy, rehabilitation, and diagnostic imaging techniques. These studies evaluate the efficacy of non-surgical approaches in symptom relief, functional improvement, and disease management. The findings highlight the potential benefits and limitations of conservative strategies, guiding healthcare professionals in selecting appropriate treatment plans based on patient-specific factors.

Table 1: Studies on Conservative Treatment for Hip Osteoarthritis

Study	Intervention	Key findings
Sousa *et al*. (2022) [28]	Viscosupplementation	Improvement in joint lubrication and pain reduction in patients with mild to moderate HOA.
Crespo Rodríguez *et al*. (2015) [11]	Magnetic resonance arthrography	High sensitivity in diagnosing lesions associated with HOA.
Rochi *et al*. (2021)	Intensive rehabilitation	Reduction in hospital stay and improvement in functional recovery.
Ulusoy & Kıvrak (2023) [31]	Use of NSAIDs and opioids	Effectiveness in pain reduction, but with adverse long-term effects.
Linnhoff *et al*. (2025) [18]	Physical therapy and cognitive rehabilitation	Physical therapy improves mobility and reduces pain; cognitive rehabilitation can aid in the return to functionality.
Aqil *et al*. (2016)	Effect of conservative treatment on gait	Gait symmetry improves, but some patients still have residual asymmetries.
Garcia *et al*. (2022) [15]	Spinopelvic mobility in HOA	Changes in pelvic mobility influence the effectiveness of conservative treatments.
Osteras *et al*. (2016)	Therapeutic exercise	Exercise therapy reduces pain and improves function, with no difference between high and low dosage.
Domingues *et al*. (2015) [13]	Osteoporosis and HOA	High prevalence of osteoporosis in patients with HOA, influencing the risk of fractures.
Nardo *et al*. (2015) [23]	Femoroacetabular impingement in HOA	Femoroacetabular impingement is common but not always symptomatic.

The results demonstrate that viscosupplementation (Sousa *et al*., 2022) [28] plays a crucial role in reducing joint pain and improving lubrication in mild to moderate HOA, making it a viable option for patients seeking to delay surgical intervention. Similarly, exercise-based interventions (Osteras *et al*., 2016; Linnhoff *et al*., 2025) [18] are shown to enhance mobility, decrease pain, and restore function. Physical therapy, when combined with cognitive rehabilitation (Linnhoff *et al*., 2025) [18], not only improves physical functionality but also helps in neuromuscular adaptation and patient confidence in movement, further enhancing rehabilitation outcomes.

Pharmacological treatments remain essential in conservative management; NSAIDs and opioids (Ulusoy & Kıvrak, 2023) [31] are effective for pain relief, but their long-term use is associated with gastrointestinal and cardiovascular risks. The findings underscore the importance of evaluating patient-specific risk factors before prescribing long-term medication. Additionally, Garcia *et al*. (2022) [15] highlights the influence of spinopelvic mobility on treatment efficacy, suggesting that postural and biomechanical assessments should be incorporated into conservative treatment plans for better outcomes.

Diagnostic advancements also contribute significantly to conservative management. Crespo Rodríguez *et al*. (2015) [11] demonstrate that direct magnetic resonance arthrography offers high sensitivity in detecting intra-articular lesions, which aids in precise treatment planning. Additionally, studies on osteoporosis prevalence (Domingues *et al*., 2015) [13] and femoroacetabular impingement (Nardo *et al*., 2015) [23] reveal that underlying skeletal conditions frequently coexist with HOA, impacting treatment efficacy and requiring multidisciplinary management. These findings collectively emphasize the necessity of a personalized,

multimodal approach to conservative HOA treatment, integrating pharmacology, rehabilitation, biomechanical assessments, and diagnostic precision to optimize patient outcomes.

Table 2 presents a concise summary of relevant studies on the surgical treatment of hip osteoarthritis, covering a variety of aspects, from implant survival to return to sports activity after surgery. The included studies offer valuable insights into different techniques, risk factors, and outcomes associated with total hip arthroplasty (THA) and other surgical interventions.

Table 2: Summary of Studies on Surgical Treatment for Hip Osteoarthritis

Study	Intervention	Key findings
Cohen *et al.* (2020) [10]	THA implant survival	Ceramic-on-ceramic implants show greater survival (mean 12.8 years)
Zhang *et al.* (2015)	Biomechanical correction postTHA	THA corrects limb length discrepancies and improves postural stability
Clough & Clough (2021) [9]	Metal-on-metal hip resurfacing	Indicated for young and active patients, but requires monitoring due to the risk of adverse reactions
Santoso *et al.* (2018) [27]	Minimally invasive technique in THA	Minimizes hospital stay and improves postoperative recovery
Esposito *et al.* (2018) [14]	Spinopelvic alignment and risk of dislocation	Patients with fixed spinopelvic misalignment have a higher risk of post-THA dislocation
Linnhoff *et al.* (2025) [18]	Comparison of THA vs TKA in functional recovery	Functional recovery differs between THA and TKA, with impacts on rehabilitation
Matsumoto *et al.* (2017) [19]	Influence of contralateral hip on post-THA evaluation	Contralateral hip significantly influences the FJS-12 score in the THA evaluation
Di Martino *et al.* (2024) [12]	Return to sports after THA	Patients can return to sports activities, but with restrictions in high-impact sports
Mazur *et al.* (2023) [20]	THA in very young patients	Satisfactory results in patients <30 years old, but concerns about early implant failure
Tu *et al.* (2025) [30]	Biomechanical evaluation of THA	Biomechanical methods assist in optimizing surgeries and adjusting prostheses

The first study, by Cohen *et al.* (2020) [10], highlights the importance of implant choice in THA, demonstrating that ceramic-on-ceramic implants exhibit greater survival compared to other options. The study by Zhang *et al.* (2015) emphasizes the biomechanical benefits of THA, showing that surgery corrects limb length discrepancies and improves patients' postural stability. Next, Clough & Clough (2021) [9] address metal-on-metal hip resurfacing, an option for young and active patients but which requires monitoring due to the risk of adverse reactions.

Continuing, the study by Santoso *et al.* (2018) [27] demonstrates that the minimally invasive technique in THA can reduce hospital stay and improve patients' postoperative recovery. The study by Esposito *et al.* (2018) [14] warns of the importance of spinopelvic alignment, revealing that patients with fixed misalignment have a higher risk of dislocation after THA. Linnhoff *et al.* (2025) [18] compare THA with total knee arthroplasty (TKA) in relation to functional recovery, showing that there are differences between the surgeries, which impacts patients' rehabilitation. The final studies address other important aspects of THA. Matsumoto *et al.* (2017) [17] reveal that the contralateral hip influences the post-THA evaluation, while Di Martino *et al.* (2024) [12] explore the return to sports activity after surgery, showing that it is possible, but with restrictions in high-impact sports. Mazur *et al.* (2023) [20] investigate THA in very young patients, with satisfactory results, but with the need for follow-up due to concerns about early implant failures. Finally, Tu *et al.* (2025) [30] highlight
the importance of biomechanical evaluation in optimizing surgeries and adjusting prostheses, contributing to better results in THA.

This table (Table 3) compares conservative and surgical (specifically, Total Hip Arthroplasty - THA) approaches for managing hip osteoarthritis (HOA) across several key criteria. It highlights the trade-offs between the two approaches, helping patients and clinicians weigh the benefits and risks of each.

Table 3: Comparison of Conservative vs. Surgical Approaches

Criteria	Conservative Treatment	Surgical Treatment (THA)
Pain Management	Effective initially, but pain relief tends to decline over time as the disease progresses.	Highly effective in providing significant and long-lasting pain relief.
Functional Improvement	Can offer partial improvement in function, but the extent of improvement depends heavily on patient compliance with rehabilitation programs and the severity of the disease.	Typically leads to complete or nearcomplete restoration of mobility and function.
Durability of Effect	Effects are temporary as conservative management does not address the underlying disease process, which continues to progress.	Effects are generally long-term, although the longevity depends on the lifespan of the prosthesis and other factors.
Risk Factors	Primarily related to the side effects of medications used for pain management (e.g., NSAIDs).	Involves surgical risks, including infection, dislocation, blood clots, and reactions to anesthesia.
Recovery Time	Recovery is immediate in terms of resuming daily activities, but functional improvement is gradual.	Requires a medium to long-term recovery period (typically 3-6 months) to regain full function and strength.
Indications	Appropriate for mild to moderate HOA where pain and functional limitations are manageable.	Recommended for severe or refractory HOA that significantly impacts quality of life and has not responded to conservative treatment.
Cost	Generally lower due to the avoidance of surgery and hospitalization.	Significantly higher due to the costs associated with surgery, hospitalization, rehabilitation, and the prosthesis itself.

This table (Table 3) presents a comparative overview of conservative and surgical approaches for managing hip osteoarthritis (HOA), focusing specifically on Total Hip Arthroplasty (THA) as the primary surgical intervention. It outlines the key differences between these two treatment strategies across seven crucial criteria: pain management, functional improvement, durability of effect, risk factors, recovery time, indications, and cost. By examining these criteria sideby-side, patients and healthcare providers can better understand the trade-offs associated with each approach and make informed decisions about the most appropriate course of treatment.

In terms of pain management, conservative treatments, such as medication, physical therapy, and lifestyle modifications, can provide effective relief for mild to moderate HOA. However, this relief tends to diminish over time as the disease progresses and joint damage worsens. In contrast, THA offers highly effective and long-lasting pain relief by replacing the damaged joint surfaces with artificial components. Regarding functional improvement, conservative methods may offer partial

restoration of mobility and function, but their effectiveness is limited by the extent of joint damage and the patient's adherence to rehabilitation programs. THA, on the other hand, typically leads to complete or near-complete restoration of mobility and function, enabling patients to return to their normal activities with minimal limitations.

The durability of the treatment effects also differs significantly between the two approaches. Conservative treatments provide only temporary relief, as they do not address the underlying disease process, which continues to progress and cause further damage to the joint. Conversely, THA offers long-term benefits, with the prosthesis typically lasting for 15-20 years or even longer with proper care. However, THA involves surgical risks, such as infection, dislocation, blood clots, and reactions to anesthesia, which are not associated with conservative treatments. Conservative treatments primarily carry the risk of side effects from medications, such as gastrointestinal issues or cardiovascular problems. As for recovery time, conservative treatments require minimal downtime and allow patients to resume their daily activities immediately, although functional improvement is gradual. THA, on the other hand, requires a medium to long-term recovery period (typically 3-6 months) to regain full function and strength, due to the need for healing and rehabilitation after surgery.

The indications for each treatment approach depend on the severity of the HOA and its impact on the patient's quality of life. Conservative treatments are generally recommended for mild to moderate HOA, where pain and functional limitations are manageable. THA is reserved for severe or refractory HOA that significantly impairs the patient's ability to perform daily activities and has not responded to conservative treatment. Finally, the cost of each approach varies considerably. Conservative treatments are generally less expensive due to the avoidance of surgery, hospitalization, and rehabilitation costs. THA, on the other hand, incurs significantly higher costs due to the surgery itself, hospitalization, rehabilitation programs, and the cost of the prosthesis.

4. Discussion

The results of this study provide a comprehensive comparison between conservative and surgical treatments for hip osteoarthritis (HOA), emphasizing their respective effectiveness, limitations, and clinical applications. Conservative management remains the primary approach for symptom relief and functional preservation, while total hip arthroplasty (THA) represents the definitive solution for patients with severe disease progression and functional disability. The decision regarding treatment modality depends on factors such as disease severity, patient-specific biomechanical conditions, and response to non-surgical interventions.

Conservative management of HOA aims to delay disease progression, alleviate pain, and maintain joint function (Sousa *et al*., 2022) [28]. Among the most studied interventions, viscosupplementation has demonstrated significant benefits in improving joint lubrication and reducing pain in mild to moderate HOA cases. Sousa *et al*. (2022) [28] reported that hyaluronic acid injections effectively enhance synovial fluid properties, providing a temporary protective effect on the articular cartilage. This intervention is particularly valuable for patients who are not immediate candidates for surgery, offering a minimally invasive option for symptomatic relief.

Pharmacological therapy remains a cornerstone of conservative treatment, with non-steroidal anti-inflammatory drugs (NSAIDs) and opioids being the most frequently prescribed agents (Ulusoy & Kıvrak, 2023) [31]. NSAIDs have been shown to effectively reduce inflammation and pain, but longterm use is associated with gastrointestinal, cardiovascular, and renal complications. Opioids, although effective in cases of severe pain, are associated with dependency risks, making their prolonged administration controversial in the management of HOA. These findings suggest that pharmacological interventions should be carefully tailored, with considerations regarding patient comorbidities, pain severity, and potential side effects (Ulusoy & Kıvrak, 2023) [31].

Rehabilitation and physical therapy play a critical role in conservative treatment, aiming to improve muscle strength, joint stabilization, and mobility (Linnhoff *et al*., 2025) [18]. Studies indicate that exercise-based interventions significantly contribute to pain reduction and functional improvement, reinforcing the importance of structured rehabilitation programs (Osteras *et al*., 2016). Additionally, the integration of cognitive rehabilitation has been explored as a strategy to enhance neuromuscular adaptation and reduce fear of movement, allowing patients to maintain an active lifestyle despite joint degeneration (Linnhoff *et al*., 2025) [18]. These findings highlight the need for a multimodal rehabilitation approach that incorporates both physical and cognitive interventions to optimize patient outcomes.

A fundamental aspect influencing the success of conservative treatment is spinopelvic mobility, which directly impacts biomechanical function and joint stability (Garcia *et al*., 2022) [15]. Garcia *et al*. (2022) [15] emphasized that altered pelvic mobility affects treatment efficacy, indicating that postural and biomechanical assessments should be routinely conducted before initiating conservative therapy. These findings suggest that a standardized approach to conservative management may not be applicable to all patients, as individual biomechanical differences must be considered when designing rehabilitation programs.

Despite its advantages, conservative treatment has inherent limitations, particularly in moderate to severe HOA cases. As the disease progresses, joint degeneration intensifies,

leading to a decline in the effectiveness of non-surgical interventions (Aqil *et al*., 2016). The study by Aqil *et al.* (2016) demonstrated that while conservative treatment improves gait symmetry, some patients still experience residual biomechanical impairments, which can contribute to functional instability and persistent joint stress. These findings highlight the progressive nature of HOA, indicating that conservative interventions may not suffice in advanced cases.

Moreover, coexisting musculoskeletal conditions, such as osteoporosis, significantly impact treatment outcomes (Domingues *et al*., 2015) [13]. Domingues *et al*. (2015) [13] reported that osteoporosis is highly prevalent in HOA patients, increasing fracture risk and accelerating disease progression.

This suggests that early screening for osteoporosis should be integrated into HOA management, as it can influence both conservative and surgical decision-making. Additionally, the presence of femoroacetabular impingement (FAI) further complicates treatment outcomes, as Nardo *et al*. (2015) [23] found that FAI is frequently associated with HOA and can exacerbate symptoms. In cases where FAI contributes to pain and mechanical restriction, surgical intervention may be warranted to address the underlying anatomical abnormalities (Nardo *et al*., 2015) [23].

For patients with severe HOA and significant functional impairment, total hip arthroplasty (THA) remains the gold standard of treatment (Cohen *et al*., 2020) [10]. The findings from Cohen *et al*. (2020) [10] indicate that ceramic-ceramic prostheses demonstrate superior longevity, with an average survival rate of 12.8 years, making them the preferred choice for younger, active patients. These results suggest that implant selection plays a crucial role in determining long-term surgical success, emphasizing the importance of prosthesis material and design in optimizing patient outcomes.

Beyond pain relief, THA has been shown to restore biomechanical function by correcting joint deformities and improving stability. Zhang *et al*. (2015) demonstrated that THA effectively corrects leg length discrepancies, leading to improved postural stability and enhanced gait mechanics. These findings reinforce the notion that surgical intervention not only alleviates pain but also addresses the underlying biomechanical abnormalities associated with HOA.

Advancements in minimally invasive surgical techniques have further enhanced THA outcomes. Santoso *et al*. (2018) [27] reported that minimally invasive THA reduces hospitalization time and accelerates post-operative recovery, making it a viable option for patients seeking faster rehabilitation. However, these benefits are contingent upon appropriate patient selection, as minimally invasive procedures require preserved bone quality and adequate soft tissue integrity to achieve optimal long-term outcomes.

One of the primary concerns in THA is prosthesis dislocation, particularly in patients with fixed spinopelvic alignment (Esposito *et al*., 2018) [14]. Esposito *et al*. (2018) [14] found that patients with restricted spinopelvic mobility exhibit a higher risk of THA dislocation, underscoring the importance of preoperative biomechanical assessment. These findings suggest that spinopelvic evaluations should be routinely performed before THA, allowing for better alignment planning and improved post-surgical stability.

Furthermore, THA has been studied for its impact on functional recovery and return to physical activity. Di Martino *et al*. (2024) [12] reported that post-THA patients can resume sports activities, though high-impact sports should be approached with caution to prevent premature implant wear and loosening. Similarly, Mazur *et al*. (2023) [20] highlighted that patients under 30 years old present higher implant failure rates, necessitating closer monitoring and potential revision surgeries. These findings suggest that while THA restores function and enables an active lifestyle, prosthesis durability and patient activity levels must be carefully managed.

Recent advancements in biomechanical modeling and prosthesis design have contributed to more precise surgical planning and improved post-operative outcomes. Tu *et al*. (2025) [30] demonstrated that biomechanical analysis allows for optimized prosthesis alignment, leading to better long-term THA results. These findings reinforce the importance of individualized surgical planning, as patient-specific biomechanical characteristics can significantly impact surgical success and implant longevity.

Overall, the findings of this study confirm that both conservative and surgical treatments have a place in HOA management. Conservative treatment should be prioritized in the early stages of the disease, focusing on pain management, functional preservation, and delaying surgical intervention. However, for patients with advanced HOA and severe functional limitations, THA provides the most effective long-term solution, offering substantial pain relief, biomechanical correction, and improved quality of life. Future research should continue to explore advancements in prosthesis materials, minimally invasive techniques, and post-operative rehabilitation protocols to optimize treatment outcomes for all patient populations.

5. Conclusion

The present study analyzed the most used treatments for hip osteoarthritis (HOA), comparing conservative management and surgical intervention, particularly total hip arthroplasty (THA). The findings highlight that both treatment modalities play essential roles in disease management, with conservative approaches being prioritized in the early stages of HOA and surgical intervention becoming necessary when functional impairment and pain become unmanageable through nonsurgical means.

Conservative treatment aims to relieve symptoms, maintain joint function, and delay disease progression, employing strategies such as pharmacological therapy, viscosupplementation, physical therapy, and rehabilitation. Studies have demonstrated that NSAIDs and opioids effectively manage pain (Ulusoy & Kıvrak, 2023) [31], while viscosupplementation enhances joint lubrication in mild to moderate cases (Sousa *et al*., 2022) [28]. Exercise-based therapy has proven to be a crucial component in improving mobility and strength (Osteras *et al*., 2016; Linnhoff *et al*., 2025 [18]), and cognitive rehabilitation has emerged as a valuable adjunct to physical therapy, helping patients maintain an active lifestyle despite progressive joint degeneration. However, conservative treatment has limitations, particularly in advanced disease stages, where joint degeneration continues to progress despite symptom management efforts.

As disease advances and conservative treatments lose efficacy, total hip arthroplasty (THA) becomes the standard intervention for patients experiencing severe pain, disability, and reduced quality of life (Cohen *et al*., 2020) [10]. THA has

been shown to restore joint function, correct biomechanical deformities, and provide long-term pain relief (Zhang *et al*., 2015). Advancements in prosthesis materials and surgical techniques have led to improved implant longevity, with ceramic

ceramic prostheses demonstrating extended durability (Cohen *et al*., 2020) [10]. Minimally invasive THA techniques have also reduced post-operative recovery times and improved rehabilitation outcomes (Santoso *et al*., 2018) [27].

Despite its success, THA presents potential complications, including prosthesis dislocation and wear, particularly in patients with spinopelvic misalignment (Esposito *et al*., 2018) [14]. Biomechanical assessments and individualized surgical planning are essential to reduce complications and optimize outcomes (Tu *et al*., 2025) [30]. Additionally, younger patients undergoing THA require close monitoring, as they are at a higher risk of implant failure and may require revision surgeries later in life (Mazur *et al*., 2023) [20].

Given the findings, it is evident that the choice between conservative and surgical treatment must be tailored to the individual patient, taking into account disease severity, functional impairment, comobidities, and biomechanical considerations. Conservative treatment remains the preferred approach in the early stages, while THA provides a definitive solution for end-stage HOA. Future research should focus on improving conservative management strategies to prolong joint function, developing more durable prosthesis materials, and enhancing rehabilitation protocols to optimize post-surgical recovery.

In conclusion, both conservative and surgical treatments play integral roles in HOA management, and a multidisciplinary approach is necessary to ensure that patients receive the most appropriate intervention at the right stage of their disease. As advancements in biomechanics, surgical techniques, and rehabilitation continue to evolve, treatment outcomes for HOA patients will continue to improve, ultimately enhancing their quality of life and functional independence.

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