ISSN 2689-8268 | Volume 8

American Journal of Surgery and Clinical Case Reports

Review Article Open Access

Iliopsoas Impingement in Dual Mobility Hip Implants:A Rare Complication with Effective Treatment

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Received: 08 Jan 2025
Accepted: 06 Feb 2025
Published: 12 Feb 2025
J Short Name: AJSCCR

Citation:

Bruno Capurro-Soler. Iliopsoas Impingement in Dual Mobility Hip Implants:A Rare Complication with Effective Treatment. Ame J Surg Clin Case Rep. 2025; 8(4): 1-6

1. Abstract

1.1. Introduction

Iliopsoas impingement (IPI) is an underdiagnosed cause of persistent groin pain following total hip arthroplasty (THA). While conventional IPI is typically attributed to acetabular overhang, dual mobility (DM) components introduce additional impingement mechanisms due to liner mobility. To date, only one case of IPI directly caused by a dual mobility liner has been described, without a documented resolution. This report presents the first comprehensive clinical case demonstrating the diagnostic challenges associated with iliopsoas impingement caused by dual mobility liners. It outlines an effective diagnostic protocol and highlights the successful management of this condition using minimally invasive hip arthroscopy.

1.2. Case Presentation

We describe the case of a 57-year-old female who developed groin pain three months after undergoing DM THA. Imaging studies, including radiographs, ultrasound, and computed tomography (CT), confirmed direct mechanical contact between the liner and iliopsoas tendon, further validated by diagnostic infiltration. Hip arthroscopy revealed liner extrusion and psoas impingement at the superolateral rim, which was successfully treated with partial iliopsoas tendon release, resulting in complete symptom resolution.

1.3. Conclusion

This case underscores the importance of considering IPI in patients with persistent groin pain following DM THA. It highlights the role of multimodal imaging and diagnostic infiltration in confirming the diagnosis, as well as the efficacy of arthroscopic management in resolving symptoms while preserving joint stability. Given the increasing use of DM components, awareness of this complication is crucial for optimizing patient outcomes and guiding implant selection in complex hip reconstructions.

2. Introduction

Total hip arthroplasty (THA) is a widely performed surgical procedure for the treatment of severe coxarthrosis. While most cases achieve excellent outcomes, iliopsoas impingement (IPI) remains an underdiagnosed cause of persistent groin pain in THA patients, with an incidence ranging from 2% to 7% according to published series [1].

In recent decades, the use of DM components in THA has increased significantly [2]. Their primary advantage is maximizing the effective femoral head size, which enhances the range of motion and optimizes joint stability, particularly in patients with a history of lumbar arthrodesis [3]. However, DM cups are not exempt from complications, with IPI being one of the reported issues [4]. To date, only one case of impingement between a dual

mobility liner and the iliopsoas tendon has been documented, yet it lacks a detailed description of the clinical and surgical resolution of the problem [5].We present the case of a patient diagnosed with iliopsoas impingement caused by direct contact between the dual mobility liner and the iliopsoas tendon following THA. A thorough evaluation, including clinical examination, ultrasound, radiography, and treatment with hip arthroscopy, enabled precise documentation of the impingement and its clinical implications. This case aims to provide additional evidence highlighting the importance of recognizing IPI as a potential complication in patients with dual mobility cups, thereby contributing to a better understanding and improved management of this condition.

3. Methods

3.1. Case Presentation

A 57-year-old female with a history of overweight (body mass index 35) and L4-L5 arthrodesis (14 years prior) presented with a two-year history of right inguinal and lateral coxalgia, unresponsive to physiotherapy and intra-articular hyaluronic acid injections. Examination revealed restricted range of motion (ROM), positive FADIR and FABER tests without decompression relief, and painful resisted hip abduction.Imaging, including anteroposterior and axial hip radiographs and ipsilateral MRI, revealed Tönnis grade III (6) coxarthrosis and a partial insertional tear of the gluteus medius tendon with tendinopathy, preoperative modified Harris Hip Score (mHHS) was 46. The patient underwent THA with concomitant gluteal reconstruction via an modifiedHardinge anterolateral approach. Implanted components included a 48 mm Plasmafit acetabular shell, a 48/32 mm Vitilene dual mobility liner, and a CoreHip femoral stem (B. Braun Melsungen AG, Germany).At 12 weeks postoperatively, the patient developed groin pain in the operated hip with a mHHS of 72. Examination revealed preserved passive ROM but pain with hip flexion and resisted leg elevation, without lateral discomfort. Radiographs, ultrasound, and computed tomography (CT) were performed for further evaluation. Radiographic assessment confirmed proper positioning of both acetabular and femoral components (Figure 1). Ultrasound identified iliopsoas tendinopathy in contact wirh the DM liner associated with bursitis (Figure 2A), while CT showed a hypodense area adjacent to the iliopsoas muscle, extending superiorly toward the trochanteric and femoral neck region (Figure 3). Three-dimensional reconstruction verified adequate acetabular bony coverage (Figure 4) and impingement due to liner extrusion (Figure 5). Imaging confirmed that the acetabular cup was optimally positioned, with appropriate anteversion, sizing, and centralization, ruling out any structural metallic factors as contributors to the impingement. Instead, the findings indicated that psoas impingement was attributable to the dual mobility liner.

Under ultrasound guidance, the patient underwent an diagnostic infiltration with of local anaesthetic and corticosteroids, along with tendon needling (figure 2B). She experienced significant pain relief for two weeks, followed by progressive recurrence of symptoms, supporting a positive diagnostic response.Hip arthroscopy was performed, revealing extensive synovitis and fibrosis, along with migration of the liner to the anterosuperior region. This displacement resulted in psoas tendon impingement against the superomedial portion of the dual mobility liner. A partial release of the iliopsoas tendinous portion was conducted at the level of the acetabular component. Arthroscopic visualization confirmed the release, which was further validated through dynamic assessment in maximum hip flexion and extension (Figure 6).At the six-month follow-up, the patient demonstrated favorable clinical progression, remaining asymptomatic in the right hip. Postoperative assessment revealed resolution of groin pain and full recovery of functional mobility, with no signs of residual iliopsoas impingement. Gait analysis showed normalized ambulation without compensatory mechanisms, and physical examination confirmed preserved hip range of motion without discomfort and fullstrength recovery, showing mHHS of 91 at 6-month Follow-up. These findings suggest a successful outcome following arthroscopic iliopsoas release for dual mobility liner impingement.

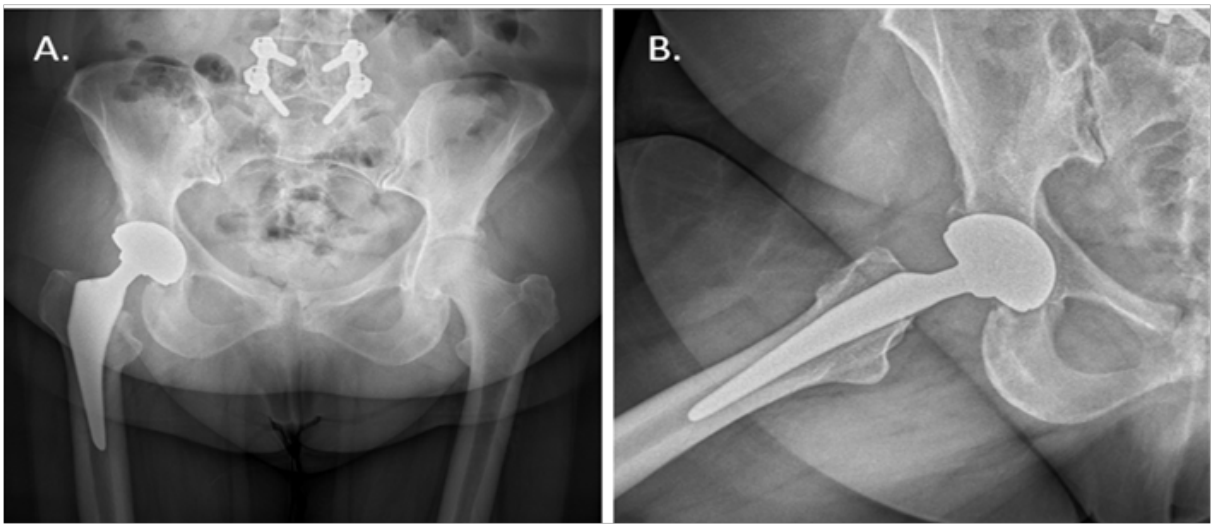

Figure 1: (A) Anteroposterior pelvic radiograph and (B) axial radiograph of the right hip, showing appropriate positioning of the acetabular cup and femoral stem.

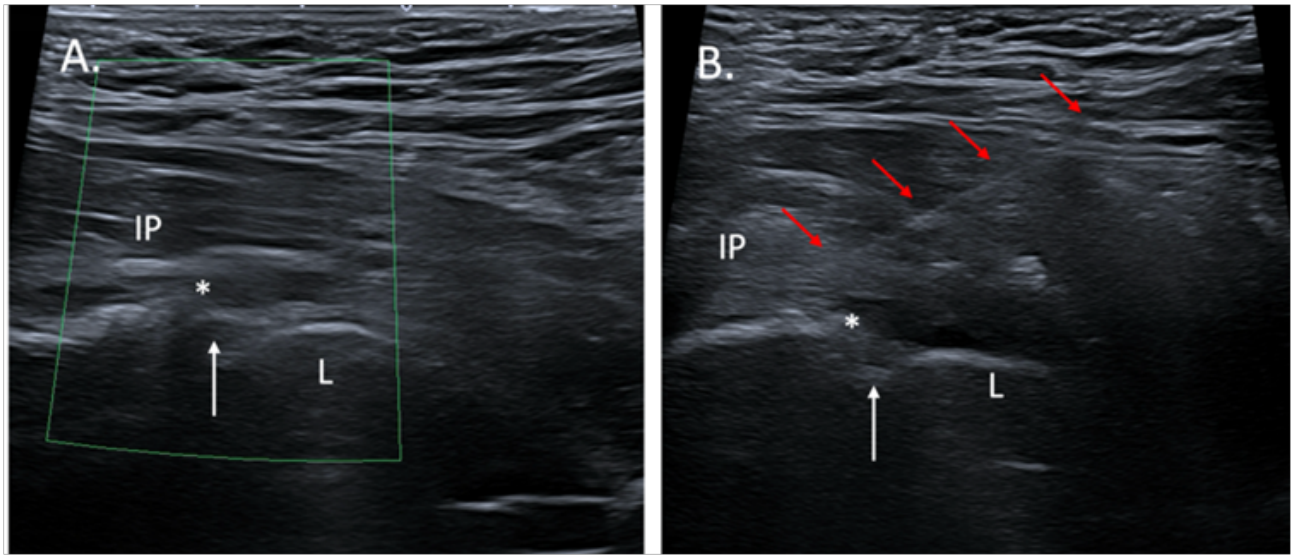

Figure 2(A): Longitudinal ultrasound images showing the contact between the psoas and the dual mobility liner associated with iliopsoas tendinopathy and bursitis. Acetabulum bone (*) the metallic acetabulum (white arrow), liner (L), and iliopsoas tendon (IP). is evident, associated with iliopsoas tendinopathy and bursitis. 2B.- US guided infiltration for iliopsoas impingement (red arrows).

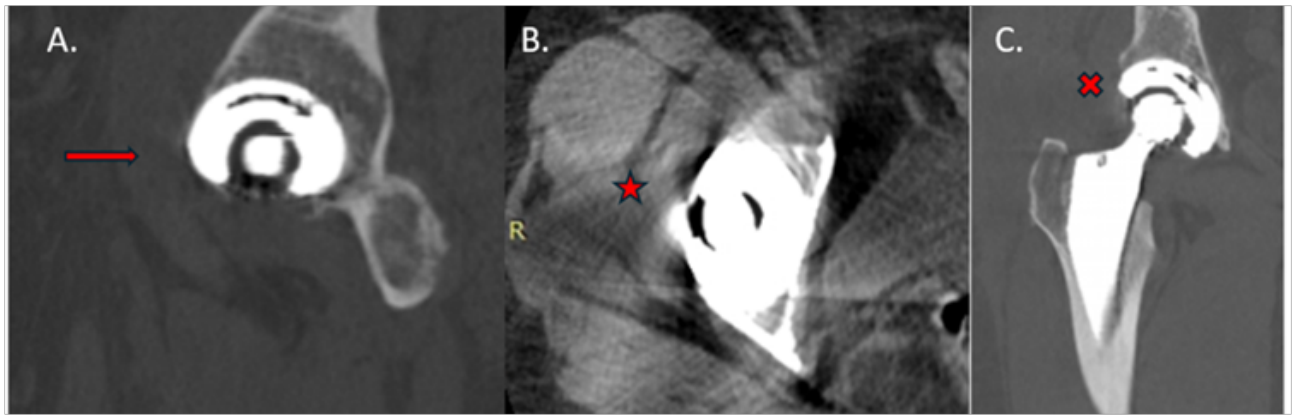

Figure 3: (A) Sagittal CT scan of the right hip showing contact between the insert and the psoas tendon (red arrow). (B) Axial CT scan with a star marking a hypodense, ill-defined region related to the iliopsoas tendon and the liner. (C) Coronal CT scan with an X indicating a lower-density area near the lateral edge of the femoral stem neck.

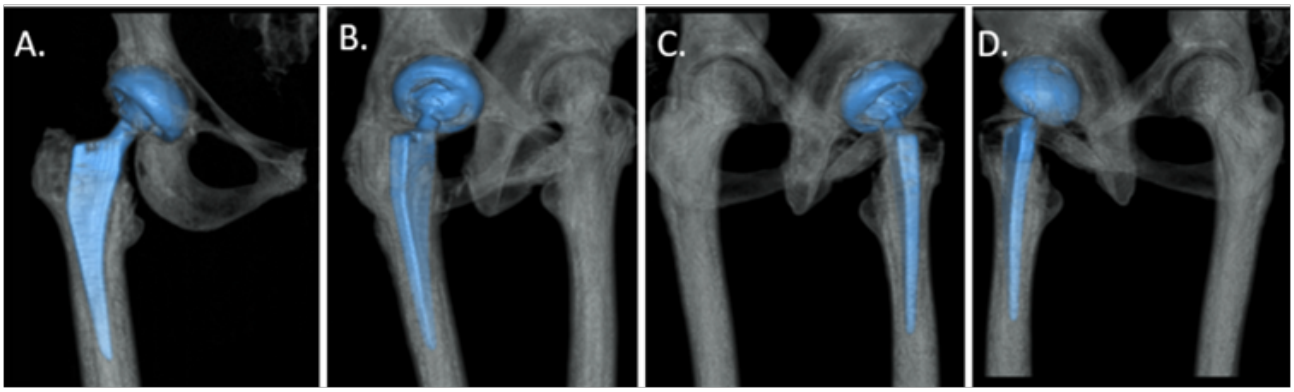

Figure 4: (A) to (D) are 3D reconstructions with metal suppression from a CT scan of the right hip in AP, lateral, internal oblique, and external oblique projections, respectively. Adequate bone coverage of the acetabular component is observed in the superolateral and anterior regions.

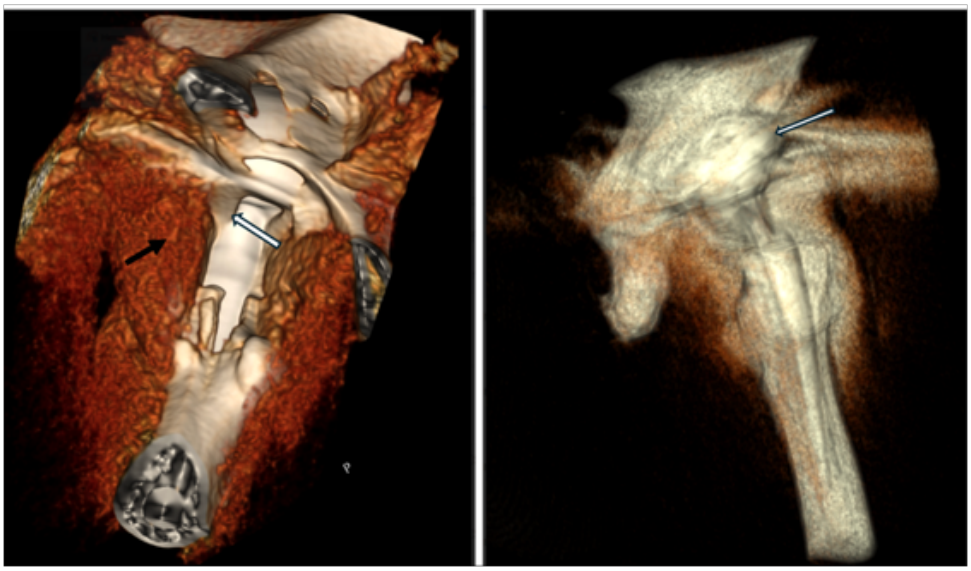

Figure 5: (A) and (B) are 3D reconstructions generated using Vitrea™ software*. (A) The white arrow indicates contact between the liner and the psoas tendon (black arrow). (B) The white arrow illustrates liner extrusion. *Vitrea™ is an advanced multimodal medical image viewer (Vital Images, Inc., Minnesota, USA).

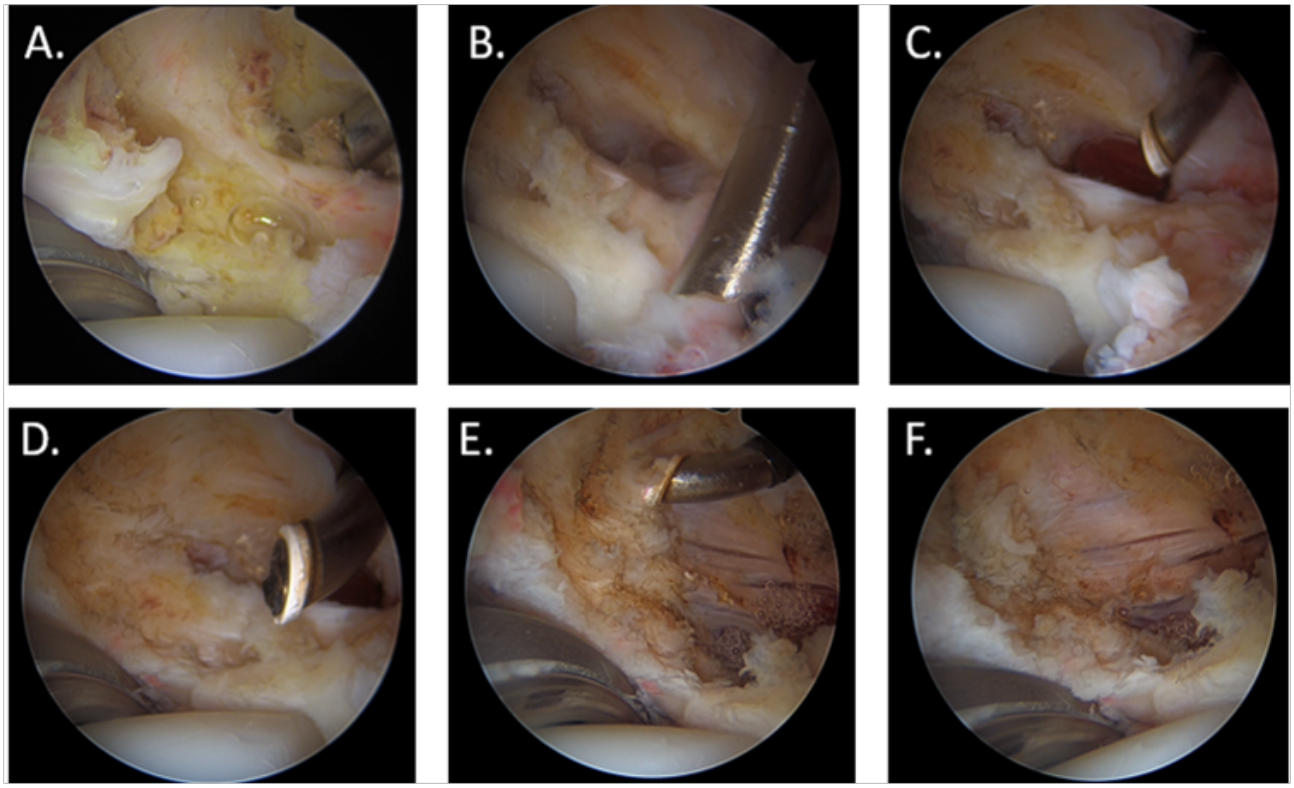

Figure 6: Intraoperative Hip Arthroscopic images of iliopsoas impingement with a DM Liner. (A) Abundant synovitis and fibrosis. (B) Impingement between the liner and the tendon during tenolysis. (C) Increased impingement with extension. (D) Partial tenotomy. (E) Progressive space release. (F) Complete release confirmation.

4. Discussion

The key finding of this study is that it represents the first comprehensive clinical case demonstrating the challenges in diagnosing iliopsoas impingement caused by dual mobility liners. It outlines an effective diagnostic protocol and highlights the successful management of this condition using minimally invasive hip arthroscopy. Classically, in conventional prostheses, the primary cause of IPI is attributed to contact between the acetabular component and the psoas tendon [7], typically associated with a retroverted, lateralized, and oversized acetabular cup at its anteroinferior edge [8]. However, in dual mobility cups, there may be a dual mechanism contributing to impingement. The first

corresponds to the classic etiology, where acetabular component-to-tendon contact is facilitated by the larger effective femoral head size, potentially increasing the risk of psoas and soft tissue impingement. The second arises from the dual articulation: one interface between the acetabular cup and the liner, and another between the liner and the femoral head. Since the insert is not fixed, its movement is unpredictable, leading to possible eccentric migration. Given the anatomical proximity of the psoas tendon, this migration can result in impingement [9].Biomechanical studies on cadaveric models [10] have demonstrated that liner motion can be affected by contact with the iliopsoas tendon, particularly in hyperextension positions. Zumbrunn et al. [11] showed that anatomically contoured liners reduce both contact pressure and stresses between the polyethylene (PE) liner and the iliopsoas tendon, suggesting that non-anatomical liners may predispose to impingement.Fessy et al. [5] first reported in vivo iliopsoas tendon impingement against the liner, diagnosed via ultrasound and arthro-CT scan, but did not describe management or outcomes. Our case confirms the diagnosis through multimodal imaging and diagnostic infiltration, demonstrating successful treatment with arthroscopic iliopsoas release. The favorable recovery underscores the effectiveness of this approach in resolving symptoms while preserving hip function and stability.The treatment of IPI in THA can be approached in different ways. Conservative management includes physiotherapy and injections, with reported success rates between 39-53% [12]. Arthroscopic or endoscopic tenotomy has a reported success rate of 93% [13], without increasing dislocation risk and improving functional outcomes [14]. Prosthesis revision is another treatment option, although Shapira et al. [15] demonstrated that revision is not superior to tenotomy and is associated with a higher complication rate.

This clinical case comprehensively presents the diagnosis and stepwise management of IPI following dual mobility total hip arthroplasty, from clinical assessment to advanced imaging studies (radiography, ultrasound, and CT scan), followed by minimally invasive arthroscopic treatment. It highlights the biomechanical implications of prosthetic design as a predisposing factor for impingement and a critical consideration in implant selection. Given that this is a single case and only two similar cases have been documented in the literature, there is a clear need for further research to assess long-term outcomes, compare different therapeutic strategies, and optimize the management of PIP-related complications.

5. Conclusion

In conclusion, this case highlights the complexity of Iliopsoas impingement in dual mobility total hip arthroplasty, emphasizing both the impact of prosthetic design as a predisposing factor and the importance of a stepwise and comprehensive diagnostic approach. While arthroscopic minimally invasive management can provide favourable initial outcomes, the limited number of reported cases underscores the need for further research on long-term follow-up to inform implant selection and optimize timely treatment strategies.

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