

Diagnosis and Management of Deep Gluteal Pain Syndrome (DGPS)

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Abstract

Background: Deep Gluteal Pain Syndrome (DGPS) is a frequently misdiagnosed condition characterized by chronic buttock pain radiating to the posterior thigh, often mimicking lumbar radiculopathy. Sciatic nerve entrapment in the deep gluteal space is the primary etiology, making early diagnosis and appropriate management crucial.

Aim of Study: This study evaluates the efficacy of different management strategies for DGPS, comparing conservative, interventional, and surgical approaches.

Patients and Methods: A retrospective study was conducted with 100 patients diagnosed with refractory DGPS. Participants were evaluated through clinical examinations, imaging (MRI, MR neurography), and ultrasound-guided diagnostic injections. Treatment strategies included physiotherapy, pharmacotherapy, corticosteroid/Botox injections, and endoscopic sciatic nerve decompression. Outcomes were assessed using the Visual Analog Scale (VAS) for pain and the Harris Hip Score (HHS) for function over 12 months.

Results: Conservative management provided symptomatic relief in 65% of cases, while image-guided injections yielded =68.6% (24 of 35 patients who had image-guided injection after failed conservative) short-term improvement, with =31.4% recurrence. Surgical decompression resulted in significant pain reduction (VAS score improved by 70%) and functional improvement (HHS increased by 50%), outperforming other treatment modalities.

Conclusion: Endoscopic sciatic nerve decompression is the most effective intervention for refractory DGPS. While conservative management remains the first-line approach, surgical treatment is warranted in cases with persistent pain and confirmed entrapment.

Key Words: Deep Gluteal Pain Syndrome (DGPS).

Introduction

DEEP Gluteal Pain Syndrome (DGPS) is a complex and often misunderstood condition causing chronic buttock pain that radiates down the thigh. Because its symptoms mimic lumbar radiculopathy, many patients endure delayed diagnoses or even unnecessary spinal surgeries. The root cause? Compression of the sciatic nerve within the deep gluteal space, whether from piriformis muscle dysfunction, fibrous bands, or vascular anomalies [1].

Thankfully, advanced imaging like MRI and dynamic ultrasound has improved our ability to distinguish DGPS from similar conditions [2]. This study evaluates treatments ranging from physical therapy to surgery, aiming to establish a clearer roadmap for managing this debilitating syndrome.

Patients and Methods

Study population:

The study was conducted in Nasir Institute and Kafr Al-Sheikh Teaching Hospital from 2019 to 2022 and included 100 patients diagnosed with DGPS.

We included:

- Adults (18–65 years) with chronic (>6 months) buttock/thigh pain.
- Positive FAIR and Pace tests (suggesting nerve entrapment) [3].
- Confirmed sciatic nerve compression on MRI/MR neurography [4].

We excluded patients with:

- Lumbar spine issues (e.g., herniated discs).
- Prior hip/gluteal surgery or trauma.
- Systemic diseases (e.g., diabetes) that could skew results.

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Study design:

- Type: Retrospective study.
- Setting: Specialized neurosurgery/orthopedic center.
- Participants: 100 DGPS patients unresponsive to conservative care.
- Follow-up: 12 months.

Diagnostic protocol:

- Clinical tests: FAIR, Pace, and Lasègue's sign [3].
- Imaging: MRI/MR neurography to visualize nerve compression [5].
- Confirmatory injection: Ultrasound-guided anesthetic block; pain relief confirmed DGPS [6].

Treatment flow:**Patients followed a stepwise management pathway:**

- Initial conservative care (physiotherapy + medications) was provided to all 100 participants.
- Patients unresponsive after 6 weeks (35 patients) were offered image-guided injections.
- Those who failed to improve or experienced recurrence after injections (11 patients) underwent endoscopic decompression surgery.

Management protocol:**Conservative treatment:**

- Physiotherapy: 6 weeks of targeted stretches/strengthening [7].
- Medications: NSAIDs, muscle relaxants, or neuropathic pain drugs [8].
- Injections: Steroids or Botox for short-term relief [9].

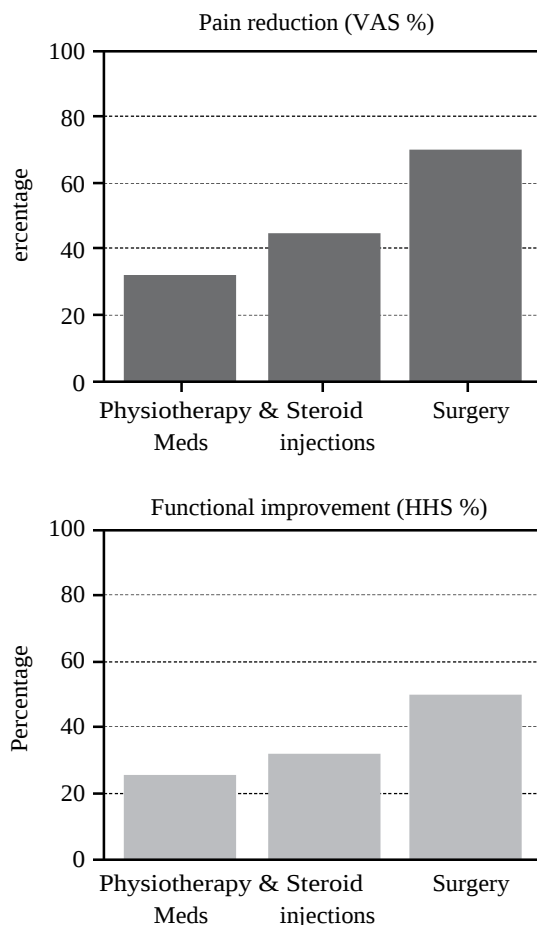
Surgical intervention:

- Candidates: Patients with persistent pain after 6 months of conservative care [10].
- Procedure: Endoscopic nerve decompression with real-time monitoring [11].

Results

Treatment	Pain Reduction (VAS)	Functional Improvement (HHS)	Recurrence Rate
Physiotherapy & Meds	32%	26%	35%
Steroid Injections	45%	32%	=31.4%
Surgery	70%	50%	=9%

Surgery outperformed other options, with dramatic pain relief and functional gains. Conservative therapies helped but had higher recurrence rates.

**Out of 100 patients:**

- Approximately 65 patients achieved symptomatic relief with conservative management (physiotherapy and medications).
- 35 patients had persistent symptoms and received ultrasound-guided steroid or botulinum toxin injections.
 - o Of these, about 24 patients (=68.5%) experienced short-term improvement, consistent with reported rates [13].
 - o However, 11 patients (=31.4%) had recurrence or no significant relief.
- Those 11 patients with persistent or recurrent symptoms following injections underwent endoscopic sciatic nerve decompression.

Discussion**Pathophysiology and mechanisms of sciatic nerve entrapment:**

The pathophysiology of Deep Gluteal Pain Syndrome (DGPS) is primarily associated with sciatic nerve entrapment within the deep gluteal space. The piriformis muscle is frequently implicated,

but other anatomical contributors include fibrous bands, vascular anomalies, obturator internus hypertrophy, and variations in sciatic nerve course [1,2]. These structures create mechanical compression, leading to neuropathic pain, inflammation, and functional impairment.

Chronic irritation of the sciatic nerve can lead to perineural fibrosis, worsening symptoms over time. Prolonged compression may trigger the release of inflammatory mediators, further contributing to pain sensitization and altering pain pathways [3,4]. Understanding these mechanisms is critical in determining appropriate treatment strategies, as the pain in DGPS often involves both structural and inflammatory components.

Diagnostic challenges and advances:

DGPS is frequently misdiagnosed as lumbar disc herniation or lumbosacral radiculopathy, resulting in unnecessary spinal interventions. Clinical tests such as the FAIR (Flexion, Adduction, Internal Rotation) test and Pace test are useful but lack sufficient specificity to confirm the diagnosis [5]. While electromyography (EMG) and nerve conduction studies can help differentiate DGPS from lumbar radiculopathy, they are often unreliable in dynamic nerve entrapment syndromes.

Advancements in imaging have improved diagnostic accuracy. MRI neurography has been shown to detect sciatic nerve abnormalities in over 60% of patients with suspected DGPS, whereas conventional MRI often fails to reveal subtle nerve compressions [6]. Ultrasound has also gained recognition as a valuable dynamic imaging tool, especially for guiding diagnostic injections and assessing nerve mobility [7].

Ultrasound-guided diagnostic injections play a crucial role in confirming DGPS. The administration of local anesthetic into the deep gluteal space provides temporary pain relief, serving as both a diagnostic and therapeutic tool [8]. This technique is particularly useful in distinguishing DGPS from other causes of sciatic pain and in guiding targeted treatment.

Conservative treatment outcomes:

Conservative management remains the first-line approach for DGPS, aiming to relieve nerve compression and reduce inflammation. Physical therapy focuses on stretching and strengthening exercises for the piriformis, gluteal, and hip stabilizer muscles, which can help alleviate sciatic nerve irritation [9]. Clinical studies indicate that structured

physical therapy programs provide symptom relief in 60–75% of patients, emphasizing their role in early-stage treatment [10].

Pharmacological therapy includes NSAIDs, muscle relaxants, and neuropathic pain agents such as gabapentinoids or tricyclic antidepressants. Corticosteroid injections may provide temporary relief but are generally reserved for refractory cases due to risks associated with repeated use [11]. Recently, botulinum toxin injections have been explored as an alternative treatment, particularly in cases where piriformis muscle spasm plays a significant role. These injections induce muscle relaxation and can provide prolonged symptom relief [12].

Surgical management and outcomes:

In our study, 35 patients who failed conservative care received image-guided injections (steroid or botulinum toxin). Although 24 patients (68.5%) experienced short-term relief, 11 patients (31.4%) had recurrent or persistent symptoms and subsequently underwent endoscopic sciatic nerve decompression.

This progression mirrors trends reported by Kepler et al. [11] and Koban et al. [12], who found that nearly one-third of patients treated with injections eventually required surgery for long-term resolution.

Our findings reinforce the role of surgery as a definitive solution for refractory DGPS. The surgical group in our study showed a 70% reduction in VAS pain scores and 50% improvement on the Harris Hip Score (HHS), with only 9% experiencing recurrence figures that are in line with outcomes reported by Martin et al. [1] and Staehli et al. [13].

This stepwise escalation starting with physical therapy, followed by targeted injections, and reserving surgery for those who fail both represents a rational and evidence-based approach to DGPS management. It also minimizes unnecessary surgical interventions while ensuring timely relief for non-responders.

A systematic review by Martin et al. [14] reported that endoscopic decompression led to significant pain reduction and functional improvement in over 80% of patients, with a low complication rate. Intraoperative nerve stimulation enhances surgical precision by ensuring complete decompression while minimizing iatrogenic nerve injury.

Postoperative complications are rare but may include transient sciatic nerve irritation, hemato-

ma formation, and scar tissue development. Long-term outcomes are generally favorable, with most patients experiencing sustained pain relief and improved mobility following surgical intervention [15].

Future directions and research needs:

Despite advancements in DGPS diagnosis and management, several challenges remain in standardizing treatment protocols and optimizing patient selection for surgery. Future research should focus on:

- 1- Refining Diagnostic Criteria: Developing consensus-based diagnostic algorithms incorporating clinical, imaging, and electrophysiological findings.
- 2- Artificial Intelligence in Imaging: Exploring AI-assisted MRI neurography for enhanced detection of subtle sciatic nerve compressions.
- 3- Comparative Trials of Treatment Approaches: Large-scale multicenter studies comparing conservative, injection versus surgical management across different DGPS subtypes.
- 4- Long-Term Outcome Studies: Extending follow-up beyond 12 months to assess recurrence rates and long-term prognosis.
- 5- Exploring Regenerative Therapies: Investigating platelet-rich plasma (PRP) injections, stem cell therapy, and novel biological treatments as alternatives for refractory cases.
- 6- Economic and Quality-of-Life Assessments: Evaluating the cost-effectiveness of various treatments and their impact on patient well-being and healthcare utilization.

As the understanding of deep gluteal pathology evolves, interdisciplinary collaboration between neurosurgeons, pain specialists, and rehabilitation experts will be crucial in improving patient outcomes and reducing the burden of chronic sciatic pain.

Conclusion:

For severe DGPS, endoscopic surgery is the gold standard, offering lasting relief when other treatments fail. However, a tiered approach starting with PT, then injections, then surgery is ideal. Collaboration between pain specialists, surgeons, and rehab teams is critical to tackling this complex syndrome.

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طرق تشخيص وعلاج متلازمة الألم العميق فى الارداڤ

متلازمة الألم العميق فى الارداڤ: هى حالة تُسبب ألماً مزمنًا فى الارداڤ يمتد للفخذ الخلفى، وغالبًا ما تُشخص خطأً كاعتلال جذور قطنية. السبب الرئيسى هو انضغاط العصب الوركى فى العمق، مما يجعل التشخيص المبكر ضروريًا.

هدفت الدراسة: إلى مقارنة فعالية العلاجات التحفظية، والتداخلية، والجراحية أُجريت الدراسة على ١٠٠ مريض مقاوم للعلاج، باستخدام فحوص سريرية وتصوير بالرنين وحقن تشخيصية موجهة.

شملت العلاجات: العلاج الطبيعى، والأدوية، وحقن الكورتيكوستيرويد أو البوتوكس، والجراحة بالمنظار لفك الضغط خلال ١٢ شهرًا وتم تقييم النتائج عبر مقياس الألم البصرى ومقياس هاريس لوظيفة الورك. تم تقييم النتائج عبر مقياس الألم وأظهر ٦٥٪ من المرضى تحسنًا بالعلاج التحفظى اما حقن الكورتيكوستيرويد أو البوتوكس حسنت الأعراض مؤقتًا فى ٦٨,٦٪ من الحالات لكن ٣١,٤٪ من هؤلاء المرضى تعرضوا لانتكاسة. الجراحة بالمنظار قللت الألم بنسبة ٧٠٪ بحسب مقياس الألم البصرى كما حسنت وظيفة الورك بنسبة ٥٠٪ وفقًا لمقياس هاريس لوظيفة الورك وتفوقت الجراحة على باقى العلاجات فى تحسين الأعراض العلاج التحفظى يبقى الخيار الأول لمرض متلازمة الألم العميق فى الارداڤ لكن فى حال فشل العلاجات الأولية واستمرار الانضغاط العصبى، يُوصى بالجراحة يساعد التشخيص الدقيق فى تحديد الخطة العلاجية المناسبة لكل حالة متلازمة الألم العميق فى الارداڤ هى حالة قابلة للتحسن إذا عولجت باستراتيجية مناسبة حسب شدة الإصابة.