

ORIGINAL ARTICLE

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Fluoroscopy-guided impar ganglion block in post-traumatic coccydynia: A retrospective study impar block for post-traumatic coccydynia

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Abstract

The objective of this study was to investigate the long-term effectiveness and safety of fluoroscopy-guided impar ganglion block in patients with traumatic coccydynia who failed to improve with conservative management, focusing on both pain reduction and functional recovery. Twenty-one patients with post-traumatic coccydynia underwent ganglion impar block by the same physician at a tertiary neurosurgery center between November 2019 and July 2024. Pain intensity was measured using the Visual Analog Scale (VAS), and functional disability was assessed with the Oswestry Disability Index (ODI) at baseline and at 1, 6, and 12 months after the intervention. The mean patient age was 41.8 ± 5.0 years, with a mean BMI of 27.6 ± 1.4 kg/m². VAS scores decreased significantly from 7.8 ± 0.7 at baseline to 3.2 ± 0.5 at one month, 2.9 ± 0.6 at six months, and 3.6 ± 0.7 at twelve months (all $p < 0.05$). ODI scores also improved significantly, falling from 44.5 ± 2.7 at baseline to 23.1 ± 1.5 , 20.9 ± 1.4 , and 20.1 ± 1.2 across the same time points (all $p < 0.05$). No major complications were reported. Fluoroscopy-guided impar ganglion block is a safe and minimally invasive procedure that provides durable pain relief and functional improvement in patients with refractory post-traumatic coccydynia. It is an effective intervention method since no serious complications were observed in our study.

Keywords: Coccydynia, ganglion impar block, fluoroscopy-guided intervention, chronic pain management, oswestry disability index

Introduction

Coccydynia is a pain syndrome localized to the coccygeal region, often precipitated by trauma such as falls, childbirth, or repetitive stress [1-3]. Although most patients respond to conservative measures—including nonsteroidal anti-inflammatory drugs, physiotherapy, and ergonomic modifications—a subset remains refractory, experiencing persistent pain that significantly reduces quality of life and daily function [4,5].

The impar ganglion, or Walther's ganglion, located anterior to the sacrococcygeal junction, serves as the terminal sympathetic ganglion transmitting nociceptive inputs from the coccyx and perineum. Targeted blockade of this structure has been shown to provide meaningful analgesia in patients with chronic coccygeal pain [6-8]. Several image-guided techniques are available to ensure accuracy, including ultrasound, CT, and fluoroscopy. Of these, fluoroscopy is widely used due to its accessibility, cost-

effectiveness, and ability to confirm proper needle placement, often visualized by the “reverse comma sign” following contrast injection [9-11].

Given the limited but growing evidence, this study aimed to evaluate the clinical outcomes of fluoroscopy-guided impar ganglion block in patients with post-traumatic coccydynia unresponsive to conservative treatment. Particular emphasis was placed on assessing both pain reduction and functional recovery over a 12-month follow-up period.

Material and Methods

This retrospective cohort included twenty-one patients treated by the same physician for post-traumatic coccydynia at the Department of Neurosurgery, Karabük University Faculty of Medicine, between November 2019 and July 2024. Ethical approval was obtained from the institutional review board (2025-

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2321, date: 27 April 2025), and all patients provided written informed consent prior to undergoing the procedure.

Inclusion criteria: Being 18 years of age or older, having coccydynial pain that started after trauma and has continued for at least 6 months, not responding to at least two different conservative treatment methods (medication, sitting cushion, physical therapy, injection, etc.), and having a clinical condition suitable for the procedure under fluoroscopy. **Exclusion criteria:** Pregnancy, previous spinal surgery in the relevant region, presence of systemic or local infection, history of malignancy, bleeding diathesis or coagulopathy, incomplete follow-up data or inability to complete the 12-month follow-up period.

All procedures were performed under sterile conditions with the patient in the prone position. A 22-gauge spinal needle was advanced through the trans-sacroccygeal approach under fluoroscopic guidance. Correct positioning was confirmed with 1 mL of contrast medium, producing the typical “reverse comma sign”. Once confirmed, a mixture of 10 mL of 0.25% bupivacaine and 40 mg of methylprednisolone was injected. Patients were monitored for one hour post-procedure and discharged the same day.

Pain intensity was measured using the Visual Analog Scale (VAS) scored from 0 to 10, and disability was assessed using the Oswestry Disability Index (ODI) scored from 0 to 100 percent. Assessments

were made at baseline and repeated at 1, 6, and 12 months after the intervention. Statistical analysis was performed using the Friedman test for repeated measures, followed by Bonferroni-adjusted Wilcoxon signed-rank tests for pairwise comparisons. Subgroup differences were examined using the Mann-Whitney U test, and correlations were analyzed using Spearman's test. A p-value less than 0.05 was considered statistically significant.

Result

The study included 21 patients, with a mean age of 41.8±5.0 years and an average BMI of 27.6±1.4 kg/m². Baseline mean VAS score was 7.8±0.7. After treatment, VAS scores improved significantly, reaching 3.2±0.5 at one month, 2.9±0.6 at six months, and 3.6±0.7 at twelve months (p<0.05 for all comparisons).

Functional outcomes demonstrated a similar pattern of improvement. Mean ODI scores decreased from 44.5±2.7 at baseline to 23.1±1.5 at one month, 20.9±1.4 at six months, and 20.1±1.2 at twelve months, all representing statistically significant changes (p<0.05). The most dramatic improvement occurred within the first month, with sustained benefits observed at long-term follow-up. The power of the study for the 12-month change in ODI was set at 1-β=100%.

No serious adverse events or complications were recorded during the follow-up period, and all patients tolerated the procedure well.

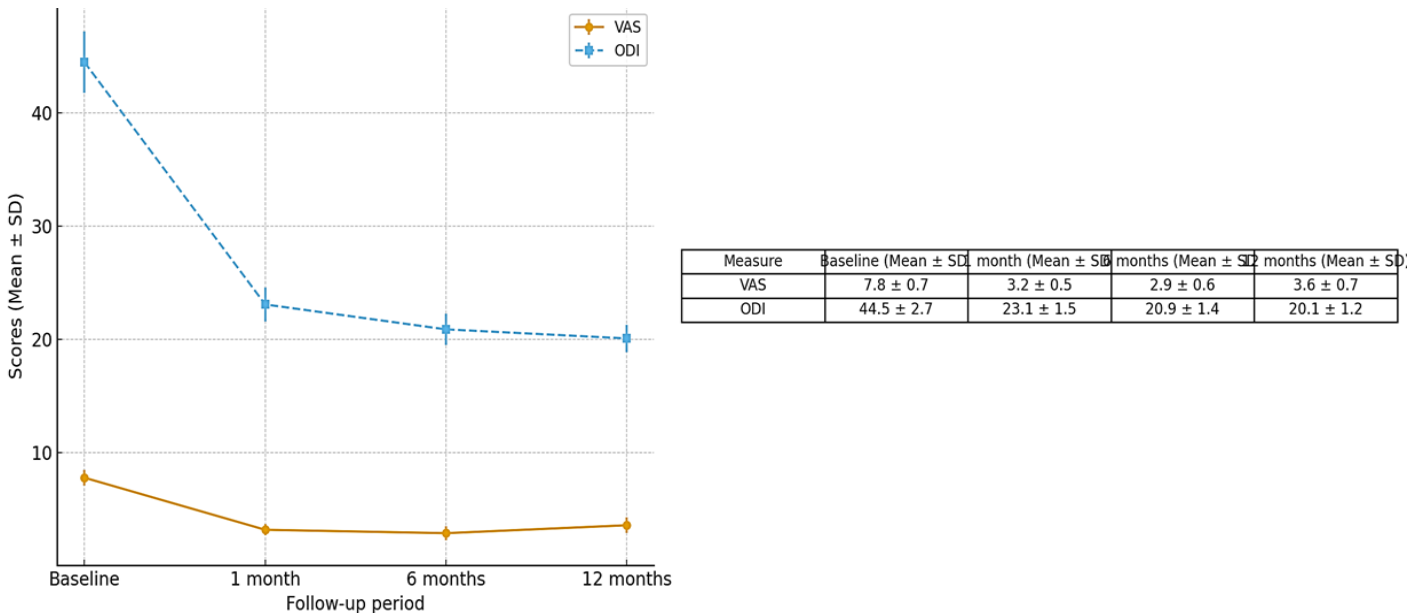


Figure 1. Changes in VAS and ODI scores

Discussion

The present study demonstrates that fluoroscopy-guided impar ganglion block is both effective and safe in the management of refractory post-traumatic coccydynia. As shown in Figure 1, our results revealed significant reductions in pain scores, as reflected in VAS measurements, and substantial improvements in functional disability, as demonstrated by ODI scores. These

effects were evident within the first month after the procedure and were sustained throughout a 12-month follow-up period. Furthermore, no major complications occurred, supporting the safety and feasibility of this minimally invasive technique.

Our findings are consistent with previous studies that have highlighted the impar ganglion as a valuable therapeutic target for coccygodynia. Earlier work by Sagir et al. [6] demonstrated

significant long-term pain relief following an impar ganglion block in patients with persistent coccydynia. At the same time, Gunduz et al. [7] and Ghai et al. [12] reported similar positive outcomes with significant functional recovery. Kaya et al. [9] recently introduced a fluoroscopy-guided technique without contrast injection, emphasizing its feasibility and safety. In contrast, our study used conventional contrast fluoroscopy, confirming accuracy through visualization of the characteristic 'reverse comma sign.' Taken together, these data reinforce the reliability of fluoroscopy as a standard imaging method for achieving accurate needle placement and minimizing procedural risks.

The magnitude of improvement observed in our series is particularly noteworthy. Pain scores decreased by more than 50% compared to baseline values, a threshold generally regarded as clinically meaningful in interventional pain management. Similarly, the average reduction in ODI scores exceeded 20 points, indicating not only analgesia but also a substantial restoration of functionality in daily activities such as mobility, sitting, and social participation. These outcomes are important because chronic coccydynia can profoundly impair quality of life, causing both physical limitations and psychological distress. By demonstrating improvement in both pain and disability, our results underscore the holistic benefits of this intervention.

From a clinical perspective, the impar ganglion block provides an important therapeutic option before considering surgical treatment. Coccygectomy, though effective in selected patients, is associated with surgical risks such as wound infection, delayed healing, and potential recurrence of pain. Studies such as those by Demircay et al. [5], Kalstad et al. [13] and Postacchini et al. [14] confirm the role of coccygectomy in refractory cases but also highlight its complications. In contrast, the impar ganglion block is minimally invasive, carries fewer risks, and can be repeated if necessary. This repeatability makes it particularly advantageous, especially for younger patients or those unwilling to undergo surgery. Moreover, compared with destructive interventions such as radiofrequency ablation [15] or neurolytic injections, which may provide longer-lasting effects but carry higher risks of complications, the local anesthetic and corticosteroid combination used in this study offers a practical and safer option that preserves tissue integrity.

Technical considerations also play a crucial role in determining the choice of guidance modality. CT and ultrasound have both been described for impar ganglion blocks, but each carries limitations. CT, while providing detailed anatomical visualization, exposes the patient to higher radiation and greater cost. Ultrasound avoids radiation exposure but can be technically challenging due to the depth and anatomical variability of the coccygeal region. Fluoroscopy, as applied in this study, remains widely available, cost-effective, and sufficiently accurate, particularly when contrast injection confirms correct needle placement. This balance of safety, accessibility, and precision reinforces fluoroscopy as a preferred technique in daily clinical practice.

The strengths of this study include the use of a homogeneous population with post-traumatic coccydynia, standardized assessment tools, and a structured follow-up protocol. By limiting the study to trauma-related cases, variability due to idiopathic or postpartum etiologies was reduced, thereby enhancing the interpretability of the results. The consistent use of validated scales such as VAS and ODI at multiple time points adds reliability and objectivity. Moreover, the one-year follow-up duration provides valuable insights into the durability of the intervention, which is often lacking in smaller or shorter-term series.

Nonetheless, the limitations must be acknowledged. The retrospective design inevitably introduces potential biases, including patient selection and recall bias. The relatively small sample size of 21 patients restricts the generalizability of the findings, although the consistency of the results strengthens their validity. Another limitation is the absence of a control group or placebo arm, which makes it difficult to fully separate the effects of the intervention from possible placebo responses or natural improvements over time. Additionally, while follow-up extended to 12 months, longer-term outcomes remain uncertain, and future studies should investigate whether the benefits persist beyond one year.

Future research should aim to address these limitations by conducting prospective randomized controlled trials with larger cohorts. Such studies could also compare fluoroscopy-guided techniques with ultrasound and CT guidance to determine the most effective and efficient imaging modality. Investigating predictors of treatment success, such as body mass index, coccygeal mobility, and history of repeated trauma, would be valuable for improving patient selection and optimizing outcomes. Another important area for future exploration is cost-effectiveness analysis. Given the high burden of chronic coccydynia, including repeated medical visits, long-term pharmacological therapy, and the potential need for surgery, establishing whether an impar ganglion block is an economically viable intervention could help shape treatment guidelines, particularly in resource-constrained healthcare systems.

In conclusion, this study provides evidence that fluoroscopy-guided impar ganglion block is a safe, minimally invasive, and effective intervention for patients with post-traumatic coccydynia who fail to respond to conservative measures. By delivering significant and sustained improvements in both pain and functional status over a 12-month follow-up, the procedure stands as a valuable option prior to surgical consideration. While larger controlled studies are required to validate these results, our findings support the integration of the impar ganglion block into interventional pain management protocols for refractory coccydynia. The slight increase in VAS scores at 12 months could be explained by recurrence of the underlying pathology in some patients, persistence of chronic nociceptive input, or engagement of secondary central sensitization mechanisms. Despite this small increase, overall analgesic efficacy and functional improvement

were maintained throughout the year.

This study has several limitations. However, the relatively small sample size and the heterogeneous nature of the patient group limit the generalizability of the findings; therefore, the results need to be confirmed in larger and more homogeneous samples. Also, the single-arm design of this study makes it difficult to definitively distinguish whether the observed improvement in pain is due to the intervention or to the natural healing process after trauma. Furthermore, because comparative data on the natural history of untreated post-traumatic coccydynia patients with similar follow-up periods are lacking, prospective studies with control groups are needed to confirm our findings.

Conclusion

Fluoroscopy-guided impar ganglion block represents a safe, minimally invasive, and effective treatment option for patients with post-traumatic coccydynia who fail to respond to conservative measures. By providing durable improvements in both pain and function, the procedure offers an important intermediate step that may prevent or delay the need for surgical intervention. Further large-scale prospective studies are warranted to validate these findings and to refine patient selection criteria for optimal outcomes. Although these findings are promising, prospective studies with control groups are needed to increase methodological strength and demonstrate effectiveness more clearly.

Conflict of Interests

The authors declare that there is no conflict of interest in the study.

Financial Disclosure

The authors declare that they have received no financial support for the study.

Ethical Approval

The study received ethical approval from the Karabük University Non-Interventional Clinical Research Ethics Committee (27 April 2025) (Approval No:2025/2321)

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