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ARTICLE



# Follow-up of at least 3 years after ganglion impar block for control of chronic coccygodynia

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**ABSTRACT**

**Introduction:** Although it is well known that ganglion impar block (GIB) reduces pain in the short term in patients with chronic coccygodynia, there are insufficient data on long-term treatment outcomes. The aim of this study was to examine the long-term outcomes of patients who underwent GIB for chronic coccygodynia and possible factors that might affect these outcomes.

**Methods:** The pre-treatment, 1st-hour, and 3rd-week numeric rating scale (NRS) scores of patients who underwent GIB 36-119 (min-max) months ago (between November 2011 and October 2018) due to coccygodynia were obtained from the medical records. Final NRS scores and presence of factors that may affect success such as accompanying low back pain (LBP) were questioned via telephone interviews. Treatment success was defined as a 50% or more reduction in final NRS scores compared with pre-treatment NRS scores.

**Results:** Telephone interviews were made with 70 patients. Treatment success was achieved in 55.7% of the patients. The patients were divided into two groups as those who achieved treatment success (group A) and those who could not (group B) and were compared. The NRS scores at the 3rd week and the number of patients with LBP in the group B were significantly higher than the group A. No serious complications developed in any patients.

**Conclusion:** In patients with chronic coccygodynia, GIB is an effective and safe treatment option for pain reduction in the long term. Accompanying LBP and high pain scores in the 3rd week after injection should be considered as parameters that negatively affect long-term treatment success.

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Coccygodynia; ganglion impar; ganglion impar block; long-term outcomes; long-term follow-up

## Introduction

Coccydynia, which can also be called coccygodynia, tailbone pain, is characterized by pain in the coccyx (Mabrouk et al. 2021). It constitutes 1% of those with musculoskeletal diseases (Dampc and Słowiński 2017). It is five times more common in females than in males (Gunduz et al. 2015). In coccygodynia, pain usually increases with sitting, and some patients may also have low back pain (LBP) (Khatri et al. 2011; Lirette et al. 2014). The pathophysiology of coccygodynia has not been fully elucidated, but it has been reported that coccygodynia may begin with trauma and childbirth in some patients (Elkhashab and Ng 2018). Diagnosis of coccygodynia is based on history and physical examination (Elkhashab and Ng 2018). Conservative treatments such as sitting cushion use, nonsteroidal anti-inflammatory drugs, levator ani relaxation exercises, and physical therapy are performed in the treatment (Elkhashab and Ng 2018). Ganglion impar block (GIB) is frequently preferred as a safe and effective treatment option for pain in patients whose pain cannot be reduced despite conservative treatment (Gunduz et al. 2015).

The ganglion of impar, also known as Walther's ganglion, is a sympathetic ganglion and is located in the retroperitoneal space behind the rectum, anterior to the sacrococcygeal junction or coccyx (Scott-Warren et al. 2013; Gonnade et al. 2017). It supplies nociceptive and sympathetic fibres to the distal rectum, perineum, coccyx, perianal region, vulva/scrotum, distal urethra, and the distal third of the vagina. Although GIB was originally defined for cancer-induced perineal pain, it has subsequently been widely used for many types of perineal pain of benign and malignant origin (Khosla et al. 2013; Scott-Warren et al. 2013; Bogduk 2015). Although there are different techniques for GIB, the fluoroscopy-guided transsacrococcygeal approach is often preferred because it is faster, more effective, simple, and well-tolerated by patients (Gonnade et al. 2017). In the technique of Plancart et al. by inserting a bent spinal needle through the anococcygeal ligament, the risk of rectal perforation and needle sticking in the practitioner's finger is relatively higher (Plancarte et al. 1990; Scott-Warren et al. 2013). Although it is well known that GIB provides short-term pain relief in patients with chronic coccygodynia, there are insufficient data on long-term treatment outcomes and possible factors affecting these outcomes (Gonnade et al. 2017; Elkhashab and Ng 2018; Malhotra et al. 2021). The primary aim of this study was to reveal the long-term outcomes of

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patients with chronic coccygodynia who underwent GIB with a fluoroscopy-guided transsacrococcygeal approach. Our secondary aim was to investigate the possible factors affecting these treatment outcomes.

## Materials and methods

### GIB procedures

The patients were diagnosed with chronic coccygodynia after anamnesis, physical examination and radiological imaging in the pain outpatient clinic. GIB was performed under fluoroscopy with a transsacrococcygeal approach to patients who did not respond to conservative treatments. Impar block applications in our clinic are performed with the transsacrococcygeal approach, as it has been reported that it is faster, more effective, simple and well tolerated by the patients (Scott-Warren et al. 2013; Gonnade et al. 2017). Injections were administered by a pain physician with at least 10 years of experience in this field, after obtaining written and verbal consent from the patients before the procedure. The patients were positioned in the prone position. The coccyx area was cleansed three times using povidone-iodine and covered with a sterile drape with an opening placed over the injection field. A lateral view of the patient's sacrococcygeal region was taken using a C-arm fluoroscopy device. A 25-G needle was first used for skin and subcutaneous anaesthesia using 3-mL of 2% prilocaine. Afterward, a 22-G 88-mm spinal Quinke needle was advanced through the sacrococcygeal disc under intermittent fluoroscopic imaging to reach just anterior to the sacrococcygeal region. After confirming proper localization and ensuring that there was no vascular distribution with 2 cc iohexol injection, a mixture of 40 mg triamcinolone acetate, 3 cc of 0.5% bupivacaine, and 1 cc of saline was administered. After the procedure, the patients were followed in the observation room for 1 h and were discharged with recommendations. Coccygodynia pain levels of patients before GIB and at 1 h after GIB are recorded as numerical rating scale (NRS). score. Patients were free to take analgesic medication after discharge. Patients are routinely examined at the 3rd week after GIB in the pain outpatient clinic. The pain levels of the patients at the 3rd week visit are recorded in the patient information system as NRS score.

### Patients

This retrospective single-center study was approved by the ethics committee of Marmara University Faculty of Medicine (09.2021.967). The protocol was performed in accordance with the ethical standards laid down in the 1975 Declaration of Helsinki. Verbal consent was obtained from all patients to use their data during a telephone interview. Patients who underwent GIB between November 2011 and October 2018 (36–119 months ago) were included. The inclusion criteria were as follows: (1) age >18 years, (2) being diagnosed with chronic coccygodynia before GIB, (3) having coccygodynia for at least 3 months before GIB and (4) being unresponsive to conservative treatments prior to GIB. Patients who had a disease other than coccygodynia that would explain the pain in the coccyx region (e.g., malignancy, chronic pelvic pain), a history of coccygectomy surgery, a history of previous lumbosacral spinal surgery, patients who could not be reached by telephone, those with incomplete records, and patients who did not consent to participate in the study were not included in the study.

### Outcome measures

Dates of GIB; pain levels in pre-treatment, 1st-hour and 3rd-week; height; weight; accompanying LBP; the number of times GIB was performed; and duration of pain-free sitting before the procedure were obtained from patient medical records. In addition, the adverse effects detected during the procedure and the 1-hour observation period after the procedure were obtained from the patients' medical records. Pain levels were evaluated using a numerical rating scale (NRS). The NRS is scored between 0 and 10, with 0 indicating no pain and 10 indicating the highest level of pain (Hjermstad et al. 2011). Telephone interviews with the patients were made by a physiatrist who was unaware of the patients' data. The patients were asked about their current pain-free sitting times, the surgical treatments they received for coccygodynia, and their current pain levels (final NRS) felt during the last 2 weeks, and their responses were recorded. They were also asked whether they had to leave heir jobs due to coccygodynia. Patients were asked how GIB affected activities of daily living (e.g., personal care, sitting), and they were asked to choose one of the positive, ineffective, or negative options. The patients were also asked about possible late adverse effects after GIB. Considering that an abscess may develop in the late period, or an overlooked rectal perforation may cause symptoms later, the patients were questioned in terms of these conditions. The patients were asked about the number of pregnancies, marital status, and whether their complaints started with trauma or pregnancy. These factors have been identified as predisposing factors for coccygodynia in previous studies. (Lirette et al. 2014; Márquez-Carrasco et al. 2019) GIB treatment satisfaction was measured using a Likert scale as in Table 1. (Hsiao and Yao 2008; Sir and Eksert 2019) Treatment success was defined as at least a 50% reduction in the final NRS score relative to the pre-treatment NRS score (Kim et al. 2021). Those who achieved success in treatment were defined as group A, and those who did not achieve treatment were defined as group B.

### Statistical analysis

Statistical analyses of the study data were performed using the Statistical Package for Social Sciences for Windows (IBM

Table 1. Likert scale designed to measure patients' GIB treatment satisfaction.

| | |
|---|---|
| 1 | I am completely dissatisfied with the treatment given to me |
| 2 | I am not satisfied with the treatment given to me |
| 3 | I'm undecided |
| 4 | I am satisfied with the treatment given to me |
| 5 | I am very satisfied with the treatment given to me. |

SPSS version 25.0, Armonk, NY, USA) software. The normality assumption of continuous variables was tested using the Kolmogorov–Smirnov and Shapiro–Wilk tests. Descriptive statistics of the variables are given as mean ± standard deviation, median (25th∼75th percentile), and frequencies *n* (%) according to the variable type and the normality assumption. Chi-square tests, the Fisher–Freeman–Halton exact test, Fisher's exact test, the independent sample *t*-test, Mann-Whitney *U*, and Friedman tests were used for univariate analyses of the variables in the study. The Friedman test was used to compare the NRS scores obtained from the same subject at four different times. The Wilcoxon signed-ranks test was used to compare the groups with statistical differences as a result of the Friedman test. In all statistical analyses, cases with a *p*-value of below 0.05 were interpreted as statistically significant.

## Results

An attempt was made to reach 95 patients with chronic coccygodynia who underwent GIB at least 3 years ago and had recorded follow-up data. Twenty-four patients could not be reached by phone. It was learned that one patient died as a result of a traffic accident. A total of 70 patients were interviewed by phone (Figure 1). The follow-up period of the patients (from the procedure to the time of the phone call) was 36 months at the earliest and 119 months at the latest. The mean follow-up period was 64.57 ± 28.99 months. The general characteristics of the patients are given in Table 2.

The 1st-hour, 3rd-week, and final NRS scores were found to be significantly lower than pre-treatment (Table 3).

More than one GIB was performed on 51.43% (36/70) of the patients. The final NRS of 29 (41.4%) patients was zero and the mean GIB count was 1.5 in these patients. Treatment success was achieved in 39 (55.7%) patients by reducing the final NRS score of 50% or more compared with pre-treatment (group A), and the average number of GIBs performed on these patients was 1.64. In 31 (44.3%) patients, treatment success could not be achieved (group B) and the mean GIB count was 2.3. There was a significant difference between the two groups in terms of accompanying LBP and the amount of change in the NRS score at the 3rd week compared with pre-treatment ($p = 0.015$ and $p = 0.005$, respectively). In group A, the number of patients with accompanying LBP was lower, and the decrease in the NRS score at the 3rd week was higher than before treatment. The comparison of clinical and demographic factors of groups A and B is shown in Table 4.

Thirty six of all patients (51.4%) had accompanying LBP. 41.7% of patients with LBP achieved success, while 70.6% of patients without LBP achieved success. This difference was statistically significant ($p = 0.015$). The mean final NRS score of the patients with LBP was 4.7, while the mean of the final

**Table 2.** General characteristics of the study participants.

| | *n* (%) |
|---|---|
| **Sex** | |
| Male | 15 (21.4) |
| Female | 55 (78.6) |
| Number of pregnancies | |
| 0 | 22 (31.4) |
| 1 | 6 (8.6) |
| 2 | 18 (25.7) |
| 3 and above | 24 (34.3) |
| Age | 44.27 ± 12.01 [μ] |
| BMI | 26.96 ± 5.06[μ] |
| Follow-up time (months) | 64.57 ± 28.99 [μ] |

[μ]Mean ± SD; SD: standard deviation; BMI: body mass index.

**Table 3.** Median values of pre-treatment, 1st-hour, 3rd-week, and final NRS scores of the patients.

| | Median (min-max)* | Mean ± SD |
|---|---|---|
| Pre-treatment NRS | 8.0 (5.0–10.0)a | 8 ± 1.5 |
| First-hour NRS | 0.0 (0.0–8.0)b | 0.9 ± 1.5 |
| Third-week NRS | 3.0 (0.0–10.0)c | 3.6 ± 2.6 |
| Final NRS | 2.0 (0.0–10.0)c | 3.2 ± 3.5 |
| *p* | <0.001 | |

*There is no significant difference between the median values shown with the same letter in the same column ($p < 0.05$).
NRS: Numeric rating scale; SD: standard deviation, min: minimum, max: maximum

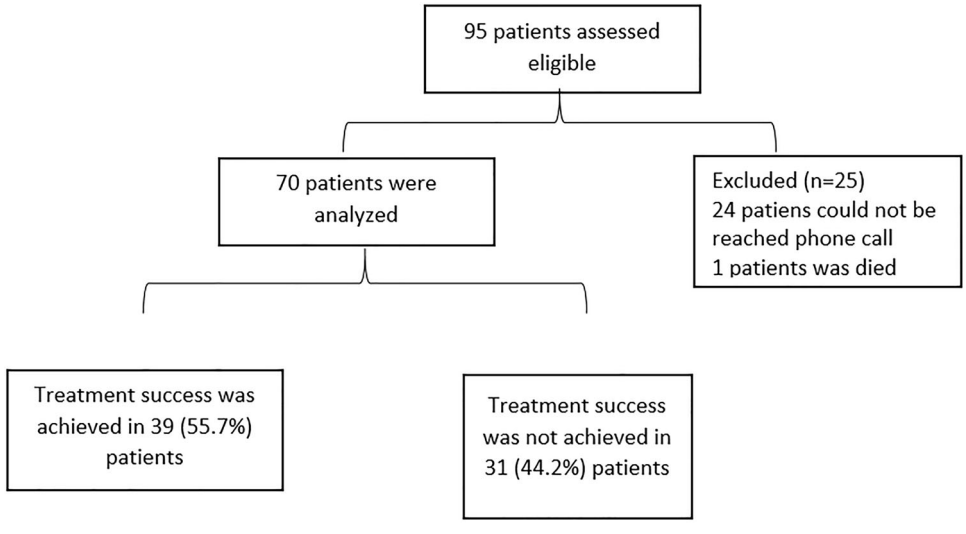


**Figure 1.** Flow of participants in this study.

**Table 4.** Comparison of clinical and demographic factors of groups A and B.

| | Group A $n = 39$ | Group B $n = 31$ | $p$ |
|---|---|---|---|
| Number of GIB administered | | | |
| 1 | 21 (53.8) | 13 (41.9) | 0.252 |
| 2 | 12 (30.8) | 10 (32.3) | |
| 3 And above | 6 (15.4) | 8 (25.9) | |
| History of onset with trauma | | | |
| Yes | 19 (48.7) | 11 (35.5) | 0.266 |
| No | 20 (28.6) | 20 (28.6) | |
| Age | 44.23 ± 10.82 | 44.32 ± 13.54 | 0.975 |
| BMI (kg/m$^2$) | 26.80 ± 4.64 | 27.15 ± 5.61 | 0.776 |
| Sex | | | |
| Male | 7 (17.9) | 8 (25.8) | 0.426 |
| Female | 32 (82.1) | 23 (74.2) | |
| Marital status | | | |
| Single | 2 (5.1) | 2 (6.5) | 0.813 |
| Married | 37 (94.9) | 29 (93.5) | |
| Number of pregnancies | | | |
| 0 | 11 (28.2) | 11 (35.5) | 0.666 |
| 1 | 4 (10.3) | 2 (6.5) | |
| 2 | 8 (20.5) | 10 (32.3) | |
| 3 and above | 16 (41.1) | 8 (25.8) | |
| History of onset with pregnancy | | | |
| Yes | 35 (89.7) | 26 (83.9) | 0.496 |
| No | 4 (10.3) | 5 (16.1) | |
| [α]Pre-procedure symptom duration (months) | 18.0 (6.0 ∼ 36.0) | 24.0 (12.0 ∼ 60.0) | 0.248 |
| [α]Pain-free sitting time before the procedure (min) | 10.0 (5.0 ∼ 20.0) | 5.0 (3.0 ∼ 20.0) | 0.465 |
| [α]Follow-up time (months) | 55.0 (41.0 ∼ 102.0) | 40.0 (48.0 ∼ 86.0) | 0.220 |
| Accompanying LBP | | | |
| Yes | 15 (38.5) | 21 (67.7) | **0.015** |
| No | 24 (61.5) | 10 (32.3) | |
| Change in pre-treatment-first hour NRS scores | 7 (6.0 ∼ 9.0) | 6 (5.0 ∼ 8.0) | 0.061 |
| Change in pre-treatment-third week NRS scores | 5 (5.0 ∼ 7.0) | 4 (0.0 ∼ 5.0) | **0.005** |

NRS: Numeric rating scale; min: minute; BMI: body mass index; GIB: ganglion impar block; LBP: low back pain. * P < 0.05 significant.
[α]Median (25th–75th percentile)

NRS score of the patients without LBP was 1.7. This difference was statistically significant ($p < 0.001$).

The median values of pain-free sitting time before and after the procedure were 2.5 min and 120 min, respectively, which was statistically significantly different ($p < 0.05$). The patients were asked how the GIB procedure affected their activities of daily living and asked to choose one of the positive, negative, or ineffective options. Fifteen (21.43%) patients chose the ineffective option and 55 (78.57%) chose the positive option. None of the patients gave a negative answer. Thirty (42.9%) patients were very satisfied with the procedure, and 24 (34.3%) were satisfied. One (1.4%) patient stated that she was not satisfied with the procedure, and another (1.4%) stated that she was not completely satisfied. The procedure was postponed to a later date due to the development of severe hypotension in one patient, and no complications were observed in the next procedure. Three patients had vasovagal reactions and one patient had a transient increase in pain at the injection site. No major adverse effects such as infection and discitis were observed in any patients.

Coccygectomy was performed in three patients because the pain persisted despite GIBs. The final NRS score of one of these patients was 0, the second was 9, and the third was 3. Two (2.86%) patients had to leave their jobs due to coccygodynia.

## Discussion

In this study, the long-term treatment outcomes of patients who were diagnosed as having chronic coccygodynia and underwent fluoroscopy-guided GIB for at least 3 years and the possible factors affecting these outcomes were examined. A significant decrease was achieved in the 1st-hour, 3rd-week, and final NRS scores of the 70 patients who underwent GIB, whose recorded medical data were sufficient and could be reached by phone. More than one GIB was performed on 36 patients (51.43%), and no major complications were observed in any patients. Treatment success was achieved in 55.7% (39/70) of the patients. A significant increase was achieved in the pain-free sitting times of the patients compared with pre-procedure. Fifty-five (78.7%) patients reported that the procedure had a positive effect on their daily living activities, and 77.2% of patients were satisfied or very satisfied with the procedure. The number of patients with accompanying LBP was significantly lower and the change in the NRS score at the 3rd week was significantly higher in the patient group with successful treatment. In addition, patients with LBP had a lower success rate and higher final NRS scores.

Gonnade et al. found a significant decrease in NRS scores with GIB in a prospective study of 31 patients with coccygodynia with a 3-month follow-up period (Gonnade et al. 2017). Sencan et al. found a significant decrease in the VAS scores of 28 patients who underwent GIB due to chronic coccygodynia in the 1st, 3rd, and 6th months compared with pre-procedure (Sencan et al. 2018). In our study, the 1st-hour, 3rd-week, and final NRS scores were found to be significantly lower than pre-treatment. Contrary to both previous studies, 51.43% of the patients in our study had more

than one GIB during a mean follow-up of 64.57 ∓ 28.99 months. For this reason, both studies achieved a maximum of 3 or 6 months of pain relief with a single injection; the results of our study showed the necessity of repeated injections for long-term pain relief.

Gunduz et al. evaluated the pain levels of 22 patients who underwent GIB for coccygodynia before the injection, at the 1st hour, and 3 weeks after the injection. In addition, patients were interviewed to determine the duration of relief that ensued following treatment. There was at least a 50% reduction in pain with the first GIB in 82% of patients. When the results of repeated injections in patients who were unsuccessful or whose pain relapsed were analyzed together, they found at least a 50% relief in pain, which lasted for an average of 17 months (Gunduz et al. 2015). However, although there was no lower limit for the follow-up period of the patients in their study, which was conducted with 22 patients, the patients in the current study, which was conducted with 70 patients, had a follow-up period of at least 36 months. Therefore, our study may provide more accurate information about long-term results. To the best of our knowledge, there is no study in the literature showing the long-term efficacy of GIB with a follow-up period of 3 years or longer.

Few studies are examining the factors affecting the short and medium-term treatment success of GIB. In the study conducted by Kim et al. with patients who underwent GIB due to coccygeal and perineal region pain, those who reported a 50% decrease or a 4-point decrease in the NRS score in the 1st month after the procedure were considered successful procedures. The authors examined factors associated with the success of the procedure. As a result, they found that cancer-related pain was positively associated with success (Kim et al. 2021). Sencan et al. reported that adding steroids to the local anaesthetic during the block resulted in greater pain reduction in the 1st and 3rd months (Sencan et al. 2019). In another study by Sencan et al. they examined the relationship between coccyx mobility and GIB success. They reported that coccyx mobility at 1 h and 4, 12, and 24 weeks did not significantly affect GIB treatment success (Sencan et al. 2018). However, we found no studies examining the factors affecting long-term treatment outcomes in patients undergoing GIB for coccygodynia. In the present study, it was concluded that accompanying LBP negatively affected GIB success. This may be because patients with LBP have impaired spinal biomechanics compared with other patients. In addition, the decrease in NRS at week 3 was also correlated with long-term success in the present study. This may suggest that NRS at the 3rd week may have predictive value for long-term success. The fact that the NRS score in the 3rd week, not the NRS score at the 1st hour, was associated with the long-term success could be explained as follows: the analgesic effect in the 1st hour is predominantly the result of the short-term effect of the local anaesthetic, and in the 3rd week, it is the reflection of the prolonged analgesic effect contributed by the steroid (Pehora et al. 2017; Chen et al. 2018; Sencan et al. 2019).

Consistent with the literature, in the current study, the majority of the patients were women, and the majority of the women in this study were multiparous. Female sex and multiparity are risk factors for coccygodynia (Lirette et al. 2014; Márquez-Carrasco et al. 2019). However, the results in this study showed that female sex or multiparity did not significantly affect the long-term pain outcomes of GIB in coccygodynia. Furthermore, obesity and coccyx-related trauma have been reported to be risk factors for coccygodynia (Lirette et al. 2014; Kodumuri et al. 2018). Kodumuri et al. found that operative interventions, such as manipulation under anaesthesia and coccygectomy treatment success, were associated with trauma history and BMI (Kodumuri et al. 2018). Maigne et al. reported that intrarectal manipulation was more successful in patients with shorter symptom duration (Maigne et al. 2006). However, in the current study, no relationship was found between GIB long-term success and BMI, trauma history, or duration of symptoms before the procedure.

Malhotra et al. revealed that patients who underwent GIB for coccygodynia had high patient satisfaction at the 3rd month (Malhotra et al. 2021). In the current study, 77.2% of the patients stated that they were satisfied with the procedure in the long term. Possible factors associated with this high patient satisfaction rate may be the onset of pain relief in a short time such as an hour, the persistence of this effect for a long time, the ability to perform the procedure in a short time, and the low risk of complications.

In patients with coccygodynia, the appearance of pain after sitting for a while is one of the main symptoms, and there are studies evaluating the duration of pain-free sitting as an outcome measure (Khatri et al. 2011; Mohanty and Pattnaik 2017; Sencan et al. 2018). In their study examining the effects of coccyx manipulation, Khatri et al. determined VAS and pain-free sitting time as outcomes measures. They reported that coccyx manipulation was effective in reducing pain and prolonging pain-free sitting (Khatri et al. 2011). Mohanty et al. showed the positive effect of stretching of the piriformis and iliopsoas muscles and Maitland's rhythmic oscillatory thoracic mobilisation over the hypomobile segments on pain-free sitting time (Mohanty and Pattnaik 2017). In the current study, the long-term positive effect of GIB treatment on pain-free sitting was demonstrated.

### *Limitations*

The fact that the study was conducted retrospectively is one of the limitations of the study. A valid and reliable scale could not be used in the study to assess disability, activities of daily living, or functional status because there is no specific scale designed for this purpose. Therefore, the authors prepared some questions for the short-term telephone interview to evaluate the effects of the procedure on the patients' activities of daily living and work life. In addition, that quality of life or functional evaluations were not performed in the pre-treatment periods is another limitation. There was also no control group and the number of patients was relatively small. Phone calls could not be made with

17.6% of the patients, which is a potential source of selection bias. There was a possibility of recall bias in some of the answered questions. The patients' low back pain levels and treatments for low back pain were not evaluated. The fact that this study did not include the GIB treatment outcomes due to cancer pain can also be counted as a limitation. Despite all these limitations, this study provides important contributions to the literature and knowledge in this field because it is the first to reveal the long-term pain, complications, and satisfaction results of patients with coccygodynia who underwent GIB at least 3 years ago, and to examine the factors affecting the success in the long-term.

## Conclusion

GIB was an effective, reproducible, and safe treatment option for patients with chronic coccydynia in reducing pain in the long term, with high patient satisfaction and low adverse effect rates. It should be considered that the presence of accompanying LBP and high pain scores at the 3rd week after the injection are parameters that negatively affect the long-term treatment success. Further studies are needed in this area.

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## Data availability statement

The data that support the findings of this study are available from the corresponding author (Mehmet Okçu) upon reasonable request.

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