

Evaluation of the Results of Ganglion Impar Blockade in Patients with Chronic Coccydynia

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ABSTRACT

Our study examined whether bupivacaine and steroid injections followed by Radiofrequency Thermocoagulation (RFT) improved symptoms among coccydynia patients.

The Ganglion Impar Block (GIB) treatment of eight patients with coccydynia in our neurosurgery clinic was reviewed. A retrospective analysis of demographics, pain causes, X-ray results, types of invasive procedures, and Visual Analog Scale (VAS) and Oswestry Disability Index (ODI) scores was performed. VAS and ODI scores were recorded before the procedure, the first day after the procedure, and three months after the procedure.

The study included five females (62.5%) and three males (27.5%). The mean age of the patients was 40.5 ± 10.6 years, and the mean BMI was 26.21 ± 4.2 kg/m². Two patients had idiopathic neuralgia, two had trauma-related neuralgia, two had post-herpetic neuralgia, and one patient had persistent pain following previous anorectal surgery and S2 perineural cyst-related pain. There was a significant improvement in both VAS [2.5 (range: 1-4)] and ODI scores [4 (range: 0-34)] on the first day after the procedure ($p < 0.001$). These low scores were maintained at the third month [VAS: 1.5 (range: 1-10) and ODI: 1 (range: 0-78)]. In only one patient, excision of the coccyx was planned due to inadequate pain relief.

In patients with coccydynia, bupivacaine and steroid injections followed by RFT provide satisfactory long-term analgesia, as evidenced by decreased VAS and ODI scores.

Keywords: Ganglion Impar Blockade, Coccyx, Coccydynia, GIB, RFT, VAS, ODI

Introduction

Sacrococcygeal pain, more specifically in the sacrococcygeal joint, is known as coccydynia. Coccyx hypermobility, resulting in chronic inflammation, accounts for less than 1% of non-traumatic vertebral column issues.

Rare causes include coccyx infection and tumors. The risk of developing coccydynia is increased in obese people and women, and the incidence is five times higher in women than in men (1,2). Furthermore, it is also known to be a very complex and difficult disease to treat, adversely affecting patient quality of life (3). Many physiological and psychological factors play a role in the etiology of coccydynia (4,5). Located in the sacrococcygeal region, this pain often worsens when sitting for long periods on uncomfortable surfaces and when rising from a sitting position (1,6).

Among the available treatment options for coccydynia are nonsteroidal anti-inflammatory drugs (NSAIDs), relaxation exercises of the

levator ani, and transcutaneous electrical nerve stimulation (TENS). Most cases can be managed with these approaches, along with modifying sitting posture, using coccygeal pillows, pelvic floor rehabilitation, extracorporeal shock wave therapy (ESWT), and physical therapy (4,7–10). It should be noted, however, that approximately 10% of patients are unresponsive to any of these methods (11).

Today, sympathetic ganglion blocks are increasingly used in the control of various painful conditions. (3). A solitary structure, the ganglion impar terminates bilateral sympathetic chains in the retroperitoneal space. Located anterior to the sacrum, it transmits nociceptive and sympathetic stimulation to the perineal region (4,5).

Ganglion impar block (GIB) is a commonly performed procedure that targets the ganglion impar. Among minimally invasive injection techniques, GIB shows the most promise. (7). GIB can be performed under computed tomography (CT), ultrasound (US) or fluoroscopy guidance, usually using the transsacrococcygeal

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Fig. 1. Contrast substance distribution (inverted comma mark) in control of needle location for ganglion impar ablation

approach technique (12,13). Coccygeal, perineal or pelvic pain can be successfully treated with GIB (3). Neurolytic ganglion impar blockade is now generally used for coccygodynia of malignant etiology (14).

GIB can be performed using various methods (including local anesthetics, corticosteroids, botulinum toxin, alcohol, radiofrequency thermocoagulation [RFT], or cryoablation). Surgical intervention, such as coccygectomy, is rarely necessary and is considered a last resort (6).

Steroid injections alone or in combination with radiofrequency lesion therapies (such as radiofrequency thermocoagulation or pulsed radiofrequency) are commonly used for refractory coccydynia. Our study aimed to evaluate the effects of bupivacaine and steroid injections followed by radiofrequency thermocoagulation (RFT) on improving VAS and ODI scores in patients with coccydynia.

Material and Method

Patients: After obtaining approval from the institutional ethics committee, we conducted a prospective single-arm interventional study from July 1, 2022, to June 30, 2024. Informed written consent was obtained from all patients.

We conducted a retrospective analysis of medical records from eight coccydynia patients treated with GIB. Data collected from these records included age, gender, BMI, onset of pain, and potential causes of pain. Coccyx anatomy,

physiology, and underlying pathologies were evaluated using anterior-posterior (AP) and lateral (L) radiographs. Additionally, CT or MR imaging was performed to investigate potential causes such as tumors, infections, dislocations, or fractures contributing to coccydynia.

The study included patients of both sexes, aged 20 to 60 years, experiencing coccydynia (pain in the coccyx) persisting for ≥ 3 months and unresponsive to both opioid and non-opioid analgesics (including NSAIDs). Patients with no abnormal results in laboratory tests indicating the presence of pain were eligible. Exclusion criteria were local skin infection, allergy to any anesthetic or contrast agent, fusion of the sacrococcygeal junction due to any pathology, history of coccygectomy, bleeding disorders, and pregnancy. All patients in the study underwent lateral and anteroposterior (AP) radiographs of the coccyx (15). Patients visiting our outpatient clinic received treatment with NSAIDs, paracetamol, and the use of sitting cushions.

Operation Procedure: For support during the procedure, patients lie face down on the X-ray table with a pillow under their lower abdomen. Local anesthesia with 2% lidocaine was administered into the subcutaneous tissue to numb the area. An aseptic metallic marker was used to pinpoint the sacrococcygeal space, and the targeted area was marked under lateral fluoroscopic guidance.

The dorsal sacrococcygeal ligament was punctured with a 22-gauge, 10-cm needle under fluoroscopy. It was advanced through the intervertebral disc so that it reached a position immediately anterior to the ventral sacrococcygeal ligament at the time of the procedure.

Fig. 1. shows the injection of radiopaque contrast medium (Omnipaque 320 mg I/ml) into the retroperitoneal space to verify the needle tip is positioned accurately, ensuring that the contrast medium spreads out like an inverted comma as illustrated. Diagnostic Ganglion Impar Blockade (dGIB) was performed by injecting a solution containing 5% bupivacaine and 40 mg methylprednisolone after the needle had been positioned. Following dGIB, pulsed radiofrequency treatment (Kimberly Clark RF Generator, Halyard RF Cannula, Belgium) was administered for 120 seconds at 70°C, using a 5-mm active tip and a 22-G insulated needle. During the procedure, the patient's condition is closely monitored for early success and any complications. The procedure takes approximately five minutes. During this timeframe, the Quincke

needle is inserted into the skin and is correctly positioned.

Post-procedure process: After GIB, a routine care procedure was conducted. As part of the procedure, the number of attempts was recorded and any complications such as visceral damage, discitis, bleeding, infection, or perforation were documented. Following the procedure, patients were monitored for one hour in the recovery room for signs of cardiotoxicity, hypotension, or bradycardia.

VAS and ODI Scoring: We assessed the overall quality of life of our study patients using VAS and ODI questionnaires before surgery, after GIB, and at a follow-up third month post-surgery. Patients mark their current pain level on this line, and the distance to the 'no pain' endpoint is measured with a ruler, yielding a pain score from 0 to 10. Based on a study by Yaray et al., the Turkish version of the VAS questionnaire has been proven to be valid and reliable for patients suffering from low back pain and spinal fractures (16,17). Each item presents 6 statements graded from 0 to 5, allowing patients to select the statement that most accurately reflects their ability. To calculate the index, the scores from all questions are summed and then multiplied by two. It typically takes only 3-6 minutes to complete, and its reliability has been extensively validated across numerous studies. Additionally, Yakut et al. conducted a validity and reliability study of the Turkish version of the questionnaire (18).

Data: For this study, we evaluated VAS and ODI scores along with analgesic requirements of the patients before the procedure, immediately afterward, and at the three-month follow-up. Data were extracted from patient records, including classification of images as either normal or showing anterior coccygeal angulation. VAS and ODI scores obtained from patient records were compared before and after the procedure.

Statistical Analysis: SPSS 26.0 (IBM Corporation, Armonk, New York, United States) was used for the statistical analysis. To compare variables that have more than two repeated measurements, Friedman's Two-Way test with Monte Carlo simulation was used. Post hoc testing utilized Stepwise step-down comparisons. A Monte Carlo simulation was used to compare dependent dichotomous variables using McNemar's test. Quantitative variables are presented as mean (standard deviation) and median (minimum - maximum) in the tables, while categorical variables are expressed as n (%).

Analyses were conducted at a 95% confidence level, with significance set at $p < 0.05$.

Results

Our study included a total of 8 patients, comprising 5 females (62.5%) and 3 males (37.5%). The mean age of the patients was 40.50 ± 10.6 years, with a mean BMI of 26.21 ± 4.2 kg/m² (Table 1 and Table 2).

Among the patients, two had idiopathic pain, two had pain related to trauma, two had post-herpetic neuralgia, and one patient experienced persistent pain following previous anorectal surgery and S2 perineural cyst-related pain (Table 1 and Table 3).

Two patients had isolated coccydynia, while others had additional pain complaints. All patients underwent a single session of GIB. The baseline VAS score was 10 (range 9-10), and the baseline ODI score was 69 (range 48-94). All patients had previously used NSAIDs. Before the procedure, 3 patients (37.5%) were using opioids, and 6 patients (75%) were undergoing treatment with Gabapentin or Pregabalin (Table 4).

There was a significant improvement in VAS scores [2.5 (range 1-4)] and ODI scores [4 (range 0-34)] among patients evaluated on the first postoperative day ($p < 0.001$). Additionally, there was a reduction in the requirement for opioids, NSAIDs, and Gabapentin/Pregabalin treatment on the first postoperative day.

At the three-month follow-up after the procedure, patients were reassessed based on VAS and ODI scores. The low scores observed on the first day after the procedure were sustained at three months [VAS: 1.5 (range 1-10) and ODI: 1 (range 0-78)] ($p < 0.001$) (Table 4). In all patients, blocks were conducted following fluoroscopic verification of needle tip accuracy and radiocontrast material spread. One patient, who had undergone anorectal surgery, pilonidal sinus surgery, and subsequent infection requiring coccyx removal, experienced pain recurrence three months after the procedure. No complications were reported during or after the procedure.

Discussion

A coccydynia, also known as coccygeal neuralgia or coccygodynia, refers to pain in the coccyx (19). There is an estimated prevalence of coccygodynia of between 1 and 3% of all back pain cases (20). The causes of coccydynia remain unclear in the literature; however, it is commonly observed in

Table 1: Demographic Results

Patient No	1	2	3	4	5	6	7	8
Gender	Female	Male	Female	Female	Male	Female	Female	Male
Age	39	28	49	38	52	45	23	50
Height	1,66	1,82	1,69	1,56	1,71	1,68	1,65	1,73
Weight	67	93	89	51	83	66	62	94
BMI	24,3	28,1	31,2	20,1	28,4	23,4	22,8	31,4
Complaint	Coccydynia	Coccydynia, perianal pain	Coccydynia	Pain around the perineum and anus, hip and lower back pain	Pain in both buttocks and groin, Coccydynia	Coccydynia	Pain in the left buttock, groin, and genital area	Coccydynia
Comorbidity	HL, gastric hernia, lumbar hernia, cholelithiasis	Inflammatory polyneuropathy, previous pilonidal sinus op, Coccydynia	absent	Interstitial cystitis, Inflammatory PNP	Benign prostatic hyperplasia	Peptic ulcer	Herpes infection	absent
Etiology	Trauma, coccyx fracture	Anorectal surgery, iatrogenic, pilonidal sinus surgery, abscess	Trauma	Idiopathic	Post herpetic neuralgia	Idiopathic	Post herpetic neuralgia	S2 perineural cyst

Table 2: Clinical Results of The Patients

	n	%
Gender		
Female	5	62,5%
Male	3	37,5%
	Mean±SD.	Median (Min-Max)
Age (year)	40.50±10.6	42 (23-52)
Height (m)	1.69±0.1	1.685 (1.56-1.82)
Weight (kg)	75.63±16.2	75 (51-94)
BMI (kgm2)	26.21±4.2	26.2 (20.1-31.4)

SD.: Standard Deviation

obese individuals and more frequently in females, with a fivefold higher incidence compared to males (2,21). Females are more likely to suffer from this condition due to the physiological and anatomical changes that occur during pregnancy and childbirth (22).

Chronic coccydynia can result from various forms of traumatic injury, including falls from heights, slips, traffic accidents, birth trauma, and repeated unrecognized microtrauma from prolonged cycling (23). A blockage of ganglion impar produces an analgesic effect and reduces sensitivity when blocking nociceptive transmission (24). The success of the GIB depends primarily on

the correct positioning of the ganglion. However, in clinical practice, the exact anatomical location of ganglion impar remains unclear.

According to Karcellı et al., RFT was effective in reducing pain in patients suffering from chronic coccydynia following GIB (25). Radiofrequency thermocoagulation (RFT) ablation of the ganglion impar has been reported to alleviate coccydynia pain in patients who do not respond to conservative treatments. Reig et al. achieved successful outcomes using RFT for Ganglion Impar Blockade (GIB) in non-malignant perineal pain (26). Similarly, Demirçay et al. reported satisfactory results for 90% of patients who

Table 3: Coccydynia Etiological Results

	n
Complaint	
Pain in both buttocks and groin, coccydynia	1
Pain in the hip, coccydynia	1
Coccydynia	1
Coccydynia, perianal pain	1
Coccydynia	2
Pain around the perineum and anus, buttocks and lower back	1
Pain in the left buttock, groin, pain in the genital area	1
Comorbidity	
Benign Prostatic Hyperplasia, recurrent urinary tract infection	1
Inflammatory polyneuropathy, pilonidal sinus op, Coccydynia	1
Herpes infection	1
Hyperlipidemia, gastric hernia, lumbar hernia, cholelithiasis	1
Interstitial cystitis (14.01.2021), inflammatory polyneuropathy	1
Peptic ulcer	1
None	2
Etiology	
Anorectal surgery, iatrogenic, pilonidal sinus surgery, perianal abscess	1
Idiopathic	2
Post-Herpetic Neuralgia	2
S2 perineural cyst	1
Trauma	1
Trauma, coccyx fracture	1

Table 4: Change in Clinical Results Before and After GIB

	Pre-Op	Post-Op	3rd Month of Post-Op	p
	Median (Min-Max)	Median (Min-Max)	Median (Min-Max)	
VAS	10 (9-10) BC	2.5 (1-4)	1.5 (1-10)	<0.001 ^f
ODI	69 (48-94) BC	4 (0-34)	1 (0-78)	<0.001 ^f
Opioid drug				0.625 ^m
Absent	5 (62.5)	7 (87.5)	-	
Present	3 (37.5)	1 (12.5)	-	
NSAID				0.031 ^m
Absent	0 (0.0)	6 (75.0)	-	
Present	8 (100.0)	2 (25.0)	-	
Gabapentin/Pregabalin				0.063 ^m
Absent	2 (25.0)	6 (75.0)	-	
Present	6 (75.0)	2 (25.0)	-	

^f Friedman Test (Monte Carlo); Posthoc Test: Stepwise step-down comparisons), ^m McNemar-Bowker test, Paired T Test (Bootstrap)

^B It indicates significance for post-procedure measurements, ^C It indicates significance for measurements at third month post-procedure,

underwent radiofrequency thermocoagulation to treat chronic coccydynia at six months (27). Consistent with results in the literature, our study also achieved satisfactory results. However, one patient required coccyx excision due to inadequate pain relief.

Various methods such as local anesthetics, steroids, neurolytic agents and radiofrequency can be used in GIB (26). The combination of GIB and local anesthetics provides rapid and satisfactory relief from coccydynia. A simultaneous neurolysis of the ganglion has the potential to prolong pain control, although pain control is usually short-lived.

Fluoroscopy-guided injections reduce the risk of complications such as needle misplacement into intravascular areas, overly advanced insertion (into the rectum), or superficial positioning (at the sacrococcygeal disc). Several fluoroscopy-guided techniques are described in the literature, with the transsacrococcygeal technique being the most commonly used. In our study, blockade procedures were performed using a fluoroscopy-guided transsacrococcygeal approach.

In between conservative medical treatment and radical surgical excision, GIB and RFT serve as intermediate treatment options. Generally, these minimally invasive techniques can be used to treat patients who have failed to respond to conservative treatments, which can reduce the need for surgery. At our clinic, where these procedures are frequently performed, GIB was conducted once with high success rates and no complications.

Rectal perforation, bleeding, infection, and sepsis, along with technical challenges, restrict the widespread application of this highly effective block (28,29). We utilized fluoroscopy for needle advancement and radiocontrast administration in all patients, ensuring anatomical verification before performing the blockade. No complications were reported during or after the procedure.

In our study, we have made significant contributions. This study demonstrates the long-term effectiveness of GIB for alleviating pain in patients with coccydynia, using a transsacrococcygeal 'needle in needle' procedure. Additionally, our aim was to extend analgesia duration through steroid injection followed by RFT. Furthermore, these patients were advised to maintain ergonomic precautions and continue conservative treatment methods. In all cases, the blocks were conducted under fluoroscopy after

confirming the needle tip position and radiocontrast spread at the targeted site. No complications were reported during or after the procedures.

It should be noted that the study has a number of limitations, including a small sample size of patients due to the nature of the disease and the absence of a control group. Additionally, the mean post-operative evaluation period was limited to three months. Therefore, it is crucial to assess longer follow-up periods to ascertain the enduring effects of GIB.

The ganglion impar block is considered when conservative treatments prove ineffective. In this study, we evaluated the effectiveness of GIB in coccydynia unresponsive to conservative treatment. Based on our findings, ganglion impar block and RFT appear highly effective for treating coccydynia in patients unresponsive to conservative therapies. In order to establish definitive conclusions about the efficacy of these procedures, prospective randomized studies with larger cohorts are required.

Declarations

Funding: There is no funding in this study.

Competing interests: The authors declare no competing interests.

Ethics approval: This research was carried out in accordance with the Declaration of Helsinki. Institutional approvals for the conduct of the study were obtained from the Kapadokya University Clinical Studies Ethics Committee (14.03.2024/24.05).

Consent to participate: All authors have read and accepted the article's content; all authors consent to participate in the study.

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