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## Comparison of the two different techniques for treatment of coccydynia: Pulse radiofrequency and corticosteroid injection

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### Abstract

**Introduction:** Ganglion impar block is a promising method in terms of results in patients with coccydynia. In this study, the results of patients diagnosed with coccydynia and treated with a single dose of corticosteroid and the pulse radiofrequency method were compared.

**Material and methods:** A total of 26 patients who were treated with corticosteroids (Group 1) and pulse radiofrequency neurotomy (Group 2) between 2022 and 2023 with at least 6 months of follow-up were included in the study. Pre-procedure, 3rd and 6th month VAS scores were recorded during follow-up. The patients were called to their final controls, and their VAS scores and Oswestry scores were recorded and compared.

**Results:** The mean VAS scores of the patients in Groups 1 and 2 at 3 months were  $1.4 \pm 0.6$  and  $1.5 \pm 0.6$ , respectively. The VAS scores of the patients in Group 1 at 6 months and at the last control were  $1.3 \pm 0.6$ ,  $1.5 \pm 0.67$ , Group 2 were  $0.4 \pm 0.5$ ,  $0.2 \pm 0.46$ , respectively. The Oswestry scores of the patients in Groups 1 and 2 at the final control were  $22.5 \pm 1.9$ ,  $17.3 \pm 1$ , respectively. When the patients' 3rd month VAS scores were compared, no significant difference was found ( $p > 0.05$ ). There was a significant difference between the 6<sup>th</sup> month and the last control VAS score ( $p < 0.05$ ). There was a significant difference in the Oswestry scores at the last control of the patients.

**Conclusion:** Although a single dose of corticosteroid and pulse radiofrequency neurotomy used in the treatment of chronic coccydynia seem similar, pulse radiofrequency treatment seems to be superior in terms of late follow-up results.

**Keywords:** Ganglion impar, pulse radiofrequency, coccydynia, corticosteroid injection

### Introduction

Coccydynia is one of the major causes of disability and is characterized by pain around the coccyx. Since it was first pronounced by Stimson in 1859, its treatment is still in development [1]. The coccyx is a bird's beak-shaped bone that is connected to the sacrum via the sacrococcygeal joint, usually consisting of 4 or 5 vertebrae. There is usually a rudimentary disc between the first and second coccygeal bones. This disc is a potential area in terms of causing pain after trauma. When coccydynia etiology is evaluated, it is basically classified as idiopathic and traumatic. Moreover, reasons such as hypermobility, obesity, female gender and coccyx type are among the predisposing factors [2-5]. In addition, pilonidal cysts, chordoma, colon cancer, Tarlow cysts and lumbar disc disease are among the rare causes in their etiology [6, 7]. In addition, the sacrum is in close relationship with the parasympathetic and sympathetic ganglia. The structure formed at the junction of the paravertebral sympathetic chains is called the ganglion impar. This ganglion provides sympathetic and nociceptive stimulation to the perineal, urethral, vaginal, and anal regions. Besides, it is the ganglion where visceral sensations from neighboring organs are transferred to the sympathetic nerve. In this respect, it is important in terms of pain management [8-11].

Conservative treatment methods constitute the first stage of coccydynia treatment. Nonsteroidal anti-inflammatory drugs, sitting cushions, Levator Ani muscle stretching exercises, physiotherapy, and intrarectal manipulations are methods used in conservative treatment [10, 12]. Interventional procedures are used in both diagnosis and treatment for patients whose pain persists despite conservative treatment methods.

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These procedures can be applied as local repetitive per coccygeal injections or as ganglion impar block [13]. The ganglion impar block was first applied by Plankarte *et al.*, and it continues to be applied with different techniques today [13]. Today, the ganglion impar block maintains its current position with the help of radiofrequency. There is no study in the literature comparing the results of patients who underwent ganglion block with corticosteroids and radiofrequency ablation. In this study, we aimed to present the results of patients who underwent ganglion impar block with the help of corticosteroid and pulse radiofrequency due to coccydynia.

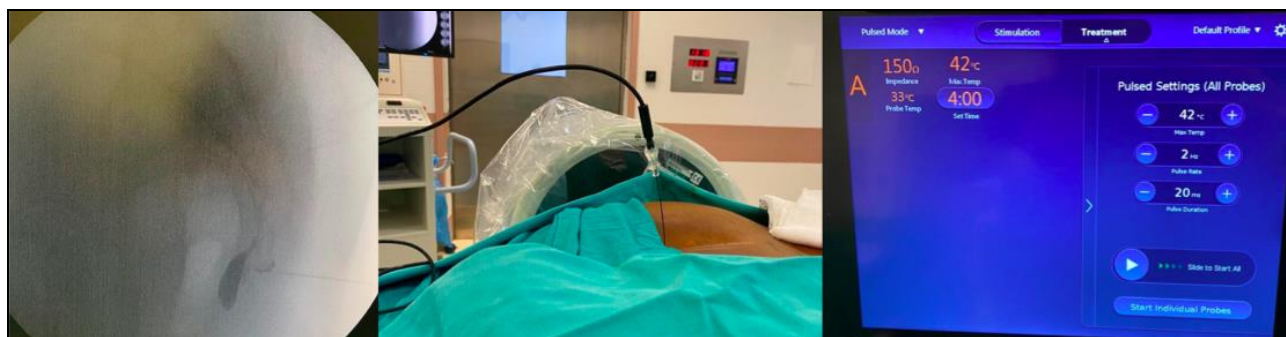
**Materials and Methods**

Between 2022 and 2023, a total of 36 patients, aged 18-60 years, who had ganglion impar block with 2 different methods and had at least 6 months of follow-up and whose pain persisted despite conservative treatment for 1 month due to coccydynia, were evaluated retrospectively. Patient age, gender, and follow-up period VAS (Visual Analogue Score) before the block and VAS at the 3rd and 6th months after the block were recorded. The patients were divided into 2 groups: Those who received corticosteroid injections (Group 1) and those who received pulse radiofrequency therapy (Group 2). Except for trauma and idiopathic causes, 2 patients with lumbar disc disease, 3 patients with Tarlow cyst and 5 patients with pilonidal sinus were excluded from the study. Pelvic anterior-posterior and full lateral radiographs of all patients were evaluated, and sacrococcygeal angle, coccygeal length, intercoccygeal angle, and sacral slope angles were recorded and evaluated. The radiological classification of the patients was made according to the Postacchini classification system [5]. VAS and Oswestry scores at the last control were recorded. All patients before and after the block, at the 3rd

month, 6<sup>th</sup> month, and at the last follow-up VAS were compared. In addition, between groups, 3rd month, 6<sup>th</sup> month, and last follow-up Oswestry scores were compared.

**Operative Details**

After all patients were taken to the operating room, blood pressure, pulse, and saturation values were monitored in the prone position. ECG probe was connected to the patients, and cardiac monitoring was provided. In addition, 0.9% saline fluid was supported by intravenous catheterization. The sacral region was sterilized with 10% povidone iodine. A full lateral radiograph of the sacrum was obtained under fluoroscopy. After the entry point was infiltrated with 2% lidocaine for local anesthesia, the entry point was determined by fluoroscopy, marking the intercoccygeal disc with the help of a 25 Gauge 90 mm spinal needle. With the help of fluoroscopy, the spinal needle was checked at the midpoint in the anterior-posterior view. In order to understand that the spinal needle was in the retroperitoneal area, 1 mm non-ionic radiocontrast material was injected, and the image was confirmed by fluoroscopy. Patients who underwent pulsed radiofrequency were first asked whether the patient's pain decreased after 2 ml of 0.25% bupivacaine injection. Afterwards, two cycles of pulse radiofrequency neurotomy were performed for 2 minutes at 420C. In patients who received corticosteroid injections, firstly, 2ml of 0.25% bupivacaine were injected, it was questioned whether the patient's pain decreased, and afterwards, 2ml of 40mg/ml methylprednisolone and 3ml of 0.25% bupivacaine was injected into this area. During the procedure and post-operative bedside visit, pain status of all patients was evaluated (Figure 1).



**Fig 1:** Lateral fluoroscopic view of the trans coccygeal approach and needle position (Reverse comma sign)

**Statistical Analysis**

All data were evaluated with the SPSS 22 program. Descriptive variables were expressed as mean and standard deviation. After the normality analysis of categorical data was evaluated with Skewness-Kortis analysis, comparisons between groups were made with independent T test. Values before and after the block were compared with the paired T test. The results were evaluated as 95% confidence interval and  $p < 0.05$ .

**Results**

Twelve of the patients included in the study were in Group 1, and 14 were in Group 2. While there were five men and seven women in Group 1, there were five men and nine women in Group 2. While the mean age of the patients in group 1 was  $40.4 \pm 9.3$ , the mean age of the patients in group 2 was  $40 \pm 8.6$ . The mean follow-up period of the patients in Group 1 was  $8 \pm 0.7$  months, while the mean follow-up period of the

patients in Group 2 was  $7.8 \pm 0.8$  months. The distribution of the patients according to the Postacchini classification system and the demographic data of the patients are given in Table 1.

**Table 1:** Demographic data of the patients

		Groups		
		Group 1	Group 2	Total
Gender	Male	5	5	10
	Female	7	9	16
Classification	Type1	2	4	6
	Type2	6	6	12
	Type3	3	3	6
	Type4	1	1	2

The mean VAS scores of the patients in Groups 1 and 2 before the procedure were  $8.1 \pm 0.7$  and  $8.07 \pm 0.63$ , respectively. The mean VAS scores of the patients in Group 1 and 2 at the 3<sup>rd</sup> month were  $1.4 \pm 0.6$  and  $1.5 \pm 0.6$ , respectively.

The VAS scores of the patients in Group 1 and 2 at 6th month and at the last control were  $1.3\pm 0.6$ ,  $1.5\pm 0.67$ ,  $0.4\pm 0.5$ ,  $0.2\pm 0.46$ , respectively. The Oswestry scores of the patients in Groups 1 and 2 at the final control were  $22.5\pm 1.9$ ,  $17.3\pm 1$ , respectively. When the 3<sup>rd</sup> month VAS scores were compared between the groups, no significant difference was found ( $p>0.05$ ). The VAS scores at the 6th month and at the last follow-up were statistically significantly lower in patients who underwent pulse radiofrequency neurotomy compared to patients who received a single dose of corticosteroid ( $p<0.05$ ). Oswestry scores at the last control of the patients were statistically significantly lower in patients who underwent pulse radiofrequency neurotomy ( $p<0.05$ ). There was a statistically significant difference between pre-block and post-block 3rd month, and 6th month of the patients and at the last control VAS scores were compared in Groups 1 and 2 ( $p<0.05$ ) (Table 2).

**Table 2:** Visual numeric scale before radiofrequency and after radiofrequency 3 months, 6 months and last follow up and last follow up oswestry scale

Group	VNS1	VNS 3.month	VNS 6.month	VNS last follow up	Oswestry Scale
	Mean Standard Deviation	Mean Standard Deviation	Mean Standard Deviation	Mean Standard Deviation	Mean Standard Deviation
Group1	8,17±1,42	1,42±0,67	1,33±1,50	1,50±0,67	22,50±1,93
Group2	8,07±1,50	1,50±0,65	0,43±0,29	0,29±0,47	17,36±1,01

While the mean sacrococcygeal, intercoccygeal and sacral slope angles of the patients in Group 1 were  $118.7\pm 4$ ,  $140\pm 4.2$ ,  $37.7\pm 2.4$  degrees respectively, the same angles of the patients in Group 2 were  $115.2\pm 4.2$ ,  $138.2\pm 4.3$ ,  $6.8\pm 1.2$  degrees, respectively. The mean coccygeal length of the patients in Groups 1 and 2 were  $34.9\pm 3.1$  and  $33.8\pm 1.9$  mm, respectively (Table 3).

**Table 3:** Average values of the radiological measurements

		SC	IC	CL	SS
		Mean Standard Deviation	Mean Standard Deviation	Mean Standard Deviation	Mean Standard Deviation
Group	Group1	118,75±4,03	140,08±4,23	34,92±3,18	37,75±2,45
	Group2	115,21±4,30	138,21±4,02	33,86±1,99	36,86±1,29

No complications were observed in either group. There was no need for a second procedure due to pain in any patient.

## Discussion

The most important finding of our study is that the pulse radiofrequency neurotomy method, which we applied in the treatment of coccydynia, was more effective than corticosteroid treatment for a 6-month period. We think that this situation is related to thermocoagulation.

Ganglion impar block has been a successful treatment method in the last 30 years after Plancarte *et al.* first enemy in 1990 (14). This method can be applied trans coccygeal, trans sacrococcygeal and paramedian, as well as anorectal (15). Due to the low complication rate, we use the trans coccygeal method more frequently in our daily practice.

There is no consensus in the literature on the method of ganglion impar block. In the study conducted by Sencan *et al.* in 2019, they divided the patients into 2 groups, with administration of 3 ml of 0.5% bupivacaine and 2 ml of saline to one of the groups and 40 mg of methylprednisolone in

addition to the other group. At the end of 3 months, the VAS of the steroid group was better [16]. Nalini *et al.* Used 5 ml of 100% alcohol for ganglion impar block in a series of 5 patients, and they found 50% improvement in VAS after 3 months [17].

It has been emphasized in the literature that neurotomies performed with the pulse radiofrequency method are more effective in the long term [18]. In the study conducted by Kircelli *et al.* in 2019, pulse radiofrequency therapy was applied to a total of 20 patients, and they evaluated VAS and Eurogol scores in the 6th month and 1st year. They achieved a successful result of 67.4% at the end of the 6th month and 61.1% at the end of the 1st year [6].

Fluoroscopy, USG and CT are the imaging techniques that used to reach the right point while performing the ganglion impar block. Although imaging techniques are not superior to each other, it has been emphasized in the literature that they depend on the experience of the physician performing them [10]. However, although the use of fluoroscopy has a disadvantage due to its radiation exposure, it has an advantage in terms of preventing damage to the rectum and vascular structures [19]. In our study, we performed ganglion impar block under fluoroscopy.

Discitis, rectal damage, vascular damage, and bleeding are important complications in patients with ganglion impar block [20]. In the study conducted by Datir and Connell, ganglion impar block was applied to 8 patients, and no complications were observed in any of them [21]. In another study by Toshniwal *et al.*, they applied ganglion impar block to a total of 16 patients, and similarly, no complications were observed in any of the patients [22]. In our study, we applied ganglion impar block to a total of 26 patients, and we did not find any complications in any of our patients.

It has been shown in the literature that coccydynia is associated with some radiological parameters. In the classification made by Postacchini *et al.*, the most common type of coccyx was found to be type 1, while Yoon *et al.* and Kaya *et al.* found type 2 coccyx [5, 23, 24]. In our study, we found 23.1% type1, 46.2% type2, 23.1% type 3 and 7.7% type 4 coccyx. Kaya *et al.* found the sacrococcygeal angle to be 117.53 degrees and Yoon *et al.* found 110 degrees in their study. In the same studies, they found the intercoccygeal angle to be 132.2 and 131 degrees, respectively. Again, in the same studies, they found the coccygeal length to be 26 and 34.7 mm, respectively [5, 23]. In our study, we found the mean sacrococcygeal and intercoccygeal angles to be 116.8 and 138 degrees, respectively. We found the mean coccygeal length to be 34.3 mm. In addition, we found the sacral slope angle to be 37.2 degrees, and these values were consistent with the literature.

There were some limitations in our study. Firstly, the limited number of patients may affect the results. Secondly, we could not determine the long-term results of patients who underwent pulse radiofrequency due to the lack of longer follow-up results.

## Conclusion

As a conclusion, ganglion impar block with the help of pulse radiofrequency seems to be superior to single-dose corticosteroid treatment in terms of VAS and Oswestry score in the six month period. Moreover, the low complication rate indicates that it is an effective and safe treatment method.

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**Competing Interest:** Authors have no competing interest to declare.

**Ethics Approval:** Liv Private Hospital 2023/012

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