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Original Article

Comparison of Ilioinguinal/Iliohypogastric Nerve Block and Ilioinguinal/Iliohypogastric Nerve Block Plus Genitofemoral Nerve Block in Patients with Chronic Pelvic/Groin Pain: A Retrospective Quasi-experimental Study

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Abstract

Background: Chronic pelvic/groin pain (CP/GP) is a debilitating condition with various treatment options, including nerve blocks. This study aimed to compare the effectiveness of ilioinguinal/iliohypogastric (II/IH) nerve block and the combination of genitofemoral (GF) and II/IH nerve block in patients with CP/GP.

Methods: This retrospective quasi-experimental (longitudinal) study was conducted at Labbafinejad Hospital (Shahid Beheshti University of Medical Science, Tehran, Iran) and assessed the medical records of 54 patients with CP/GP. Patients alternately received interventions from an experienced pain specialist. Twenty-six patients received the II/IH plus GFN block, and 28 patients received the II/IH nerve block alone. Visual analog scale (VAS) scores (before and 1, 2, and 3 months after intervention) available in medical records were extracted for all patients.

Results: In the first ($P=0.019$), second ($P=0.015$), and third month ($P=0.021$) following the intervention, patients in the G+I group consistently reported significantly lower pain severity compared to patients in the I group. Patients with pain from surgical causes demonstrated significantly better treatment response than those with idiopathic causes in the second ($P=0.014$, 0.021) and third months ($P=0.015$, 0.026) post-intervention in the G+I group compared to the I group.

Conclusion: Both II/IH nerve block and II/IH nerve block plus GFN block are effective in treating CP/GP. However, patients who received II/IH nerve block plus GFN block demonstrated a better treatment response than those who received II/IH nerve block alone. Additionally, it is worth noting that patients with pain from surgical causes reported lower pain intensity compared to patients with idiopathic causes in both treatment groups.

Keywords: Genitofemoral, Ilioinguinal, Iliohypogastric, Chronic pelvic pain, Nerve block

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Introduction

Chronic pelvic pain (CPP) is persistent and recurring discomfort in the lower abdominal region, pelvis, and surrounding structures for at least six months (1). This complex condition, with diverse causes, poses challenges to both diagnosis and treatment (2,3). Chronic groin pain, a subset of CPP, refers specifically to persistent pain localized to the groin area Chronic groin pain's etiology includes surgical and nonsurgical reasons (3,4).

Managing chronic pelvic/groin pain (CP/GP) challenges healthcare providers due to its multifactorial nature and the absence of standardized treatment approaches. Nerve blocks have gained attention as a potential therapeutic option.

One specific approach that holds promise in managing CP/GP is the combination of genitofemoral and ilioinguinal/iliohypogastric (II/IH) nerve block (5,6). The genitofemoral nerve is responsible for innervating the skin of the pubic region, external genitalia, and upper medial thigh. In contrast, the ilioinguinal and iliohypogastric nerves innervate the lower abdomen, anterior thigh, and inguinal region. By targeting these nerves with a combination of nerve blocks, clinicians aim to disrupt pain signals and provide relief for patients suffering from CP/GP (7,8).

The evaluation of genitofemoral plus II/IH nerve block

in patients with CP/GP is crucial to determine its efficacy and potential benefits. Understanding the effectiveness of this combined nerve block approach can help healthcare providers make informed decisions regarding its use as part of a multimodal pain management strategy (9,10).

Numerous studies have been carried out to assess the efficacy of genitofemoral block or II/ IH nerve block in different medical conditions. These studies have utilized various methodologies, including randomized controlled trials, retrospective analyses, and case series, to evaluate the outcomes of this treatment approach. The findings from these studies provide valuable insights into the potential benefits, limitations, and safety profile of this nerve block combination (11). However, according to our research, there is a lack of studies specifically investigating the effectiveness of combining genitofemoral nerve block plus II/ IH nerve block in patients with CP/GP (12,13).

Genitofemoral plus II/ IH nerve block may offer significant pain relief and improvement in functional outcomes for patients with CP/GP. These nerve blocks can be performed using various techniques, such as landmark-based, ultrasound-guided, or a combination of both. The choice of technique may depend on the provider's expertise, patient characteristics, and anatomical considerations. Additionally, the use of corticosteroids with nerve blocks may further enhance their efficacy (14,15).

In addition to pain relief, during the evaluation of genitofemoral plus II/ IH nerve block, other important factors should also be considered, including safety, duration of pain relief, patient satisfaction, and potential adverse effects. It is crucial to assess the short-term and long-term outcomes of this treatment approach to determine its sustainability and overall effectiveness in managing CP/GP (14,16).

Furthermore, the selection of appropriate patient populations for this combined nerve block approach is an important consideration. Factors such as the underlying etiology of pelvic/groin pain, patient characteristics, and previous treatment history can influence the outcomes of the nerve blocks. Identifying the most suitable candidates for this intervention can optimize the success rate and ensure appropriate resource allocation. Evaluating genitofemoral plus II/ IH nerve block in patients with CP/GP offers valuable insights into its efficacy, safety profile, and patient outcomes. By analyzing the evidence surrounding this nerve block combination, healthcare professionals can improve patient care, enhance quality of life, and contribute to the advancement of pain management practices in this challenging patient population. This retrospective quasi-experimental study aimed to compare II/IH nerve block and genitofemoral nerve block plus II/IH nerve block in patients with CP/GP.

Methods

Study design

This retrospective quasi-experimental (longitudinal) study was conducted at Labbafinejad Hospital (Shahid Beheshti University of Medical Science) between January 2019 and November 2022.

Sampling

To calculate the sample size, we followed these steps: Initially, we examined the clinical records of ten patients (5 from each group) in terms of pain intensity scores in the third month after the intervention (pilot). The mean ± standard deviation of pain intensity was 0.93 ± 1.91 for the II/IH nerve block group and 1.21 ± 1.27 for the II/IH plus genitofemoral nerve (GFN) block group. Additionally, we set the α to 0.05, the test power to 80%, and considered a sample dropout rate of 15%. Then, we used the sampsi module in STATA (version 13) to estimate the sample size. Finally, 26 patients in the II/IH plus GFN block group and 28 patients in the II/IH block group were considered in this study. We also included the samples used in the pilot study in the results of the main study.

Eligibility criteria

We evaluated medical records containing the necessary information and pain intensity measurements based on the VAS score at various times (before and 1, 2, and 3 months after the intervention). For this study, we excluded medical records of patients outside the age range of 18 to 60 years. Additionally, patients undergoing another intervention within the preceding three months were excluded from the review process. We specifically focused on cases where the primary pain intensity exceeded the VAS score of four, with a duration of more than six months, considering it as the main outcome. In our center, to ensure our work's validity and verify that the interventions we provide to our patients are effective, we systematically record data on pain intensity and analgesic use at regular intervals. We are confident that all relevant variables are present in our patient's clinical records, and we included only those records in the study that had complete data pertinent to this research.

Procedures

All the data were extracted from the medical records. Standard monitoring was performed with blood pressure measurements and pulse oximetry.

All the procedures were performed in the supine position. Following skin sterilization with a povidone-iodine solution, a high-frequency (6–12 MHz) linear ultrasound transducer probe was placed preferably on the anterior superior iliac spine (ASIS). The probe, covered with a sterile plastic bag, was applied with sterile gel to the skin. The transducer was moved along the line connecting the ASIS to the umbilicus to scan the ilioinguinal (II) and iliohypogastric (IH) nerves. Three muscles of the

abdominal wall were visible near the iliac crest. The II and IH nerves are between the transversus abdominis and internal oblique muscle fascia, next to the iliac wing. The nerves are usually closely situated and appear as oval hypoechoic structures.

The deep circumflex iliac artery is close to the same fascial layer and can be identified by pulse pattern and using color Doppler. After locating the nerves, 2 cc lidocaine 1% was injected intradermally. The G22 spinal needle was inserted using the in-plane approach and was advanced to the target; then, 10 cc of ropivacaine 0.2% and 40 mg triamcinolone were injected, and the local anesthesia) spread between the internal oblique and transversus abdominis muscle fascia. This solution surrounded the II and IH nerves and appeared as a distinct hypoechoic pattern. Following this, the GFN blockade was performed in the genital area of patients in the G + I group. The transducer was placed 2–3 cm below the inguinal ligament. After identifying the femoral artery, the probe was rotated to the long axis and placed along the artery. The probe was moved over the femoral artery to determine the site at which the external iliac artery and femoral artery merge (roughly corresponding to the inner inguinal ring). Once the external iliac artery was identified, the spermatic cord in males and the round ligament in females were seen in the inguinal canal above the external iliac artery. In men, vessels in the spermatic cord can be identified and confirmed by using color Doppler. The needle was inserted out-of-plane or in-plane, and 5 cc of ropivacaine 0.2% and 20 mg triamcinolone were injected in and out of the spermatic cord in men; in women, the injection was done only around the round ligament. After the intervention, the patient was taken to the post-anesthesia care unit (PACU) for 2 hours.

It is worth noting that the procedures in this study were exclusively conducted by a highly skilled pain specialist with expertise in performing nerve blocks. The pain specialist administered the nerve block to patients alternatively, with patients with odd numbers receiving the II/IH block alone and those with even numbers receiving the II/IH block in combination with the GFN block. This approach was implemented on the patients who were admitted to the hospital.

Visual analog scale (VAS)

The VAS is a commonly used measurement tool in healthcare for assessing subjective experiences or perceptions, particularly pain intensity. It is a simple and widely recognized method allowing individuals to rate their pain levels or other subjective feelings on a continuum. The scale typically features a horizontal line, usually 10 cm in length, with anchor points at each end representing extreme states of the measured attribute. In the context of pain assessment, the left end of the scale often denotes "no pain" or "no discomfort," while the right end represents "worst pain imaginable" or "maximum discomfort." The individual is instructed to mark a point on the line that aligns with their perceived level of pain, and the measurement is recorded as the distance from the left end of the scale. This numerical value quantitatively represents subjective experiences and helps track changes over time or compare responses between individuals.

Data extraction

VAS scores were recorded at various time points, namely before (T0), 1 (T1), 2 (T2), and 3 months (T3) after the intervention. Patient satisfaction was assessed with options for not satisfied (score 0), partial satisfaction (score 1), and complete satisfaction (score 2), and these responses were recorded in the study results. Information concerning complications was extracted from the patient's medical records, including hematoma, intestinal perforation, drug allergy, femoral artery dissection, and the need for pain medication.

Statistical analysis

Statistical analysis was performed using SPSS statistical software 25.0. Continuous variables are expressed as mean ± SD. After testing the normality and homoscedasticity of the data, the means were compared with an independent samples *t*-test. Positive or categorical variables are expressed as absolute numbers (%). The ratios were compared with Fisher's test or the χ^2 test. Also, using the Friedman test, a comparison of pain intensity (before and 1, 2, and 3 months after intervention) over time. Data were analyzed using a rank scale. P value < 0.05 was considered significant.

Results

A total of 54 medical records were included in this study. Twenty-eight patients had only II/IH nerve block (the I group), and 26 had II/IH combined with genitofemoral nerve block (the G + I group). There was no significant difference in gender ($P = 0.804$), age ($P = 0.789$), American Society of Anesthesiologists (ASA) classification ($P = 0.693$), chronic pain duration ($P = 0.703$), etiology ($P = 0.581$), body weight ($P = 0.560$), body height ($P = 0.532$), and body mass index ($P = 0.613$) (Table 1).

The pre-intervention pain intensity in all patients from both groups did not show a statistically significant difference (P value > 0.05). However, it was observed that patients with idiopathic causes had higher pain intensity compared to patients with surgical causes. After the intervention, the pain intensity remained < 5 for all patients in both groups throughout the study period. We observed that the G + I group had lower pain intensity compared to the I group (P value = 0.019 for 1 month, 0.015 for 2 months, 0.021 for 3 months after intervention). Additionally, within the G + I group, patients with surgical causes showed a better response compared to patients in

Table 1. Patient characteristics

Variable		Study groups (N = 54)		*P* value
		Group I (*n* = 28)	Group G + I (*n* = 26)	
Age (y)		56.41 ± 5.83	55.96 ± 5.14	0.789
Sex (male/female)		25/3	25/1	0.804
ASA class	I	9 (32.14 %)	8 (30.76 %)	0.693
	II	15 (53.57 %)	13 (50.00 %)	
	III	4 (14.28 %)	5 (19.24 %)	
Chronic pain etiology	Surgery	19 (67.86 %)	18 (69.24 %)	0.581
	Idiopathic	9 (32.14 %)	8 (30.76 %)	
Chronic pain duration (month)		9.55 ± 2.37	9.04 ± 1.96	0.703
Body weight(kg)		82.35 ± 7.96	80.99 ± 6.37	0.560
Body height (cm)		163.85 ± 12.25	168.32 ± 12.17	0.532
Body mass index		29.74 ± 3.73	28.99 ± 3.44	0.613

The I group: II/IH block alone; the G + I group: II/ IH plus GFN block; ASA: American Society of Anesthesiologists.

Table 2. Comparison of pain intensity in patients based on the etiology of CP/IRP

Variable			Study groups		*P* value
			The I group (*n* = 28)	The G + I group (*n* = 26)	
VAS	Pre-intervention	Surgery	6.83 ± 1.25	7.07 ± 1.33	0.801
		Idiopathic	7.01 ± 1.39	7.16 ± 1.41	0.836
		P value	0.869	0.754	
		All patients	6.91 ± 1.43	7.14 ± 1.37	0.814
	1 month after intervention	Surgery	4.19 ± 1.00	3.41 ± 0.59	0.025
		Idiopathic	4.61 ± 1.14	3.88 ± 1.14	0.035
		P value	0.623	0.512	
		All patients	4.25 ± 1.01	3.59 ± 0.83	0.031
	2 months after intervention	Surgery	3.33 ± 1.17	2.19 ± 1.01	0.014
		Idiopathic	3.44 ± 1.14	2.54 ± 1.08	0.021
		P value	0.711	0.354	
		All patients	3.37 ± 1.27	2.33 ± 1.0	0.015
	3 months after intervention	Surgery	2.56 ± 0.33	1.44 ± 0.47	0.015
		Idiopathic	2.85 ± 1.13	1.69 ± 0.66	0.026
		P value	0.659	0.511	
		All patients	2.65 ± 0.88	1.57 ± 0.63	0.021

The I group: II/IH block alone; the G + I group: II/IH plus GFN block; VAS: Visual Analog Scale.

Table 3. Comparison of pain intensity at different time points compared to before

Groups	The I group (*n* = 28)	The G + I group (*n* = 26)
1 month compared with before intervention	*P* = 0.043	*P* = 0.039
2 months compared with before intervention	*P* = 0.039	*P* = 0.033
3 months after comparison before intervention	*P* = 0.028	*P* = 0.019
2 months compared with 1 month	*P* = 0.256	*P* = 0.109
2 months later compared with 1 month	*P* = 0.078	*P* = 0.053
3 months later compared with 2 months	*P* = 0.286	*P* = 0.279

The I group: II/IH block alone; the G + I group: II/IH plus GFN block.

the I group (*P* value = 0.025). However, in both groups, patients with surgical causes responded better than those with idiopathic causes. Furthermore, we noticed that in the second month (*P* value = 0.015) and the third month (*P* value = 0.021) following the intervention, patients in the G + I group consistently reported significantly lower pain severity compared to patients in the I group. It is important to highlight that patients with surgical causes exhibited a significantly better treatment response compared to patients with idiopathic causes in both the second (*P* value = 0.014 vs. *P*-value 0.021, respectively) and third (*P* value = 0.015 vs. *P* value = 0.026, respectively) months following the intervention (Table 2).

We examined variations in pain intensity at different time points. Initially, we compared pain intensity in the G group. In the final analysis, we compared the pain intensity of the third month with that of the second month. No significant change in pain intensity was observed between the two groups; however, the G + I group demonstrated a more substantial reduction in pain intensity compared to the G group. The detailed results of the pain intensity comparisons at different time points are presented in Table 3.

The satisfaction of the patients was measured at different times, and the results indicated that at all times, the level of satisfaction of the patients of the G + I group was non-significantly higher than the satisfaction of the participants of the I group (Figure 1).

Comparison of pain intensity in patients over time using the Friedman test indicated that both groups are associated with a non-significant decrease month by month, but the GFN block plus II/IH block technique is associated with more decrease in pain intensity compared to the II/IH block technique (*P* = 0.211), and it was better for pain management; however, the effectiveness of the GFN block plus II/IH block technique (*P* = 0.185) was lower in patients with an idiopathic cause than in patients with a surgical cause (*P* = 0.289).

Rescue analgesia (acetaminophen-500 mg) was required for treatment in the first month after the intervention for a total of 7 patients, 3 in the G + I group and 4 in the I group (seven days in one month). After two hours in the PACU, all patients in both groups were able to walk independently in the office without any complaints. Complications such as hematoma, intestinal perforation, drug allergy, and femoral artery dissection were not reported in either group.

Discussion

Our data showed that ultrasound-guided GFN block plus II/IH nerve block has greater analgesic effect than ultrasound-guided II/IH nerve block alone for CP/GP patients. The available evidence suggests that the GFN block alone or II/IH nerve block alone may provide

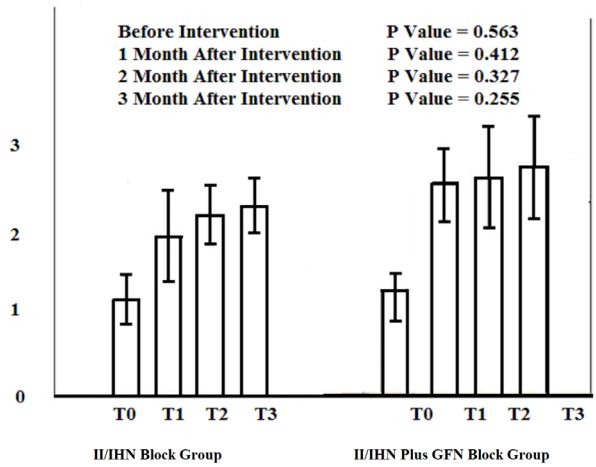

Figure 1. Participants' satisfaction at different times (T0: before intervention, T1: 1 month after intervention, T2: 2 months after intervention, and T3: 3 months after intervention)

acceptable pain relief and functional improvement. However, we could not find any study that evaluates the combined block. This study was conducted to evaluate the II/IH plus GFN block for the first time. Our study's findings suggest that adding GFN block to II/IH nerve block may offer several advantages. The results of the evaluation of GFN block plus II/IH nerve block in patients with CP/GP represent a significant advancement in this field, particularly in understanding the effectiveness of this approach for patients with surgical-related etiology chronic groin pain. Due to the prevalence of surgical factors as a common etiology for chronic groin pain, this groundbreaking study highlights the need for targeted interventions. While a specific article on this evaluation is not available, the potential benefits of GFN block plus II/IH nerve block can be discussed in a general context. GFN block plus II/IH nerve block is effective for treating chronic groin pain with nonsurgical and surgical etiology due to its ability to target the affected nerves and provide localized pain relief selectively. Surgical factors, such as complications from hernia repair or scar tissue formation, often involve specific anatomical structures and nerves in the pelvic/groin region (17,18). By blocking the genitofemoral nerve and II/IH nerves, this approach can interrupt the transmission of pain signals originating from the surgically affected areas, leading to pain relief and improved functional outcomes (13). While the prevalence of surgical factors as compared to nonsurgical factors in chronic groin pain may vary depending on the specific population and condition being studied, it is important to acknowledge the impact of surgical etiologies on chronic groin pain (19). Surgical interventions in the pelvic/groin region, such as hernia repairs or pelvic surgeries, can potentially lead to complications and chronic pain (3). Understanding and addressing these surgical factors are crucial for effective pain management and improving the quality of life for individuals experiencing chronic groin pain (20).

Secondly, the GFN has been implicated in contributing to CP/GP in specific patient populations. For example, in patients with inguinal hernia or post-herniorrhaphy pain syndrome, the GFN can play a significant role in the pathophysiology of pain. By including GFN block in the treatment approach, clinicians can specifically address the involvement of this nerve and potentially achieve better pain control. Moreover, the combination approach may lead to improved functional outcomes compared to the II/IH nerve block alone. Chronic pelvic and groin pain can significantly impact a patient's daily activities and quality of life. More comprehensive pain relief can be achieved by targeting multiple nerves involved in the innervation of the pelvic and groin region, including the genitofemoral nerve, potentially leading to enhanced functional improvement and restoration of everyday activities (21,22).

Sundara et al demonstrated that GFN block and II/IH nerve block can ameliorate chronic refractory abdominal wall and groin neuropathic pain in patients who have failed to respond to conventional medical management six weeks after the procedures, but they did not compare each block alone and combined (23). Poh et al believe that while the exact mechanisms underlying prolonged pain relief are not fully understood, it is postulated that the inclusion of GFN block may provide a synergistic effect, resulting in sustained pain control (9).

It is important to note that adding a GFN block to the II/IH nerve block is a technically more challenging procedure than the II/IH nerve block alone (9). In their study, Sasaoka et al noted that the GFN is smaller and more variable in its course, requiring precise localization and expertise (24). Conversely, Drakonaki et al mentioned in their study that, with ultrasound guidance and experienced operators, the success rate of GFN block can be optimized, and the potential benefits of the combined approach can be realized (25).

While the available evidence suggests that the analgesic effects of GFN block plus II/IH nerve block are more than those of II/IH nerve block alone, it is important to acknowledge the limitations of the existing studies. The number of studies directly investigating and comparing each block approach is limited, the sample sizes are often small, and no study compares either block with a combined block. Additionally, variations in patient populations, underlying etiologies of pelvic/groin pain, and procedural techniques may contribute to heterogeneity among the studies, making direct comparisons challenging. Further well-designed, randomized controlled trials with larger sample sizes are needed to provide more robust evidence regarding the superiority of GFN block plus II/IH nerve block over II/IH nerve block alone. These studies should also consider long-term outcomes, patient satisfaction, and potential adverse effects to evaluate the efficacy and safety of the combined approach comprehensively.

Conclusion

In conclusion, combining genitofemoral nerve block with II/IH nerve block shows superior efficacy in managing chronic pelvic and groin pain. Evidence indicates that this combined approach offers more effective pain relief and improves quality of life compared to using II/IH nerve block alone. By targeting both the genitofemoral nerves, which innervate the groin, and the II/IH nerves, this method provides more precise and localized pain relief, particularly for pain related to surgical procedures.

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Competing Interests

The authors declare no competing interests.

Ethical Approval

This study was conducted following approval by the Ethics Committee of Shahid Beheshti University of Medical Sciences (ethics code: IR.SBMU.RETECH.REC.1402.135).

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