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# Ultrasound-Guided Caudal Block Versus Pudendal Nerve Block for Post-Operative analgesia in Anal Surgery

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ORIGINAL ARTICLE

# Ultrasound-Guided Caudal Block Versus Pudendal Nerve Block for Post-Operative analgesia in Anal Surgery

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Abstract

*Background;* ***Anal fissure is a frequent disorder that is regarded as a prevalent surgical condition that frequently arises in the anorectal area. The administration of a caudal block can offer an extended duration of pain relief following anorectal surgery.***

*Aim and objectives:* ***To compare Ultrasound (US)-Guided caudal Block group and US -Guided Pudendal Nerve Block.***

***Subjects and methods: this prospective, randomized clinical trial included (116) cases divided into two groups. It was conducted in Al-Azhar University Hospitals for Boys in Cairo.***

*Results:* ***There were insignificant differences among the studied groups concerning the baseline characteristics (Age, height, sex, weight, BMI, and ASA), VAS at PACU, at 3, 6, 24, 36, and 48 hr, the number of cases who essential postoperative analgesia, the sphincter relaxation assessment, incidence of PONV and patient satisfaction. Regarding the postoperative pain assessment, VAS at 12h was significantly lower in group B, contrasted with group A (P<0.001). The time of 1st necessity for analgesics was delayed considerably in group B contrasted with group A (P=0.036). The total postoperative morphine consumption was significantly reduced in group B, contrasted with group A (P=0.023). The need for a catheter was substantially greater in group A than in group B (P=0.006).***

*Conclusion:* ***We concluded that US -Guided Pudendal Nerve Block was more efficient & safer than US -Guided caudal Nerve Block before anal fissure surgery.***

*Keywords:* Ultrasound-Guided; Caudal Block; Pudendal Nerve Block; Anal Surgery

## 1. Introduction

The prevalence of anorectal disorders among adults is estimated to be around 4-5%, with approximately 10% of affected individuals requiring surgical intervention. [1]

An anal fissure is a frequent disorder that is regarded as a prevalent surgical condition that frequently arises in the anorectal region. Traditional open surgery in Patients with anal fissures, especially those who have been exposed to lateral sphincterotomy, whatever the method used, often have immediate postoperative pain.[2]

Regional anesthesia is preferred in these types of surgeries by minimizing or eliminating the risks and discomforts associated with general anesthesia, such as muscle pain, sore throat, and airway obstruction. It is straightforward to carry out, simple to learn, and offers preventative analgesia. [3]

In patients undergoing anorectal surgery, protracted postoperative analgesia may be administered via caudal block. The efficacy of the blind technique for the caudal block is limited to 68–75 percent, even among experienced surgeons, owing to the atypical sacral anatomy. Moreover, its application in adult patients is more prevalent in the pediatric population. Nevertheless, several studies have documented exceptionally great rates of efficacy (96.9–100%) when the caudal epidural injection is guided by US. [4]

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The pudendal nerve comes from the S2, S3, and S4 nerve roots. It is the biggest nerve of the pudendal plexus. It passes between the sacrotuberous and sacrospinous ligaments to find the perineum. It goes out the pelvis via the greater sciatic foramen, passes the ischial spine medial to the pudendal blood vessels & passes via the lesser sciatic foramen. It passes upward and forward at the lateral wall of the ischiorectal fossa. Vulval skin is innervated by the ilioinguinal, genitofemoral, posterior femoral cutaneous nerves and by cutaneous branches of S2-S4. [5]

The objective of our research was to contrast among US -Guided Caudal Block and US -Guided Pudendal Nerve Block following anal fissure surgery concerning the relief of after-surgery pain.

The primary study outcomes will be the analgesic duration attained by each variety of blocks, as ascertained by the first analgesic request. Furthermore, the intensity of pain will be measured by the VAS pain score and total morphine consumption in the first 24 hours. The secondary outcomes will be side effects, analgesic consumption, and patient satisfaction following surgery.

## 2. Patients and methods

This research was a prospective, randomized clinical trial involving (116) cases conducted in Al-Azhar University Hospitals for Boys in Cairo. The local ethical Committee approved it. The cases were separated into two groups: Group A: US -Guided caudal Block group: (58) cases underwent US -Guided caudal Nerve Block before anal fissure surgery. And Group B: US -Guided Pudendal Nerve Block group: (58) cases underwent US -Guided Pudendal Nerve Block before anal fissure surgery.

2.1.Inclusion criteria: Patients accepting to join the study, Age: between 18–55 years, Body Mass Index (BMI) < 30 kg/m2, and ASA physical status I and II.

2.2.Exclusion criteria: Patients who refuse treatment at the site of injection, infection, pelvic and vertebral deformities, prior allergies to the medications utilized in the research, severe diseases of the liver, kidneys, or heart, and bleeding disorders.

2.3.Sample size:

A calculation was made utilizing the G power program version 3.1.9.4 to determine the needed sample size. According to the findings of earlier research done by Alkhaldi et al., the minimum sample size required for each group is 58 patients, with a total of 116 patients, to attain a power level of 0.80 and an alpha level of 0.05 (two-tailed). [2]

2.4.Methods

All patients were subjected to: Complete history taking, Clinical examinations (General and Physical Examination of Anorectal disorders that included External Inspection, Digital Rectal Examination (DRE), Assessment of Anal Sphincter Tone, Rectal Prolapse Assessment and Evaluation of Perineal Muscles), laboratory investigations and Pain assessment with the visual analog scale (VAS).

2.5.Anesthetic techniques:

Patients received general anesthesia with intravenous fentanyl 1mcq/kg, propofol 2mg/kg, atracurium 0.5mg/kg with controlled ventilation while anesthesia was maintained by isoflurane one mac, atracurium 0.1mg/kg every 30min.

Ultrasound-Guided Caudal Nerve Block group.

After positioning the patients in the prone position, a linear array transducer with a frequency range of 13-6 MHz was used to scan them. Between the two sacral cornua, a cross-sectional picture of the sacral hiatus and dorsal sacrococcygeal ligament was captured. A 25-gauge, 5-centimeter short-bevel needle was inserted under real-time ultrasonography. After penetrating the sacral canal, the needle was advanced 1 cm farther into the sacrococcygeal ligament.

After the aspiration of CSF fluid and blood was confirmed to be negative, a 20 ml solution of 0.5% plain Bubivicaine was given.

Ultrasound-guided Pudendal Nerve Block Group

Under US guidance, a trans gluteal technique was utilized to administer a pudendal nerve block at the ischial spine level. At the same time, the patient was in a prone position. Scanning is best accomplished with a curvilinear probe at 2-5 Hz. Starting with the PSIS in the transverse plane, the probe is pushed caudad till the piriformis muscle is discovered throughout scanning. The ischium, a curved hyperechoic line at this level, can be followed to the ischial spine by moving it farther. Following the pudendal artery, the ischial spine & ligamentous plane had been properly identified, and a peripheral nerve-stimulating needle measuring 120 mm and 22 gauge was inserted from the probe's medial side. A tiny amount of normal saline was administered once the needle had gone through the sacrotuberous ligament. The pudendal nerve was not easy to see because of its depth, narrow diameter, and the likelihood that it would be anatomically divided into two or three trunks.

2.6.Ethical Consideration: The research received approval from the local ethics committee. After explaining the objective of the research to every patient, written informed consent was obtained. The data obtained from participants are confidential. The study participants weren't identified by name in any report or publication concerning this study.

2.7.Statistical analysis: Using the SPSS

software statistical computer program (IBM Corp., Armonk, NY, USA), the obtained data were ordered, tabulated, and statistically evaluated. To summarize the data, a normal distribution was utilized for the numerical variables, like Age, body weight & the mean plus the standard deviation.

We contrasted the mean values of the two groups utilizing a t-test independent of each other. As a measure of significance, the Mann–Whitney U-test was used. Other variables do not follow a normal distribution and are stated as the median and the interquartile range (IQR).

## 3. Results

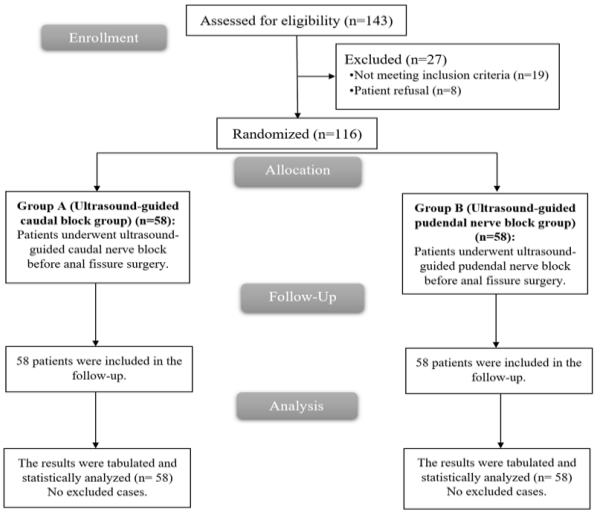


Figure 1. CONSORT flowchart of the enrolled patients

Following determining the eligibility of 143 patients for this research, 8 patients declined to participate and 19 patients failed to satisfy the eligibility requirements. A random allocation of 58 patients per group was done on the remaining 116 patients. Statistical analysis was done on all allocated patients who underwent follow-up. Figure 1

*Table 1. Baseline characteristics of the studied groups*

| | | GROUP A (N=58) | GROUP B (N=58) | P VALUE |
|---|---|---|---|---|
| AGE (YEARS) | Mean ± SD | 38.5 ± 10 | 37.8 ± 11.07 | 0.739 |
| | Range | 20 - 55 | 20 - 55 | |
| SEX | Male | 36 (62.07%) | 30 (51.72%) | 0.261 |
| | Female | 22 (37.93%) | 28 (48.28%) | |
| WEIGHT (KG) | Mean ± SD | 69.1 ± 4.96 | 68.3 ± 5.14 | 0.360 |
| | Range | 59 - 79 | 58 - 79 | |
| HEIGHT (M) | Mean ± SD | 1.61 ± 0.02 | 1.62 ± 0.04 | 0.206 |
| | Range | 1.58 - 1.65 | 1.58 - 1.78 | |
| BMI (KG/M²) | Mean ± SD | 26.5 ± 2.03 | 25.97 ± 1.86 | 0.117 |
| | Range | 22.21 - 29.73 | 21.67 - 29.24 | |
| ASA | II | 41 (70.69%) | 39 (67.24%) | 0.688 |
| | I | 17 (29.31%) | 19 (32.76%) | |

ASA: American society of anesthesiologists.

There were insignificant variances among the studied groups concerning the baseline characteristics (Age, height, sex, weight, BMI & ASA).

*Table 2. Postoperative pain assessment by the visual analog scale (VAS) of the studied groups*

| | GROUP A (N=58) | GROUP B (N=58) | P VALUE |
|---|---|---|---|
| VAS AT PACU | 0 (0 - 1) | 0.5 (0 - 1) | 0.579 |
| VAS AT 3H | 1 (0 - 2) | 1 (0 - 2) | 0.538 |
| VAS AT 6H | 1 (1 - 2) | 1 (1 - 2) | 0.270 |
| VAS AT 12H | 4 (3 - 5) | 3 (2 - 4) | <0.001* |
| VAS AT 24H | 3 (3 - 4) | 3 (3 - 4) | 0.556 |
| VAS AT 36H | 1 (1 - 2) | 1 (0 - 2) | 0.201 |
| VAS AT 48H | 1 (0 - 2) | 1.5 (1 - 3) | 0.239 |

Data presented as median (IQR), *: statistically significant as P value <0.05.

Regarding the postoperative pain assessment, VAS at 12h was significantly lesser in group B contrasted with group A (P<0.001). VAS at PACU, at 3, 6, 24, 36 and 48 hr. was insignificantly different between both groups.

*Table 3. Postoperative analgesic requirement of the studied groups*

| | GROUP A (N=58) | GROUP B (N=58) | P VALUE |
|---|---|---|---|
| TIME OF 1ST ANALGESIC REQUIREMENT (HR) | 16.0 ± 5.71<br>12 - 24 | 18.7 ± 6.57<br>12 - 36 | 0.036* |
| TOTAL POSTOPERATIVE MORPHINE CONSUMPTION (MG) | 2.9 ± 1.81<br>0 - 8 | 2.2 ± 1.58<br>0 - 4 | 0.023* |
| NUMBER OF PATIENTS REQUIRED POSTOPERATIVE ANALGESIA | 51 (87.93%) | 41 (70.69%) | 0.058 |

Data presented as mean ± SD

The time of 1st analgesic requirement was significantly delayed in group B contrasted with group A (P=0.036). The total postoperative morphine consumption was significantly reduced in group B contrasted with group A (P=0.023). There was an insignificant variance among both groups concerning the number of cases who needed postoperativeanalgesia.

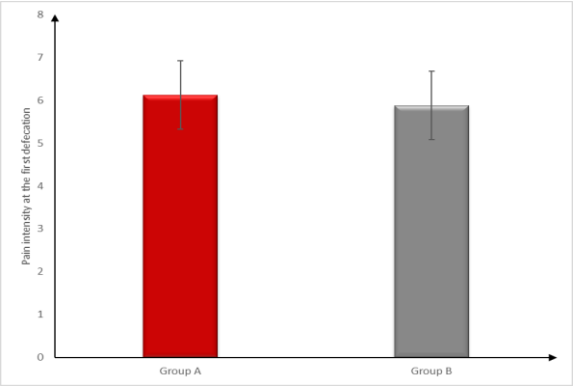


Figure 2. Pain intensity at the first defecation of the studied groups

*Table 4. Sphincter relaxation assessment and need for catheter of the studied groups*

| | | GROUP A (N=58) | GROUP B (N=58) | P VALUE |
|---|---|---|---|---|
| SPHINCTER RELAXATION ASSESSMENT | Scale 1 | 7 (12.07%) | 3 (5.17%) | 0.410 |
| | Scale 2 | 9 (15.52%) | 9 (15.52%) | |
| | Scale 3 | 42 (72.41%) | 46 (79.31%) | |
| NEED FOR CATHETER | | 7 (12.07%) | 0 (0%) | 0.006* |

The need for catheter was significantly greater in group A contrasted with group B (P=0.006). There was an insignificant variance amongst both groups concerning the sphincter relaxation assessment.

*Table 5. Incidence of complications of the studied groups*

| | GROUP A (N=58) | GROUP B (N=58) | P VALUE |
|---|---|---|---|
| INCIDENCE OF URINE RETENTION | 7 (12.07%) | 0 (0%) | 0.013* |
| PONV | 5 (8.62%) | 3 (5.17%) | 0.717 |
| RESPIRATORY DEPRESSION | 0 (0%) | 0 (0%) | --- |
| PRURITUS | 0 (0%) | 0 (0%) | --- |

PONV: postoperative nausea and vomiting

Concerning the prevalence of complications, urine retention occurred only in 7 (12.07%) cases in group A and PONV occurred in 5 (8.62%) cases in group A and 3 (5.17%) cases in group B, whereas respiratory depression and pruritus not occurred to any case in both groups.Incidence of urine retention was significantly lesser in group B contrasted with group A (P=0.013) and incidence of PONV was insignificantly different between both groups.

*Table 6. Patient satisfaction of the studied groups*

| | GROUP A (N=58) | GROUP B (N=58) | P VALUE |
|---|---|---|---|
| TERRIBLE | 0 (0%) | 0 (0%) | 0.140 |
| POOR | 6 (10.34%) | 4 (6.9%) | |
| SATISFACTORY | 20 (34.48%) | 13 (22.41%) | |
| GOOD | 23 (39.66%) | 22 (37.93%) | |
| EXCELLENT | 9 (15.52%) | 19 (32.76%) | |

Table 6 showed that 6 (10.34%) cases in group A and 4 (6.9%) in group B showed poor satisfaction, 20 (34.48%) in group A and 13 (22.41%) in group B were satisfactory, 23 (39.66%) in group A & 22 (37.93%) in group B showed good satisfaction and 9 (15.52%) in group A & 19 (32.76%) in group B showed excellent satisfaction. There was an insignificant variance amongst the studied groups regarding the patient satisfaction.

## 4. Discussion

The caudal epidural anesthesia technique is frequently employed on pediatric patients. The route is predominantly utilized in adults to treat low back discomfort while under fluoroscopic guidance. [6]

Additionally, success rates are increased when ultrasound (US) guidance is utilized throughout caudal injections, in contrast to cases of blood aspiration, bone contact, accidental subcutaneous injections, and decreased attempt numbers. Similar adverse events, complication rates, and treatment efficacy were observed when contrasted with the fluoroscopic technique.[7] In contrast, the duration of the procedure is reduced when US guidance is utilized. [8]

Our research displayed insignificant variances among the studied groups regarding the baseline characteristics (Age, height, gender, weight, BMI, and ASA).

Chen et al. sought to determine whether US-guided CEB and SA affected perioperative satisfaction among patients undergoing anorectal surgery. Our findings are consistent with their research. In terms of age, gender, BMI, height, weight, and ASA, they found no significant variations among the groups under investigation.[4]

Aldabbas & Kreshan aimed to compare the effects of Pudendal nerve block and alternative anesthetic approaches on the postoperative pain profile following anorectal surgery. Their study was conducted on 114 cases; their age ranged from 20- 55 years. The authors reported no significance among the studied groups concerning age, sex, height & weight.[9]

Regarding the postoperative pain assessment, VAS at 12h was significantly lesser in group B, contrasted with group A (P<0.001). VAS at PACU, at 3, 6, 24, 36, and 48 hr., was insignificantly different amongst both groups. The time of 1st

analgesic requirement was significantly delayed in group B contrasted with group A (P=0.036). The total postoperative morphine consumption was significantly reduced in group B, contrasted with group A (P=0.023). Both groups had an insignificant variance concerning the number of cases needing postoperative analgesia.

Our results are consistent with Chen et al., who observed that there was significance among the studied groups concerning postoperative pain assessment.[4]

Also, Siddiqui et al. stated that there was no significant distinction among the studied groups concerning 1st analgesic requirement. [10]

Our findings showed an insignificant variance among the studied groups concerning the pain intensity at the first defecation.

Alkhaldi et al. demonstrated that the patients in group G-I endured moderate pain for a median of 5.3 days, significantly longer than the 4.3 days in group G-II (P>0.05). Severe pain was not reported by any patient in either group. Cases were discharged when they no longer required analgesics for pain relief following surgery. G-I patients exhibited a prolonged postoperative stay in comparison to G-II patients. There were three patients in G-II (4.9%) who remained for more than 24 hours, contrasted with five patients in G-I (8.1%) (P<0.05). The average time it took for patients in G-II to resume regular activities was 7.5 days, whereas in G-I, it was 8.0 days. [2]

Siddiqui et al. stated that pain intensity was not significant among the studied groups. [10]

The current study showed that the need for a catheter was significantly greater in group A than in group B (P=0.006). The sphincter relaxation assessment was insignificantly different between both groups.

Our results are consistent with those of Chen et al., who observed significant variance concerning the need for catheters among the studied groups. There was an insignificant variance amongst both groups concerning the sphincter relaxation assessment. [4]

Our findings showed that the prevalence of complications and urine retention occurred only in 7 (12.07%) cases in group A, and PONV occurred in 5 (8.62%) in group A and 3 (5.17%) in group B. In contrast, respiratory depression and pruritus did not happen to any patient in either group. The incidence of urine retention was significantly lower in group B than in group A (P=0.013), and the incidence of PONV was insignificantly different among both groups.

Our results are consistent with those of Chen et al., who stated that there was no significant distinction amongst the studied groups concerning time until the return of bowel function.

While they reported demonstrated that there was no significant variance amongst the studied group's Incidence of PONV. [4]

The current study showed that 6 (10.34%) cases in Group A as well as 4 (6.9%) in Group B showed poor satisfaction, 20 (34.48%) in Group A & 13 (22.41%) in group B were satisfactory, 23 (39.66%) in group A & 22 (37.93%) in group B showed good satisfaction and 9 (15.52%) in group A and 19 (32.76%) in group B showed excellent satisfaction. There was an insignificant variance in patient satisfaction among the studied groups.

Our results are consistent with those of Chen et al., who detected significance among the studied groups regarding patient satisfaction. There was a satisfaction rate of 0.37 among surgeons. 35 (72.9%), 32 (68.1%), 13 (27.1%), and 15 (31.9%), respectively, were highly satisfied. [4]

Wang et al. found that the utilization of PLS was associated with an elevated risk of physical discomfort, postoperative fatigue & emotional distress. [11]

### *4. Conclusion*

Regarding the postoperative pain assessment, VAS at 12h was significantly lesser in group B, contrasted with group A (P<0.001). VAS at PACU, at 3, 6, 24, 36, and 48 hr., was insignificantly different among both groups. The time of 1st analgesic requirement was significantly delayed in group B contrasted with group A (P=0.036). The total postoperative morphine consumption was significantly reduced in group B, contrasted with group A (P=0.023). The need for a catheter was substantially greater in group A than in group B. We can conclude that US -Guided Pudendal Nerve Block was more efficient and safer than US -Guided caudal Nerve Block before anal fissure surgery.

## Disclosure

The authors have no financial interest to declare in relation to the content of this article.

## Authorship

All authors have a substantial contribution to the article

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## Conflicts of interest

There are no conflicts of interest.

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