Original Article

Ultrasound-Guided Erector Spinae Block Vs Fascia Iliaca Compartmental Block in Perioperative Pain Control in Children Undergoing Surgical Repair of Developmental Dysplasia of the Hip. A Randomized Controlled Trial

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ABSTRACT

Background: Peripheral nerve block is an analgesic modality in children which reduces surgical stress response, decreases parenteral opioids requirements, and improves the quality of post- operative pain control. We aim to compare the effect of ESB with FICB on perioperative pain control in children undergoing DDH.

Methods: This is Randomized controlled prospective interventional study where Children's age starts from 6 months to 8 years were enrolled. Patients were randomly allocated into three groups either the "erector spinae plane block" group (group A), the "fascia iliaca compartmental block" group (group B), or control group (group c). Assessment for intra and postoperative pain using hemodynamic parameters and FLACC pain score.

Results: Sixty-three patients were enrolled. There was a statistically significant difference between the three groups regarding time to 1st rescue analgesic request, number of rescue analgesic doses and the rate of fentanyl top-up (*P*- values <0.001). The comparison between both groups receiving block revealed that FICB duration was significantly longer than ESPB (302.55±51.38 vs 240.11±42.56min, *P*<0.001).

Conclusions: Fascia Iliaca Compartment Block provide long duration of post-operative analgesia compared to Erector Spinae Plane Block in hip surgeries in children.

Key Words: Children, Erector Spinae Plane Block, Fascia Ilaca Compartment Block, Hip.

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INTRODUCTION

Many children experience significant pain following hip surgeries which can impact their health outcomes as it is associated with agitation, depression, and sleep disturbance[1]. Recent studies indicate that about 20% of children report persistent postsurgical pain at 6 to 12 months after major surgery[2] which is associated with functional disability and decreased quality of life[3].

The use of regional anesthesia in the pediatric population has increased over the last decade as it offers several potential advantages in the provision of postoperative analgesia including a reduction in parenteral opioids, decreased exposure to general anesthetic agents, and shortened hospital stay. Ultrasound guidance has provided a safe way for single injection and continuous techniques in regional anesthesia. In addition to rapid and painless recovery, when combined with general anesthesia, the use of intraoperative anesthetic and postoperative analgesic drugs can be reduced[4,5].

Developmental dysplasia of the hip (DDH) is a condition where the "ball and socket" joint of the hip does not properly form in babies and young children. Reduction surgery is done under general anesthetic[6].

Erector spinae block is a promising block that showed positive results in a few case studies[7,8], although ESP block has been previously used for postoperative analgesia of lower extremity surgeries in adults[9]. However, Erector spinae plane block (ESPB) has been used recently in pediatrics through deposition of the local anesthetic mixture in the fascial plane between the transverse process of the vertebra and erector spinae muscles[10]. The local anesthetic mixture may spread to the paravertebral space achieving multiple dermatomal analgesic effects that involves both somatic and visceral pain. ESPB was used in children in many surgical interventions including hip surgeries[11].

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The suprainguinal fascia iliaca compartment block (FICB) is a more recently described technique to anesthetize the femoral, lateral femoral cutaneous and obturator nerves in a superficial fascial plane for postoperative analgesia in adult patients after hip arthroplasty[12,13]. We aim to compare the effect of ESB with FICB on perioperative pain control in children undergoing DDH.

METHODS

This Randomized controlled prospective interventional study was conducted in Cairo University children's Hospital (Abou El-Reesh), Giza, Egypt. The study protocol was approved by the Research Ethics Committee, and informed consent was obtained from patients before commencement.

All Children's age starts from 6 months to 8 years with ASA I and ASA II Posted for unilateral DDH were consecutively included between 1st of March 2020 to the 30th of September 2020. Patients with Known local anesthetic (LA) drug allergy, Skin lesions or wounds at the site of proposed needle insertion, Bleeding disorders with INR >1.5 and/or platelets <100,000/mm^3, refusal of participation by parents and Bilateral DDH repair in the same session were excluded.

Study Procedures:

Randomization and blinding

Randomization was done by computer-generated numbers and concealed by serially numbered, opaque, and sealed envelopes. The details of the series were unknown to the investigators and patients. The group assignment was kept in a set of sealed envelopes each bearing only the case number on the outside. Patients were randomly allocated into three groups either the "erector spinae plane block" group (group A), the "fascia iliaca compartmental block" group (group B), or control group (group c).

Group (A): Received a single injection erector spinae block after induction of general anesthesia, IV fentanyl 1mcg/kg and 15mg/kg paracetamol.

Group (B): Received a single injection fascia iliaca compartmental block after induction of general anesthesia, IV fentanyl 1mcg/kg and 15mg/kg paracetamol.

Group (C): Received IV fentanyl 1mcg/kg and 15mg/kg paracetamol after induction of general anesthesia.

This study was performed by 3 anesthetists; one anesthetist who is experienced in performing the blocks was allocated to perform either the erector spinae plane block or the fascia iliaca compartmental block according to a computer-generated sequence of random numbers and sealed envelope, and the other two anesthetists were blinded to the technique performed, and they monitored the patients intra and postoperatively. Both the lumbar and inguinal areas were covered to maintain the blinding of investigators, surgeons, and guardians.

Study Protocol:

The study started after obtaining approval from the Ethics and Research Committee of the Anesthesia Department, Faculty of Medicine, Cairo University.

Upon arrival at the OR, children were assigned to one of the study groups after receiving a premedication in the form of an intramuscular injection of atropine 0.02mg/Kg, midazolam 0.1mg/Kg, and ketamine 2mg/Kg before admission to operation theater (O.R).

Upon arrival to the O.R; perioperative monitoring including continuous Electrocardiogram, pulse oximetry, and non-invasive arterial blood pressure (GE_ DatexOhmeda) were applied, then general anesthesia was induced by sevoflurane. A peripheral venous cannula was inserted after the loss of consciousness, then atracurium at a dose of 0.5mg/kg was given intravenously to facilitate endotracheal intubation, and fentanyl at a dose of 1µg/kg was given to abolish the stress response of intubation. Pressure-controlled ventilation was adjusted to maintain normocapnia. Anesthesia was maintained by using 1-1.5% isoflurane in a mixture of oxygen and air (50/50) and atracurium top-ups at a dose of 0.1mg/kg every 30 minutes.

In group ESPB (*N*= 21):

This group received a single shot erector spinae block.

The blocks were performed after induction of anesthesia and under ultrasound guidance using SonoSite M Turbo (USA), the scanning probe was the linear multi-frequency 6-13MHz transducer (L25x6-13MHz linear array), using a 22G/50-mm block needle (PajunkSonoplex, Geisingen, Germany), All the blocks were performed by the same investigator.

A unilateral block was performed in the lateral decubitus position and each patient will be turned on his/her side so that the blocked side was the uppermost one. Strict sterile techniques were implemented; skin sterilization with povidone-iodine at the site of needle entry was performed.

The 2nd lumbar vertebral level was determined using US by identifying the lumbosacral junction (LSJ) which is the point of lord tic transition from the relatively straight line of the dorsal side of the lumbar vertebrae, then the vertebra proximal to the LSJ was labeled the third lumbar vertebra (L3). The US transducer was placed at the mid-vertebral line in the sagittal plane. The transducer

was shifted from the midline, 3.5–4cm laterally to the side of the surgery to visualize the erector spinae muscle and transverse process.

Using the out-of-plane technique, the needle was advanced until it reaches the transverse process. The correct location of the needle tip in the fascial plane deep to the erector spinae muscle was confirmed by injecting 0.5-1ml saline and seeing the fluid lifting the erector spinae muscle off the transverse process while not distending the muscle i.e. hydro dissection. Once the needle is in the correct location, a negative aspiration test was confirmed. Then 0.5mL/Kg of bupivacaine 0.25% was injected taking care not to exceed the maximum recommended dose (2mg/kg of bupivacaine). The spread of the injectate should be observed to distribute within this plane. Then the patient was turned supine again and surgery commenced fifteen minutes later.

In FICB group (*N*= 21):

A unilateral block was performed in the supine position. Strict sterile techniques were implemented. The inguinal ligament was identified by the US. From superficial to deep, the anterior abdominal wall is composed of skin, subcutaneous fat, muscle aponeuroses, fascia, and peritoneum. Lying either side of the midline are the rectus abdominis muscles, separated by the linea alba. More laterally, there are three layers of flat muscles, the external oblique, internal oblique, and transversus abdominis. At their medial aspect, these form flat broad tendons (aponeuroses), which run towards and then superficial or deep to the rectus abdominis.

The inguinal ligament is the thickened, rolled-up inferior edge of the external oblique aponeurosis, running from the anterior superior iliac spine to the pubic tubercle and divided into three equal parts between them. A short axis (cross-section) ultrasound view of the inguinal ligament area identifies the fascia iliaca, femoral nerve, and vessels. Rotating the transducer 90 obtained a long-axis ultrasound view. Transducer orientation was parallel with the femoral nerve and vessels. The transducer was then positioned lateral to the junction between the lateral 1/3 and the medial 2/3 of the inguinal ligament. The mid-point of the transducer was over the inguinal ligament with the ultrasound image revealing the internal oblique, Sartorius, and iliacus muscles, in addition to the fascia iliaca.

The needle was inserted approximately 1–2cm below the inguinal ligament in-plane with the transducer and directed cephalic, then the needle tip was advanced through the fascia iliaca and inserted further cephalic to pierce the fascia iliaca and positioned between it and the iliacus muscle[14]. A volume of 0.5ml saline was injected to confirm the needle's correct position by observing the hydro dissection. Then a volume of 0.5mL/Kg of bupivacaine 0.25% was injected taking care not to exceed the maximum recommended dose (2mg/kg of bupivacaine) and visualized the local anesthetic spreading between the fascia and the iliacus muscle.

In the control group (*N*= 21) Iv analgesia in the form of intravenous fentanyl at a dose of 1mg/kg and iv paracetamol 15mg/kg were given at the beginning of surgery 15 minutes before skin incision.

In all groups:

All patients were receiving paracetamol 7.5-15mg/kg according to age and fentanyl 1 microgram/kg. Extra needs for opioids recorded for comparison. All patients received crystalloid (Ringer lactate) 4ml/kg/hour. The surgical incision was performed fifteen minutes after the blocks. Intraoperatively, the increase in hemodynamics in response to skin incision by more than 20% of baseline values or thereafter throughout the whole operation was managed by intravenous administration of fentanyl 0.5µg/Kg with a maximum dose of 2µg/Kg.

In all groups; after skin closure, inhalational anesthesia was discontinued and reversal of muscle relaxation with atropine (0.02mg/Kg) and neostigmine (0.05mg/Kg) will be administered intravenously after the return of the patient's spontaneous breathing. Patients were then transferred to the post-anesthesia care unit (PACU) for 60min to complete recovery and monitoring. In the PACU; pain scores (face, legs, activity, and cry consolability scale [FLACC]) depending on age and cognitive abilities were assessed, and when the score exceeded 4/10, rescue analgesia in the form of IV Morphine at a dose of 0.05mg/kg provided that total daily Morphine dose not to exceed 0.3mg/kg was given in the immediate postoperative period. Paracetamol 7.5-15mg/kg according to age was given routinely every 6 hours.

Measurement tools:

Hemodynamic parameters (heart rate, systolic and mean arterial blood pressure) were recorded at baseline, after intubation, every 10min till the end of the surgery, immediately after extubation, 5min after extubation, and every 10 minutes in the recovery room till the discharge of the patient.

Assessment for postoperative pain using FLACC pain score (39) every 15min in the recovery room and every 2h post-operatively for 24 hours postoperative.

Duration of general anesthesia:

Time in minutes to 1st rescue of analgesia in PACU. i.e.: time starting immediately after giving the block till the first postoperative analgesic rescue which will be given if the pain score exceeds 4\10.

The number of doses of rescue analgesia up to 24 hours postoperatively.

The number of patients in three groups who needed intraoperative administration of an extra analgesic dose of fentanyl 0.5µg/kg and the number of doses for each patient.

The failure rate of the block will be calculated, where the block will be considered a failed block if the patient required more than two doses of rescue analgesia in the first hour postoperatively.

Primary outcome:

Time to 1st rescue analgesia post-operative.

Secondary outcomes

Pain scores (face, legs, activity, cry, and consolability scale [FLACC][15] depend on age and cognitive abilities. Block failure rate, the block was considered a failed block if the patient required more than two doses of rescue analgesia in the first hour postoperatively. The incidence of adverse effects (bradycardia, hypotension, local anesthetic toxicity, postoperative nausea and vomiting, lower limb weakness, urine retention). Duration of the block. i.e.: time starting immediately after giving the block till the first postoperative analgesic rescue which was given if the pain score exceeds 4\10.

Statistical analysis:

Statistical analysis was done by SPSS version 28 (IBM Co., Armonk, NY, USA). Quantitative data were presented as mean and standard deviation (SD), were analysed by ANOVA (F) test to compare between the three studied groups or Unpaired student *t*-test to compare between ESPB and FICB groups regarding block results. Qualitative variables were presented as frequency and percentage (%), were analysed utilizing the Chi-square test. A two tailed *P* value <0.05 was considered statistically significant. Kaplan Meier survival analysis with log-rank test were used to analyse the time to 1st rescue analgesic request between the three groups.

RESULTS

In this randomized study, 88 patients were assessed for eligibility, of which, 25 cases were excluded for various reasons: 1 patient with bilateral DDH and 24 patients did not consent.

The remaining 63 patients (candidates for unilateral DDH operation) were divided into 3 equal groups as follows; ESPB, FICB and the control group who received IV fentanyl and paracetamol after induction of general anesthesia (21 patients each). All patients were followed-up and analyzed statistically (Figure 1).

Table (1) demonstrates the baseline characteristics of the studied groups. There was no statistically significant difference between the three studied groups in terms of age, weight, sex distribution, durations of GA and surgery. Noteworthy, all patients were ASA I with no comorbidities.

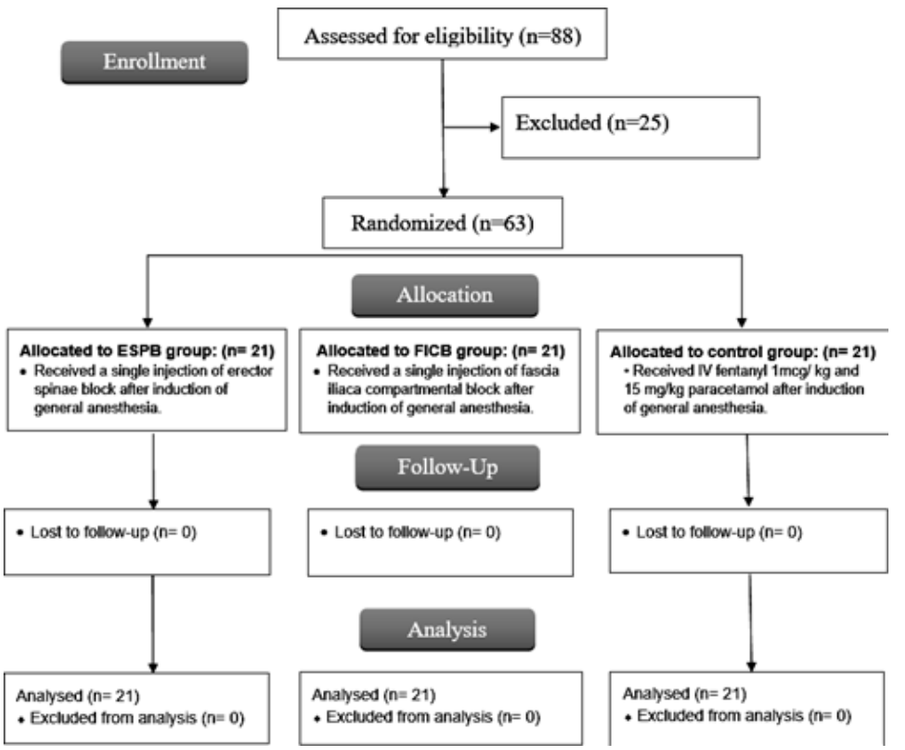

Fig. 1: CONSORT flowchart of the enrolled patients.

Table 1: Baseline characteristics of the studied groups:

		ESPB group (*n*= 21)	FICB group (*n*= 21)	Control group (*n*= 21)	*P* value
Age (years)		3.48±1.21	3.43±1.08	3.48±1.03	0.987
Weight (kg)		15.95±3.12	15.76±2.55	15.24±2.02	0.656
Sex	Male	10(47.6%)	9(42.9%)	10(47.6%)	0.938
	Female	11(52.4%)	12(57.1%)	11(52.4%)	
Comorbidities		0(0%)	0(0%)	0(0%)	---
ASA physical status (I)		21(100%)	21(100%)	21(100%)	---
Duration of GA (min)		77.33±8.53	76.95±11.67	76±4.77	0.88
Duration of surgery (min)		58.9±8.53	58.57±10.92	63.71±4.33	0.093

Data are presented as mean±SD, or frequency (%) as appropriate; ESPB: Erector spinae plane block; FICB: Fascia iliaca compartmental block; ASA: American Society of Anesthesiologists.

As summarized in Figure (2), the baseline heart rate was statistically non-significant between the three studied groups. Intraoperatively, the first two measurements were comparable between the three groups while HR3, 4, 5, 6 and HR after extubation were significantly different between three groups (*P*<0.05).

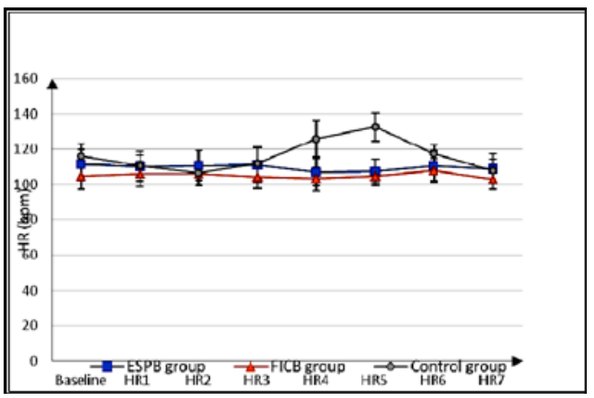

Fig. 2: Heart rate measurement of the study groups.

In terms of mean arterial blood pressure, preoperative measurements was no significantly different, all intraoperative and post extubation measurements were significantly different between the three studied groups (*P*<0.05) as shown in Figure (3).

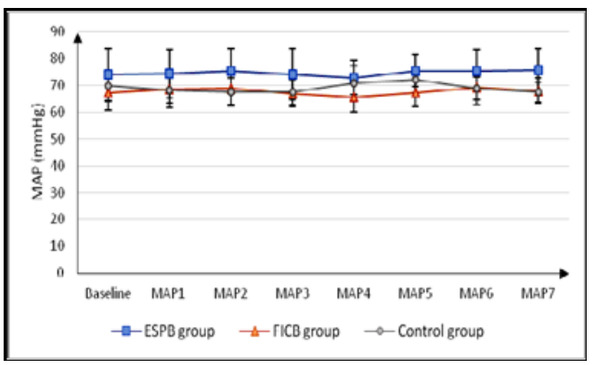

Fig. 3: Mean arterial pressure measurments of the study groups.

Postoperatively, pain was assessed by FLACC scale giving significantly different results between the three groups after 15, 30, 45, 60min, 12 and 24hr (*P*<0.05) but no significant difference was detected after 6 hours as summarized in Table (2).

Table 2: FLACC pain scale of the studied groups:

	ESPB group (*n*= 21)	FICB group (*n*= 21)	Control group (*n*= 21)	*P* value
15min	3.05±1.36	2.38±1.02	6±0	<0.001*
30min	2.86±1.35	2.19±0.6	6±0	<0.001*
45min	3.14±1.01	2.86±1.2	5.52±0.87	<0.001*
60min	3.52±0.87	2.95±1.02	4.19±0.6	<0.001*
6hr	4.29±1.15	3.9±0.77	4.38±0.8	0.217
12hr	4.86±1.01	4.48±0.87	4±0	0.003*
24hr	4.86±1.01	4.57±0.93	4±0	0.003*

Data are presented as mean±SD; *: Statistically s ignificant as *P* value <0.05; FLACC: Face, Legs, Activity, Cry, Consolability.

As shown in Table (3) there was a statistically significant difference between the three groups regarding time to 1st rescue analgesic request, number of rescue analgesic doses and the rate of fentanyl top-up (*P*- values <0.001).

The comparison between both groups receiving block revealed that FICB duration was significantly longer than ESPB (302.55±51.38vs 240.11±42.56min, *P*<0.001) while block performance time was similar between both groups.

Kaplan–Meier survival analysis showed a statistically significant difference between the three groups regarding time to 1st rescue analgesic request (Log-rank *P*-value <0.001) being prolonged in both ESPB and FICB groups in comparison to control group with hazard ratio (95%CI) of 0.381(0.159 to 0.914), 0.183(0.081 to 0.41) respectively as shown in Figure (4).

Table 3: Block performance and analgesic requirements of the studied groups:

		ESPB group (*n*= 21)	FICB group (*n*= 21)	Control group (*n*= 21)	*P* value
Time to 1st rescue analgesia (min)		142±58.79	205.14±63.06	42.86±8.6	<0.001*
N of rescue analgesia doses	One	13(61.9%)	18(85.7%)	0(0%)	
	Two	6(28.6%)	2(9.5%)	0(0%)	<0.001*
	Three	2(9.5%)	1(4.8%)	21(100%)	
Block Duration (min)		240.11±42.56	302.55±51.38	---	<0.001*
Block performance time (min)		1.19±0.4	1.48±0.51	---	0.051
Fent top up		6(28.6%)	4(19%)	21(100%)	<0.001*

Data are presented as mean±SD or frequency (%) as appropriate; *: Statistically significant as *P* value <0.05.

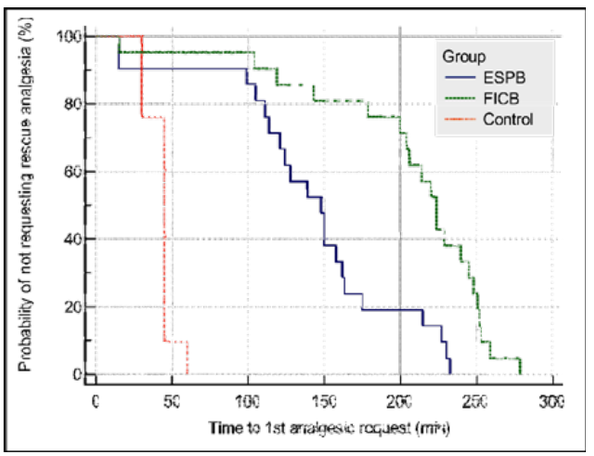

Fig. 4: Kaplan Meier survival plot for time to 1st rescue analgesic request in ESPB, FICB and control groups.

There was no statistically significant difference between ESPB and FICB groups regarding block success rate as the block failed in only 2 cases on ESPB vs 1 case on FICB (Table 4).

Table 4: Block success rate of ESPB and FICB groups:

	ESPB group (*n*= 21)	FICB group (*n*= 21)	*P* value
Success	19 (90.5%)	20 (95.2%)	>0.999
Failure	2 (9.5%)	1 (4.8%)	

Data are presented as frequency (%).

The only postoperative adverse effect that took place was nausea and vomiting in 2 cases of ESPB group, 2 cases of FICB and 4 cases of control group with no statistically significant difference between the three groups. Noteworthy, no patients in either group required MV or ICU admission (Table 5).

Table 5: The incidence of adverse effects, MV need and ICU admission of the studied groups:

	ESPB group (*n*= 21)	FICB group (*n*= 21)	Control group (*n*= 21)	*P* value
Adverse effects				
Bradycardia	0 (0%)	0 (0%)	0 (0%)	---
Hypotension	0 (0%)	0 (0%)	0 (0%)	---
Hematoma	0 (0%)	0 (0%)	0 (0%)	---
Nausea and vomiting	2 (9.5%)	2 (9.5%)	4 (19%)	0.564
Urine retention	0 (0%)	0 (0%)	0 (0%)	---
LL weakness	0 (0%)	0 (0%)	0 (0%)	---
LA toxicity	0 (0%)	0 (0%)	0 (0%)	---
MV	0 (0%)	0 (0%)	0 (0%)	---
ICU	0 (0%)	0 (0%)	0 (0%)	---

Data are presented as frequency (%).

DISCUSSION

Systemic opioids are usually not sufficient for pain control after hip surgery in children. Thus, neuraxial analgesia is usually required in these operations in combination with general anesthesia[16]. Neuraxial analgesia decreases opiate exposure, shortens post-anesthesia recovery room time and hospital stay. However, it may be associated with hypotension, urinary retention, excessive motor block and pruritus[17].

Peripheral nerve block is another analgesic modality which reduces surgical stress response, decrease parenteral opioids requirements, and improves the quality of post-operative pain control. Regional anesthetic techniques would seem a good choice for improving pain management in children with less adverse effects compared to neuraxial blocks[18,19].

In pediatrics, FICB using this ultrasound guided technique was easy to perform and provided postoperative analgesia for hip and femur surgical procedures[20]. However, as far as is known, no studies compared ESPB and FICB as perioperative analgesia in pediatric patients undergoing hip surgery. We aimed at this work to compare the effect of ESB with FICB on perioperative pain control in children undergoing DDH.

The current study displayed that ESPB was an efficient regional anesthetic technique in DDH surgical repair surgeries in children. This was demonstrated by delayed time of 1st rescue analgesic requirement, lower number of postoperative morphine doses in both ESPB and FICB groups compared to control group. However, FICB had a better analgesic profile compared to it. This was demonstrated by the longer block duration and lower pain scores in the early postoperative period in the FICB group than in the ESPB group.

In this study we cleared that there was a statistically significant difference between the three groups regarding time to 1st rescue analgesic request (P<0.001) as it was significantly prolonged in both ESPB and FICB groups than control group (142±58.79, 205.14±63.06min vs 42.86±8.6min respectively), moreover, it was delayed in FICB group than ESPB group. Regarding number of rescue analgesia doses, it was significantly different (P<0.001) as both ESPB and FICB groups required significantly lower doses than control group in which all patients required 3 doses. Likewise, the rate of fentanyl top-up was significantly lower in both ESPB and FICB groups than control group (P<0.001).

Townsend *et al.,* found that the control group had significantly higher median opioid consumption than the ESPB group in the first 8 hours postoperatively, 28[8–44] mg OME versus 5[0–20]mg OME (p<0.013)[21].

Pınar *et al.,* found that three patients (11.5%) in group E (ESPB group) required postoperative rescue analgesia compared to 15(60%) patients in group C (control group) (p= 0.000). The time to first rescue analgesic administration was significantly longer in the group E compared to the group C (P= 0.001)[22].

McGraw-Tatum *et al.,* identified that FICB required less overall total opioids than the control group. And FICB is a relatively safe anesthesia technique as the needle point is away from the femoral nerve, femoral artery, and femoral vein[23].

Atwa, reported that regarding the rescue analgesic dose, it was found a decrease in dosage of consumed morphine and more prolonged time to the 1st rescue dose of morphine in the first postoperative day in FICB the group compared to the control group, which was reflected as less opioid side effects ultrasound guided FICB groups compared with the control group[24].

Kumie *et al.,* showed that a single injection of FICB could relieve pain during the first twenty-four hours in the postoperative period, decreasing the total postoperative analgesic consumption after 12 and 24 hours postoperatively, and a significantly prolonged time for 1st analgesic demand after femur fractures surgeries[25].

Eastburn *et al.,* who concluded that performing FICB for hip surgery is reliable in anesthetizing the femoral and lateral cutaneous nerve in adults and older children underwent hip surgeries. They found that pain scores and opioid consumption were generally low. However, they used a supra inguinal approach while we use an infra inguinal approach in our study. They used a dose of 0.53ml/kg of 0.2% ropivacaine while we used 0.5ml/kg of 0 . 25% bupivacaine. The age group in their study was adolescents and elder children while this study was done on children aged 1-5 years old[26].

In this study we found that after 15, 30, 45 and 60min, ESPB and FICB groups had similar pain score while both had significantly lower pain score than control group. After 12 hours, ESPB group had significantly higher FLACC score than control group (P<0.001) while after 24 hours, both ESPB and FICB groups had significantly higher FLACC score than control group (P= 0.001, 0.031).

Yuan *et al.,* found that FLACC scores were lower in the GA+ESPB group than in the GA group at 1 to 24 hours postoperatively (P= 0.023 at 1h, and P<0.001 at 3h, 6h, 12h, 18h, 24h), but not upon immediate PACU entry (P= 0.189 at 0h)[27].

Pınar *et al.,* found that at 1h postoperatively, the FLACC scale values were significantly lower in group E (ESPB group) than in group C (control group) (estimated difference, −0.9 [95% CI,−1.6, −0.3]; p= 0.003) and remained significantly lower in Bonferroni- corrected pairwise comparisons until 8h postoperatively; p= 0.000 at 2h, p= 0.000 at 4h, and p= 0.018 at 8h[22].

Xu *et al.,* found that Pain scores and opioid consumption did not differ between FICB and ESPB groups (p>0.05)[28].

Flaviano *et al.,* study focuses on this early interval between 0 and 8 hours, when both FIB and ESPB may provide effective analgesia, with no differences found in pain scores and morphine consumption[16].

In this study we found that Block duration was significantly longer in FICB group than ESPB (302.55±51.38 vs 240.11±42.56min, P<0.001) while block performance time was similar between both groups.

Dalens *et al.,* compared the FICB with the 3- in 1 block in children underwent lower extremity operations. They recorded a block duration of about 300 minutes which was nearly the same block duration recorded in the current study. However, they used a nerve stimulator assisted technique while an ultrasound guided technique which is more accurate and reliable was used in the current study. This could explain the higher dose they used (0.7ml/kg of a solution consisting of a mixture of 1% lidocaine with 0.5 bupivacaine both with 1:200000 epinephrine) compared to smaller dose we used (0.5ml/kg of 0.25% bupivacaine with no additives)[29].

In another study done by Ahiskalioglu *et al.,* they used Lumbar Erector Spinae Plane Block as a main anesthetic method for hip surgery in high-risk elderly patients and concluded that ESPB when combined with mild sedation provides adequate and safe anesthesia in high risk elderly patients. They used the same ultrasound guided technique we used in this study[30]. However, the block duration in this study was about eight hours which is longer than that of our study (about 3.8 hours), this could be explained by the different dosage and the different age groups of the two studies.

The current study displayed that ESPB was an efficient regional anesthetic technique in hip surgeries in children. However, FICB had a better analgesic profile compared to it. This was demonstrated by the longer block duration and longer time to 1st rescue analgesic request in the early postoperative period in the FICB group than in the ESPB group.

LIMITATIONS

Our study had some limitations, First, the sample size was relatively small. Second, because the children were too young to cooperate, ESPB had to be done in addition to GA, which prevented the assessment of the sensory block and meant that we could not perform an objective evaluation of the block range.

Finally, we only observed the analgesic effect within 24 hours after surgery, and the long-term effects of this regional block technique need to be further explored.

CONCLUSION

Fascia Iliaca Compartment Block has a better analgesic profile compared to Erector Spinae Plane Block in hip surgeries in children.

Further comparative-effectiveness studies are required to evaluate other alternative regional analgesic techniques and determine the best motor-sparing block for hip surgery, if any.

CONFLICT OF INTERESTS

There are no conflicts of interest.

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