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KEY WORDS: continuous fascia iliaca compartment block, continuous epidural infusion, ropivacaine

CONTINUOUS FASCIA ILIACA COMPARTMENT BLOCK VERSUS CONTINUOUS EPIDURAL BLOCK FOR POSTOPERATIVE PAIN RELIEF FOR PATIENTS UNDERGOING LOWER LIMB ABOVE KNEE ORTHOPAEDIC SURGERY-A PROSPECTIVE, RANDOMIZED, COMPARATIVE, SINGLE BLIND OBSERVATIONAL STUDY.

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ABSTRACT

Background: The objective was to compare the efficacy of continuous epidural analgesia(CEA) with continuous fascia iliaca compartment block(CFIB) for postoperative pain management in patients undergoing lower limb above knee orthopaedic surgery.

Methods: Eighty patients of ASA physical status I and II, aged between 18-65 years undergoing lower limb orthopaedic surgery above knee,were randomly allocated to either group E or group F. Group E received combined spinal-epidural anaesthesia plus epidural analgesia. Group F received spinal anaesthesia plus fascia iliaca compartment block. Patients were assessed for postoperative pain, hemodynamic changes, motor function and overall patient satisfaction for 24 hours postoperatively. Use of rescue analgesia (intravenous tramadol)and the adverse events were also recorded.

Results: Demographic variables, post operative pain and tramadol consumption, residual motor blockade and patient satisfaction were similar in both the groups. No significant adverse effect occurred in either group.

Conclusion: Continuous fascia iliaca compartment block is an effective and safe alternative to continuous epidural block in lower limb above knee orthopaedic surgery as it is easier to administer with fewer side effects and does not require nerve stimulator or paresthesia.

INTRODUCTION:

Continuous epidural technique is a conventional technique for postoperative analgesia in lower limb orthopaedic surgery. However this technique has its own disadvantages like expertization,hemodynamic changes and chances of infection, urinary retention etc. It is also hazardous in patients having coagulopathy.

Fascia iliaca compartment block is a novel technique for post operative analgesia in lower limb orthopaedic surgeries like total knee replacement, total hip replacement, fracture shaft femur. This technique was first described by Winnie et al and first applied by Dalen et al. To perform this block nerve stimulator is not required.

Therefore we decided to evaluate the quality of postoperative analgesia by CFIB (0.2% ropivacaine with fixed rate0 of0 5 ml/hour) and compare it with CEA (in same dose) in these surgeries. This was a prospective, randomized, single blinded, observational comparative study.

METHODS

After Institutional Ethics Committee approval and written informed consent, 80 ASA physical status I-II patients in age group 18-65 years scheduled for elective unilateral lower limb above knee orthopaedic surgery under spinal anaesthesia(SA) were included in our study. Exclusion criteria included an infectious process at the site of puncture, a clinical and/or biological coagulopathy, allergy to bupivacaine and ropivacaine, neurologic deficit of the limb. Obese patients with BMI>45, psychiatric patients unable to comprehend pain scale and any other contraindication to either neuraxial block or FIC block were also excluded from the study.

Preoperatively all patients were informed and educated about the care of the catheter, Visual Analogue Scale(VAS) for pain and patient satisfaction scale.

All patients were premedicated with oral diazepam 5mg one hour before surgery and received spinal anaesthesia (SA) with 2.5 ml (12.5mg) hyperbaric bupivacaine at L3-4 or L2-3, in sitting position. Patients were allocated into two groups of 40 in a randomized fashion using a computer generated list of random permutations. Group E (CEA) the epidural and spinal was given by Espocan;(B BRAWN).A 19 G catheter inserted 5 cm past the cannula. The catheter was secured but activated only after completion of surgery. In Group F (CFIB)patients received SA with 27 G Whitacare needle. The fascia iliaca block was initiated after the end of surgery. A tuhoy needle (B Brawn, 18 G) was inserted through a point 0.5-1 cm below the inguinal ligament at the union of the lateral one-third and medial two-thirds of the line joining pubic tubercle and anterior superior iliac spine (ASIS). The needle was introduced at a 45°-60° angle with the skin, until the perception of two losses of resistance corresponding to the crossing of the fascia lata and then the fascia iliaca(double pop technique). The sheath was distended with 20 ml of study solution, a 19-gauge epidural catheter was advanced at least 20 cm cranially. An additional 10 ml of the solution was injected via this catheter. The catheter was secured.(The course of the catheter was documented, as well as the level and the location of the catheter tip. Catheter was labelled ideal if the course of the catheter was along the iliopsoas with the tip located between the sacral promontory or within 2 cm from the upper end of sacroiliac joint and the lateral borders of L4-5 spine. Catheter that were coiled in the region of the femoral head or positioned at or below the lower end of the sacroiliac joint were labelled "unsatisfactory")The ease of insertion of the catheter and the length at skin were recorded.

On arrival in the recovery room a continuous infusion of study drug (0.2% ropivacaine) was started at a rate of 5 ml/h with elastomeric pump (easy pump;B Brawn) and continued for 48h in both the groups.

The standard monitoring was used, including noninvasive blood pressure, SpO_2, electrocardiogram. Urinary catheter was placed in patients who complained of urinary retention. The anaesthetic time was noted as the time from local anaesthetic administration for SA to the end of surgery.

On arrival in the Postanaesthesia Care Unit (PACU), pain, and other adverse effects such as nausea, vomiting, pruritus, dizziness, hypotension (30% reduced from baseline), numbness, and motor blockade were recorded every 15 minutes. Motor blockade was estimated using a modified Bromage scale (0= no blockade: extended limb lift off the bed; 1= flexion/ extension at knee and ankle joint; 2= no flexion/extension at knee or ankle joint; 3= complete

blockade). Pain was assessed by visual analogue scale (VAS 0-10, 0= no pain, 1-3=mild pain, 4-7=moderate pain, 8- 10= worst pain). Tramadol 50 mg intravenous (IV) was injected if the VAS ≥ 4. Patients complaining of nausea and vomiting (PONV) was treated with ondansetron 4 mg IV. Patients having hypotension (30% less than baseline) were treated with fluid bolus (5 ml/kg????) and phenylephrine (100 µg bolus). The epidural or FIC catheters were removed after 48hrs post-op. The residents blinded to the method of analgesia visited at 6, 12, 24, 36, 48 hrs post-op to record adverse effects, pain scores, patient satisfaction (1= poor, 2= fair, 3= good, 4= excellent), and requirement of resque analgesic.

Data were collected for 48 hr and were analysed using SPSS 15 statistical package (SPSS; Inc., Chicago, IL) for windows. Results are expressed as mean± SD for continuous variable, and independent-sample t-test was used for the statistical analyses. Nominal variables were analysed by Chi-squared test and Fisher exact test. A p-value <0.05 was considered statistically significant.

RESULT:

The demographic profile of the patients in both the groups were comparable with respect to age, sex, body weight, height, BMI, ASA physical status and mean arterial pressure and on statistical analysis no significant difference was found as is clearly evident from the table 1.

Table 2 conveys the comparison between the patients of both the groups in 1,4,8,12,20 and 24 hours postoperatively via visual analogue scale (VAS scale). Patients from both the groups perceived no pain in the 1st 4 postoperative hours, and never suffered from severe pain at any time in the 1st postoperative day. Number of patients suffering from mild and moderate pain in both the groups were comparable and without any statistical significance.

Table 3 shows the incidence of side effects and complications a,mong both the groups which were comparable. Two patients removed catheter by themselves during movement and we removed catheter of one patient due to hypotension.

Hemodynamic parameters with respect to mean arterial pressure and heart rate were comparable in both tthe groupsin all the observations as evident in table 4.

Analgesic (tramadol) requirement in 1st 24 hours postoperative period was comparable among both the groups.Overall patient satisfaction among both the groups were also comparable.There was no residual motor blockade at any point of time in either groups.

Table 1: demographic data

	CFIB (N=40)	CEI (N=40)
Sex (M/F)	26/14	32/8
Age (years)	50±6	54±5
Height (cm)	152.8±7	152.3±6
Weight (kg)	57.2±8	59±5
BMI	22.5±3	23.5±2
ASA (I/II)	3/37	4/36
MAP baseline	85.4±4	92.1±2

Table 2: pain evaluation for postoperative care

	No pain		Mild pain		Moderate pain		Severe pain		P value
	CFIB	CEI	CFIB	CEI	CFIB	CEI	CFIB	CEI	
PO1hr	40	40	0	0	0	0	0	0	0.563
PO 4hr	40	40	0	0	0	0	0	0	0.517
PO 8 hr	38	39	2	1	0	0	0	0	0.659
PO 12 hr	36	36	2	1	2	3	0	0	0.556
PO 16hr	38	38	2	1	0	1	0	0	0.553
PO 20 hr	37	37	2	3	1	0	0	0	0.559
PO 24hr	38	37	2	3	0	0	0	0	0.670

Table 3: incidence of side effects

Side effects	PONV			Hypotension			Catheter displacements		
	CFIB	CEI	P value	CFIB	CEI	P value	CFIB	CEI	P value
PO 1hr	0	0	-	0	0	-	0	0	-
PO 4hr	0	0	-	0	0	-	0	0	-
PO 8hr	0	2	0.568	0	0	-	0	2	0.591
PO 12hr	3	3	0.621	0	1	0.620	0	3	0.630
PO 16hr	2	3	0.614	0	0	-	0	0	-
PO 20hr	1	2	0.560	0	0	-	0	0	-
PO 24hr	1	3	0.559	0	0	-	0	0	-

Table 4: hemodynamic changes

	Mean Arterial Pressure (mmHg)			Heart Rate(beats/min)		
	CFIB	CEI	P value	CFIB	CEI	P value
PO 1hr	84.2±3	85.3±4	0.574	92.1±2	87.5±8	0.652
PO 4hr	83.9±4	86.7±6	0.621	91.7±6	88.3±4	0.695
PO 8 hr	85.1±5	85.9±4	0.559	92.3±4	89.6±3	0.574
PO 12hr	87.2±3	86.2±4	0.584	93.1±3	91.5±5	0.681
PO 16hr	85.4±8	85.9±3	0.662	89.2±4	91.1±3	0.563
PO 20hr	88.2±3	84.2±2	0.679	90.7±7	91.7±5	0.645
PO 24hr	91.1±2	91.6±5	0.523	90.4±5	92.8±5	0.693

DISCUSSION :

Lower limb above knee orthopaedic surgery (like fracture shaft femur) is associated with significant postoperative pain. When inadequately treated, it intensifies reflex responses, which can cause serious complications, such as pulmonary or urinary problems, thromboembolism, hyperdynamic circulation, and increased oxygen consumption[1].

Postoperative pain relief can be achieved by a number of techniques, such as IV PCA[2], epidural analgesia with narcotics and/ or local anesthetics[3,4], and lumber plexus block[5,6]. Epidural opioids/ or local anesthetics provides better pain relief than conventional IM opioids or IV PCA with morphine[7-10]. However, it is associated with side effects, such as nausea, pruritus, urinary retention, and respiratory depression with opiates, and bilateral motor blockade and arterial hypotension with local anesthetics.

The above study shows CFIB is an effective technique for postoperative pain management for lower limb above knee orthopaedic surgery and comparable to CEA.In this study VAS scores were comparable in all the times for both the groups and total post operative systemic consumption were also had no significant difference among the groups. Side effects and complications were comparable in both the groups whereas there were no significant difference in patient satisfaction.

Although CFIB is comparable to CEA in all above mentioned parameters, CFIB is an easier and effective peripheral nerve block for analgesia after lower limb above knee orthopaedic surgery[11]. In our study we used double pop technique which is also easy to perform, rapid and safe method[11]. It does not require any nerve stimulator or elicitation of paresthesia. It also has fewer side effects. Chance of femoral artery puncture and femoral nerve damage is rare as nerve and artery lies in different sheathes.

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