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PAIN RELIEF IN PATIENTS WITH HIP FRACTURE- COMPARATIVE STUDY OF ON ARRIVAL FEMORAL BLOCK VERSES INTRAVENOUS TRAMADOL

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ABSTRACT

Aim and Objectives: The present study was undertaken to compare pain relief, haemodynamics, glycemic response and rescue analgesic requirement after femoral block versus tramadol.

Method: In this randomized controlled trial, total 60 patients of ASA grade I and II, aged between 40-70 years and who presented with hip fracture were enrolled and randomly divided into two groups. Group A received femoral block with PNS with 0.5 ml/kg of 0.25% bupivacaine and group B received intravenous infusion of systemic opioid, inj tramadol 100 mg in 100 ml NS over 10 minutes. In each patient pulse, BP, RBS, pain by VAS score was checked just after admission and then at regular interval. Also time for rescue analgesia was noted in each group.

Results: Patients receiving femoral nerve block had significantly lower VAS pain scores from 0 min to 24 h after admission than did group B, (p-value <0.001). Pulse rate decreased significantly in group A patients from 0 min to 24 h compared with group B ($p < 0.001$). There was no significant difference observed between two groups with respect to blood pressure and random blood sugar (RBS), ($p>0.05$). Rescue analgesia was required at around 10 hrs in group A while it was required at around 6 hrs in group B.

Conclusion: Femoral nerve block provides better analgesia than intravenous tramadol in terms of VAS score, haemodynamic stability, duration of analgesia and glycemic response.

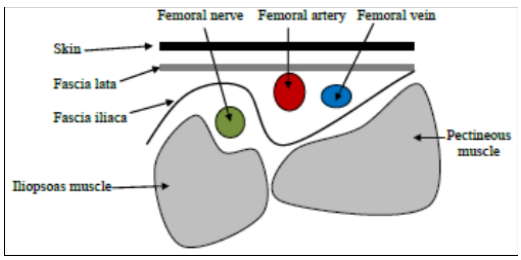
INTRODUCTION

Hip fractures refer to a fracture occurring between the edge of the femoral head and 5 cm below the lesser trochanter. This is one of the most common orthopaedic emergencies [1,2]. Hip fractures configure an important public health issue. Its importance lies on the high mortality taxes and lose of functionality it brings. Patient of hip fracture presents with severe pain and this pain is associated with increased neuro-hormonal stress response, leading to hemodynamic instability, myocardial ischemia, altered glycemic response and thereby prolonged hospital stay and also is associated with increased postoperative mortality [3,4].

Safe and effective pain control for patients with hip fractures can be challenging. Various pain management modalities including opioids, NSAIDs, Regional blocks etc are available but at present, parenteral opioids are most commonly used for pain management. However, hip fractures typically afflict older individuals, often with other medical comorbidities, and the use of opioids in this population must be balanced with their potentially deleterious consequences. It has been demonstrated that older adults are at risk for oligoanalgesia, likely in part because of the concern of opioid-related side effects [5-7]. Both the use of opioid medications and poor pain control have been associated with acute confusional states in the elderly [3,8]. It is therefore necessary to investigate additional means of pain management in elder patients with hip fractures.

A femoral nerve block is a specific regional anaesthetic technique used by doctors to provide anaesthesia and analgesia of the affected leg [9]. It is formed by contributions from L2, L3, and L4 and is the largest branch of the lumbar plexus. The femoral nerve enters the thigh under the inguinal ligament, between the psoas and iliacus muscle, and is located below the fascia iliaca , (Figure 1).

Figure 1: Anatomy of femoral nerve block



However, it interrupts sensory impulses from the hip joint and provide near complete pain relief without obvious side effects, thus making convenient mobilisation for preoperative workup without significant neurohormonal stress response. Also, it can reduce opioid requirement in the preoperative period. They are used as adjuncts to spinal and general anaesthesia, and should always be considered when the latter is administered [10]. In the present study, femoral block and intravenous tramadol was compared with respect to pain relief, haemodynamics, glycemic response and rescue analgesic requirement in patients with hip fracture.

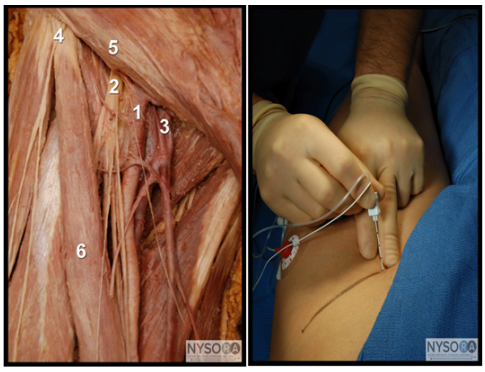
MATERIALS AND METHODS

After obtaining Institutional Ethical Committee Approval and written inform consent from all the patients, this randomized controlled trial was conducted in 60 patients of ASA grade I and II, age between 40-70 years and who were presented with hip fracture. Non diabetic and non hypertensive patients also included in the study. The patient refusal, burn or infection at injection site, patient with coagulopathy, crush injury, neurological disease, local anesthetic allergy, failed block were excluded from the study.

All eligible candidates who fulfilled inclusion and exclusion criteria were randomly divided into two groups on alternative

basis. Group A: received femoral block with PNS with 0.5 ml/kg of 0.25% bupivacaine. At midpoint of pubic tubercle and ASIS, pulsation of femoral artery was felt. One cm lateral to it, needle of PNS was inserted. If muscle twitches below 0.05 mA of current, inj bupivacaine was injected, (Figure 2).

Figure 2: Femoral nerve block- Technique



On arrival, group B: received intravenous infusion of systemic opioid, inj tramadol 100 mg in 100 ml NS over 10 minutes. In each patient pulse, BP, RBS, pain by VAS score was checked just after admission and then at regular interval. Also time for rescue analgesia was noted in each group. Rescue analgesic was given when VAS was more than 6. All the data were collected and analyzed statistically by using mean, standard deviation and unpaired t test.

OBSERVATIONS AND RESULTS

A total of 60 patients were enrolled in the study, of which the most of patients were in the age group 51-60 years followed by the age group of 61-70 years. Out of 60 patients, 31 were male and 29 patients were female. The age and sex distribution of patients were shown in table 1.

Table 1: Age and Sex wise distribution of study participant

Age in Years	Female	Male	Total
40-50	7(63.6)	4(36.4)	11
51-60	12(46.2)	14(53.8)	26
61-70	10(43.5)	13(56.5)	23
Total	29(48.3)	31(51.7)	60

In both the groups, mean pain scores at 0 minutes after administration was the same and difference was not significant, ($p>0.05$). But after 30min, 1 hour, 6 hour, 12 hour and at 24 hour there was statistically highly significant difference observed between two groups, ($p<0.001$) as shown in table 2.

Table 2: Pain Relief with respect to time in both groups

VAS at various time interval	Groups	Mean±SD	t value	P value
0 min	Group A	6.73±1.31	0.6	>0.05
	Group B	6.97±1.37		
30 min	Group A	1.90±0.88	12.2	<0.001
	Group B	5.10±1.12		
1Hour	Group A	1.97±0.80	14.4	
	Group B	5.20±0.92		
6 Hour	Group A	2.43±0.85	14.7	
	Group B	6.53±1.25		
12 Hour	Group A	3.33±0.99	8.6	
	Group B	5.63±1.06		
24 Hour	Group A	4.03±1.09	5.6	
	Group B	5.83±1.36		

Table 3 show the mean pulse rate observed in both the groups. Pulse rate decreased significantly in group A patients from 0 min to 24 hrs compared with group B ($p < 0.001$). There was no significant difference observed at 0 min but highly significant difference observed at 30 min, 1, 6, 12 and 24 hours after administration.

Table 3: Mean pulse rate with respect to time

Pulse at various time interval	Groups	Mean ± SD	t value	P value
0 min	Group A	92.93±12.2	2.04	>0.05
	Group B	95.60±8.9		
30 min	Group A	70.13±6.74	8	<0.001
	Group B	89.87±11.5		
1 Hour	Group A	69.80±7.6	8.5	
	Group B	89.80±10.1		
6 Hour	Group A	70.73±6.4	9.4	
	Group B	91.13±9.9		
12 Hour	Group A	70.00±7.5	11.9	
	Group B	95.60±8.9		
24 Hour	Group A	78.40±14.1	4.5	
	Group B	92.13±8.8		

The mean blood pressure (Table 4) and mean random blood sugar (RBS) (Table 5) were same in both groups and difference found between groups was insignificant, ($p>0.05$), but at 30 minute RBS found significant difference among groups.

Table 4: Blood pressure with respect to time

Variable	Groups	Mean ± SD	t value	P value
SBP 0	Group A	143.67±12.4	0.92	>0.05
	Group B	140.33±15.4		
DBP 0	Group A	87.67±8.5	0.43	
	Group B	88.67±9.3		
SBP 1	Group A	129.00±8.84	1.82	
	Group B	134.33±13.3		
DBP 1	Group A	82.33±6.7	1.23	
	Group B	84.67±7.7		
SBP 12	Group A	133.33±12.9	1.44	
	Group B	128.33±13.9		
DBP 12	Group A	84.33±6.26	0.19	
	Group B	84.67±6.81		

Table 5: Glycemic response with respect to time in both groups

RBS at various time intervals	Groups	Mean ± SD	t value	P value
0 min	Group A	116.63± 21.5	1.58	>0.05
	Group B	113.23± 10.23		
30 min	Group A	106.57± 6.46	2.34	<0.05
	Group B	111.23± 5.78		
1 Hour	Group A	108.03± 18.58	0.98	>0.05
	Group B	109.87± 28.53		
12 Hour	Group A	107.73± 10.5	0.85	
	Group B	109.27± 12.23		
24 Hour	Group A	111.37±23.6	0.36	
	Group B	112.17±17.3		
	Group B	116.63± 25		

Rescue analgesia was required at around 10 hrs (mean 10.2±1.80) in group A while it was required at around 6 hrs (mean 6.23±1.22) in group B, ($p<0.001$). No serious side effects were observed in the postoperative period.

Discussion

Hip fractures are painful [11], in both the pre and postoperative period. Adequate treatment of pain is not only a humanitarian issue, but may also impact on recovery. Undertreated pain can lead to cardiovascular events, delirium; depression, sleep disturbances and decreased responses to interventions for other disease states [12]. Pain can lead to metabolic, endocrine and electrolyte changes in the body. Moreover, the physiological responses to the damage can contribute to chronic persistent pain that can

occur time after surgery [1]. Treating pain femoral fractures is difficult because there are limited numbers of analgesics available, many of which have side effects that can limit their use. The management of acute pain combines the use of systemic opioids, paracetamol and non-steroidal anti-inflammatory drugs [1].

Tramadol is a central analgesic with a dual mechanism of effect that causes activation of the opioid and non-opioid systems to inhibit pain. The non-opioid effect is mediated through 2 agonistic and serotonergic activities, and the opioid effect through -receptors with local anaesthetic action on peripheral nerves. Tramadol is effective in antagonising glutamate N-methylD-aspartic acid receptors in the pathophysiology of chronic pain [13–15]. However the tramadol increases the duration and quality of postoperative analgesia in a dose-dependent fashion while the incidence of adverse events increases with larger doses, the use of up to 200 mg tramadol remains acceptable [16]. A high dose of tramadol is associated with a delayed onset of anaesthesia; this may be due to the dilution effect of tramadol in the local anaesthetic solution. However, a very low dose of tramadol may result in a lack of efficacy [17,18]. Systemic tramadol efficacy may be affected by polymorphisms in drug-metabolising enzyme or transporters [19,20].

Femoral nerve block was introduced by Fenwick at Sydney Hospital in 1957 and since then it has gradually gained popularity [21]. Blockade of the femoral nerve can be performed using a nerve stimulator to identify the nerve and injecting local anaesthetic close to the nerve; using a blind method named fascia iliaca block that uses large amounts of anaesthetic; using another blind method named Three in One Block in a paravascular approach that can block the femoral, obturator and lateral cutaneous nerves with a single injection; or using an ultrasound guidance to identify the femoral nerve [22]. One survey conducted in England concluded that femoral nerve blocks are an underutilized effective method of analgesia for patients with a femoral fracture and it is associated with a low risk of compartment syndrome [23]. It is said that the use of femoral nerve blocks brings a low risk of adverse events, with the most likely being vascular haematoma, nerve damage, infection and intravascular infection [1]. Two other reviews concluded that nerve blockade seemed to be more effective than opioids alone for preventing pain in patients suffering from a femoral fracture.

The present randomized control study shows that femoral nerve block (FNB) can provide more pain relief than parenteral tramadol in patients with hip fracture. In both groups, initial pain scores at rest were the same, whereas after 30 min, 1, 6, 12 and 24 hours, FNB analgesia was significantly different. Thus, compared with the findings of other studies, pain scores were lower among patients receiving FNB in the current study [24-26]. Berry in 1997 [21] stated that the femoral nerve block provides almost total pain relief and abolition of muscle spasm within a few minutes; there is negligible systemic reaction to the block procedure; pain during procedures which often necessitate patient movement can be prevented. Parker et al reported that nerve blocks reduced pain score and analgesic requirements [27]. However, few studies have investigated FNB to facilitate positioning during conduct of regional anesthesia.

In several studies assessing the effects of FNB over time, final pain assessments were performed at earlier time points and the nerve blocks was administered [25, 26, 28, and 29]; we observed that FNB had a significant analgesic effect over a 24-h period. This perspective over a longer period of time is important, as wait times to surgery are often long and most preoperative preparations take place in the Orthopaedic Ward. A long analgesic effect, such as that achieved with FNB, can reduce patients' requirements for systemic analgesics, thereby potentially reducing the risk of related side effects. In addition, long wait times to surgery and pain can increase the risks of conditions such as pressure ulcers and sleeping problems [30]. In a study comparing continuous femoral nerve blockade with participant controlled intravenous morphine and continuous epidural analgesia in elective hip surgery, no differences were found in quality of analgesia although the femoral nerve block was associated with fewer side effects [31]. Other studies of similar design have not reported differences in pain scores [25]. Epidural analgesia is uncommon in UK practice in this group of patients, with concerns about nursing time, catheter fall out and falls secondary to bilateral motor and proprioceptive block.

In the present study, pulse rate decreased significantly in group A patients from 0 min to 24 hrs after administration compared with group B ($p < 0.001$). There was no significant difference observed between two groups with respect to systolic and diastolic blood pressure and random blood sugar (RBS), ($p>0.05$). Thus both the groups show good haemodynamic stability but when comparing two groups, group A had better stability than group B. Also the requirement of rescue analgesia was more in group B than group A. Thus, the use of a relatively high dose of tramadol might have reduced any difference seen between the groups. Tramadol does not appear to be effective for preventing severe dynamic pain.

CONCLUSION

The femoral nerve block provides better analgesia than intravenous tramadol in terms of VAS score, haemodynamic stability, duration and glycemic response. The study suggested that the femoral nerve block is new and promising alternative for analgesia in patients with hip fracture that provides prolonged effect with good safety profile particularly in elderly and vulnerable patients.

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