PREOPERATIVE FEMORAL NERVE BLOCK IN EXTRACAPSULAR FEMORAL NECK FRACTURES: A CLINICAL EVALUATION OF PAIN RELIEF DURING TRANSPORTATION TO OPERATION THEATRE

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ABSTRACT

Introduction: Fracture of neck femur is very painful injury, which worsened by movement. This prospective study was performed to compare the analgesic effects of femoral nerve block (FNB) with intravenous (IV) tramadol prior to shifting the patients with fractured femur into operation theatre for spinal block. Material and Methods: Seventy-five ASA I–II patients aged 18–60 years undergoing surgery for femur neck fracture were compared between three groups. Thirty minutes before spinal block, the FNB group received femoral nerve block with classical approach of LABAT with a mixture of 20 mol bupivacaine 0.5%, and the tramadol group received inj. tramadol 100 mg intramuscular and control group received neither the block nor the analgesic. The patients were then observed and evaluated for onset of analgesia, intensity of pain, assessment of sensory block, degree of pain relief, complications and patient's acceptance. Results: FNB provides almost total pain relief and abolition of muscle spasm within few minutes as compared to tramadol group, FNB causes little change in hemodynamic parameters in patient compared to intramuscular tramadol. Conclusion: FNB provided quick onset and more effective pain relief with statistically significant change in hemodynamic parameters as compared to intramuscular tramadol.

KEYWORDS: Femoral Nerve Block, hemodynamic parameters.

INTRODUCTION

The periosteum has the lowest pain threshold for the deep somatic structures and this causes severe pain in fracture of neck of femur. Orthopaedic intervention most commonly involves either internal fixation of the fractured site or arthroplasty i.e. replacement of the femoral head. In our institution, spinal block is the standard anesthesia of choice for femoral head fracture surgery. However, any movement of the patient during positioning or transport of the patient to the operation theatre (OT) can lead to severe pain. Providing adequate pain relief during transport or positioning for spinal anesthesia increases comfort in these patients. Intravenous analgesia or femoral nerve block (FNB) is often used to help the patient tolerate transport and positioning.

Various studies have been conducted to establish the benefit of one type of pain relief over another. This prospective study was performed to compare the analgesic effects of FNB with intramuscular tramadol prior to transport to OT for spinal block in patients with fractured femur neck.

MATERIAL AND METHODS

After obtaining institutional approval and written informed consent, we recruited patients with fractured neck of femur over a period of one year for this prospective comparative study. Inclusion criteria were age 18–60 years, ASA physical status I–II and being scheduled for surgery under spinal block. Exclusion criteria were multiple fractures, peripheral neuropathy, bleeding disorders, mental disorders, communication failure, allergy to local anesthetics, and use of analgesics for premedication. The patients were allocated by computer-generated random numbers into two groups of 25 patients each: a control group (group A), a FNB group (group B) and a tramadol group (group C). Patients in the FNB group received FNB guided by peripheral nerve stimulator under full asepsis in the ward. After proper painting and draping an insulated 50 mm 22 G needle was introduced 1 cm lateral to the femoral artery just below the inguinal ligament. When quadriceps contractions were observed for at a current 0.2–0.4 mA, 20 mL of bupivacaine 0.5% was injected incrementally after a negative aspiration test. Patients of tramadol group received IM tramadol 100 mg and control group received nothing in the ward 30 minutes before the
surgery. All patients were monitored with electrocardiography, pulse oximeter, and non-invasive blood pressure measurement. An infusion of Ringer’s lactate solution 1000 ml was given. Pain scores were assessed at 0, 5, 10, 20, 30 minutes after intervention with FNB or IM tramadol using visual analog scale (VAS) with 0 = no pain and 10 = maximal pain. Satisfaction with patient position maintained for spinal block (yes = satisfactory, no = not satisfactory) was also recorded. Assesors of pain were blinded to the patients’ allocated treatment group, and remained outside the operating room during administration of FNB or tramadol. Thereafter, they came into the operating room to assess the pain score.

RESULTS

Demographic data according to ASA physical status, age and sex were not significantly different between the treatment groups (Table 1). Evaluation of onset of analgesia was performed by pinprick test and onset time in group B was earlier than in group C in majority of patients.

VAS score in group B was initially higher which progressively decreased and so in group C while in group A it remained same. Five minutes after procedure, VAS score in group B was lower than that of group A and it was statistically significant. After 20 minutes of procedure, VAS score in group C was lower than group A and was statistically significant. VAS score in group B was lower than that of group C five minutes after procedure and the difference was statistically significant.

Pulse rate decreased steadily over period of time in group B compared to group A and after 10 minutes of procedure the difference was statistically significant. It is evident that pulse rate in group C decreased over time while it remained unchanged in group A. Difference of pulse rate between groups A and C was statistically significant after 20 minutes of procedure. Pulse rate difference between group B and C was significant 10 minutes after procedure.

It is evident that systolic blood pressure decreased in group B over period of time which in group A remained unchanged and the difference was significant 10 minutes after procedure. Difference in systolic blood pressure between group A and C was significant 20 minutes after procedure. Difference in systolic blood pressure between group B and C was significant 30 minutes after procedure. Diastolic blood pressure decreased significantly in group B compared to group A, 10 minutes after procedure. Twenty minutes after procedure, diastolic blood pressure decreased in group C significantly compared to group A. After 10 minutes of procedure, diastolic blood pressure changes in group B were more than group C and it was statistically significant.

Respiratory rate in group B is significantly decreased compared to group A 10 minutes after procedure. Respiratory rate in group C significantly decreased compared to group A, 10 minutes after procedure. Difference in respiratory rate between group B and C were significant 20 minutes after procedure.

SPO₂% steadily increased in group B, while in group A it remained almost static. After 20 minutes of procedure the difference was statistically significant (P<0.05). SPO₂% in patient steadily increased in group C while it remained almost static in group A. After 10 minutes of procedure the difference was significant (p<0.05). SPO₂% in patients increased both in group B and group C and here the difference was insignificant (p>0.05).

After procedure, out of 25 patients of tramadol group, 14 (56%) of them graded analgesia as excellent, 6 (24%) as good, 4 (16%) as fair while 0 (0%) patient graded it as poor. There were no complications in 72% of cases but in 28% cases there were some complications i.e. nausea / vomiting (12%) respiratory depression (8%) and shivering (8%). In FNB group, there were no complications in 92% of cases but in two cases there was some blood on aspiration. After procedure, out of 25 patients 16 (64%) of them graded analgesia as excellent, 5 (20%) as Good, 4 (16%) as fair while 0 (0%) patient graded it as poor.

DISCUSSION

In our study, patients with fracture neck of femur were given femoral nerve block with injection Bupivacaine 0.5% 20 ml. We have observed good analgesia and comfortable patient during transportation for various radiological procedures and orthopedic manipulations and positioning for spinal anesthesia. Haemodynamic stability is maintained and it also helped in prevention of shock due to neurological cause.

G.D. Grossbard and B.R.T. Love in 1974[6] applied this technique on a large number of adults with fractures of shaft of femur. They recommend 0.5% bupivacaine (Marcaine) at a dose of 0.2 ml/kg of body weight upto a maximum of 10 ml. It gave good analgesia for a period of up to 4 hours. Apart from pain relief & case management which is been outlined in the acute traumatic cases, the technique of femoral nerve block has been quite successfully used where patients required to be moved between departments for investigation or even to another hospital.

Berry, F.R. (1977)[7] described the application of femoral nerve block technique to the fractured shaft femur. He used 1% Lignocaine with 1/200,000 adrenaline, a 23G 32 mm needle. Block produced rapid onset of analgesia and prolongation of analgesia when repeated with bupivacaine for continuing pain relief.

Antappa Shantappa Tondare and Arvind Vithal nadkarni (1982)[8] studied femoral nerve block in 25 patients with fracture shaft femur aged 5 to 35 years. Lidocaine Hydrochloride 1 percent with adrenaline 1:180,000 (w/v)
10 ml were used in adults. Intensity of pain was assessed both subjectively and objectively. The block was found to be useful for purposes of transportation & immobilization.

The result of our study, supported by the above studies suggests that femoral nerve block provides adequate analgesia for transportation with extracapsular fracture of neck femur. Tondore, A.S. and Nadkarni, A.V. (1982) have studied 25 patients with fracture shaft femur out of which 17 were made and 8 female. In the present study 60% of the patients were female and 40% were male.

The onset of analgesia was 0-6 minutes in 21 (84%), 7-10 minute in 4 (16%) patients, in FNB Group and in I/M tramadol Group onset of analgesia was 0-6 minute 0%, 7-10 minute 0% and 11-15 minute in 5 (20%) and 16-20 minute in 20 (80%) patients.

The mean value of onset of analgesia was 12.5+12.02 minutes FNB group while in tramadol group 12.5+10.60 minutes. There is statistically significant faster onset in FNB group. Grossbard, G.D. and Love B.R.T., (1974) the result was comparable to studied done by us. They used 0.5% bupivacaine at doses of 0.2 ml per kg of body weight upto maximum of 10 ml in adults and observed mean value of onset of analgesia 2.97 minutes with standard deviation 0.95 minutes.

Ronchi L et al. (1989) also conducted his study on 14 patients with femoral nerve block and found the time of onset 3.5+1 minutes. Haddad FS and Williams RL, 1995 studied on 50 patients of age ranging between 68-89. They compared femoral nerve block (0.3 ml/kg 0.25% Bupivacaine) with systemic analgesia only. They found the mean time of onset of analgesia in femoral nerve block was 3.9+1.15 minutes.

The results of our study supported by the above studies suggest that femoral nerve block provides quick onset of analgesia compared to I/M tramadol. In the present study, bupivacaine hydrochloride was used in the dose of 2 mg/kg body weight and onset of analgesia was seen at 0-6 minutes in 84%, 6-10 minutes in 16%, 11-15 minutes in 0% and 16-20 minutes in 0% in group B. The average mean value was 12.5% minute with standard deviation of +12.02 in FNB group.

Grossbard, G.D. and Love B.R.T. (1974) used 0.5% Bupivacaine in doses of 0.2 ml per kg of body weight upto maximum of 10 ml in adults and observed good analgesia upto 4 hours. Tondore, A.S. and Nadkarni A.V. 1982 used bupivacaine hydrochloride 0.25% 10 ml in 7 adults. The analgesia remained upto 2 hrs and 30 min. Fletcher A.K., Rigby AS and Heyes FLP 2003 conducted his study on 50 patients, age ranging between 63 and 69 years with fracture neck of femur. He compared femoral nerve block (with 20 ml of 0.5% Bupivacaine) with systemic analgesic only. They found the average mean duration of analgesia was 2.93+0.95 hrs with femoral nerve block. The results of our study, supported by the above studies suggest that femoral nerve block provides longer duration of analgesia.

In our study, patients with fracture neck femur were given femoral nerve block by 0.5% bupivacaine 20 ml, 30 minutes before transportation to O.T. We have observed that VAS score had significantly decreased after the block. Haemodynamic parameters were also found to be stabilized during positioning after the block. Patient co-operates after the block for positioning due to comfort & 0-1 VAS score in tramadol group & 0-10 in control group.

Chandran Kant P. Gosavi, LS Choudhary, Rashmi Poddar in 1998 used femoral nerve block to help positioning during conduct of regional anaesthesia. 40 patients were given block by Khoo & Brown method. 15 ml of solution (10 ml of 2% lignocaine + 1 ml sodium bicarbonate + 4 ml of normal saline) was injected. They found the average onset of analgesia was 5 (+0.54) mins. Analgesia of first change of position was 2.7 (+1.1) on VAS. Analgesia at second change of position was 2.1 (+1.1) on VAS. Average duration of conduct of regional analgesia was 28.56 (+7.78) min. Most of the patients rated analgesia as adequate to satisfactory.

Shweta Gidwani et al 2002 compared IV opiates Vs femoral nerve block in fracture neck of femur for positioning during regional block. Study was conducted on 40 patients of age group 40-80 yrs with 0.5% Bupivacaine. They found faster and adequate pain relief with block group during positioning.

Salvatore Sia, Fr. Pelusio et al 2004 compared femoral nerve block and IV fentanyl during positioning for performing spinal block in patients with fracture shaft femur. They included 20 patients & used 1.5% Lidocaine. They found time to perform spinal anaesthesia (mean+SD) was shorter in femoral nerve block group 1.8+0.7 min versus 3.0+1.10 min (p<0.05). Quality of patient positioning for spinal anaesthesia was higher in femoral nerve block group.

The results of our study supported by the above studies suggests that femoral nerve block is an adequate & successful technique for relieving pain caused by movement of fractured limb during transportation. There were no complications in 98% of cases but in two case there was some blood on aspiration. Other workers, Grossbard. G.D. (1976) Berry, F.R. (1977) Tondare. A.S. and Nadkarni. A.V. (1982) Denton. J.S. and Manning M.P.R.A. (1988) also practically had no complications.

In our study when patients were interviewed before transportation to O.T. for their response to procedure. Out of 50 patients 16 (64%) graded overall analgesia excellent. 5 (20%) as good, 4 (16%) as fair while 0(0%) patients grade it as poor. Surgeon's acceptability was
cent percent while in tramadol group, it was 14 (56%) who graded analgesia as excellent, 6 (24%) as good and 4 (16%) as fair and 1 (4%) is poor.

J. Gjessing & N. Harley\textsuperscript{[1]} at Sundsvall’s Hospital, Sweden (1969), Berry FR (1977), Hadded FS & William RL, (1995)\textsuperscript{[1]} Ganapathy S., Wasserman RA, Watsen JT et al (1999)\textsuperscript{[1]} Salvator Sia, Fr. pelusia et al (2004) also found 80-90% of patient acceptability of the technique. The result from our study, supported by the above studies suggests that patient acceptability was good for the femoral nerve block technique.

**CONCLUSION**

On the basis of the results obtained from our study on femoral nerve block we concluded that FNB provides almost total pain relief and abolition of muscle spasm within few minutes as compare to tramadol group in which onset of analgesia was achieved only after 15 minutes. FNB causes little change in hemodynamic parameters in patient compared to intramuscular tramadol. No major complications were observed in any group other that aspiration of blood which can be minimized by constant vigilance.

**REFERENCES**


