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# EVALUATION OF ADDING TRAMADOL TO LOCAL ANAESTHETICS IN BRACHIAL PLEXUS BLOCK FOR POST OPERATIVE ANALGESIA.

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**ABSTRACT** This study was aimed to evaluate adding Tramadol to local anaesthetics for brachial plexux block regarding its effect on sensory and motor blockade, haemodynamic stability, postoperative analgesia and side effects.100 patients of ASA grade I and II undergoing upper limb orthopedic surgeries under supraclavicular brachial plexus block were divided into two groups of 50 patients each. Each patient was given 2% inj. Lignocaine 10ml, 0.5% Bupivacaine 20ml with inj. Normal saline 10ml (Group C) and inj. Normal saline 8ml plus inj.Tramadol 100mg 2ml (Group T ). Addition of Tramadol significantly prolongs the duration sensory and motor block along with provide prolong postoperative analgesia & perioperative hemodynamic stability.

**KEYWORDS :** bupivacaine, lignocaine, tramadol, VAS (visual analogue score)

## Introduction

Since 1980, the concept of regional analgesia was propagated by various workers. Postoperative pain-It is proved that if not treated, leads to derangement of various physiological functions in the body which may ultimately increase the incidence of morbidity and mortality.

Supraclavicular brachial plexus block provides anaesthesia around the elbow, forearm and hand. It produces more dense block and relief of tourniquet pain, it was chosen for upper limb surgery in our study.

Tramadol is a synthetic, centrally acting analgesic agent with two distinct synergistic mechanism of action acting as a weak opioid agonist and inhibitor of monoamine neurotransmitter reuptake with minimum adverse effect and though it is not as potent as morphine, but the quality of analgesia and its duration are found to be very effective for postoperative analgesia.

Thus we decided to evaluate the efficacy of tramadol added to mixture of local anaesthetics lignocaine (2%) and bupivacaine (0.5%) in supraclavicular brachial plexus block.

## Review of literature:

**Algohary M et al (2002)[2],** conducted study to assess the effect of tramadol added to lignocaine in axillary brachial plexus block. Patients were divided into three groups. Group A received 40ml lignocaine 1.5%, Group B received 40ml lignocaine 1.5% mixed with 100mg tramadol and Group c received 40ml lignocaine 1.5% and i.v 100mg tramadol.

**Antonucci S et al (2001)**[3], evaluate effect of tramadol used as adjuvant in brachial plexus block. Patients were divided into three groups. In Group T, tramadol 100mg, in Group C clonidine 1,5 mcg/kg, in S, sufentanil 20 mcg in 5ml of sodium chloride was added along with local anesthetic ropivacaine 0.75% 20ml.

**Vaswani RK et al (2003)[4],** evaluated the effect of tramadol (100mg)/or verapamil (2.5mg) added to lignocaine (2%) with adrenaline (1:200000) in supraclavicular brachial plexus block.Patients were divided into four groups of 25 each; Group A received 20ml lignocaine 2% with adrenaline + 10ml normal saline , Group B received 20ml lignocaine 2% with adrenaline + 2 ml 100mg tramadol + 8 ml normal saline and Group c received 20ml lignocaine 2% with adrenaline + 1ml (2.5mg) verapamil and 9 ml normal saline, Group D received 20ml lignocaine 2% with adrenaline + 1ml (2.5mg) verapamil + 2 ml 100mg tramadol and 7 ml normal saline.

**Imani Farnad et al (2004)[5],** studied the comparision of adding tramadol to lignocaine in continous supraclavicular brachial plexus block for upper limb surgeries. Patients were divided into two groups : Groups Ln received 2% liginocaine 7mg/kg + 100mg (2ml) tramadol. For additional intraoperative analgesia, 2% lignocaine through catheter and i.v sufentanil and midazolam was administerd.

**Robaux S et al (2004)[6],** assessed the effect of tramadol adeed to brachial plexus anaesthesia.Patients were divided into two groups: All the patients received 1.5% mepivacaine 40ml plus study solution containing either isotoinic sodium chloride (control group), tramadol 40mg (group $T_{40}$) or tramadol 100mg (group $T_{100}$) or tramadol 200mg (group $T_{200}$).

## Material and method:

The present study was conducted in 100 patients between the age group 18 to 65 years belonging to ASA class I and II scheduled for supraclavicular brachial plexus block using local anaesthetic agent with or without injection tramadol for upper limb (elbow, forearm and hand) surgeries, after approval from the institutional ethical committee and written informed consent.

Detailed general examination and routine investigations were done. On arrival in recovery room, informed consent was taken after explaining the procedure.NBM status was confirmed. All patients were explained about the Visual Analogue Scale (VAS; 0 = no pain and 10=worst pain) for assessing the intensity of pain during postoperative pain interview. After securing18G intravenous line in contralateral arm, patient was premedicated with inj. Glycopyrrolate 0.2mg i.m 30 minutes before procedure.

Patients were randomly divided into 2 groups (50 patients each)
GROUP C (control): Inj. Lignocaine (2%) 10ml + Inj. Bupivacaine (0.5%) 20 ml + Inj.Normal saline 10ml

GROUP T (Tramadol): Inj. Lignocaine (2%) 10ml+ Inj. Bupivacaine (0.5%) 20 ml + Inj.Normal saline 8ml + Inj.Tramadol (100mg) 2ml

In operation theatre, baseline parameters like pulse, blood pressure, respiratory rate and spO2 were recorded.

After positioning and preparation of parts with all aseptic and antiseptic precaution, supraclavicular block was given with 23 gauge 1.5 inch long needle and patient was asked for feeling of tingling at the elbow and fingers (paraesthesia). Once the patients felt paraesthesia, it was suggestive that the needle was touching the brachial plexux.40ml of drug mixture was given after negative aspiration.

Pulse rate, blood pressure, respiratory rate ,sensory and motor blocked as well as sedation score were observed at 5min, 10min,15min, 20min,30min,45min and 1hr,then at hourly interval for first 6 hrs and then 2 hourly upto 12hours and then 15,18 and 24 hours. Oxygen saturation was also monitored upto 6 hours.

Complication of brachial plexus block and side effects of opioids were also noted.

Sensory blocked was assessed by a 3 point sensory score:
0: Sharp pain on pin prick
1: Touch sensation on pin prick
2: Not even touch sensation

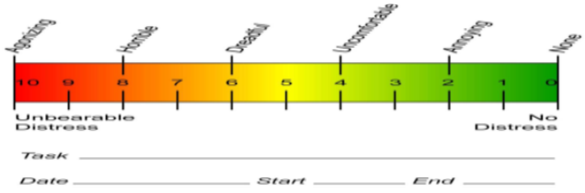
**Motor blocked was assessed by a Bromage 3 point motor score:**

Score clinical description
0 Normal motor function with full flexion and extention of elbow wrist and fingers.
1 Decreased motor strength with ability to move fingers only.
2 Complete motor blocked with inability to move fingers also.

**Sedation score was assessed as follows:**
Score clinical description
0 No sedation
1 Drowsy
2 Asleep but arousable
3 Asleep but not arousable

Post operative analgesia was assessed by visual analogue score at 3,6,9,12,18 and 24hrs on 10cm marked linear line.

**Visual analogue score:**




Diclofenac sodium 1.5 mg/kg i.m was given as an analgesic when patient had a VAS ≥ 5 or when patient demanded for it.

**Observations and Results**
Brachial plexus block is the preferred technique for upper limb surgeries. Even when local anaesthetic like bupivacaine and lignocaine are used, the duration of block is short and higher doses of analgesics are required in the postoperative period.

So, there is a need to prolong the duration of postoperative analgesia without increasing the intensity and duration of motor blockade.

Demographic Data were comparable in all groups (P>0.05).

Pre-operative Pulse rate, Systolic BP, Diastolic BP and SPO2 were comparable in all the three groups (P>0.05).

The average duration of surgery was 113.5±32.68 min in Group C and 114.60±27.57 min in Group T which were comparable (P>0.05).

**Table 1: Sensory block**

| Particular | Group C (Mean ± Sd) | Group T (Mean ± Sd) | 'P' Value |
|---|---|---|---|
| Onset of sensory block(min) | 11.74±2.27 | 10.60 ±1.80 | >0.05 |
| Total duration of sensory block (min) | 229±37.78 | 298±36.36 | <0.01 |
| Total duration of postoperative analgesia(min) | 273.50±37.21 | 571.90±49.77 | <0.01 |

Thus, there was prolonged duration of sensory block in Group T.

The mean duration of postoperative analgesia in Group T was found to be almost twice that of the control group. Thus, a highly significant prolongation of pain relief was noted in Group T. (P<0.001)

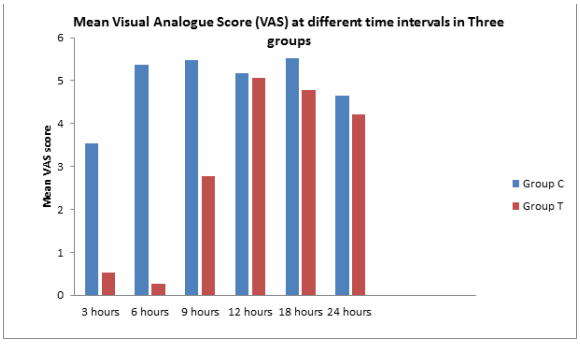
**Table 2: Motor block**

| Particular | Group C (Mean ± Sd) | Group T (Mean ± Sd) | 'P' Value |
|---|---|---|---|
| Onset of motor block(min) | 14.98±1.65 | 14.00±1.86 | >0.05 |
| Duration of motor block(min) | 185.20±31.86 | 231.10±39.10 | <0.01 |

Mean onset of motor block was 14.98±1.65 min in Group C and 14.00 ±1.86 min in Group T were comparable among all groups (P >0.05).

The mean duration of motor block was significantly higher in group T 231.10±39.10 min compared to group C 185.20±31.86 min (p<0.01).Thus there was statistically highly significant difference between the two groups which suggest that there was prolonged duration of motor block in Group T.

**Chart 1: VAS Score**




The visual analogue score in Group C was >5 after 6 hours whereas in Group T it was >5 after 12 hours. The difference between the two was statistically significant from 3 to 12 hours (P<0.01) after performing brachial plexus block.

The patient in group T had sedation grade 1 to 2 and in Group C sedation grade 0 to 1.

The incidence of nausea was 4% in Group C and 10% in Group T, while that of vomiting was 2% in Group C and 6% in Group T.

**Discussion:**
Brachial plexus block is the preferred technique for upper limb surgeries. Even when local anaesthetic like bupivacaine and lignocaine are used, the duration of block is short and higher doses of analgesics are required in the postoperative period.

So, there is a need to prolong the duration of postoperative analgesia without increasing the intensity and duration of motor blockade.

Opioids are powerful centrally acting agents which have peripheral effects also. Opioids produces analgesia, when given in peripheral nerve blocks by the following mechanism (Viel & Collegues)[1]:

Primary afferent tissue (dorsal root) have been found to contain opioid receptors. Opioids may diffuse from the brachial plexus sheath and bind with opioid receptor.

The evidence of axonal flow of various macromolecules suggested possible centripetal axonal transport of opioids into the substantia gelatinosa after peripheral injection.

Tramadol, comparatively new opioid analgesic, is a racemic mixture of two enantiomers, each displaying different opioid receptor binding properties, monoaminergic inhibition and metabolic pathway. Tramadol is a weak μ receptor and strong κ receptor agonist.

In the present study, 100 patients of either sex belonging to ASA Class 1 or 2 undergoing upper limb orthopedic surgeries under supraclavicular brachial plexus block were randomly divided into two groups of 50 patients each:

GROUP C (control): Inj. Lignocaine (2%) 10ml + Inj. Bupivacaine (0.5%) 20 ml + Inj.Normal saline 10ml

GROUP T (Tramadol): Inj. Lignocaine (2%) 10ml + Inj. Bupivacaine (0.5%) 20 ml + Inj.Normal saline 8ml + Inj.Tramadol (100mg) 2ml

In the present study, demographic data like mean age, weight and height were comparable in all groups.

The vital parameters such as mean pulse rate, mean systolic BP, mean respiratory rate, mean oxygen saturation were statistically comparable in both groups. There was no significant statistically difference between the two groups.

The average duration of surgery was 113.5±32.68 min in Group C and 114.60±27.57 min in Group T which were comparable (P>0.05).

In our study, mean time to **onset of sensory blockade** was 11.74±2.27 min in Group C and 10.60 ±1.80 min in Group T which was comparable (P>0.05) and mean **onset time of motor block** was

14.98±1.65 min in Group C and 14.00 ±1.86 min in Group T were comparable among all groups (P>0.05).

These two are consistent with study conducted by Robaux S et al (2004)[6], Algohary M et al (2002)[2], Antonucci S et al (2001)[3], Vaswani RK et al (2003)[4], Imani Farnad et al (2004)[5].

Algohary M et al (2002)[2] reported that onset of sensory blockade 9±4 min in control group, in Tramadol group was 10±4 min and in i.v tramadol group lower 9±5min which was statistically insignificant.

R Robaux S et al (2004)[6] found that mean was 9±4 in control group and 9±4, 10±4, 9±8 in $T_{40,}$ $T_{100}$ and $T_{200}$groups respectively.

In our study, mean **duration of sensory block was** 223±37.78 min in Group C and 298±36.36 min in Group C and mean **duration of motor block** was significantly higher in group T 231.10±39.10 min compared to group C 185.20±31.86 min (p<0.01) which is consistent with study conducted by Robaux S et al (2004)[6], Algohary M et al (2002)[2], Antonucci S et al (2001)[3], Vaswani RK et al (2003)[4], Imani Farnad et al (2004)[5].

Antonucci S et al (2001)[3] observed that duration of sensory and motor analgesia was lower in control group compared to tramadol, clonidine and sufentanil groups.

R Robaux S et al (2004)[6] found that duration of sensory and motor analgesia – in Group $T_{40}$ was 274±96 and 222±89 min respectively; in Group $T_{100}$ was 217±46 and 207±71 min respectively; Group $T_{200}$ was 220±41 and 205±43 min respectively which was significantly longer compared to control group, where it was 183±43 and 171±51 min respectively.

The mean **duration of postoperative analgesia** in Group T was found to be almost twice that of the control group. Thus, a highly significant prolongation of pain relief was noted in Group T (P<0.001) which is comparable with study conducted by Algohary M et al (2002)[2], Vaswani RK et al (2003)[4] and Imani Farnad et al (2004)[5].

In our study, the VAS in Group C was >5 after 6 hours whereas in Group T was >5 after 12 hours. The difference between the two groups was statistically significant from 3 to 12 hours (p< 0.01).

Algohary M et al (2002)[2] reported that VAS in Tramadol group was lower (1.7± 0.8) compared to control group (2.4±1.2) at 6 hours after performing brachial plexus block.

R Robaux S et al (2004)[6] found that mean was low 2.6±2.1, 1.9±, 1.3±1.7 in $T_{40,}$ $T_{100}$ and $T_{200}$ groups respectively compared to 3.5±2.4 in control group.

For Postoperatively analgesia, injection diclofenac sodium 1.5 mg/kg i.m was given when **VAS** was equal to or >5.

In Group C, 8% required 1 injection, 60% required 2 injections and 32% required 3 injections. In Group T, 64% required 1 injection, 4% required 2 injections and 32% required no injection and none of the patients required 3 injections.

In our study, incidence of **nausea** was 4% in Group C and 10% in Group T, while that of **vomiting** was 2% in Group C and 6% in Group T. R Robaux S et al (2004)[6] observed the nausea /vomiting in 3/1,4/1,4/1 in $T_{40,}$ $T_{100}$ and $T_{200}$ groups respectively compared to 1/0 in control group. Antonucci S et al (2001)[3] did not report any side effects in tramadol group.

In our study, patients in group T had **sedation** grade 1 to 2, where the patients were drowsy but arousable for 3 to 4 hours compared to Group C where the patients had sedation score 0 to 1. R Robaux S et al (2004)[6] found 5/22, 5/22, 4/22 patients in groups $T_{40,}$ $T_{100}$ and $T_{200}$ respectively were sedated compared to 2/17 in control group, which is consistent with our study.

**Conclusion:**

Addition of 100mg Tramadol to a mixture of 20ml 0.5% bupivacaine and 10ml 2% lignocaine in 8ml of normal saline significantly prolongs the duration of sensory and motor blockade as well as the duration of postoperative analgesia without affecting the time to onset of sensory and motor blockade.

It does not affect the vital parameters and is devoid of significant adverse effect with a few incidences of nausea and vomiting. It produces mild sedation, grade 1-2 where the patient remains drowsy but easily arousable.

Hence, Tramadol is effective and safe adjuvant to local anaesthetics for brachial plexus block to produce prolonged postoperative analgesia.

**References:**


1) Viel EJ, Dathis F, Eledjam J J; Brachial plexus block with opioids for postoperative pain relief. Comparision between buperenorphine and morphine. Regional Anaesthesia. 1989; 14:274-278.
2) Algohary M , Nagla Abdalla Abdel-Aliem Maha A. Tramadol added to lignocaine prolongs anaesthesia and analgesia after axillary brachial plexus block.JESMP,Vol-20,No-1 April 2002.
3) Antonucci S. Adjuvants in the axillary brachial plexus blockade. Comparision between clonidine, sufentanil and tramadol. Minerva anaesthesia (Italy) 2001; 67(1-2); 23-27
4) Vaswani R.K., Raiger L, Mittal J.C, Bajaj P; Effect of adding tramadol and/or verapamil to lignocaine with adrenaline on onset time and duration of brachial plexus block; J Anaesthesia Clinical Pharmacology 2003; 19 (4) : 377-381.
5) Imani Franad, Hassan V, Sadri B, Alebouyeh M. Evaluation of adding tramadol to lignocaine in continous supraclavicular brachial plexus block. Anaesthesia and Analgesia 2004 April; 98 (4); 1172-77.
6) Robaux S , Blunt C, Viel E, Cuvillon P, Dautel G, Bouaziz H; Tramadol added to 1.5% mepivacaine for axillary brachial plexus block improves postoperative analgesia in dose-dependent fashion. Anaesthesia and Analgesia 2004 April; 98 (4); 1172-77.
7) Stoelting Robert K.: Pharmacology and physiology in Anaesthesia practice; 8th edition,1999.
8) Tripathi K.D.: Essential of medical Pharmacology; 4th edition, 1999