Analgesic effect of paracetamol as an adjuvant to lignocaine in upper limb surgeries under intravenous regional anaesthesia (IVRA)

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Abstract

Background: Intravenous regional anaesthesia (IVRA) is a simple, most reliable, and less economic burden with 95-98% success rate in upper limb surgeries. Multiple drug combinations have been used to achieve few systemic adverse effects and to increase the postoperative analgesia. This study was aimed to assess the efficacy of lignocaine alone and lignocaine with paracetamol as adjuvant in upper limb surgeries under intravenous regional anaesthesia.

Materials and methods: A total 120 cases belong to ASA grade I or II, between age group 21-60 years undergoing upper limb surgeries were divided into two groups. Group A administered with 2% lignocaine (10 ml) with paracetamol (30 ml) and group 2 administered with 10ml 2% lignocaine with normal saline (30ml). Onset of motor and sensory blockade and recovery duration, intraoperative pain assessment by using 10 cm visual analogue scale, utilization of intra operative analgesia and need of post-operative analgesia, Post-operative patient satisfaction were evaluated.

Results: The duration of onset (p=0.002) and recovery (p=0.016) of sensory block and motor block among two group was statistically significant. Intra operative VAS score difference among the two groups was statistically significant (p=0.002). Intra operative requirement of fentanyl was more in group B than group A, which was statistically significant (p=0.041). In lignocaine with paracetamol group, patient satisfaction was graded as good in 76.7% cases and excellent in 18.3% cases. Intra-operative requirement of fentanyl was more in group B than group A, which was statistically significant (p=0.002). Intra-operative requirement of fentanyl was more in group B than group A, which was statistically significant (p=0.002).

Conclusion: Paracetamol to lignocaine as adjuvant in intravenous regional anaesthesia was effective than the lignocaine alone. The drug combination minimizes the duration of onset of sensory block, intraoperative requirement of analgesia and enhances the analgesic effect of lignocaine.

Keywords: lignocaine, paracetamol, sensory block, motor block, postoperative analgesia.

Introduction

Intravenous regional anaesthesia (IVRA) is the preferable technique in upper limb surgeries. IVRA is simple, safe, most reliable, easy to administer, cost effective procedure and short hospitalization period [1, 2]. Besides, IVRA had disadvantages like poor muscle relaxation, delayed onset of action, tourniquet pain and poor in prolonged post operative analgesia [3, 4]. Different drug combinations and adjuvants like tramadol, fentanyl, clonidine, dexamethasone etc. have been used to achieve few systemic adverse effects and to increase the postoperative analgesia [5].

Paracetamol has anti-inflammatory property, effect on central nervous system and peripheral antinociceptive properties in different pain models [6]. Studied demonstrated that paracetamol as an adjuvant improves post operative analgesia when added to lignocaine in IVRA [7]. The present study was designed to assess the efficacy of lignocaine alone and lignocaine with paracetamol as adjuvant in upper limb surgeries under intravenous regional anaesthesia.

Materials and Methods

The present prospective randomised double blind study was conducted in Department of Anaesthesiology, S.V.S Medical College, Mahabubnagar during April 2018 to August 2019. A total 120 cases between age group 21-60 years undergoing upper limb surgeries were recruited. Cases belong to ASA grade I or II, undergoing upperlimb surgeries with maximum 60 minutes and willing to participate in the study were included, cases undergoing >60 minutes of upper limb surgeries, allergy to the local anaesthetics and not willing to participate were excluded.

Informed consent was obtained from all the study participants and study protocol was approved by institutional ethic committee. All the study participants were randomly divided...
into two groups. Group A administered with 2% lignocaine (10 ml) with paracetamol (30 ml) and group 2 administered with 10ml 2% lignocaine with normal saline (30ml). Parameters like onset of motor and sensory blockade and recovery duration, intraoperative pain assessment by using 10 cm visual analogue scale, utilization of intra operative analgesia and need of post-operative analgesia were assessed. Post-operative patient satisfaction was evaluated and graded as excellent, good, moderate and poor. The data was collected into Microsoft Office Excel 2010. The processes of exporting the coded data from excel to SPSS version 20.0 was employed.

**Results**

**Fig 1: Age wise distribution of study participants**

![Age distribution](image)

**Table 1: Details of demographic parameters and surgical procedures in study participants**

| Parameters          | Group A       | Group B       | p-value |
|---------------------|---------------|---------------|---------|
|                     | Number | Percentage | Number | Percentage |
| Gender              |         |            |         |            |
| Male                | 38     | 63.3%      | 46     | 76.7%      | 0.252   |
| Female              | 22     | 36.7%      | 14     | 23.3%      |         |
| ASA Grade           |         |            |         |            |
| Grade I             | 42     | 70%        | 45     | 75%        | 0.548   |
| Grade II            | 18     | 30%        | 15     | 25%        |         |
| Type of surgical procedure |      |            |         |            |
| Suturing            | 03     | 5%         | 01     | 1.67%      | 0.472   |
| K wire fixation     | 38     | 63.3%      | 36     | 60%        |         |
| Carpal tunnel repair| 12     | 20%        | 15     | 25%        |         |
| Ganglion Excision   | 07     | 11.67%     | 08     | 13.3%      |         |

**Table 2: Duration of onset and recovery of sensory and motor blockade**

| Onset/Recovery     | Group A Mean±SD | Group B Mean±SD | p-value |
|--------------------|-----------------|-----------------|---------|
| Duration of Sensory block (In min) |                |                |         |
| Onset              | 5.91±2.04       | 6.84±2.12       | 0.002   |
| Recovery           | 7.64±1.67       | 6.19±1.72       | 0.016   |
| Duration of Motor block (In min) |                |                |         |
| Onset              | 8.66±2.77       | 11.98±2.87      | 0.027   |
| Recovery           | 8.74±2.35       | 11.01±2.62      | 0.035   |
| Intra-operative VAS score | 2.54±1.37      | 3.25±1.98       | 0.002   |

**Table 3: Details of fentanyl intake in surgical procedure**

| Fentanyl intake     | Group A | Group B | p-value |
|---------------------|---------|---------|---------|
| Intra operative intake |        |         |         |
| Required            | 06 (10%) | 42 (70%) | 0.041   |
| Not required        | 54 (90%) | 18 (30%) |         |
| Intake quantity (In mcg) (Mean±SD) | 8.89±18.2 | 35.6±27.8 | 0.002   |
Discussion
Intra venous regional anaesthesia (IVRA) has benefits such as minimal haemorrhage risk, safe, reliable and cost effective. Surgeries to the upper limb can be done under general anaesthesia or through nerve block or through regional anaesthesia by IVRA [8, 9]. Besides the benefits, it is poor in prolonged post operative analgesia and muscle relaxation [10]. To avoid this many adjuvants have been added to local anaesthetics [11]. This study was designed to assess the efficacy of lignocaine alone and lignocaine with paracetamol as adjuvant in upperlimb surgeries under iravenous regional anaesthesia. In this study, study participants were randomly distributed in to 2 groups based on drug administration. The difference among gender (p=0.252) and ASA grade (p=0.548) was statistically not significant. K-wire fixation (group A 63.3%, group B 60%) was common surgical procedure followed by carpel tunnel repair (group A 20%, group B 25%) in two study groups. The mean onset duration of sensory block in group A was 5.91±2.04 and in group B was 6.84±2.12. Whereas, the mean duration of recovery time in group A was 7.64±1.67 and in group B was 6.19±1.72. The duration of onset (p=0.002) and recovery (p=0.016) of sensory block among two group was statistically significant. The mean onset duration of motor block in group A was 8.66±2.77 and in group B was 11.98±2.87. The mean recovery duration of motor block in group A was 8.74±2.35 and in group B was 11.01±2.62 (Table 2). Sudy by Pankaj Kumar et al., found no significant difference in onset of sensory block (P>0.05) and recovery duration was significantly longer among groups (P<0.05). Similarly, onset duration of motor block was shorter and recovery duration was longer (P<0.05) [12]. Study by Huseyin Sen et al., found no significant difference in the onset of sensory block among study groups (p>0.05), whereas recovery time was significantly longer in group 2 (P<0.05). As the same, onset duration of motor block was shorter and recovery duration was longer (P<0.05) [13]. Celik M et al., found that onset and recovery times of sensory block and motor block was similar in both groups [11]. Study by Amar prakash Kataria et al., stated that onset of sensory and motor block was significantly lower in lignocaine with paracetamol group than lignocaine alone group (P<0.001). The recovery duration of sensory block and motor block was similar in both groups (P>0.05) [14]. Reda K. Abdel-Rahman et al., found no statistical significant difference in onset and recovery of sensory block and motor block between lower in lignocaine with paracetamol group than lignocaine only group (P>0.05). Mehrdad Noroozi et al., stated that the mean duration of sensory block was statistically significant among study goup (P<0.001) [16]. Sen H et al., stated that onset duration of motor block was shorter and recovery duration of motor and sensory block was significantly longer in lidocaine and paracetamol group [17]. Study by Vishala G et al., stated that onset duration of sesory block was not significant (p>0.05) and recovery duration of sesory block was statistically significant (P<0.05) [18]. Study by Sulekha S et al., found onset duration of sensory and motor block was shorter and sensory recovery time was longer in group 1 (P<0.001) [19]. In this study, intra operative VAS score in group A was 2.54±1.37 and in group B was 3.25±1.98. The difference among the two groups was statistically significant.

Table 4: Details of patient satisfaction rate

| Satisfaction rate | Group A | Group B | p-value |
|-------------------|---------|---------|---------|
|                   | Number  | Percentage | Number  | Percentage |         |
| Excellent         | 11      | 18.3%    | 04      | 6.67%      | 0.034   |
| Good              | 46      | 76.7%    | 31      | 51.67%     |         |
| Moderate          | 03      | 5%       | 25      | 41.66%     |         |
| Poor              | NIL     | -        | NIL     | -          |         |

Fig 3: Post-operative analgesia
(p=0.002). Intra operative requirement of fentanyl was more in group B than group A, which was statistically significant (p<0.041). The mean intake quantity of fentanyl in group A was 8.89±18.2 and in group B was 35.6±27.8. The difference was statistically significant (p=0.002). Study by Pankaj Kumar et al., stated intraoperative VAS score was significantly lower in group 2 (P<0.05) and intraoperative analgesic requirement was significantly lower in group 2 (P<0.05) [19]. Intraoperative VAS score were significantly lower in group 2 (P<0.05). Intra operative requirement of fentanyl was significantly lower in group 2. Study by Huseyin Sen et al., found no significant difference in the intraoperative VAS score [13]. The mean intraoperative VAS pain score was 2.17±1.62 in Group 1 and 3.80±2.36 in Group 2. The p-value 0.003 showed that there is a statistically significant difference in the intraoperative VAS score between the two groups [19].

In group A, 76.7% cases had good satisfaction rate followed by excellent rate in 18.3%. In group B, 41.66% case had moderate satisfaction rate and 51.67% case had good satisfaction rate (Table 4). The difference was statistically significant (p=0.034). Study by S Sulekha stated that patient satisfaction rate was statistically significant between two groups (P<0.05) [19].

Conclusion
The study results concluded that, the addition of paracetamol to lignocaine as adjuvant in intravenous regional anaesthesia was effective than the lignocaine alone. The drug combination minimizes the duration of onset of sensory block, and intraoperative requirement of analgesia. In this study, onset and recovery duration of sensory & motor blocks and intraoperative analgesia requirements were statistically significant (P<0.005). Post operative requirement of analgesia was less in group B when compared group B. In lignocaine with paracetamol group, patient satisfaction was graded as good in 76.7% cases and excellent in 18.3% cases.

References
1. Dos Reis A Jr. Intravenous regional anesthesia-first century. Beginning, development, and current status. Rev Bras Anestesiol. 2008; 58(3):299-321.
2. Candido KD, Winnie AP. Intravenous regional block for upper and lower extremity surgery In Hadzic A (Ed.). Textbook of Regional Anesthesia and Acute Pain Management, 2. Ed. NewYork, McGraw-Hill Profesional 2007, 565-578.
3. Mohr B Safety and effectiveness of intravenous regional anaesthesia (Bier block) for outpatient management of forearm trauma. CJEM. 2006; 8(4):47-50.
4. Brown EM, McGriff JT; Malinowski RW- Intravenous regional anesthesia: review of 20 years experience. Can J Anaesth. 1989; 36:307-310.
5. Johnson CN. Intravenous regional anesthesia: new approaches to an old technique. CRNA. 2000; 11(2):57-61.
6. Bertolini A, Ferrari A, Ottani A, Guerzoni S, Tacchi R, Leone S. Paracetamol: new vistas of an old drug. CNS Drug Rev. 2006; 12:250-75.
7. Lamyaa Malik Mohammed, Sura Mustafa Abbas, Ali abdulhammed. The analgesi effect of paracetamol when added to lidocaine for intravenous regional anesthesia. International journal of current research. 2018; 10(12):76434-76440.
8. Mahmoud El-Khatib, Saad El-Deen, Ibrahim El, Desoky Mohammed, Abd-Allah Ali, Mohammed Abd-Elsalam. Effect of Paracetamol and Dexamethasone with Lidocaine in Intravenous Regional Anesthesia of Upper Limb Surgeries. Egyptian Journal of Hospital Medicine. 2019; 76(1):3373-3379.
9. Choyce A, Peng P. A systematic review of adjuncts for intravenous regional anaesthesia for surgical procedures. Can J Anaesth 2002; 49:32-45 4.
10. Chan VW, Peng PW, Kaszas Z, Middleton WJ, Muni R, Anastakis DG et al. A comparative study of general anesthesia, intravenous regional anesthesia, and axillary block for outpatient hand surgery: clinical outcome and cost analysis. Anesth Analg 2001; 93:1181-4.
11. Celik M, Saricaoglu F, Canbay O, Dal D, Uzumcigil A, Leblebicioglu G et al. withdrawn The analgesic effect of paracetamol when added to lidocaine for intravenous regional anesthesia. Minerva Anestesiol. 2011, 21.
12. Pankaj Kumar, Deogaonkar SG, Manju Jha. Analgesic efficacy of paracetamol when used as adjuvant in ivra. Int J Med Res Health Sci. 2016; 5(1):63-66.
13. Huseyin Sen, Yalcin Kulahci, Enis Bicerer, Sezai Ozkan, Guner Dagli, Alparslan Turan. The Analgesic Effect of Paracetamol When Added to Lidocaine for Intravenous regional Anesthesia. Anesthesia & Analgesia. 2009; 10 9(4):1327-1330.
14. Amar Parkash Kataria, Mandip Kaur, Anju Bala, Harcharan Singh, Jugal Kumar, Radhe Sharan. Comparison of the Effects of Lignocaine, Lignocaine plus Paracetamol, Lignocaine Plus Tramadol in Intravenous Regional Anesthesia. Journal of Evolution of Medical and Dental Sciences. 2015; 4(04):539-544.
15. Reda K Abdel-Rahman, Montaser S Ahmed, Mahmoud G Montaser, Abdelbadee A Ahmed, Ibrahim E Elalfy. Bier’s block using different doses of paracetamol added to lidocaine in patients undergoing hand surgeries. AAMJ. 2012; 10(3):181-196.
16. Mehrdad Noroorzi, Mohammad reza Douroudi, Ali Sarkouhi, Mehdi Ahmadi nejad, Ali Barkhorii, Masoud Moghadari et al. Synergistic effects of Paracetamol and Dexamethasone with Lidocaine in Intravenous regional anesthesia (IVRA) of upper limbs: A randomized clinical trial. Egyptian Journal of Anaesthesia. 2016; 32:111-115.
17. Sen H, Kulachi Y, Bicerer E, Ozkan S, Dagli G, Turan A. The analgesic effect of paracetamol when added to lidocaine for intravenous regional anesthesia. Anesth Analg. 2009; 109(4):1327-30.
18. Vishala G, Ram Siva Naik DV, Balaji T. Comparative Study of Analgesic Effects in Intravenous Regional Anesthesia With Lidocaine VS Lidocaine With Paracetamol IV. Indian Journal Of Applied Research. 2015; 5(5):19-30.
19. Sulekha S, Prasanth Kumar MS. Efficacy of paracetamol when added as an adjunct to lignocaine in intravenous regional anaestheisa- A prospective randomised double blinded study. Med Pulse International Journal of Anaesthesiology. 2019; 12(1):43-47.