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Dexmedetomidine as an Adjuvant to Lignocaine in Intravenous Regional Anesthesia

[1]Durga Aparna Lakkoju [2.] Busupalli Mythili Priyanka [3.] Indira Priyadarshini
***Corresponding author**: DurgaAparnaLakkoju, Department of Anesthesia, Guntur Medical College, Guntur.*

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I. Introduction:

Since its invention by August Bier in 1908, intravenous regional anaesthesia (IVRA) has grown to be a crucial tool in anaesthesiologists' toolbox. For a while, this approach was very well-liked. In addition to lowering the chance of local anaesthetic toxicity, adjuvants to local anaesthetics have significantly increased the potential applications of regional anaesthesia by providing quicker onset times, inhibiting tourniquet pain, extending post-operative analgesia, and improving peri-operative analgesia(1,2).

Dexmedetomidine, a parenterally administered alpha agonist, has analgesic effects in this regard via acting on alpha-adrenergic receptors found in nerve terminals as well as lowering nerve action potentials, particularly in C fibres. When combined with local anaesthetics, it lessens post-operative discomfort(3).
This study is being done to evaluate the effect of Dexmedetomidine as an adjuvant to lignocaine in intravenous regional anesthesia.

II. Aims and Objectives:

The effectiveness of Dexmedetomidine as an adjuvant in intravenous regional anesthesia in terms of preventing tourniquet pain and the duration of postoperative analgesia.

III. Materials and Methods:

At the Government General hospital in Guntur, this prospective randomised double-blind control trial was carried out. 60 patients with ASA grades I and II between the ages of 20 and 60 who underwent upper limb procedures lasting less than 90 minutes were included in this study after receiving ethical committee permission. Individuals with Paget's disease, sickle cell anaemia, raynaud's disease, scleroderma, local infections, a history of hypersensitivity to local anaesthetics, inadequate starvation lasting less than six hours, and patients with a history of Dexmedetomidine contraindication were excluded from this study.

The patient's systolic blood pressure was at least 100 mm Hg higher than the inflation of the proximal tourniquet. The absence of a pulse in the radial pulse was confirmed before administering local anaesthetic. The local anaesthetic is then gradually injected over a 90-second period. 40 ml of 0.5% lignocaine or 40 ml of 0.5% lignocaine plus 0.5 micrograms/kg of dexmedetomidine were used as the standard injection volume. Depending on the medication they got, the patients were split into two groups. After obtaining surgical anaesthesia, the distal tourniquet that covers a portion of the anaesthetized arm was inflated, and the proximal one was deflated. Group A patients received 40 ml of 0.5% lignocaine with 0.5 micrograms/kg Dexmedetomidine, and Group B patients received 40 ml of 0.5% lignocaine.

IV. Results:

Mean age of the population in Group A is 37.5 ∓ 5.6 years and the mean age of the population in Group B is 35.7 ∓ 10.4 years. There was no significant statistical difference (p = 0.8). In Group A, 20 were males and in Group B, 17 were males. The mean weight of population in group A was 52.2 ∓ 6.2 kgs and in group B was 51.3 ∓ 4.2 kgs.

Variable	Group A	Group B	P Value	Significance
Sensory onset time in minutes (mean)	1.7	5.1	0.0001	Significant
Motor onset time in minutes (mean)	13.7	19.07	0.0001	Significant
Duration of surgery in minutes (Mean)	46.25	47.33	0.7	Not Significant
Sensory recovery time in minutes(mean)	19.56	5.1	0.0001	Significant

Motor recovery time in minutes (mean)	24.6	3.24	0.0001	Significant
Duration of post-operative analgesia	410.5	12.4	0.0001	Significant

Rescue analgesia:

Rescue analgesia	Group A	Group B
Yes	1	22
No	29	8
P value	0.0001 (Significant)	

MAP	Group A	Group B	P Value
1 minute	94.6	94.2	0.23
5 minutes	93.2	94.1	0.17

The difference in MAP between both the groups is statistically not significant.

Heart rate	Group A	Group B	P Value
1 minute	82.6	81.5	0.09
5 minutes	81.3	81.6	0.13

The difference in HR between both the groups is statistically not significant

V. Discussion:

In order to provide conduction blockage, local anaesthetics are delivered to one specific limb during intravenous regional anaesthesia by proximally occluding the arm. It must be risk-free, not upsetting or uncomfortable for the patient, permit sufficient surgical access to the operation site, and interfere with the body's internal homeostatic systems as little as possible.

There are numerous benefits to intravenous regional anaesthesia. It has a quick onset and recovery and is uncomplicated and dependable. In spite of these benefits, intravenous regional anaesthesia has certain drawbacks, including no postoperative analgesia and tourniquet pain that hurts the patient. By including Dexmedetomidine as an adjuvant in our trial, we aimed to overcome these drawbacks.

In this trial, the age, sex, weight, and surgical time of the patients in Group A (lignocaine plus Dexmedetomidine) and Group B (lignocaine only) were comparable. When compared to Group B, Group A experienced a faster start of sensory and motor blockage. After cuff deflation, the duration of blocking is identical for both sensory and motor recovery. These findings are consistent with research by Esmaoglu, A., et al(4). The incidence of tourniquet discomfort during surgery, as measured by supplementing, was statistically substantially lower in Group A (0%) compared in Group B (70%) with a p value of 0.0001. Similar research by Memis et al(5). indicates that the incidence of tourniquet discomfort decreased when Dexmedetomidine was added.

Despite the involvement of A fibres and unmyelinated C fibre, the exact mechanism underlying tourniquet discomfort is still unknown. Dexmedetomidine inhibits neuronal action potentials by a mechanism unrelated to the activation of -2-adrenergic receptors, particularly in C fibres. This mechanism explains for strengthening of the local anaesthetic block induced by perineural delivery of the medication and could be implicated in the impact shown in this investigation. Finally, by inhibiting the production of norepinephrine, -2-adrenergic receptors found in nerve endings may contribute to the analgesic impact of the medication. In this study, it was discovered that dexmedetomidine also had a delayed tourniquet pain onset and reduced the need for intra- and postoperative analgesics in addition to its local anaesthetic effects(6).

VI. Conclusion:

According to the data and statistical analysis, adding Dexmedetomidine 0.5 micrograms/kg to lignocaine for intravenous regional anaesthesia resulted in faster onset of sensory and motor blockade, less tourniquet pain, and longer postoperative analgesia.

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