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THE USE OF 0.5% LIDOCAINE WITH FENTANYL AND PANCURONIUM FOR AXILLARY BLOCK

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ABSTRACT

The present study was designed to assess the efficacy of fentanyl and pancuronium combined with dilute lidocaine solution for axillary block. One-hundred adult patients undergoing upper limb surgery were randomly allocated to receive either 0.6 mL/kg of 1% lidocaine (6 mg/kg) or 0.6 mL/kg of 0.5% lidocaine (3 mg/kg) with 1μg/kg of fentanyl and 0.5 mg of pancuronium. The onset of sensory and motor blocks was significantly shorter in the 1% lidocaine group ($p<0.05$). However no differences in analgesia or motor blockade were found between the two groups, during the later 20 min. after block. The procedure was considered successful in 100% of patients without the necessity of supplementary medication, and no adverse effect were observed in the two groups, and the time of the first request for analgesia was not significantly different between the two groups. We conclude that the addition of fentanyl plus pancuronium to the lidocaine solution, with an unknown mechanism of effect on major nerve block, reduces the dose of the local anesthetic and possibly systemic toxicity.

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Keywords: Axillary block, Lidocaine, Fentanyl, Pancuronium.

INTRODUCTION

The axillary approach to the brachial plexus is the most popular because of the ease of block and reliability.[1] However a relatively large dose of local anesthetic is required to induce motor and sensory blockade (for lidocaine 6mg/kg as a 1% solution) and may produce systemic toxic reactions.[2] Lidocaine (3mg/kg) is considered as a safe intravenous dose in intensive care[3] but this reduced dosage as a 0.5% solution is insufficient for major nerve block.[2] To complete or prolong the neural block, the addition of an opioid or muscle relaxant has been proposed and shown that it can improve the quality of the block.[4-8] The aim of the present study was designed to assess the efficacy of fentanyl and pancuronium combined with dilute lidocaine for axillary block (3mg/kg of a 0.5% lidocaine solution with 1μg/kg fentanyl and 0.5mg pancuronium), compared with 6 mg/kg of a 1% lidocaine solution. Intra- and postoperative analgesia, motor blockade, and adverse effects were analyzed in 100 unpremedicated adult patients.

METHODS

Patients were randomized in a double-blind fashion into two groups: Group 1(n=50) received 0.6mL/kg of lidocaine 1% without epinephrine or alkalinization, and group 2(n=50) received 0.6mL/kg of lidocaine 0.5% with the addition of 1μg/kg fentanyl and 0.5mg pancuronium without epinephrine or alkalinization for blockade. Using the transarterial technique, the solution was injected through a 25 gauge, 4-cm needle, one-half of the solution is injected posterior and the other half anterior to the artery, and another catheter was inserted in a vein on the contralateral arm for fluid infusion. All the patients were monitored by clinical observation, automatic

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noninvasive blood pressure, heart rate, and pulse oximetry, throughout the procedure, intraoperatively and 1h postoperatively.

The onset of the sensory block was evaluated by the same investigator using the pinprick method at three separate areas on the hand, selected to represent the innervation of the ulnar, median, and radial nerves. Anesthesia was defined as a loss of pinprick sensation. Complete motor blockade was recorded when the patient colud not induce any movement of the fingers. The measurements were made once every 5 min for 30 min. Patients were observed carefully for any sign of adverse effects of drugs throughout the procedure, during the intraoperative period and within 1h postoperatively.

If the time of the surgery was prolonged, the time of the first request for analgesics would be recorded and general anesthesia would be performed.

Results are expressed as mean±SD unless indicated otherwise. Statistical analysis was performed using Student's t-test and chi-square test. A P-value of less than 0.05 was considered significant.

RESULTS

Group 1 consisted of 10 women and 40 men, aged 30±8 years and weighing 62±9 kg. In group 2, there were 16 women and 24 men, aged 33±5 years and weighing 65±6 kg. Differences were not significant (Table I).

The onset of sensory and motor blocks was significantly different between the groups (Figs. 2,3). The mean time of complete sensory block and that of complete motor blockade were shorter in group 1 (Table II). However, no differences in analgesia or motor blockade were found between the two groups regarding 20 min later (Figs. 2 and 3). Block was successful in all patients of both groups without necessity of supplementary medication.

There were no significant differences between the groups at the time of the first request for analgesics (Table II) and no adverse effects were observed in the two groups.

DISCUSSION

This study shows that half dose lidocaine combined with fentanyl and pancuronium is a successful method for major nerve block and possibility to use a non-toxic dose of lidocaine. We observed no differences between the two groups 20 min. after block. Our data is surprisingly similar to Sztark and Thiciope's study in intravenous regional anesthesia.[6]

The mechanisms of the effect of opioids or muscle relaxants in major nerve block are unclear or unknown. The effects of fentanyl on nerve conduction have been reported in experimental studies.[8]

Table I. Mean and SD of age and weight in the two groups.
Group 1: Lidocaine, Group 2, Lidocaine+Fentanyl+Pancuronium.

	Group 1	Group 2
Mean age (year and SD)	30 (SD= 8)	33 (SD= 5)
Mean and SD of weight (kg)	62 (SD= 9)	65 (SD= 6)

Table II. Onset of motor and sensory block and need for analgesics in the two groups.
Group 1: Lidocaine, Group 2: Lidocaine+Fentanyl+Pancuronium.

	Group 1	Group 2
Onset of motor block	11 (SD= 6)	15 (SD= 8)
Onset of sensory block	16 (SD= 6)	20 (SD= 8)
Request of analgesic	56 (SD= 12) min	65 (SD= 16) min

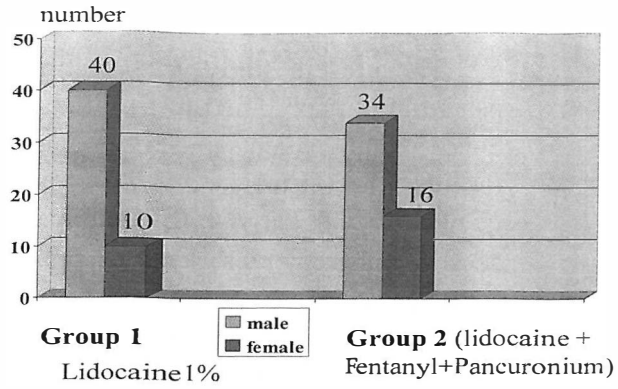

Fig. 1. Sex difference in the two groups.

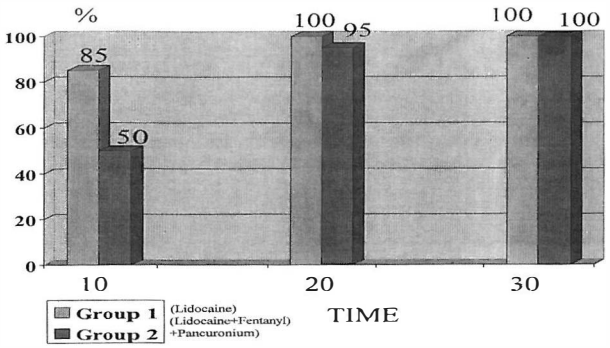

Fig. 2. Onset of complete motor block 10, 20 and 30 minutes after injection.

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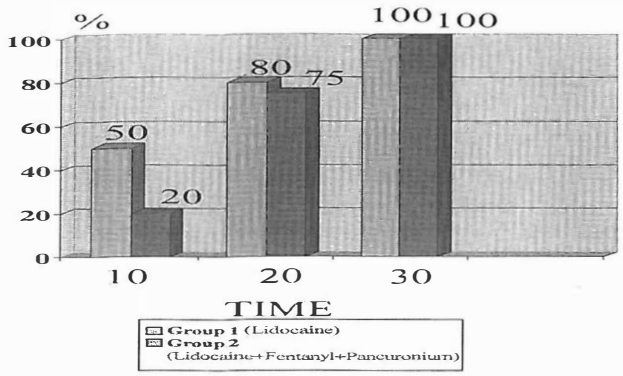

Fig. 3. Onset of sensory block 10, 20 and 30 minutes after injection.

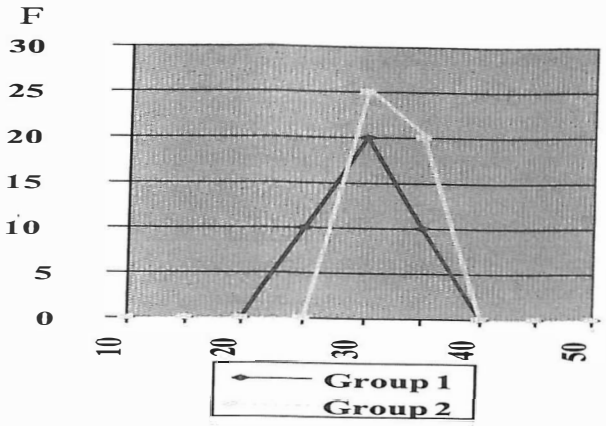

Fig. 4a. Distribution of age in the two groups of patients.

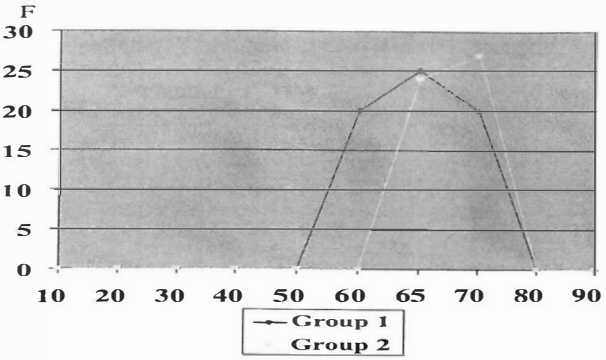

Fig. 4b. Distribution of weight in the two groups of patients.

Abdulla and Fadhi[3] obtained successful analgesia in 100% of the cases with the combination of lidocaine (100mg) + fentanyl (50µg) + pancuronium (0.5mg) in comparison with only 13% with lidocaine (100mg) alone and 27% with the combination of lidocaine (100mg) + fentanyl (50µg) in intravenous regional anesthesia.

Alkalinization of the local anesthetic solution in order to accelerate the onset and prolong the duration of analgesia has been studied.

The addition of sodium bicarbonate to prilocaine seems to be clinically useful. However, Benlabel et al. found no advantage in using pH-adjusted lidocaine.

Other attempts have been made to improve and design the mechanism of action in this triple combination in plexus block.

In summary, with the addition of fentanyl (1µg/kg) and pancuronium (0.5mg) to the local anesthesia solution, it is possible to inject only 3mg/kg of lidocaine as a solution of 0.5% instead of the usual 6mg/kg. This triple combination produced the same quality of anesthesia as the 1% lidocaine solution. Thus this modification reduces the dose and potential toxicity of the local anesthetic.

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