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COMPARISON OF INTERCOSTAL NERVE BLOCK USING 0.5% BUPIVACAINE VERSUS 0.5% BUPIVACAINE WITH 25 µg FENTANYL FOR ANALGESIA IN MEDICAL THORACOSCOPY: A RANDOMIZED CLINICAL STUDY

Anaesthesiology

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ABSTRACT

Background: Medical thoracoscopy is an important minimally invasive procedure for diagnosing and managing pleural diseases. Adequate analgesia during the procedure is essential for patient comfort and procedural success. Intercostal nerve block with bupivacaine is commonly used, and the addition of fentanyl may enhance analgesic efficacy. **Aim:** To compare the analgesic efficacy of intercostal nerve blockade using 0.5% bupivacaine alone versus 0.5% bupivacaine with 25 µg fentanyl in patients undergoing medical thoracoscopy. **Methods:** A prospective randomized clinical study was conducted involving 60 patients (ASA grade III–IV) undergoing medical thoracoscopy at Government General Hospital, Kurnool. Patients were randomly divided into two groups:

- Group A: 0.5% bupivacaine
- Group B: 0.5% bupivacaine + 25 µg fentanyl

Pain was assessed using the Visual Analog Scale (VAS) during the procedure, 20 minutes after completion, and 120 minutes after the procedure. **Results:** VAS scores during the procedure were significantly lower in Group B compared to Group A (3.1 ± 0.7 vs 5.2 ± 0.8, $p < 0.001$). Duration of nerve block was significantly prolonged in Group B (246 ± 16 min) compared to Group A (161 ± 14 min). Sedation requirement was also significantly lower in the fentanyl group. **Conclusion:** Addition of fentanyl to bupivacaine significantly improves analgesia, prolongs the duration of intercostal nerve block, and reduces sedation requirements during medical thoracoscopy without increasing complications.

KEYWORDS

Medical Thoracoscopy, Intercostal Nerve Block, Bupivacaine, Fentanyl, Pleural Disease, Analgesia.

INTRODUCTION

Medical thoracoscopy has become an essential minimally invasive procedure for the diagnosis and management of pleural diseases. It allows direct visualization of the pleural cavity and enables diagnostic biopsy, pleurodesis, and drainage procedures. The procedure is commonly performed under local anesthesia with conscious sedation in spontaneously breathing patients.

Although thoracoscopy is less invasive than surgical thoracoscopy, manipulation of the pleura and thoracic structures can cause significant pain. Adequate analgesia is therefore essential to ensure patient comfort and facilitate successful completion of the procedure.

Intercostal nerve block (ICNB) is one of the most commonly used techniques for providing analgesia during thoracic procedures. The intercostal nerves supply sensory innervation to the thoracic wall and pleura, making them an ideal target for regional anesthesia.

Bupivacaine is a long-acting local anesthetic frequently used for intercostal nerve blockade because of its prolonged duration of action. However, the analgesic duration may still be limited in some patients.

Opioid adjuvants such as fentanyl have been used in regional anesthesia to enhance analgesic efficacy and prolong the duration of nerve blocks. The addition of fentanyl may improve pain control and reduce the need for systemic sedation during procedures.

However, evidence regarding the effectiveness of fentanyl as an adjuvant in intercostal nerve block during medical thoracoscopy remains limited. Therefore, this study was conducted to compare the analgesic efficacy of intercostal nerve blockade using bupivacaine alone versus bupivacaine combined with fentanyl.

MATERIALS AND METHODS

Study Design

Prospective randomized clinical study.

Study Setting

Government General Hospital, Kurnool.

Study Duration

January 2024 – December 2025.

Study Population

A total of 60 patients undergoing medical thoracoscopy were included in the study.

Inclusion Criteria

- Age 10–70 years
- ASA grade III–IV
- Patients undergoing medical thoracoscopy
- Patients giving informed consent

Exclusion Criteria

- Allergy to local anesthetics
- Coagulopathy
- Infection at injection site
- Severe cardiopulmonary instability

Randomization

Patients were randomly allocated into two groups using computer-generated random numbers.

Group	Intervention	Sample Size
Group A	0.5% Bupivacaine	30
Group B	0.5% Bupivacaine + 25 µg fentanyl	30

Technique of Intercostal Nerve Block

The patient was placed in the lateral position with the side to be blocked uppermost. Under aseptic precautions, the lower border of the rib was identified.

A 22-gauge needle was inserted perpendicular to the rib and advanced until it contacted the rib. The needle was then redirected to pass just below the lower border of the rib into the subcostal space.

After negative aspiration, 5–10 ml of anesthetic solution was injected.

Monitoring

The following parameters were monitored:

- Heart rate
- Blood pressure
- Mean arterial pressure
- Oxygen saturation

Outcome Measures

Primary Outcome

Pain intensity assessed using Visual Analog Scale (VAS).

Secondary Outcomes

- Duration of nerve block
- Requirement of sedation
- Postoperative analgesia duration
- Complications

RESULTS

Demographic Characteristics

Parameter	Group A	Group B	p-Value
Age (years)	47.9 ± 8.4	46.8 ± 8.9	0.61
Male	20	19	0.79
Female	10	11	0.79

No significant difference was observed between the groups.

Hemodynamic Parameters

Parameter	Group A	Group B	p-Value
Heart Rate	88.6 ± 4.1	85.9±3.8	0.07
MAP	92.8±3.5	90.3 ± 3.2	0.06
SpO2	97.4 ± 1.1	97.9 ± 0.9	0.12

Hemodynamic parameters were comparable between groups

VAS Pain Scores

Time	Group A	Group B	p-Value
During Procedure	5.2 ± 0.8	3.1 ± 0.7	<0.001
20 Minutes	4.1 ± 0.7	2.3 ± 0.6	<0.001
120 Minutes	3.0 ± 0.6	1.8 ± 0.5	<0.001

Pain scores were significantly lower in Group B.

Sedation Requirement

Sedation Required	Group A	Group B	p-Value
Yes	18 (60%)	7 (23%)	0.004
No	12 (40 %)	23 (77%)	0.004

Sedation requirement was significantly lower in Group B.

Duration of Block

Parameter	Group A	Group B	p-Value
Block Duration	161 ± 14 min	246 ± 16 min	<0.001

Block duration was significantly prolonged in Group B.

DISCUSSION

This study evaluated the efficacy of adding fentanyl to bupivacaine for intercostal nerve block during medical thoracoscopy.

The results demonstrated that the addition of fentanyl significantly improved analgesia during and after the procedure. Patients receiving fentanyl experienced lower pain scores compared to those receiving bupivacaine alone.

The duration of nerve block was also significantly prolonged in the fentanyl group. This may be attributed to the synergistic effect between opioids and local anesthetics on peripheral nerve receptors.

Sedation requirement during the procedure was significantly reduced in the fentanyl group, suggesting improved analgesic efficacy.

Importantly, the addition of fentanyl did not result in an increased incidence of complications.

These findings are consistent with previous studies investigating opioid adjuvants in regional anesthesia.

Limitations

- Small sample size
- Single-center study
- Short follow-up period

CONCLUSION

Addition of 25 µg fentanyl to 0.5% bupivacaine for intercostal nerve blockade significantly improves analgesia, prolongs block duration, and reduces sedation requirements during medical thoracoscopy without increasing complications.

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