*Original Article*

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# Haemodynamic Changes and Depth of Anaesthesia with Use of Thiopentine and Ethomidate for Closed Reduction in Elderly Patients with Comorbidieties: A Randomized, Comparative Study

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**Abstract**

Fractures are a known entity in old age due to various physiological changes, the most common being osteoporosis. These patients also come with an array of comorbidieties like diabetes mellitus, Hypertension,thyroid disorders or neurological problems. Such patients require emergency close reduction under anaesthesia in the emercency department or on opd basis in the casualty. The objective of our study was to compare the favourable haemodynamic changes in terms of HR, BP and MAP before, during and after the procedure using the age old thiopentone and the now easily available in India ethomidate. These procedures were restricted to fractures of upper limb requiring closed reductions.

**Keywords:** Thiopentone; Ethomidate; Co-Morbidities; Hemodynamic Changes.

## Objective

The objective of our study was to compare the favourable haemodynamic changes in terms of HR, BP and MAP before, during and after the procedure using the age old thiopentone and the now easily available in India ethomidate. These procedures were restricted to fractures of upper limb requiring closed reductions [2]. The patients are usually elderly with unknown, undiagnosed comorbidities like DM, HTN, COPD etc. These patients come to the ER for emergency nonoperative reductions where only their NBM status is taken into consideration and the hemodynamic variables are not taken into consideration or are supposed to be managed appropriately by the attending emergency physician or anaesthetist. We found that there were relatively few complications (10%), with only 2 of these (2%) being major complications. All complications were brief and did not adversely affect patient outcomes. This data further demonstrate the safety profile of deep sedation medications in the hands of emergency physicians trained in sedation and advanced airway techniques.

## Methods

### *Methodology*

After the approval from the ethical committee, The study was conducted in the emergency operation theatre at Gulbarga institute of medical sciences from 1st march 2015 to 30th august 2016. It was a prospective, non randomided, comparative study where in adult patients (aged more than 60 years) who required procedural sedation and analgesia were recruited and randomised into two groups, in which either Etomidate or Thiopentone was used as the sedative agent. The study was conducted in 60 patients scheduled for surgery under general anaesthesia who were randomly assigned into two groups. Informed consent was obtained from each

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patient under the study. Both groups received Inj Ondansetron 4 mg, Inj fortwin 0.6mg/kg and Inj Glycopyrolate 0.2mg as premedication. Each group of patients (30) received one of the following dose of Etomidate 0.20mg/Kg or thiopentone 3-5 mg/kg just before reduction. Obesity , thyroid disease, treatment with beta blockers and difficult airway constituted the exclusion criteria. Vital parameters and depth of sedation and recovery from sedation were closely monitored until they regained full consciousness. Minor complications were defined as oxygen saturation levels less than 90% for less than 5 minutes, vomiting without aspiration, need for airway manipulation such as jaw thrust or nasal airway insertion, a requirement for increased oxygen delivery, transient blood pressure decrease, or myoclonus (although it is a known side effect of etomidate) which were attended immediately

In both the groups (etomidate, thiopentone); heart rate and blood pressure were taken in stepwise manner, at pre induction, post induction and after intubation at 0,1,3,5 and 10minutes.The recorded values were tabulated for age, weight , sex, heart rate, systolic blood pressure, diastolic blood pressure and mean arterial pressure. The result of the study was compared with observation of other workers in this field of work taking steps to account for the differences as far as possible.

## Results

*Changes in Heart Rate (HR)*

The baseline HR was noted down and at study drug and 5 and 10 min after the reductions were tabulated in both groups. Though there was a very significant difference in HR between the baseline and 5 min after reduction, unfortunately there was no significant difference between Groups A (thiopentone) and Group B (Etomidate). Group A: The mean heart rate at baseline in this group 75.20 with a SD of 8.26.Following 5 min after reduction HR increased to 89.10 with a SD of 10.19 and we found a decrease of HR with a mean of 86.67 with a SD of 10.51 at the end of 10 min after reduction.

Group B: The mean heart rate at baseline in this group 788.40 with a SD of 10.28. Following 5 min after reduction HR increased to a mean of 83.87 with a SD of 10.67 and we found a decrease of HR with a mean of 82.63 with a SD of 9.67 at the end of 10 min after reduction.

Paired T –test showed a very significant variation in HR before and after reduction in both groups but there was no significant difference between the two groups when unpaired test was applied.

One way ANOVA showed a significant variation in HR before and after induction and at the intervals of 5th and 10th mm following intubation ($P<0.001$, $P<0.01$ respectively).

*Changes in SBP*

The changes in SBP as assessed before and after reduction between the two group is statistically presented in the table.

*Group A*

The mean ± SD baseline value of SBP was 133.20 ± 14.79 . We noticed an increase in SBP with a mean ± SD value of 152.50±19.0. It remained almost at the same level with a mean ± SD value of 148±15.17 immediately after reduction to a value of 139.07± 11.26 and 133.20±14.79 at the end of 5th and $10^{th}$ min respectively. At the end of 5th mm though the SBP was lower than the values at baseline, it was a highly significant increase immediately and at $5^{th}$ min, but a non significant increase at end of $10^{th}$ min.

*Group B*

The mean ± SD baseline value of SBP was 132.73 ± 14.69. We noticed an increase in SBP with a mean ± SD value of 139.17±13.22 which is a non significant increase in SBP. It remained almost at the same level with a mean ± SD value of 136.47±10.84 and 129.17±24.67 at the end of 5th and $10^{th}$ min respectively. At the end of 5th min and $10^{th}$ min the SBP was lower than the values at baseline and thus showed statistically a favourable blood pressures .

Paired T –test showed a very significant variation in SBP before and after reduction in group A but there was no significant variarion in Group B and when unpaired test was applied to both the groups there was a very significant gain in maintaining the SBP in group B with a P value of 0.0025 and 0.0008 for SBP immediately and at the end of 5 th min respectively.

*Changes in DBP*

Paired T –test showed a very significant variation in DBP before and after reduction in group A as well as in Group B and when unpaired test was applied to both the groups there was a very significant gain in maintaining the DBP in group B with a P value of 0.0032 and 0.0259 for DBP immediately and at the end of 5 th min respectively.

*Return of Conciousness or Clearheadedness*

The average time to reversal to clearheadedness was better and early with Etomidate than thiopentone.This was ascessed based on response to oral commands and simple orientation to time place and person.

## Discussion

Procedural sedation and analgesia (PSA) is defined as "a technique of administering sedatives or dissociative agents with or without analgesics to induce a state that allows the patient to tolerate unpleasant procedures while maintaining cardio-respiratory function"[1]. Many anaesthetic agents like pentothal sodium, profolol, midazolam, ketamine etc have been used alone or in combination for PSAagents. Induction agents predisposes to rapid and profound hypotension or depression of cardiac function. Hemodynamic stability is required during such emergency procedures. Etomidate is a carboxylated imidazole-derived , nonbarbiturate non narcotic, hypnotic agent that has gained increased use as an induction agent for ED intubation using rapid-sequence induction (RSI) [2,3].

Mechanism: Etomidate has GABA-like effect and acts by modulating and mimicking Gaba aminobutyric type A receptor mediated chloride current [11,12]. It is an ideal induction agent because of maintenance of hemodynamic stability even in patients with marked hypovolemia,minimal respiratory depression,cerebral protection and rapid recovery. It is highly liphophilic compound, producing rapid onset of sleep in one arm brain circulation time of 5-15 seconds [13]. Its rapid onset and short duration of action provides rapid recovery [13]. Its stable hemodynamic profile, minimal respiratory depressive effects, and favorable reduction in intracranial pressure, etomidate has been safely used both as an induction agent for adult intubation and a sedative agent for adult procedural sedation.e tom id ate h as no analgesic properties.

This study also examined the effects of procedural sedation on ED-discharged adult patients and their recovery and return to daily activities. Etomidate was the primary sedative used for orthopaedic reductions. Overall, patients receiving Etomidate for PSA in the ED were satisfied and PSA was well tolerated. Of the 26 patients in our study, only one patient required any intervention for an adverse response. These results are consistent with previously published reports [2,4,5,8,9].

## Conclusion

Etomidate as given by emergency physicians was more effective and efficient than pentobarbital, with rare adverse events.

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