

# Comparison of intravenous magnesium sulphate and intravenous esmolol in attenuating hemodynamic stress response during tracheal extubation

<b>Submission date</b> 26/09/2025	<b>Recruitment status</b> No longer recruiting	<input type="checkbox"/> Prospectively registered <input checked="" type="checkbox"/> Protocol
<b>Registration date</b> 07/10/2025	<b>Overall study status</b> Completed	<input type="checkbox"/> Statistical analysis plan <input type="checkbox"/> Results
<b>Last Edited</b> 07/10/2025	<b>Condition category</b> Circulatory System	<input type="checkbox"/> Individual participant data <input checked="" type="checkbox"/> Record updated in last year

## Plain English summary of protocol

### Background and study aims

Tracheal extubation is an important and integral procedure of general anesthesia. Tracheal extubation can lead to irritation of the airways, which may cause coughing, resulting in increased systolic and diastolic blood pressures (SBP and DBP) and an increase in intrathoracic pressure, potentially interfering with cardiac preload. Hypertensive subjects may exhibit an exaggerated response to tracheal extubation compared to normotensives. In patients with coronary artery disease, these changes can lead to myocardial ischaemia, left ventricular dysfunction, cardiac dysrhythmias, cerebral haemorrhage and reduction in ejection fraction. Esmolol is a short-acting, highly cardioselective beta-adrenergic receptor antagonist rapidly metabolized by plasma esterase. The rapid onset of action of esmolol prevents an acute increase in heart rate and arterial pressure, which occur at extubation. Magnesium is a naturally occurring calcium channel antagonist and a non-competitive antagonist of N-methyl D-aspartate (NMDA) receptor. The role of magnesium in blunting the hemodynamic response to endotracheal intubation and extubation is evolving. It has been shown that magnesium inhibits catecholamine release from adrenal medulla and adrenergic nerve endings. This study aims to compare esmolol and magnesium sulphate in attenuating hemodynamic response to extubation.

### Who can participate?

Adult patients with no to mild systemic disease, aged 20-55 years

### What does the study involve?

This study will involve patients undergoing surgery under general anaesthesia and who have been extubated at the end of the procedure. Participants will be randomly assigned to Group A to receive IV esmolol infusion 0.5 mg/kg diluted in 100 ml of normal saline over 10 minutes beginning 5 minutes pre-extubation, and Group B, who receive IV MgSO<sub>4</sub> – 40 mg/kg diluted in 100 ml of normal saline over 10 minutes starting 5 minutes pre-extubation. It is a prospective

comparative study, meaning it will follow patients forward in time and compare outcomes between groups. The research will take place over two years, with full ethical approval and informed consent obtained from all participants.

What are the possible benefits and risks of participating?  
Benefits and risks not provided at registration

Where is the study run from?  
Department of Anaesthesiology and Critical Care, Era's Lucknow Medical College and Hospital, Lucknow, India.

When is the study starting and how long is it expected to run for?  
February 2021 to July 2022

Who is funding the study?  
Era's Lucknow Medical College and Hospital, Lucknow, India.

Who is the main contact?  
Dr Asad Khalid, asadkhalid30@gmail.com

## Contact information

### Type(s)

Public, Scientific, Principal investigator

### Contact name

Dr Asad Khalid

### Contact details

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## Additional identifiers

### Clinical Trials Information System (CTIS)

Nil known

### Protocol serial number

Nil known

## Study information

### Scientific Title

Comparison of intravenous magnesium sulphate and intravenous esmolol in attenuating hemodynamic stress response during tracheal extubation in patients undergoing surgery

**Acronym**

CMET

**Study objectives**

Which drug, between intravenous esmolol and intravenous magnesium sulphate, is better for attenuating hemodynamic response to tracheal extubation?

**Ethics approval required**

Ethics approval required

**Ethics approval(s)**

approved 17/02/2021, Era's Lucknow Medical College and Hospital Institutional Ethics Committee (Sarfarazganj, Hardoi Road, Lucknow, 226003, India; +919452810007; info@erauniversity.in), ref: ELMC&H/Rcell/EC/2021/101

**Study design**

Interventional double-blinded randomized parallel group

**Primary study design**

Interventional

**Study type(s)**

Efficacy

**Health condition(s) or problem(s) studied**

Haemodynamic stress response during tracheal extubation

**Interventions**

After surgery, operated patients were randomly assigned to groups A and B, with 40 individuals in each group using a computer-generated randomized table. After randomisation, Group A received IV esmolol infusion 0.5 mg/kg diluted in 100 ml of normal saline over 10 minutes beginning 5 minutes pre-extubation, whereas Group B received IV MgSO<sub>4</sub> – 40 mg/kg diluted in 100 ml of normal saline over 10 minutes starting 5 minutes pre-extubation. If the patient experienced an adverse effect, the infusion was halted, and the patient was treated accordingly. After restoring neuromuscular inhibition and suctioning, subjects were extubated. Study vitals (SBP, DBP, MAP, and HR) were recorded before extubation, at the time of extubation, 5 mins, 10 mins and 15 mins post extubation

**Intervention Type**

Drug

**Phase**

Not Applicable

**Drug/device/biological/vaccine name(s)**

Esmolol, magnesium sulphate

**Primary outcome(s)**

SBP, DBP, MAP and HR measured using a blood pressure cuff at baseline, at the time of intervention, 5, 10, and 15 minutes post-intervention

### **Key secondary outcome(s)**

SBP, DBP, MAP and HR measured before giving the drug using a blood pressure cuff, at the time of intervention, 5, 10 and 15 minutes post-intervention in both parallel study groups

### **Completion date**

31/07/2022

## **Eligibility**

### **Key inclusion criteria**

1. ASA Grade-I and Grade-II patients, age 20-55 years, weight 40-75 kg
2. Patients undergoing surgery under General Anaesthesia, who will be extubated at the end of surgery

### **Participant type(s)**

Patient

### **Healthy volunteers allowed**

No

### **Age group**

Adult

### **Lower age limit**

20 years

### **Upper age limit**

55 years

### **Sex**

All

### **Total final enrolment**

80

### **Key exclusion criteria**

1. Patients with an allergy to study drugs
2. Patients with ASA grade 3 or more
3. Patients taking any adrenergic or psychotropic drugs
4. Patients with hepatic or renal disease
5. Patients with lung disease such as COPD

### **Date of first enrolment**

23/02/2021

### **Date of final enrolment**

23/02/2021

## **Locations**

## Countries of recruitment

India

## Study participating centre

Era's Lucknow Medical College and Hospital

Sarfarazganj

Lucknow

India

226003

## Sponsor information

### Organisation

Era's Lucknow Medical College and Hospital

### ROR

<https://ror.org/01df9ep43>

## Funder(s)

### Funder type

Hospital/treatment centre

### Funder Name

Era's Lucknow Medical College and Hospital

## Results and Publications

### Individual participant data (IPD) sharing plan

The datasets generated and/or analysed during the current study will be published as a supplement to the results publication or made available upon request from Asad Khalid, [asadkhalid30@gmail.com](mailto:asadkhalid30@gmail.com). The names and IPD numbers of the participants, along with their contact details, will not be shared as the consent form obtained from participants made it clear, and a verbal assurance was given that the personal details of the participants will not be made public under any circumstances.

### IPD sharing plan summary

Available on request, Published as a supplement to the results publication

### Study outputs

**Output type**  
[Protocol file](#)

**Details**

**Date created**

**Date added**  
07/10/2025

**Peer reviewed?**  
No

**Patient-facing?**  
No