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Emergence Cough Response During Extubation from General Anaesthesia in Head and Neck Surgeries: A Prospective Observational Study

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Abstract: ***Background**: Cough during emergence from general anaesthesia is a frequent event. In head and neck surgeries, even brief coughing episodes may precipitate haemodynamic instability, raised intracranial pressure, or postoperative bleeding, making its prevention clinically relevant. The incidence and severity profile of emergence cough in this population remains variably reported. **Aim**: To assess the incidence and severity of cough during emergence from general anaesthesia in head and neck surgeries and to evaluate the associated haemodynamic changes. **Materials and Methods**: A prospective observational study was conducted on 90 adult patients undergoing elective tonsillectomy, thyroidectomy, or craniotomy under general anaesthesia with endotracheal intubation. Cough during emergence and extubation was graded using a four-point scale. Heart rate and mean arterial pressure were recorded at predefined peri-extubation time points. **Results**: Clinically significant cough (Grade ≥2) occurred in 46.7% of patients. Severe cough (Grade 3) was observed in 16.7%. Cough occurred most commonly at the time of extubation. Significant increases in heart rate and mean arterial pressure were recorded immediately after extubation, with greater changes among patients experiencing higher cough grades. No major airway complications were observed. **Conclusion**: Emergence cough is common during extubation following general anaesthesia in head and neck surgeries and is associated with transient haemodynamic responses. Vigilant monitoring and appropriate preventive strategies may improve perioperative safety in this vulnerable surgical group.*

Keywords: Emergence cough; extubation; general anaesthesia; head and neck surgery; haemodynamic response

1. Introduction

Emergence from general anaesthesia is characterised by return of consciousness and restoration of protective airway reflexes. During this period, coughing is commonly encountered and is usually triggered by tracheal irritation from the endotracheal tube, airway secretions, or heightened airway sensitivity. [1,2] Although frequently benign, coughing during emergence may lead to abrupt sympathetic activation resulting in tachycardia and hypertension. [3]

In head and neck surgical procedures, these physiological changes may not be well tolerated. In neurosurgical patients, coughing during extubation can transiently increase intracranial pressure and compromise cerebral perfusion. [4,9] Following thyroidectomy, forceful coughing may precipitate postoperative neck haematoma and airway compromise. [5,6] In tonsillectomy, dislodgement of clots may result in postoperative haemorrhage and airway obstruction. [2]

Various interventions including intravenous lidocaine, dexmedetomidine, and deep extubation techniques have been investigated to attenuate emergence cough. [6, 7, 8] Despite this, the true frequency pattern and associated haemodynamic responses in head and neck surgery patients remain incompletely defined. [10]

This prospective observational study was therefore undertaken to evaluate the incidence, severity, and haemodynamic correlates of cough during emergence from general anaesthesia in patients undergoing head and neck surgeries.

2. Materials and Methods

Study design and setting

This was a prospective observational study conducted in the Department of Anaesthesiology of a tertiary care teaching hospital over a period of twelve months following approval from the Institutional Ethics Committee. Written informed consent was obtained from all participants.

Study population

Ninety adult patients aged 18–65 years scheduled for elective:
- Tonsillectomy
- Thyroidectomy
- Craniotomy

under general anaesthesia with endotracheal intubation were included (30 per group).

Inclusion criteria

- ASA physical status I–II
- Elective procedures under general anaesthesia
- Anticipated surgery duration <4 hours

Exclusion criteria

- Patient refusal
- Anticipated difficult airway
- Recent upper respiratory tract infection
- COPD or bronchial asthma
- BMI >30 kg/m²
- Uncontrolled hypertension or diabetes
- Pregnancy or lactation

Anaesthetic technique
Standard ASA monitoring was instituted. Anaesthesia was induced using propofol and an opioid, and tracheal intubation was facilitated with a non-depolarising neuromuscular blocking agent. Anaesthesia was maintained with inhalational agents or total intravenous anaesthesia as per the attending anaesthesiologist's discretion.

At the end of surgery, neuromuscular blockade was antagonised, and extubation was performed after adequate spontaneous ventilation, sustained head lift, and intact airway reflexes were confirmed.

Assessment of cough
Cough was graded at extubation and within 3 minutes thereafter:
- **Grade 0:** no cough
- **Grade 1:** single cough
- **Grade 2:** repeated but non-sustained cough
- **Grade 3:** sustained/severe coughing or bucking

Grades ≥2 were considered clinically significant, and Grade 3 was classified as severe.

Haemodynamic parameters
Heart rate and mean arterial pressure were recorded at:
- Baseline
- End of surgery
- At extubation
- 3 Minutes after extubation
- Recovery room

Statistical analysis
Data were analysed with standard statistical software. Continuous variables were expressed as mean ± SD, and categorical variables as percentages. Repeated measures ANOVA was used to compare haemodynamic parameters over time. A p-value <0.05 was considered statistically significant.

3. Results

Demographic profile
Ninety patients completed the study. Demographic and baseline characteristics are presented in Table 1. The groups did not differ significantly in age, sex, BMI, or ASA grade. The duration of surgery was longest in craniotomy cases ($p < 0.001$).

Table 1: Demographic profile

Parameter	Tonsillectomy (n=30)	Thyroidectomy (n=30)	Craniotomy (n=30)	p-value
Age (years)	39.4 ± 11.2	42.1 ± 10.8	41.3 ± 12.4	0.41
Sex (M/F)	18/ 12	17/13	19/ 11	0.83
BMI (kg/m²)	24.3 ± 2.2	24.7 ± 2.6	24.1 ± 2.4	0.56
ASA I/II	22/8	21/9	23/7	0.88
Duration of surgery (min)	65.8 ± 14.6	74.2 ± 16.8	92.5 ± 20.4	<0.001

Incidence and severity of cough
Distribution of cough grades is depicted in Table 2 and Figure 1.

- Grade 0: 28.9%
- Grade 1: 24.4%
- Grade 2: 30.0%
- Grade 3: 16.7%

Thus, clinically significant cough (Grade ≥2) occurred in 46.7% of patients, while severe cough was noted in 16.7%.

Table 2: Distribution of cough grades

Cough Grade	Number (%)
Grade 0 – No cough	26 (28.9%)
Grade 1 – Single cough	22 (24.4%)
Grade 2 – Repeated cough	27 (30.0%)
Grade 3 – Sustained/severe cough	15 (16.7%)

Clinically significant cough (≥ Grade 2): 46.7%

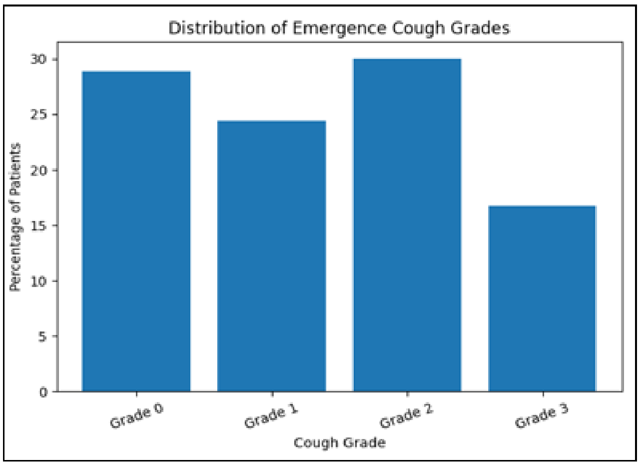

Figure 1: Distribution of emergence cough grades among patients undergoing head and neck surgeries

Haemodynamic changes
Heart rate and mean arterial pressure changes are summarised in Table 3.
Both parameters:
- increased significantly at extubation
- were higher among Grade 2 and Grade 3 cough patients
- declined toward baseline levels in recovery

Table 3: Haemodynamic changes

Time Point	HR (mean ± SD)	MAP (mean ± SD)
Baseline	82 ± 9	96 ± 8
End of surgery	86 ± 10	101 ± 9
At extubation	101 ± 12	114 ± 11
3 min post-extubation	92 ± 9	104 ± 10
Recovery room	84 ± 8	98 ± 9

p < 0.05 for trend over time

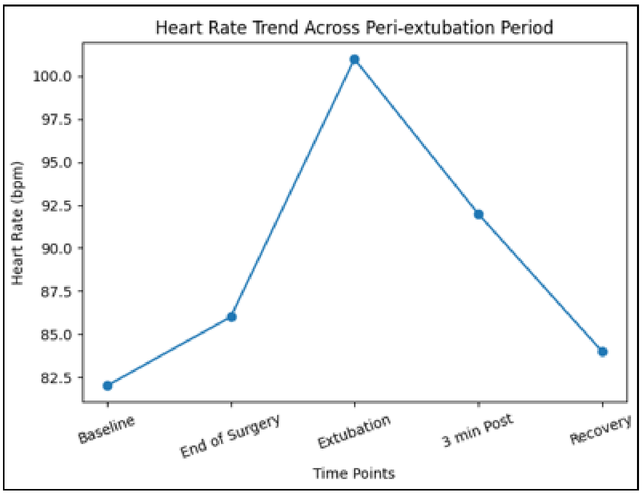

Figure 2: Trend in heart rate at predefined peri-extubation time points

- X-axis: Baseline → End of surgery → Extubation → 3 min → Recovery
- Y-axis: Heart rate (bpm)

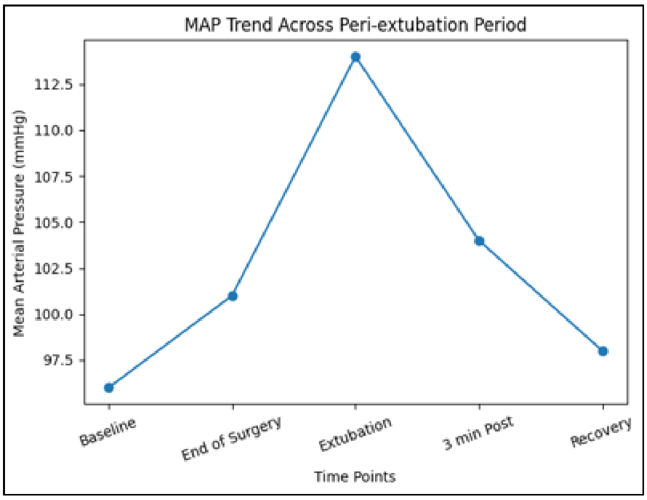

Figure 3: Mean arterial pressure changes during emergence and early recovery.

- X-axis: Baseline → End of surgery → Extubation → 3 min → Recovery
- Y-axis: MAP (mmHg)

Complications

No major airway complications such as laryngospasm, bronchospasm, or re-intubation occurred. Minor adverse effects included sore throat (18.9%) and throat irritation (12.2%).

4. Discussion

This study demonstrates that emergence cough is a common event in head and neck surgeries, occurring in nearly half of patients, with severe cough in approximately one-sixth. These findings are in agreement with previously reported variable rates of emergence cough.[1,2]

The haemodynamic changes associated with coughing are clinically relevant. Sudden increases in heart rate and arterial pressure at extubation correspond to sympathetic stimulation induced by airway irritation. [3] In neurosurgical and thyroid procedures, these transient surges may increase the risk of raised intracranial pressure, haematoma formation, and bleeding. [4,5,6,9]

Multiple pharmacologic measures have been studied to attenuate emergence cough including dexmedetomidine, remifentanil, and lidocaine.[6,7,8] However, their routine application must be individualised, considering possible adverse effects such as bradycardia and delayed recovery.

The present findings emphasize the need for vigilant monitoring, careful extubation planning, and selective prophylactic strategies in high-risk patients.

5. Conclusion

Emergence cough during extubation from general anaesthesia is frequent in head and neck surgeries and is associated with transient haemodynamic changes. Anticipation of cough, careful extubation technique, and prophylactic measures in selected patients may improve postoperative outcomes.

6. Limitations

- Single-centre study
- Modest sample size
- Cough grading partly subjective

Future studies with larger sample sizes and intervention arms are warranted.

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Nil.

Conflicts of interest

None declared.

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