

# A Comparative Study of the Effects of Dexmedetomidine and Esmolol Infusion on Haemodynamic Parameters and Surgical Condition during Functional Endoscopic Sinus Surgery

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**Abstract:** Functional endoscopic sinus surgery under general anaesthesia resulting from impaired visibility due to excessive bleeding. Controlled hypotension is a technique used to limit intraoperative blood loss and to provide the best possible field for surgery. There is no single ideal technique or pharmacological agent that is superior to any other technique for controlled hypotensive anaesthesia. This study was done to compare the efficacy of Dexmedetomidine and Esmolol on haemodynamic parameters and surgical condition during FESS. After approval by ethical committee, 60 patients of ASA I and II scheduled for FESS were randomly allocated into two groups of 30 patients with Group D receiving IV Dexmedetomidine and Group E receiving IV Esmolol. From our study we conclude that both the drugs can be safely used to provide controlled hypotension during FESS, but the results with Dexmedetomidine are superior to Esmolol with regard to Haemodynamic parameters and quality of surgical field.

**Keywords:** FESS, Dexmedetomidine, Esmolol, Controlled hypotension

## 1. Introduction

Functional Endoscopic Sinus Surgery (FESS) is a widely performed operation. Major complications have been reported for FESS under general anaesthesia resulting from impaired visibility due to excessive bleeding. Controlled hypotension is a technique used to limit intraoperative blood loss and to provide the best possible field for surgery. There is no single ideal technique or pharmacological agent that is superior to any other technique for controlled hypotensive anaesthesia.<sup>1</sup>

Esmolol is an ultra-short acting  $\beta_1$ -cardioselective adrenergic receptor blocker with a distribution half-life of 2 min and an elimination half-life of 9 min that reduces Heart Rate (HR) and blood pressure.<sup>2</sup>

Dexmedetomidine is a recently introduced highly selective  $\alpha_2$ -adrenoreceptor agonist. It produces dose-dependent sedation, anxiolysis and analgesia due to its effect on central adrenergic outflow. It has also been found to influence the catecholamine surge associated with endotracheal intubation. Quality of surgical field is better when Dexmedetomidine is used to provide controlled hypotension in FESS without the need for additional hypotensive agents.<sup>3</sup>

Various studies have compared the efficacy of Esmolol or Dexmedetomidine with other drugs during FESS. Very few studies have compared Esmolol with Dexmedetomidine during FESS. Hence the present study was undertaken to compare the efficacy of Dexmedetomidine and Esmolol infusion on haemodynamic parameters and surgical condition during FESS.

## 2. Review of Literature

**Kol IO et al**, 2009 compared hypotensive effects of Dexmedetomidine with Esmolol in 48 patients undergoing tympanoplasty under Desflurane anaesthesia. They concluded that both Esmolol and Dexmedetomidine, combined with Desflurane, provided an effective and well-tolerated method of achieving controlled hypotension to limit the amount of blood in the surgical field in adult patients undergoing tympanoplasty.<sup>5</sup>

**Shams T et al**, in 2013 induced hypotension in 40 patients scheduled for FESS using either Dexmedetomidine or Esmolol to compare the efficacy of these drugs. They concluded that both Dexmedetomidine and Esmolol are safe agents for controlled hypotension & Dexmedetomidine offers the advantage of inherent analgesia, sedative and anaesthetic sparing effect.<sup>6</sup>

## 3. Methodology

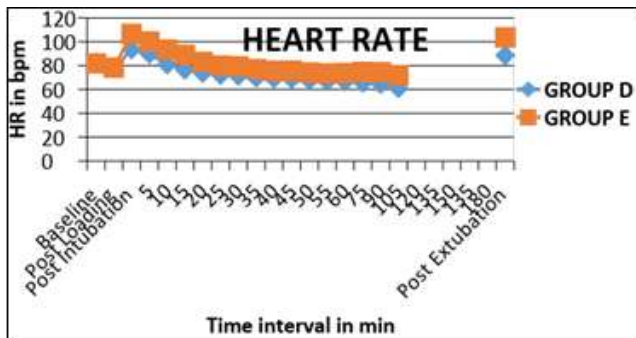
After approval by ethical committee, 60 patients of ASA I and II scheduled for FESS were randomly allocated into two groups of 30 patients with Group D receiving IV Dexmedetomidine and Group E receiving IV Esmolol. After induction of anaesthesia, infusion of study drugs were titrated to maintain the target MAP of 60-70 mmHg. HR, MAP, Average Category Scale, duration of surgery were recorded. Postoperative parameters like Modified Aldrete Score, VAS score, PONV score and need for rescue analgesia were also compared

#### 4. Statistical Analysis

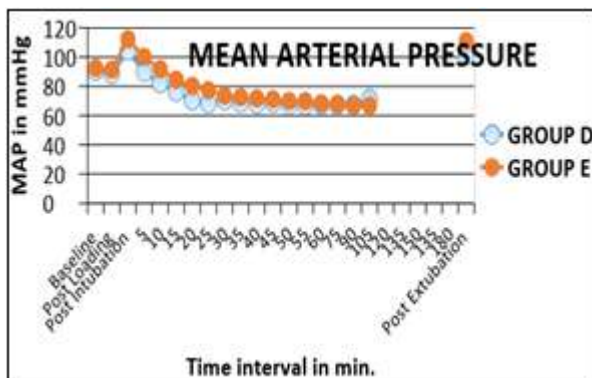
The statistical software SPSS version 24 was used for analysis of data. Quantitative data were presented as mean ± standard deviation and qualitative data as frequency and percentage. Demographic data like age, weight and the haemodynamic data like HR and MAP were compared using students paired t test. Data like gender, ASA distribution, additional hypotensive requirements and rescue analgesia were compared using Chi Square test. Microsoft word and excel was used to generate tables and graphs between the two groups.

#### 5. Results

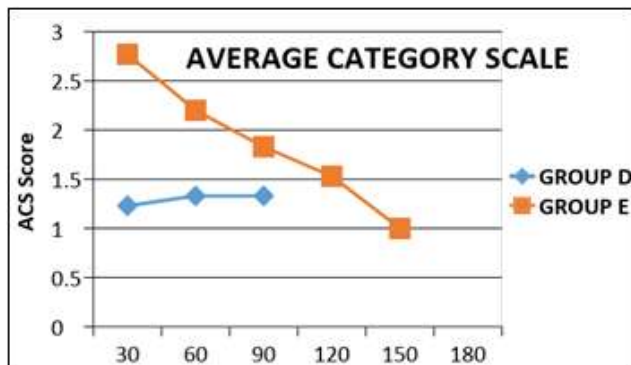
In both group the demographic data like age, Gender ASA both comparable



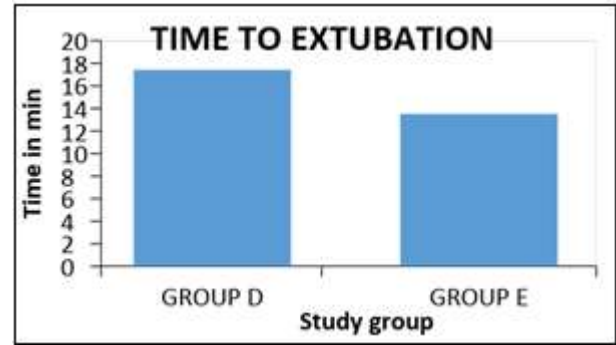
Graph 1: Comparison of Heart Rate



Graph 2: Comparison of Mean Arterial Pressure



Graph 3: Comparison of Average Category Scale



Graph 4: Comparison of time to extubation

#### 6. Discussion

The present study entitled “A comparative study of the effects of Dexmedetomidine and Esmolol infusion on haemodynamic parameters and surgical condition during Functional Endoscopic Sinus Surgery” was conducted in Father Muller Medical College Hospital Mangalore, from November 2015 to April 2017. Total of 60 patients were selected for the study. They were randomly allocated into two groups of 30 patients each. Group D received IV Dexmedetomidine and Group E received IV Esmolol. After recording the baseline readings, the patients were preoxygenated with 100 % oxygen for 3 min and induced with IV Thiopentone Sodium 5 mg/kg wt and IV Fentanyl 1 mcg/kg. Tracheal intubation was facilitated with IV Succinyl Choline 1.5 mg/kg. Anaesthesia was maintained with 33:67 O<sub>2</sub>:N<sub>2</sub>O mixture with Isoflurane 0.4 % & intermittent bolus doses of IV Vecuronium. The MAP was reduced to achieve and maintain the target MAP of 60-70 mmHg.

Continuous monitoring was carried out throughout the procedure. Infusion of the hypotensive agent & Isoflurane were stopped at the time of nasal packing at the end of surgery. Any residual neuromuscular blockade was antagonized with Neostigmine 50 mcg/kg & Glycopyrrolate 10 mcg/kg. Patients were extubated and shifted to post-operative room for 4 hrs of observation. The two groups were compared with respect to age, sex, weight, ASA physical status, duration of surgery, haemodynamic variables like HR and MAP. Post-operative data like Modified Aldrete Score, VAS score, PONV score and time to rescue analgesia were compared. The results were as follows;

Criteria	Group D	Group E
Mean Age (years)	34.3 ± 11.23	30.37 ± 7.23
Sex Ratio M:F	12:18	17:13
Mean weight (kg)	57.2 ± 10.04	58.1 ± 7.87
Mean baseline HR (bpm)	82.4 ± 13.69	81.83 ± 12.41
Mean baseline MAP ( mmHg )	90.4 ± 11.76	92.53 ± 7.72
Time to extubation ( min )	17.43 ± 1.91	13.53 ± 1.46
Mean duration of surgery (min)	85 ± 12.87	105.33 ± 16.50
Time to Aldrete score >9 ( min )	180	150

Comparison of parameters between the study groups

We found that the two groups were comparable with respect to demographic data and baseline haemodynamic variables. We found consistently lower values of HR in Group D than Group E. Target MAP was reached in both groups with Group E needing additional hypotensive agents for the same.

Average Category Scale values were better in Group D than Group E with short duration of surgery probably due to better visibility of nasal and sinus anatomy. Time to extubation was prolonged in Group D than Group E with better sedation scores in Group D. Time to first rescue analgesia was also prolonged in Group D than group E due to its sedative and analgesic property. Incidence of PONV was also less in Group D than group E

## 7. Conclusion

From our study we conclude that both the drugs can be safely used to provide controlled hypotension during FESS, but the results with Dexmedetomidine are superior to Esmolol with regard to Haemodynamic parameters and quality of surgical field.

## 8. List of Abbreviations Used

- 1) FESS- Functional endoscopic sinus surgery
- 2) HR- Heart rate
- 3) SBP- systolic blood pressure
- 4) DBP-Diastolic blood pressure
- 5) MAP-mean arterial pressure

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