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A Study To Compare The Quality Of Surgical Field Using Total Intravenous Anaesthesia(With Propofol) Versus Inhalational Anaesthesia (WithIsoflurane) For Functional Endoscopic Sinus Surgeries

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I. Background:

- FESS is an surgical procedure performed in otorhinolaryngological diseases with an aim to restore the drainage and aeration of paranasal sinuses.
- Being a delicate technique intraoperative bleeding is one of themajor challenges. Even a little bleeding can adversely affect thesurgeons's ability to visualize the region to be operated.
- Various methods have been used to decrease bleedingintraoperatively.
- Controlled hypotension using total intravenous anesthesia (TIVA)(using propofol and other Intravenous [IV] agents) is a new technique being preferred in FESS.

Aim and objectives:
- This study was conducted to compare the surgical field using total intravenous anesthesia (TIVA) with propofol and inhalational anesthesia with isoflurane for FESS.
- Secondary outcomes such as intraoperative blood loss and theincidence of perioperative complications were also recorded.

II. Methods And Methodology:

The study was conducted after obtainingthe Institutional Ethics Committee approval .{in month of march 2022 to july 2022}.
- A total of sixty patients in the age group of 16–60 years with physical status of the American Society of Anesthesiologists Classes I and II, undergoing FESS under GA,were randomly divided into two groups of thirty each after taking informed consent and ethical committee approval.
- Thirty patients in Group I: received isoflurane-based inhalationalanesthesia and other
- Thirty patients in Group P: were administered TIVA with propofol. Variousparameters were recorded and statistically analyzed.

INCLUSION CRITERIA	EXCLUSION CRITERIA
	Patients with:
• Adults with 16–60 years of age	1) Bleeding disorders
• ASA physical Status I and II	2)Major hepatic, renal dysfuntion
• Either sex	3)Pregnancy
• FESS surgery up to 3 h therapy	4) patients on anticoagulation 5)Postural hypotension
	6) Anticipated airway difficulty
	7) Uncontrolled hypertension and myocardial infarction

- On arrival in the operating room, standard monitors Ecg , pulseoximeter, NIBP were attached. IV line was secured using appropriate sized cannula.
- Vital parameters were recorded after 5 min of stabilization andtaken as a baseline reading. Preoxygenation with 100% oxygenfor 3 min was done.
- Induction of anesthesia was done with midazolam (2 mg),fentanyl (2 µg./kg), and propofol (2 mg/kg).
- After ensuring adequate ventilation, injection succinylcholine (2 mg/kg) was administered to facilitate orotracheal intubation, andoropharyngeal packing was done. Immediately after intubation, vital parameters were recorded.

- After intubation, maintenance of anesthesia was done with oxygen in airand isoflurane up to two minimum alveolar concentration in Group I.
- In Group P, maintenance was done with oxygen in air and propofol infusion at 12 mg/kg/h for 10 min, then 10 mg/kg/h for next 10 min andcontinued at 8 mg/kg/h.
- The target in both groups was to achieve a mean arterial BP of 60–70 mmHg.If targeted BP was not achieved, then injection esmolol in a doseof 1mg/kg bolus was given as a rescue drug.
- The total dose of propofol given was noted. Neuromuscular blockade was provided with injection vecuronium
- All the vitals were observed every 1 min for 5 min, then every 5 min for 15min, and then every 15 min till the end of the surgery.

- The quality of surgical field was evaluated every 15 min using the surgicalfield rating (SFR) scale of six points proposed by Fromme et al.

5 - massive uncontrollable bleeding
4 - heavy but controllable bleeding that significantly interfered withdissection
3 - moderate bleeding that moderately compromised surgical dissection,
2 - moderate bleeding – a nuisance but without interference with accurate dissection
1 - bleeding, so mild it was not even a surgical nuisance0 - no bleeding and virtually bloodless field.

- Surgical field was graded as good, fair, and poor as: good - SFR scale 0or 1, fair - SFR scale 2 or 3, poor - SFR scale 4 or 5.

Statistical analysis: SPSS 15 was used for statistical analysis.
- The data were analyzed, compared, and evaluated statistically basedon the quality of surgical field, surgeon satisfaction score, and incidence of intraoperative complications.
- Effect size was calculated, and taking alpha error 0.05, power of studyachieved was 98%. Chi-square test for nonparametric data and Student's t-test for parametric data were applied. 95% confidence interval for means was also calculated. $P < 0.05$ was considered statistically significant.

III. Results:

- Demographic data including patients age, sex, weight, height, ASA grade distributionwere comparable in 2 groups with $p>0.05$.

Variable	Group I(n=30)	Group P (n=30)	Statistical Analysis(p)
Age	30.22±11.62	37.12±12.76	0.078
Sex (male:female)	20:9	21:8	0.774
Weight	63.30±11.30	67.92±2.774	0.076
Height	158.93±6.142	161.82±6.618	0.084
ASA	18	15	0.194
grade I	12	15	
grade II			

- The total blood loss (TBL) during surgery in the Group P was statisticallymuch less than the Group I (P < 0.001)

Comparison of total blood loss during surgery in each group.

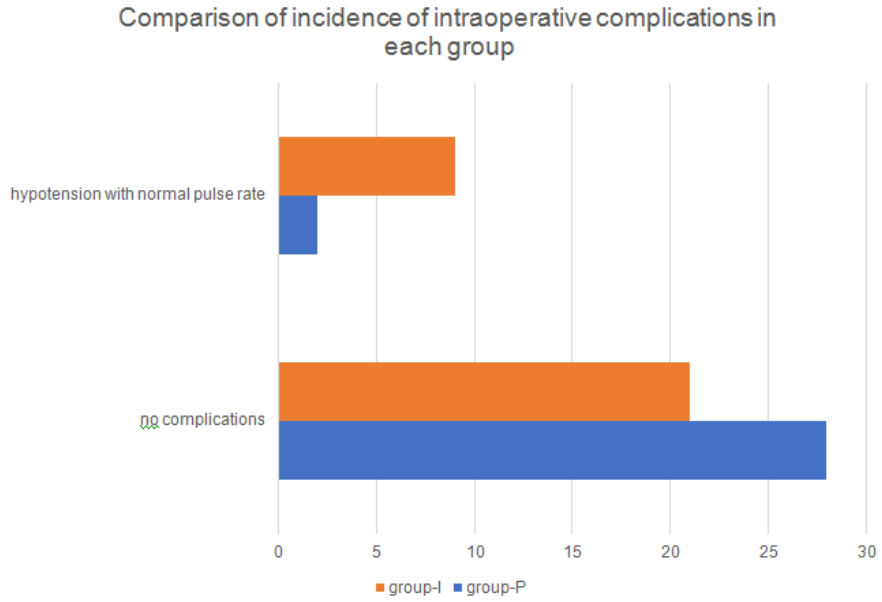
Group	n	Total blood loss(ml) mean±SD	95%CI for mean	t	p
Group -P	30	48.27±26.083	37.15-57.38		
Group -I	30	138.17±8.059	112.75-163.58	6.797	0.000*

Quality of surgical field	Start of surgery		Middle of Surgery		End of surgery		Start versus end
	Group P	Group I	Group P	Group I	Group P	Group I	Group I(z,p) Group I(Iz,p)
Poor	4	7	1	5	1	1	4.939 ,<0.001 1.069,0.285
Fair	23	19	5	11	4	26	
Good	3	4	25	14	26	3	
Total	30	30	30	30	30	30	
P value	0.511		0.006		< 0.001		

Comparison of quality of surgical field in each group

- The quality of surgical field in Group P was statistically better as compared to Group I. Although the grade of quality of surgery was statistically insignificant at the start of surgery, it became highly significant toward the end of surgery, as more patients in Group P showed good quality of surgical field toward the endof surgery as compared to Group I.

- The incidence of intraoperative complications was much more in the Group I as compared to GroupP ($P < 0.05$)



IV. Discussion:

- FESS being a delicate technique needs a clean and blood-free field. General anesthesia is often preferred over topical anesthesia in FESS as it produces immobile surgical field, effective airway protection, adequate analgesia, patient comfort, and the provision for controlled hypotension if required.
- The use of hypotensive anesthesia further reduces bleeding and thus clearing field during surgery.
- Isoflurane is a popular agent for inducing hypotension because of itssimplicity to use and has favorable effects on systemic and cerebral circulation.
- It produces a dose-dependent reduction in systemic vascular resistanceand BP by acting directly on the smooth muscles of blood vessels. Cardiac output is well maintained. Isoflurane may increase the velocity of blood flow in the muscles two or even three times,thus increasing perfusion of the nasal mucous membrane and surgical bleeding as well.
- Higher doses of isoflurane normally lead to tachycardia, thus less chances of getting controlled hypotension; however, in this study, thisdid not happen due to the use of esmolol.
- Propofol can be administered to reduce the BP intraoperatively. The major cardiovascular effect of propofol is a decrease in arterial BP owingto a drop in systemic vascular resistance, cardiac contractility, and preload.
- It causes direct myocardial depression and peripheral vasodilatation. Itblunts the sympathetic response to endotracheal tube insertion and surgical stimulation.
- Infusion rate based on patients' body weight and hemodynamic response provide adequate BP control. It also decreases cerebral metabolism, and cerebral blood flow is reduced by autoregulation. Thisreduces flow through the ethmoidal, sphenoidal, and frontal sinuses improving surgical visibility
- In this study, the TBL with TIVA(with propofol) was significantly reducedas compared to inhalational anesthesia (isoflurane) may be due to reduced cardiac output or anemization of area to be operated. Due to the reduced blood loss, there was improved quality of surgical field also.
- The incidence of intraoperative complications was much more in the inhalational anesthesia (isoflurane) group as compared to TIVA (propofol) group, probably due to more intraoperative blood loss andworse quality of surgical field in the inhalational anesthetic group as compared to TIVA with propofol group.

V. Conclusion :

This study concludes that in FESS, using TIVA with propofol decreases blood loss and the incidence of complications during surgery and alsoprovides good quality of surgical field as compared to isoflurane

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