

Hypotensive Anesthesia with Propofol Infusion Pump: A Boon for Endoscopic Sinus and Nasal Polyps Surgery

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ABSTRACT

Background: Successful outcome of endoscopic sinus surgery depends on complete visualization of the operative field and intraoperative control of bleeding. Major disadvantage of general anesthesia is the increased bleeding encountered, which can interfere with optimum visualization of the intranasal anatomy unless hypotensive methods are used.

Objectives: To study the different anesthetic techniques in relation to their impact on blood loss and duration of surgery. The role of propofol was also evaluated.

Design: Department of Anesthesia and ENT, Head and Neck Surgery, KVG Medical College and Hospital, Sullia, Karnataka, India.

Materials and methods: 213 cases of endoscopic sinus surgeries done for nasal polyposis, sinusitis, dacryocystitis and septorhinoplasties under local and general anesthesia were evaluated between June 2009 and August 2010.

Result: A good operative field was seen with propofol anesthesia compared to halothane anesthesia. The problems of fogging and frequent suctioning were lesser with propofol hypotensive anesthesia.

Conclusion: Hypotensive anesthesia using propofol infusion is the anesthesia of choice for extensive nasal polyposis. Propofol when used both for induction as well as maintenance of general anesthesia in endoscopic sinus surgeries significantly reduces the blood loss, thereby improving the visibility of the endonasal structures and minimizes the chance of complications related to endoscopic sinus surgery.

Keywords: Endoscopic sinus surgery, Propofol, Hypotensive anesthesia, Intraoperative bleeding.

INTRODUCTION

Endoscopic sinus surgery is the treatment of choice for the treatment of chronic sinusitis, nasal polyposis and chronic dacryocystitis¹. Less time consuming nasal surgeries are done under local anesthesia but more time consuming surgeries are done under general anesthesia.¹ Most of the patients prefer getting the surgery done under general anesthesia.^{2,3} The major drawback of general anesthesia for endoscopic sinus surgery and septorhinoplasty is the associated increase in intraoperative bleeding, which can interfere with optimal visualization through the endoscope or nasal cavity.^{2,3}

We studied and compared the two types of anesthesia and the two different general anesthetic techniques to determine if they have an impact on blood loss and duration of surgery. Most of the cases of endoscopic sinus surgeries are done using local anesthesia with monitored sedation.¹ However, there are cases where general anesthesia is advocated as per patient's choice or in cases of extensive disease in the form of extensive nasal polyposis.¹

In our study, we have made an attempt to study the types of anesthesia used in endoscopic sinus surgery and the types of general anesthetic techniques used for control of bleeding and better visualization to reduce the complications during surgery.

MATERIALS AND METHODS

A retrospective analysis of 213 patients who underwent endoscopic sinus surgeries and septoplasties were included under the study. The study period was of 14 months from June 2009 to August 2010. Group A included patients who underwent surgery under local anesthesia, group B who underwent surgery under propofol general anesthesia and group C were the patients who underwent surgery under halothane general anesthesia.

All patients under 15 years were excluded from the study. The youngest patient was of 16 years and the oldest was 67 years old woman. All patients with limited osteomeatal complex disease (Fig. 1) and sinusitis and septoplasty were operated under local anesthesia, and all patients with

extensive diseases and apprehensive patients were operated under general anesthesia (Figs 2 and 3).

All the three groups were studied intraoperatively for duration, cost, blood loss, field visualization, postoperative complications, mean intra-arterial blood pressure, patient comfort and cost of surgery with the type of anesthesia.

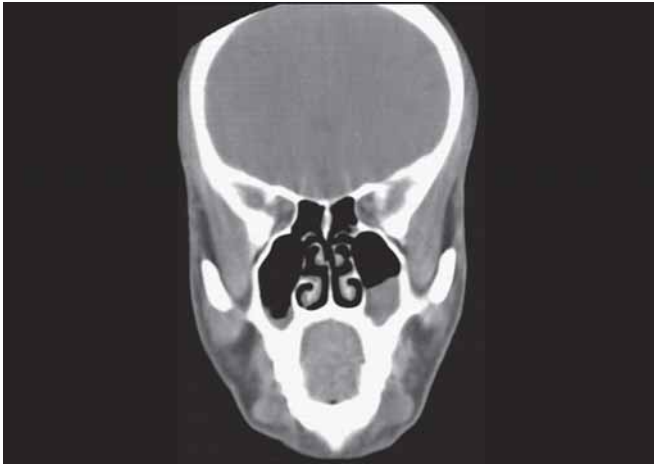


Fig. 1: Limited disease of osteomeatal complex with bilateral maxillary sinusitis



Fig. 2: Extensive ethmoidal and maxillary sinusitis with left concha bullosa

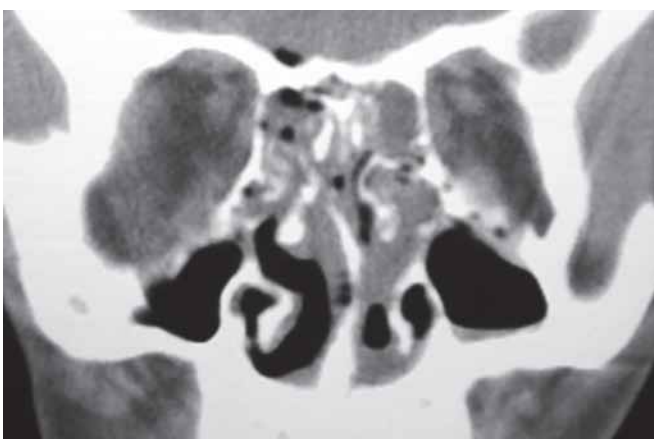


Fig. 3: Extensive ethmoidal polyposis with multisinusitis

All the patients were evaluated, history noted and baseline investigations were done. Nasal packing was done for all cases with 15 ml 4% lidocaine and 1 ml 1:100000 adrenaline. General anesthesia with orotracheal intubation was used for all group B and group C cases. In the 20 (group C) patients receiving halothane anesthesia, patients were induced with conventional thiopentone and succinylcholine and then maintained with halothane. The other group of 48 cases (group B) received propofol as inducing as well as maintenance agent using propofol infusion pump.

RESULTS

24 cases had minimal osteomeatal complex disease requiring uncinectomy and middle meatal antrostomy and were so done under local anesthesia. A total of 49 septoplasties and 17 dacryocysto-rhinostomies were done under local anesthesia. Most of the extensive nasal polyposis and antrochoanal polyps were operated under general anesthesia.

The duration of surgery was reduced to half with local anesthesia in minimal sinus diseases and septoplasties compared to general anesthesia. The duration of surgery for extensive nasal polyps were reduced drastically with propofol anesthesia. Local anesthesia was not effective for extensive nasal polyposis.

The cost of surgery was less in local anesthesia compared to general anesthesia. The cost of surgery in group B and group C were nearly equal. Blood loss was minimal with local anesthesia with good infiltration. But with extensive nasal polyposis surgery with propofol gave the best hemostasis and good intraoperative field visualization during surgery. Postoperative complications were minimal in both local as well as general anesthesia and was minimum with good hemostasis and good visualization. Patient compliance was better with general anesthesia compared to local anesthesia.

The average intraoperative mean arterial blood pressure was maintained at (60-70 mm Hg) under propofol anesthesia in group B. The average intraoperative mean arterial pressure in group C could be maintained between 60 to 80 mm Hg, but, fluctuated between 90 to 110 mm Hg in patients operated under local anesthesia.

In our study, the mean arterial pressure in propofol group B was maintained at 5 to 10 mm Hg less than in group C where halothane was used. All the surgeries were done using 0°, 30°, 45° and 70° endoscopes.

It is reported in literature that nitroglycerin is used for hypotensive anesthesia in cases where blood pressure cannot be reduced intraoperatively.⁴ In all the 68 cases operated under general anesthesia no nitroglycerin was used.

DISCUSSION

Endoscopic sinonasal surgery is the treatment of choice for all nasal and sinus diseases.¹ It is also the procedure of choice for skull base pathologies.¹ A bloodless operative field is required to do such procedures.¹ Unfortunately, with the conventional anesthetic procedures using halothane, excessive bleeding is encountered.⁵

Endoscopic surgery done under local anesthesia agents give a very good bloodless operative field.⁶ But there are instances where the surgery under local anesthesia is not effective in clearing extensive nasal polyposis.⁶ But for limited diseases (osteomeatal complex) where uncinectomy, middle meatal antrostomy with clearance of the anterior ethmoidal cells were done, blood loss was not significant, and so, local anesthesia was preferred.⁶

There is a significant reduction in the blood loss in cases with extensive disease in patients with propofol use in group B. It is possible that increased nasal mucosal perfusion accounts for the increased bleeding encountered during endoscopic sinus surgery when halothane is used as the anesthetic agent.⁵

There are some limitations of propofol use.⁷ Propofol must be used with caution in patients with decreased cardiac output reserve, as it has deleterious effect on cardiac output.⁷ Halothane decreases the cardiac output more compared to propofol.⁷ Negative inotropic effect of halothane is more compared to that of propofol.⁷

The major cardiovascular effect of propofol is a decrease in arterial blood pressure owing to a drop in systemic vascular resistance, cardiac contractility and preload.⁸ But the major effect of halothane causing a decrease in mean arterial pressure is because of decreased cardiac contractility alone and to a very lesser extent a decrease in systemic vascular resistance.⁸ Also, halothane is arrhythmogenic and adrenaline cannot be used topically or as infiltration along with it.⁸ If adrenaline in minor doses becomes inevitable in some conditions, halothane should be cut-off which increases the blood pressure and bleeding.⁸ These problems are not seen in propofol anesthesia.⁸

Several techniques have been developed in an attempt to overcome the increased bleeding encountered during sinus surgeries and septorhinoplasty.^{9,10} These methods include regular use of adrenaline (1:100000) soaked ribbons in local anesthesia or use of hypotensive agents in general anesthesia.^{9,10}

Topical and local anesthesia provide better bleeding control as compared with general anesthesia.¹¹ Adequate anesthesia is often difficult to achieve using local techniques when performing the more extensive surgeries of the nasal polyps and other extensive sinus diseases.¹¹ It is reported

that surgical exploration along the roof of the ethmoid sinuses is often painful under local anesthesia.¹² Also, some patients especially prefer to have surgery under general anesthesia.

All the cases were done under orotracheal intubation and at the time of tracheal intubation there was increases in blood pressure and heart rate.^{13,14} Adjuvant agents used during induction suppress the cardiovascular response to laryngoscopy and tracheal intubation.^{13,14} In our study, there was no significant rise in blood pressure and heart rate during intubation in group B compared to group C. Laryngoscopy and intubation caused minimal increase in blood pressure in group B patients.

Blood pressure and heart rate remained steady until the end of the procedure in propofol group. Both halothane and propofol produce a decline in systolic blood pressure by a combined effect of depressed cardiac contractility.^{4,8} Diminished systemic vascular resistance is seen only with propofol. Factors exacerbating the hypotension include large doses, rapid injection and old age.^{4,8} Hence, propofol infusion pump is used to deliver titrated doses of propofol.^{4,8}

Propofol is contraindicated in patients with impaired ventricular function who may experience a significant drop in cardiac output owing to decreases in ventricular filling pressures and contractility.^{4,8} The blood loss difference between the patients receiving general anesthesia based on continuous infusion of propofol, and the patients receiving the inhalation agent halothane was observed.

Total intravenous anesthesia with propofol infusion pump is a new technique for maintenance of general anesthesia and is associated with decreased bleeding during endoscopic sinus surgeries and septorhinoplasty compared with conventional inhalation agent techniques with halothane.^{4,8}

In cases where halothane could not control mean arterial pressure below 80 mm Hg, nitroglycerin infusion was added to reduce blood loss.^{4,8} Such instances were not seen in case of propofol anesthesia. In this study, it is concluded that total intravenous anesthesia with propofol is better than halothane anesthesia because of the rare necessity to use an additional agent like nitroglycerin to control intraoperative bleeding. One more advantage in propofol anesthesia is concurrent use of adrenaline intraoperatively.^{4,8}

The most commonly reported complications in endoscopic sinus surgeries are rebleeding in the postoperative period, periorbital emphysema and unilateral eye ecchymosis.^{1,12,15} Endoscopic sinus surgery in patients with extensive pathology should be done with caution, especially if general anesthesia is selected or if excessive bleeding occurs.^{1,12,15}

Table 1: Number of cases operated under local and general anesthesia

<i>Endoscopic sinus surgery for</i>	<i>Local anesthesia (Group A)</i>	<i>Propofol anesthesia (Group B)</i>	<i>Halothane anesthesia (Group C)</i>
Ethmoidal polyp	7	15	5
Antrochoanal polyp	9	9	4
Frontomaxillary sinusitis	24	9	4
Chronic dacryocystitis	17	22	8
Septoplasty	49	6	7
Septorhinoplasty	4	8	0
Other nasal surgeries	5	1	0
Total (213)	115	70	28

Control of bleeding and improved visualization of the operative field are therefore crucial for the successful outcome of the surgery.^{1,4,12,15} The procedure is performed through a rigid endoscope and any blood or secretions at the tip of the scope severely decreases visualization.^{1,4,12,15} Adequate visualization decreases the surgeon's workload and intraoperative anxiety and may also decrease the incidence of intraoperative complications. A clean field provided by propofol reduces complications and the operating time significantly.^{1,4,12,15}

So, propofol as induction as well as maintenance agent in general anesthesia is recommended for extensive nasal and sinus diseases.^{1,4,12,15}

CONCLUSION

In our study 213 cases, of nasal and paranasal sinuses diseases were operated. Patients operated under local anesthesia included septoplasties and those with limited sinus diseases. In patients with extensive nasal polyposis and other extensive posterior ethmoidal sinusitis, general anesthesia was preferred.

There is not much difference in blood loss in the group of patients with limited disease. Infact a very good bloodless field was seen in limited diseases and septoplasties done under local anesthesia.

But in cases with extensive nasal polyposis and posterior ethmoidal sinusitis, there is significant decrease in blood loss with the use of propofol for induction as well as maintenance anesthesia, thereby increasing the visibility of the endonasal anatomical structures. This decreases the chances of complications and also cuts down the operating time.

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