A RANDOMIZED COMPARATIVE STUDY OF PROPOFOL INFUSION VERSUS SEVOFLURANE AS THE SOLE AMBULATORY ANAESTHETIC MAINTENANCE AGENT IN VARICOSE VEINS FOAM SCLEROTHERAPY.

Anaesthesiology

Aduru Krishnamurthy	Department of Anaesthesia, Sri Lakshmi Narayana Institute of Medical Sciences, Ossudu Agaram Village, Bharath Institute of Higher Education and Research, Puducherry, India.
Seetharaman Nithianandam	Department of Anaesthesia, Sri Lakshmi Narayana Institute of Medical Sciences, Ossudu Agaram Village, Bharath Institute of Higher Education and Research, Puducherry, India.
Sakthi Vignesh G*	Department of Anaesthesia, Sri Lakshmi Narayana Institute of Medical Sciences, Ossudu Agaram Village, Bharath Institute of Higher Education and Research, Puducherry, India.*Corresponding Author

ABSTRACT

Foam sclerotherapy as a surgical procedure for varicose vein has increased in popularity because it is easier, minimally invasive, early ambulation, less post operative morbidity and mortality and less complications. It can treat superficial veins, small and great saphenous vein varicosities as well as incompetent perforators, advanced varicosities with skin lesions and ulcers, by sclerosant agent injection directly with or without the help of vascular ultrasound in obese individuals, in thin veins and in difficulty to access the veins during injection of foam. Study was performed by the anaesthesiology department using general anaesthesia for patient comfort, early ambulation and discharge, avoiding regional anaesthesia.

KEYWORDS

Sevoflurane, Propofol Infusion, Foam Sclerotherapy

Background:

Foamed sclerosing agents gained widespread popularity in the recent years.¹⁻⁴ Polidocanol when mixed with air forms a foam sclerosant.⁵ It is then injected into varicose veins by multiple intravenous pricks. Though it is a minimally invasive cosmetic procedure, injection as such without general anaesthesia can cause pain, burning, itching and discomfort. To alleviate these and to facilitate the procedure smoothly, general anaesthesia is administered.

Propofol an intravenous anaesthetic characterized by rapid metabolic clearance has been used extensively in daycare anaesthesia for smooth maintenance and rapid recovery with lesser post-operative complications. The brevity of action and rapid recovery with propofol has led to extensive usage of this agent for maintenance of anaesthesia along with oxygen and nitrous oxide.^{6,7} On the other hand, volatile anaesthetic agent Sevoflurane also allows faster recovery from anaesthesia⁸ because of its favorable pharmacokinetic property.

Aim: To compare the hemodynamic effects during induction of anaesthesia, maintenance, recovery and emergence characteristics with either Propofol infusion or Sevoflurane inhalation as the sole maintenance anaesthetic agent in 200 patients undergoing foam sclerotherapy for varicose veins.

INCLUSION CRITERIA:

- Patients aged between aged 25 years to 70 years were included in the study
- Patients with ASA grade 1, 2 and well controlled ASA grade 3 were also involved in the study
- Under general anaesthesia, the procedure duration selected for the study was around 30min - 60min.

Methodology – 200 patients undergoing varicose veins foam sclerotherapy were divided into two groups of 100 each. Group I was named as Group “P” – Propofol, O₂, N₂O and propofol infusion as the maintenance anaesthetic agent and Group II was named as Group “S” – propofol, O₂, N₂O and sevoflurane as the maintenance anaesthetic agent. As per ASA classification of physical status 1 or 2 or well controlled ASA grade 3 were involved in the study.

All patients were given a premedication of inj. glycopyrolate 0.2 mg, inj. fentanyl 1 mcg/kg, inj. ondansetron 0.08 mg/kg (4mg maximum), inj. hydrocortisone 100 mg to minimize allergic reaction, bronchospasm etc due to the sclerosant.

After Preoxygenation, i.v induction is done with Inj. Propofol 1 to 2mg/kg, with O₂ and N₂O and LMA of appropriate size inserted and assisted till spontaneous respiration attained. Patients were randomly divided into Group P and Group S. Group P was maintained with

propofol 100 to 300 micrograms/kg/mt infusion + O₂, N₂O (around 50:50) and Group S was maintained with 0.5 to 1% sevoflurane + O₂, N₂O (around 50:50). Mean arterial blood pressure, mean heart rate, ET CO₂ and emergence and recovery time were recorded. All the quantitative data were analyzed.

Table 1: Intra Operative

	Basal pre-induction		Induction and LMA		5 min		10 min		20 min		30 min		Stop anaesthetics and contn.O ₂	
	S	P	S	P	S	P	S	P	S	P	S	P	S	P
Mean BP	90	90	83	84	82	89	82	91	84	87	84	90	88	90
Mean HR	74	76	71	72	83	84	78	80	78	90	78	80	74	74
Mean RR	16	16	15	16	14	15	13	12	14	14	15	14	15	14
Mean SPO ₂	98	99	99	99	98	99	97	97	97	97	97	98	99	99

Figure 1: Mean BP graph

X – axis: minutes (intraop duration)

Figure 2: Mean HR/min

Figure 3: Mean RR/min

Figure 4: Mean SPO₂**Recovery criteria: Post anesthetic care unit (PACU) criteria**

Activity	0 - unable to lift the head or move extremities voluntarily or on command 1 - lifts head spontaneously moves extremities voluntarily or on command 2 - ambulate without assistance
Breathing	0 - apneic 1 - Dyspnea or shallow, irregular breathing 2 - able to breathe deeply and cough on command
Circulation	0 - systolic BP below 80mm of Hg 1 - systolic BP above 100mm of Hg 2 - systolic BP with normal limits for patient
Consciousness	0 - not responding or responding only to painful stimuli 1 - responds to verbal stimuli but falls asleep readily 2 - awake alert and oriented time, person and place
Total score must be 7 prior to discharge	

Table 2: Recovery criteria

	Activity	Breathing	Circulation	Consciousness	Total score
Basal					
S	2	2	2	2	8
P	2	2	2	2	8
1 min					
S	0	2	2	1	5
P	0	2	2	1	5
2 min					
S	1	2	2	1	6
P	1	2	2	1	6
3 min					
S	1	2	2	1	6
P	1	2	2	1	6
4 min					
S	2	2	2	1	7
P	1	2	2	1	6

5 min					
S	2	2	2	1	7
P	1	2	2	2	7
10 min					
S	2	2	2	2	8
P	2	2	2	2	8

Recovery criteria: **RESULTS:**

Mean heart rate was 75 $\pm$ 10 vs 75 $\pm$ 7 for Group S and group P respectively. Mean arterial blood pressure while sclerotherapy 102 $\pm$ 7 vs 98 $\pm$ 8 for group S and group P respectively. No significant difference in ET_{CO}2 in both groups. SPO₂ dropped in both groups from 99 to $\pm$ 4 during injection of sclerosant which got corrected in around 3 $\pm$ 1 mts once sclerosant injections were stopped. Time for spontaneous eye opening, following verbal commands, full voluntary movements took little shorter time in Group S than Group P, but in 10 mts both groups patients moved on their own from OR table to the transferring stretcher with full recovery.

DISCUSSION:

Varicose vein with minimally invasive Polidocanol foam sclerotherapy under anesthesia revolutionized comparatively over the varicose vein stripping with less pain, early ambulation can be performed as a day case procedure in majority (12 to 18 hrs discharge). Both Sevoflurane and propofol have rapid, smooth onset during induction and maintenance of general anesthesia with stable surgical anesthesia conditions. Present study samples intraoperatively all hemodynamic parameter with acceptable range. Table 1 shows mean arterial blood pressure drop in both groups from baseline but little more with Sevoflurane group when compared with propofol group. In both groups again baseline mean blood pressure reached in 4 minutes. In both groups mean heart rate and respiratory rate negligible fall which got corrected before 4.5 minutes. Both SPO₂ has maintained 99% in both groups except during foam sclerosant injection in to the varicose vein by 2% drop (from 99% to 97%) which became 99% after stopping the sclerosant injection in 2 minutes by enhancing fio₂ from 33% to 50% and again going back to fio₂ of 33%. All patients in both groups recovered in 10 minutes, but Sevoflurane group A had early recovery than propofol group P. the incidence of mean blood pressure, heart rate, respiratory rate are similar without much significance. Propofol and Sevoflurane causes depression in sympathetic activity but in this study Sevoflurane maintained between .75 to 1.5% and propofol infusion at 0.5 ml/kg/hour which maintained adequate depth and hemodynamic stability During surgery no episode of brady and tachy arrhythmias in both groups. Jellish et al compared the effect of Sevoflurane and propofol for induction maintenance and recovery favorably smooth induction and emergence from anesthesia and stable hemodynamic parameters. There were 3 cases in Sevoflurane and 2 cases in propofol had incidence of nausea and 2 cases in Sevoflurane and 1 case in propofol group had incidence of vomiting. Larsen et al found propofol had better cognitive function as compared to Sevoflurane in intermediate recovery phase.

Wondell C et al reported that following general anesthesia Extubation is early in patients who received Sevoflurane for maintenance than those maintained with propofol infusion. Patient regained cognitive function much early after Sevoflurane emergence.

A Samantary et al concluded that maintenance of anesthesia with Sevoflurane found a faster recovery than propofol. The antiemetic property of propofol which could have been the reason for fewer incidences of post operative nausea and vomiting. The induction of

anesthesia along with LMA Insertion with propofol and Sevoflurane there is a drop in mean blood pressure followed by normal basal value regain in a very short time has been reported by J Motsch et al .

CONCLUSION:

We can hereby conclude that General anaesthesia maintenance with Sevoflurane or propofol can be administered for early ambulatory varicose veins minimally invasive foam sclerotherapy. All patients post anaesthetic full recovery is seen in 10 mts. Group S recovered comparatively in a slightly shorter duration with slight restlessness than Group P, which is associated with little longer duration and lesser PONV.

Acknowledgements:

Funding: No funding sources

Conflict of interests: None declared

Ethical approval: Not required

REFERENCES:

1. Cabrera Garrido JR, Cabrea Garcia-Olmedo JR, Garcia-Olmedo Dominguez MA. Elargissement des limites de la sclerotherapie: nouveaux produits sclerosants. *Phlebologie*. 1997;50(2):181-7.
2. Monfreux A. Traitement sclerosant des troncs saphéniens et leurs collatérales de gros calibre par la méthode mus. *Phlebologie*. 1997;50(3):351-3.
3. Tessari L. Nouvelle technique d'obtention de la sclero-mousse. *Phlebologie*. 2000;53:129.
4. Frullini A. New technique in producing sclerosing foam in a disposable syringe. *Dermatologic surgery*. 2000 Jul 1;26(7):705-6.
5. Eckmann DM. Polidocanol for endovenous microfoam sclerosant therapy. Expert opinion on investigational drugs. 2009 Dec 1;18(12):1919-27.
6. Claeys M, Gepts E, Camu F. Haemodynamic changes during anaesthesia induced and maintained with propofol. *BJA: British Journal of Anaesthesia*. 1988 Jan 1;60(1):3-9.
7. Khanna MS, Sarha V. A comparative evaluation of 1% and 2% propofol as sole intravenous anesthetic agent for short surgical procedures. *J Anesth Clin Pharmacol*. 2002;18:87-90.
8. Jellish WS, Lien CA, Fontenot HJ, Hall R. The comparative effects of sevoflurane versus propofol in the induction and maintenance of anesthesia in adult patients. *Anesthesia & Analgesia*. 1996 Mar 1;82(3):479-85.