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Original Research Paper

Anaesthesiology

RECOVERY TIME OF DESFLURANE VERSUS SEVOFLURANE IN PATIENTS UNDERGOING GENERAL ANAESTHESIA

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ABSTRACT

OBJECTIVES: To compare recovery time of desflurane versus sevoflurane in patients undergoing general anaesthesia.

METHODOLOGY: 40 patients of age between 14-50 years, belonging to ASA grade I and II, scheduled for elective surgeries under general anaesthesia were included in the study. Patients belonging to ASA grade III and IV, those scheduled for emergency surgeries and patients with anticipated difficult airway were excluded from the study. The patients were randomised into two groups of 20 each, Group-S and Group-D. Patients in group-S received Sevoflurane as inhalation agent. Patients in group-D received Desflurane as inhalation agent Recovery time which included time to verbal response, eye opening, name stating, finger sequencing, limb lift was assessed.

RESULTS: Comparison of the parameters of recovery time which included verbal response, eye opening, name stating, finger sequencing and limb lift between the two groups were higher in Sevoflurane group with a t value of between -22.899 and -19.808 which is statistically significant with a p value of <0.001.

CONCLUSION: In comparison of both desflurane and sevoflurane we found that there was early recovery with Desflurane.

KEYWORDS :

INTRODUCTION:

Valerius Cordus synthesized diethyl ether in 1540 and shortly thereafter Theophrastus Bombastus von Hohenheim (Paracelsus) noted that it could diminish pain. Priestley synthesized nitrous oxide in 1774, and in 1800, Davy found that it decreased pain and suggested its use for surgery. In the 1820s, Hickman advanced the notion of anaesthesia, but Davy quashed Hickman's idea. Von Liebig synthesized chloroform in 1831[(1)].

The recreational use of diethyl ether and nitrous oxide and a desire to eliminate the pain of surgery, initially led to unsuccessful (nitrous oxide) demonstrations or unreported use in patients undergoing surgery. Long's experience with ether in 1842 is as famous as his failure to publicize the discovery.

Anesthesia was born on 16 Oct 1846 (Ether Day) with Morton's public demonstration of ether anesthesia. Simpson's 1847 discovery of the anesthetic effects of chloroform followed. Nitrous oxide (restored to favor in the 1860s) and ether combined with oxygen provided anesthesia for a century, with modest competition in the 1930s to 1950s from divinyl ether, cyclopropane and trichloroethylene [(2)(3).]

World War II advances in fluorine chemistry enabled development of compounds halogenated with fluorine to eliminate flammability. The major advance was Suckling's synthesis of halothane in the early 1950s. Released for clinical use in the mid-1950s, halothane swept away its pungent, toxic, flammable predecessors, dominating anesthesia for more than a decade.

Its use in newly developed vaporizers (Copper Kettle and Fluotec) allowed the precise control of anesthetic concentrations, contributing to its safety and popularity. World War II also gave birth to methods, particularly the infrared analyzer, to continuously analyze inhaled anesthetics. This facilitated the measurement of the Minimum Alveolar Conce ntration (MAC) required to eliminate movement in response to noxious stimulation in 50 % of subjects, an anesthetic EC50[(2)].

Halothane was less than perfect. It caused a rare, immuno logically-based and potentially fatal hepatic injury. This spurred the synthesis of progressively less metabolized, less toxic, and less soluble (faster recovery) anesthetics. Enflurane came first, and displaced halothane. However, enflurane could cause convulsions and in the 1980s, isoflurane, a compound less soluble and without convulsant properties, replaced enflurane. The rise of ambulatory, day case surgery in the 1980s increased the demand for more rapid awakening from anesthesia, and the 1990s saw the release of the poorly soluble anesthetics, sevoflurane and desflurane[(3),(4),(5)].

MATERIALS AND METHODS:

For this prospective, randomized, comparative study 40 patients were randomly allocated by closed envelope method into two groups of 20 each in which group D receives Desflurane and group S receives Sevoflurane. After approval from the ethical committee and written informed consent from patients, patients were randomized to the desflurane or sevoflurane group.

Patients with clinically significant cardiovascular, respiratory, hepatic, renal, neurologic, psychiatric, or metabolic disease were excluded from the study. Patients with a history of malignant hyperthermia and pregnant, possibly pregnant, or lactating women also were excluded.

Atropine, benzodiazepine, and similar drugs were not used as premedications before induction of anesthesia. Anaesthesia work station was checked. Appropriate size endotracheal tubes, working laryngoscope with medium and large size blades, stylet and working suction apparatus were kept ready before procedure. After shifting the patient to operating room, IV access was obtained with 18G IV cannula and ringer lactate started.

All patients were preoxygenated with 100% oxygen for 3 minutes before the induction of anaesthesia with fentanyl 1.5 to 2 μg/kg IV and propofol 2mg/kg IV and vecuronium 0.1mg/kg IV. After loss of consciousness, patient were intu bated. Anaesthesia was maintained with either sevoflurane 1% to 2% or desflurane 3% to 6% in N2O:O2 at a ratio of 60:40. During the procedure, the patients were monitored by electro

cardiography, pulse oxymetry, and noninvasive arterial blood pressure measurement. Volatile concentrations of sevoflurane and desflurane were determined using a multigas analyzer. Sevoflurane was administered using Ohmeda Sevotec-5 and desflurane was administered using Drager D Vapourizer. The inspired concentration of the volatile anesthetic was adjusted to maintain mean arterial pressure within 20% of baseline values.

During the maintenance period, ventilation was controlled to maintain normocarbia with a fresh gas flow (4.0 L/min) using a semiclosed circular system. Muscle relaxation was maint ained by incremental doses of vecuronium. Fluid was admin istered at a rate of 10 to 15 ml/kg/hr.At the end of surgery, inhaled anaesthetics were discontinued. The lungs were ventilated with 100% oxygen at a fresh gas flow rate of 8 L/min. Residual neuromuscular blockade reversed with Inj. Neosti gmine 0.05 mg/kg and Inj. glycopyrrolate 0.01 mg/kg.

Emergence quality was measured from the time of termination of anaesthetic gas.

PARAMETERS EVALUATED:

Recovery time which included time to verbal response, eye opening, name stating, finger sequencing and limb lift.

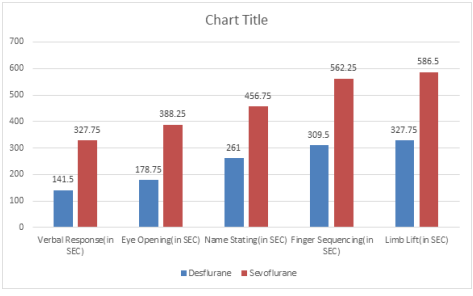
RESULTS:

40 patients randomly divided into two groups with 20 patients in Group D (Desflurane) and 20patients in Group S (Sevofl urane) scheduled for surgery under general anaesthesia was undertaken to assess the recovery time of the two volatile anaesthetic agents.

TABLE 8: INDEPENDENT T TEST: COMPARISON OF THE DURATIONS

	GROUP	N	Mean	Std. Deviation	T	df	P VALUE
Verbal Response(in sec)	Desflurane	20	141.5	26.512	-22.17	38	<0.001
	Sevoflurane	20	327.75	26.63			
Eye Opening(in sec)	Desflurane	20	178.75	27.714	-22.9	38	<0.001
	Sevoflurane	20	388.25	30.1			
Name Stating(in sec)	Desflurane	20	261	32.265	-20.44	38	<0.001
	Sevoflurane	20	456.75	28.157			
Finger Sequencing(in sec)	Desflurane	20	309.5	29.015	-19.81	38	<0.001
	Sevoflurane	20	562.25	49.137			
Limb Lift(in sec)	Desflurane	20	327.75	26.63	-20.83	38	<0.001
	Sevoflurane	20	586.5	48.75			

- *Comparison of the Verbal Response(in sec) between the two groups shows that Verbal Response(in sec) is higher in Sevoflurane group with a t value of -22.166 and is statistically significant with a p value of <0.001*
- *Comparison of the Eye Opening(in sec) between the two groups shows that Eye Opening(in sec) is higher in Sevoflurane group with a t value of -22.899 and is statistically significant with a p value of <0.001*
- *Comparison of the Name Stating(in sec) between the two groups shows that Name Stating(in sec) is higher in Sevoflurane group with a t value of -20.442 and is statistically significant with a p value of <0.001*
- *Comparison of the Finger Sequencing(in sec) between the two groups shows that Finger Sequencing(in sec) is higher in Sevoflurane group with a t value of -19.808 and is statistically significant with a p value of <0.001*
- *Comparison of the Limb Lift(in sec) between the two groups shows that Limb Lift(in sec) is higher in Sevoflurane group with a t value of -20.831 and is statistically signif icant with a p value of <0.001*



GRAPH 1

Graph1 we can see that,

- *Comparison of the Verbal Response(in sec) between the two groups shows mean of 141secs in Desflurane vs 327.75 secs in Sevoflurane and is statistically significant with a p value of <0.001*
- *Comparison of the Eye Opening(in sec) between the two groups shows mean of 178.75secs in Desflurane vs 388.25 secs in Sevoflurane and is statistically significant with a p value of <0.001*
- *Comparison of the Name Stating(in sec) between the two groups shows mean of 261secs in Desflurane vs 456.75secs in Sevoflurane and is statistically significant with a p value of <0.001*
- *Comparison of the Finger Sequencing(in sec) between the two groups shows mean of 309.5secs in Desflurane vs 562.25secs in Sevoflurane and is statistically significant with a p value of <0.001*
- *Comparison of the Limb Lift(in sec) between the two groups shows mean of 327.75secs in Desflurane vs 586.5secs in Sevoflurane and is statistically significant with a p value of <0.001*

DISCUSSION:

In our study we compared the recovery time between the two groups which included the following parameters,

1. Verbal response
2. Eye opening
3. Name stating
4. Finger sequencing
5. Limb lift

1. Verbal response: Following desflurane anaesthesia the ver bal response was 141.5 seconds as compared to 327.75 seconds in sevoflurane group. This is a significant difference in time both clinically as well as statistically. This can be attributed to the lower blood gas coefficient of desflurane as compared to sevoflurane[4].
2. Eye opening: In patients receiving desflurane anaesth e sia the time for eye opening was 178.75 seconds as compared to sevoflurane receiving patients which was more in duration at 388.25 seconds. This is clinically as well as statistically significant difference in time. 3. Name stating: Patients receiving desflurane anaesthesia stated their names earlier at a mean of 261 seconds as compared to patients receiving sevoflurane anaesthesia with a mean of 456.75 seconds.
4. Finger sequencing: Mean time for finger sequencing was 309.5 seconds in desflurane group as compared to 562.25 seconds in sevoflurane group. This is a significant difference clinically and statistically.

5. Limb lift: Return of muscle power can be assessed by limb lift. In our study patients in desflurane group lifted their limbs earlier at 327.75 seconds as compared to sevoflurane group at 586.5 seconds.

The pharmacokinetic properties of desflurane and sevofl ur ane favour better intraoperative control of anaesthesia and a rapid postoperative recovery[6],[7],[8]. They have significantly lower blood/gas partition coefficients (0.45 and 0.65 respe ctiv ely) than Isoflurane (1.4) or halothane (2.4). The lower fat/blood partition coefficient of desflurane, 27 v/s 48 for sevoflurane, should favour its early elimination from the body resulting in early recovery[8],[9],[10].

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