# A PROSPECTIVE AUDIT OF DESFLURANE ANAESTHESIA IN THE UNIVERSITY OF MALAYA MEDICAL CENTRE DAY SURGERY UNIT

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**ABSTRACT: We evaluated the use of Desflurane anaesthesia in this prospective observational audit in the University of Malaya Medical Centre Day Surgery Unit. Fifty ASA I-II unpremedicated day surgery patients received fentanyl and propofol induction after preoxygenation. Desflurane was introduced initially at 2% and the concentration was increased gradually to 4%, then 6%, 8% and 10% in nitrous oxide and oxygen. Patients breathed spontaneously throughout the surgery. Desflurane was switched off at the end of surgery and patients breathed 100% oxygen. The haemodynamic effect, perioperative complications and recovery profiles were recorded. Systolic arterial pressure and heart rate decreased after induction of anaesthesia but returned to baseline value at discharge. Adverse airway event such as coughing and postoperative nausea and vomiting are two unwanted complications. *(JUMMEC 2003-2005; 8: 45-49)***

**KEYWORDS: Desflurane, day surgery, propofol induction**

## Introduction

The desire to contain the costs of anaesthesia and surgery, as well as the changes in surgical practice such as the adoption of minimally invasive technologies, have seen an evolution of anaesthetic practice in the past two decades. One result has been an increase in the numbers of outpatient surgical procedures. In support of this trend we have seen the development of drugs which permit greater, more precise control over the course of anaesthesia and more rapid recovery. For inhaled anaesthetics, Desflurane was developed as a result and has now become widely used in the developed country.

Day Surgery Unit in the University of Malaya Medical Centre was officially opened in June 2002. Desflurane was introduced to the unit a few months later. The aim of this communication is to report the haemodynamic effect, recovery profiles and perioperative complications of Desflurane anaesthesia in daycare patients in the University of Malaya in a prospective observational audit of 50 patients.

## Methods

We audited prospectively 50 consecutive ASA physical status I-II patients who fulfilled our hospital's criteria for ambulatory surgery and who breathed spontaneously under Desflurane anaesthesia. Celebrax 200 mg or Vioxx 25 mg were given as premedication immediately after patients were seen by the anaesthetists. After cannulation of an appropriate vein, patients were preoxygenated for three minutes before induction of anaesthesia. Circle breathing system was used. Anaesthesia was induced with 1 mcg.kg$^{-1}$ of fentanyl and 2-4 mg.kg$^{-1}$ of propofol until loss of eyelash reflex. An oral airway or laryngeal mask airway or airway management device was inserted thereafter. Desflurane was introduced at 2% concentration together with 66% of nitrous oxide in oxygen and the total flow rate was 9 L.min$^{-1}$. The concentration was increased gradually to 4%, 6%, 8% and 10% every two breaths. Patients breathed spontaneously throughout the operation with 66% nitrous oxide and 6-10% of Desflurane in oxygen depending on the depth of the anaesthesia as evidence from clinical signs. The total flow rate was decreased to 1.5 L.min$^{-1}$ after surgery started. Small boluses of fentanyl or propofol was

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given to deepen the anaesthesia if necessary, during the operation, at the discretion of the anaesthetists. At the end of the surgery, Desflurane and nitrous oxide were both switched off at the same time. Patients breathed 10 L.min$^{-1}$ of 100% oxygen. Airway devices were removed with the patient fully awake and obeying commands.

A specially designed audit form was used to collect relevant data. Age, sex, weight, ASA physical status, cardiorespiratory data, total fentanyl dosage, total propofol dosage and duration of Desflurane anaesthesia (from switching on the Desflurane vaporizer to turning it off at the end of surgery) were recorded. Baseline systolic arterial pressure (SAP) and baseline heart rate (HR) was recorded before the induction and at 1 min, 2 min, 5 min, 10 min and 15 min after induction, as well as at disharge to PACU II and at discharge home. The time of eye opening (from turning off the Desflurane to eye opening) and the time of obeying command (from turning off the Desflurane to obeying simple command such as sticking the tongue out), together with the time when patients were discharged to PACU II (*Appendix 1*: Criteria for discharge to PACU II) and discharged home (*Appendix 2*: Criteria for discharge home) were documented. Note was made of any problems that occurred before induction, at induction, during the maintenance period, on awakening, and in the recovery period postoperatively. Arterial desaturation and bradycardia requiring intervention were defined as a pulse oximetry saturation < 95% and heart rate of < 40 bpm, respectively.

### *Statistical analysis*

The Statistical Package for the Social Sciences (SPSS) version 10.0 for Windows was used for statistical analysis. Paired Student t-test was used to analyze systolic arterial pressure and heart rate.

## Results

Patient characteristics and recovery profiles were presented in Table 1. Haemodynamic data were presented in Figure 1. Systolic arterial pressure and heart rate at 1 min, 2 min, 5 min, 10 min and 15 min after induction of anaesthesia was significantly lower when compared to baseline value. However, at discharge, SAP returned to baseline value. Eight patients coughed shortly after the introduction of Desflurane at the beginning of an operation. A small bolus of propofol was given to rectify the problem and there was brief desaturation in one of these eight patients. One patient developed hypotension of about 30% when Desflurane was at 10% concentration but responded to intravenous crystalloid fluid therapy. At emergence a total of nine patients coughed, five of them were smokers and the other four were non-smokers. Six patients, one male and five females complained of postoperative nausea, which responded to metoclopramide 10 mg. Two patients required admission as an inpatient for surgical reason. There were no other complications documented.

## Discussion

From this small audit we observed that Desflurane provides controllable anaesthesia, and it is haemodynamically similar to other commonly used inhalational anaesthetics.

The systolic arterial blood pressure decreased after the induction of anaesthesia and continued to be lower than the baseline value. This reduction in arterial blood pressure is in agreement with other studies and is similar to other commonly used inhaled anaesthetics (1-2).

Previous studies showed that heart rate is unchanged at lower steady state concentrations, but increases with higher concentrations (1-2). Studies also showed that when end tidal concentration is increased very rapidly to more than 1 MAC, in the absence of premedication, Desflurane increases heart rate (3-4). In our audit heart rate decreased after induction of anaesthesia and continued to be lower than baseline value by 15 mins. This is probably due to the prior administration of fentanyl (5-6).

Desflurane has two unwanted complications, postoperative nausea and vomiting and adverse airway events. Our incidence of nausea and vomiting in the

**Table 1.** Demographic data, duration of anaesthesia, fentanyl and propofol dosage

| Parameters | $\bar{x}$ ± sd |
|---|---|
| Age; years | 32 ± 12 |
| Weight; kg | 56 ± 12 |
| Sex; M:F | 9:41 |
| ASA; I:II | 48:2 |
| Fentanyl; mcg | 65 ± 17 |
| Fentanyl per weight; mcg.kg$^{-1}$ | 1.2 ± 0.3 |
| Propofol; mg | 151 ± 40 |
| Propofol per weight; mg.kg$^{-1}$ | 2.7 ± 0.6 |
| Duration of Desflurane anaesthesia; min | 20 ± 17 |

**Table 2.** Recovery profiles

| Parameters | $\bar{x}$ ± sd |
|---|---|
| Eye opening; min | 4.8 ± 2.3 |
| Following command; min | 5.6 ± 2.8 |
| Discharge to PACU II; min | 40 ± 17 |
| Discharge home; min | 109 ± 45 |

recovery room was 12%, which is lower than the 35% rate quoted by Ghouri *et al* (7). This may be because we used fentanyl-propofol as the induction agent whilst Ghouri used fentanyl-thiopentone as the induction agent. It has been shown that the incidence of vomiting is lower with propofol when compared to thiopentone. Twenty-four hours postoperative nausea and vomiting rate has been reported to be as high as 67% (8) and 52% (9). In this audit our patients were not followed up beyond discharge, this may also explain our relatively low incidence of postoperative nausea and vomiting.

Desflurane is an irritant agent and when it is used at high concentration during induction, adverse airway events can occur (9-12). Some studies have shown that even in early maintenance of anaesthesia, following intravenous induction, irritation of the upper airway is still a problem (13). Our audit agreed with this finding. 16% of the patients coughed shortly after introduction of Desflurane, following fentanyl and propofol induction. This incidence is slightly lower than reported by Wilkes *et al* (13). This may be because we did not increase the concentration beyond 10% whilst Wilkes *et al* used up to 12% of Desflurane in early maintenance phase. We were surprised to find that coughing occurred quite frequently at emergence although there was no incidence of laryngospasm and desaturation. Whether the incidence of coughing at emergence was higher with Desflurane anaesthesia compared with other inhaled anaesthetics is not known.

In conclusion, we showed that Desflurane may be a suitable agent for daycare anaesthesia in our population. However, more randomised controlled trial would be needed to evaluate its complications such as upper airway irritation and postoperative nausea and vomiting.

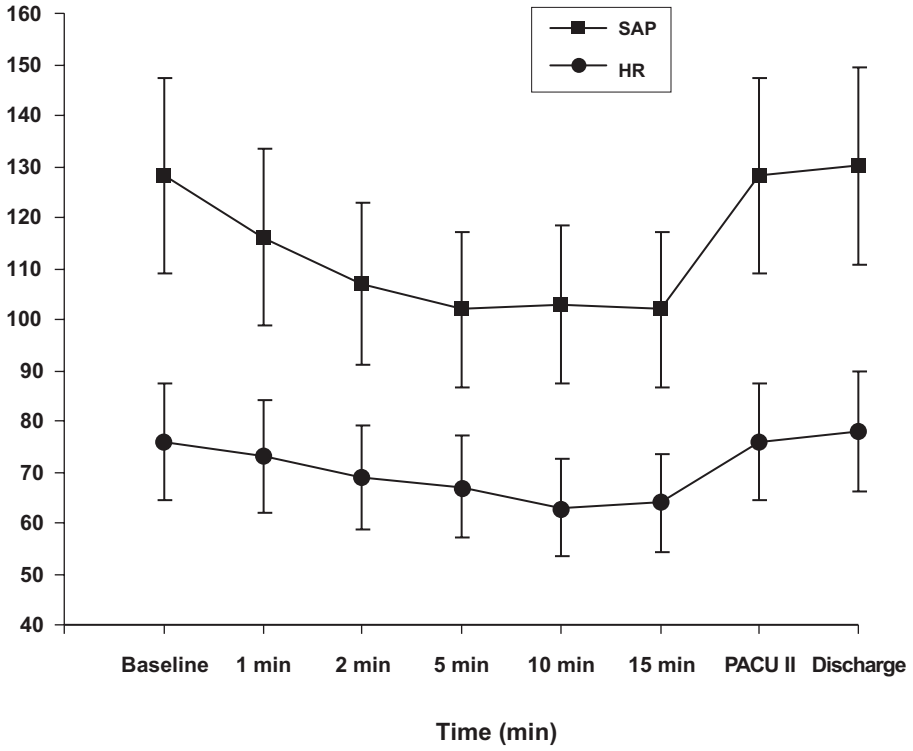


**Figure 1.** Systolic arterial pressure (SAP) and heart rate (HR) at different time intervals. Systemic arterial pressure is in mmHg and heart rate is in beats/minute.

*Data presented are mean (sd). SAP at 1 min, 2 min, 5 min, 10 min and 15 min after induction were all significantly lower than baseline SAP (P < 0.001, by paired student t-test). Heart rate at 1 min, 2 min, 5 min, 10 min and 15 min after induction were all significantly lower than baseline heart rate (p < 0.005, by paired student t-test).*

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## *Appendix 1*

Criteria for Discharge to PACU II

| **Ventilation/Respiration** | **Score** |
|---|---|
| Spontaneous ventilation needs no support, respiratory rate is at least 10 | 2 |
| Spontaneous ventilation<br>– requires artificial airway<br>– respiratory rate abnormally high or low<br>– shallow or limited respiratory effort | 1 |
| Apnea – requires ventilation | 0 |
| **Circulation** | |
| BP ± 20% of preanaesthetic level | 2 |
| BP ± 20-50% of preanaesthetic level | 1 |
| BP ± 50% of preanaesthetic level | 0 |
| **Consciousness** | |
| Responding to verbal stimuli – may or may not initiate conversation, but answers questions appropriately (verbally or by nodding head). Eye open spontaneously. Carries out commands | 2 |
| Responding to tactile stimuli – actively responds to physical stimulation (e.g. Position change, BP monitoring) by movement and/or vocalization | 1 |
| No response – unresponsive to verbal or non-painful stimuli | 0 |
| **Muscle strength** | |
| Moves four extremities spontaneously and keeps head up | 2 |
| Moves two extremities spontaneously | 1 |
| Does not move extremities when painful, non-verbal stimuli applied | 0 |
| **Colour** | |
| Pink skin colour and mucous membrane | 2 |
| Pale dusky blotchy discoloration: jaundice discoloration | 1 |
| Cyanotic | 0 |
| **Total score should be 8-10 on discharge** | |

## *Appendix 2*

Post Anaesthetic Discharge Scoring System

**Vital signs**
2 = within 20% of preoperative baseline
1 = 20-40% of preoperative baseline
0 = 40% of preoperative baseline

**Activity level**
2 = steady gait, no dizziness, consistence
1 = requires assistance
0 = unable to ambulate/assess

**Nausea and vomiting**
2 = minimal: successfully treated with no medication
1 = moderate: successfully treated with IM medication
0 = severe: continuous after repeated treatment with preoperative level

**Pain relief acceptable to patient**
2 = yes
1 = no

**Surgical bleeding**
2 = minimum: does not require dressing change
1 = moderate: required up to two dressing changes with no further bleeding
0 = severe: require three or more dressing changes and continuous bleeding

**Patients that score 9 or > are considered for discharge**