

## To Correlate Propofol or Isoflurane's Recovery Period Using Day Case Methods

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### Abstract

**Background:** To evaluate the efficacy of Propofol and Isoflurane in maintaining anaesthesia during day case surgery. To identify the most appropriate drug for sending the sufferer home as soon as possible following surgery. **Material and Methods:** In order to determine which agent is best for making the patient street-fit as soon as possible following anaesthesia maintenance with either Propofol or Isoflurane for day case procedures, a randomised prospective study was conducted in the Department of Anaesthesia, MNR Medical College and Hospitals, Fasalwadi, Sangareddy Mandal, Sangareddy District, Telangana, India, after obtaining institutional approval from October 2021 to September 2022. **Results:** 25 patients were taken in group P as well as Group I and their mean age was 28.3 and 30.6 respectively. 49.25 was mean weight of patients in group P and for Group I it was 55.56. Gender distribution in group I was 9 male and 16 females and 10 males, 15 females in group P. Time for Phase I recovery was 12.7 mins and 13 mins in group P and I respectively. Recovery period for Phase II was 32.75 min and 62 mins for group P and I respectively. **Conclusion:** A faster recovery was seen with propofol as a single drug, however both groups showed similar improvements during Phase I. With Propofol TIVA, phase II recovery time was drastically reduced in comparison to Isoflurane maintenance anaesthesia. In comparison to Isoflurane maintenance, TIVA with Propofol results in an earlier Home Readiness, which is preferable for day case procedures.

**Keywords:** Recovery period, Anaesthesia, Propofol, Isoflurane.

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### Introduction

Having a patient undergo surgery and be hospitalised and released on the same day is a common and standard process in today's healthcare system. Day case, day care, day surgery, ambulatory surgery, 23-hour surgery, and outpatient department (OPD) operations are some of the terms that have been proposed and renamed over the years. Day surgery has been around for as long as medicine has, evolving with the field and patient demand to reach its current state of the art. Even before hospitals were widely available, the famous surgeon Sushruth likely performed many of his surgeries as outpatient procedures. Ashoka the Great is widely credited for popularising the development of hospitals and ambulatory care centres. Mac Nicoll published his massive series of 7,000 day care cases in 1909.<sup>[1-3]</sup> When children are allowed to recuperate at home, he found, they do better. At the time, medical professionals agreed that keeping patients in the hospital after surgery was the best way to safeguard against the spread of infection. As a result, there was a setback in the field of day surgery. Day Care surgery was revitalised in the 1940s and 1950s because to advances in

antibiotics and asepsis, but it wasn't until the 1970s and 1980s that it became an integral element of modern medicine.

Day surgeries were given a boost when it was realised that keeping the patient in the hospital overnight was unnecessary thanks to the development of more effective anaesthetic drugs. Day surgeries have advanced thanks to a number of variables, some of which are specific to individual countries. Medical care in the United States has become so expensive that the government mandated the creation of health insurance. The medical care expert was compelled to consider and eventually adopt the cost-saving measures of Day Care surgery by pressure from insurance companies. When the National Health Service in the United Kingdom ran into trouble and patients had to wait years for operations because of the volume of patients needing care, they turned to day care centres. Both issues coexist in India, where universal health care has not yet been implemented. There has been a rise in the popularity of day surgery, which has become a more sophisticated medical speciality.<sup>[4,5]</sup> Because patients are staying in the hospital for shorter periods of time, the technique reduces overall costs and frees up resources to treat more people. Fewer nosocomial infections and less time away from work or school for the patient and his loved ones are additional benefits of a shorter hospital stay.

Because of the reduced time spent away from home, it is also more appealing to younger and older patients. In the early 1900s, Ralph Waters proposed the idea of ambulatory anaesthesia, which has since expanded at a dizzying rate. The first anaesthetic methods employed were localised methods, however currently many patients choose general anaesthesia. In the past, the lengthy recovery intervals associated with general anaesthetic medicines made them unsuitable for same-day surgery. General anaesthesia can now be used for day case procedures thanks to the availability of shorter acting anaesthetic drugs with a better recovery profile.<sup>[6-8]</sup> Patients are allowed to leave the hospital just a few hours after surgery because to the "clear headedness" of recuperation. Propofol and Isoflurane are two anaesthetics that have proven to be very helpful when employing this method. In this analysis, we compare the two medicines' recovery profiles and their efficacy for use in outpatient settings.

### **Methodology**

After receiving ethical clearance, this randomised prospective study was conducted in the Department of Anaesthesia, MNR Medical College and Hospitals, Fasalwadi, Sangareddy Mandal, Sangareddy District, Telangana, India, from October 2021 to September 2022. Study participants were exposed to either Propofol or Isoflurane for the duration of anaesthesia during day case procedures, and their Phase I and Phase II recovery periods were compared. Forty people who were scheduled to have Day Case procedures on their Head, Breast, or Upper limb were included in the analysis. Everyone's ages varied from 18 and 47. Patients with normal clinical, biochemical, radiological, and haematological criteria were chosen from the total pool of examined people. Patients gave their signed agreement after being fully informed of the risks and benefits. Individuals were randomly assigned to receive either Propofol or Isoflurane. Propofol and Isoflurane stood for the two groups' respective anaesthetics.

### **Inclusion Criteria**

1. Examined ASA physical status levels I and II patients.
2. In accordance with normal ranges for biochemical and haematological tests.
3. Adults between the ages of 18 and 50.
4. A class I and II by the American Safety Association.
5. There is no history of anaphylaxis from exposure to eggs or sulfa medications.
6. A trifecta of airway MPC 1, 2, 3

7. Head, neck, breast, and upper limb minor operations.
8. Operation timed at less than 90 minutes.
9. Patients who are typically in good physical condition for walking.
10. Well-educated participant who can follow directions.

### Exclusion Criteria

1. Lack of patient cooperation.
2. At least a class III hazard according to the ASA.
3. Egg or sulphite intolerance is a well-documented hypersensitivity.
4. MPC level four in the airway.
5. Major operations that necessitate a hospital stay of at least one night.
6. Operations performed in or around the windpipe.
7. Said patient is having trouble getting around.
8. No one showed up, or nobody showed up who could learn anything.

### Methodology

In Advance of Surgery Patients were evaluated beforehand, and both knowledge of and agreement to the planned procedure were obtained through informed consent. They were thoroughly examined to rule out any potential risks. The recovery evaluations and the significance of following directions precisely were underlined. Fentanyl 2 mg was administered as an analgesic, and Glycopyrrolate 5 mg was given as a premedication 15 minutes before induction to all patients. The patient's heart rate (HR), blood pressure (BP), and oxygen saturation (SpO<sub>2</sub>) were all recorded at the time of their arrival in the operating room and baseline values were established using various monitoring devices. In this case, the patient's nondominant arm was used to gain intravenous access.

The same dose of 2mg/Kg I.V. Propofol was used to induce both groups. The proper placement of a Laryngeal Mask Airway of the correct size was established. No tranquillizers were utilised. Propofol 0.5mg/Kg bolus was administered in case of patient movement.

**Propofol Group:** Patients were given a continuous infusion of Propofol by syringe pump immediately following induction. (B Braun Melsungen 'S' series) in accordance with this system:

-12 mg/kg/h x 10 min (200 mcg/kg/min)

-10 mg/kg/h multiplied by 20 minutes (167 mcg/kg/min),

-Eight milligrammes per kilogramme per hour multiplied by one hour (one hundred thirty-three micrograms per kilogramme per minute).

-Normal maintenance dose is 100 micrograms per kilogramme per minute (-6 mg/kg/h).

-Furthermore, they were linked up to the Bain breathing circuit, which supplied them with 66% Nitrous oxide and 33% Oxygen. The patient maintained spontaneous breathing during the entire operation. A 20mg bolus of Propofol was administered to control any involuntary muscle activity.

**Isoflurane Group:** This group was administered Isoflurane (Penlon Sigma Delta vaporiser) in a mixture of 66% Nitrous oxide and 33% Oxygen via the Bain breathing circuit immediately following induction. According to the patient's reaction, the proportion of Isoflurane was titrated up or down by 0.2%. Allowed patients to breathe on their own. Isoflurane concentration needed to be increased when breathing depth increased, and vice versa.

Non-invasive blood pressure and heart rate monitoring were performed at 5-minute intervals throughout the procedure, and electrocardiogram and blood oxygen saturation levels were monitored continuously until recovery. Once the final skin suture was in place, the maintenance agent was stopped for both groups. We started counting from "time zero," or the

moment the agent was stopped, to determine how long it would take for the body to heal. Phase I recovery is defined as the time it takes for the Aldrete score to drop below 9. Time to Phase II recovery and home ready is defined as the amount of time until a PADSS score of 9 is achieved. This is measured from the time Propofol or Isoflurane is stopped until the time when the Aldrete score drops to below 9. Time to PADSS 9 when propofol or isoflurane is stopped. It's also used as a proxy for "Home readiness" time.<sup>[8,9]</sup>

## RESULTS

Two categories of 25 patients each were created from the study's included individuals. Propofol was given as maintenance to Group P (n = 25), whereas isoflurane was given to Group I (n = 25).

**Table 1: Average age (in years) of the two study groups.**

Group	n	Mean (years)	SD	Result
Group P	25	28.3	6.96	NS*
Group I	25	30.6	10.3	

\* - Not Significant

Regarding age, there was no statistically significant difference between the two groups.

**Table 2: Average weight (Kg) for both categories.**

Group	n	Mean (Kg)	SD	Result
Group P	25	49.25	12.06	NS*
Group I	25	55.56	10.53	

\* - Not Significant

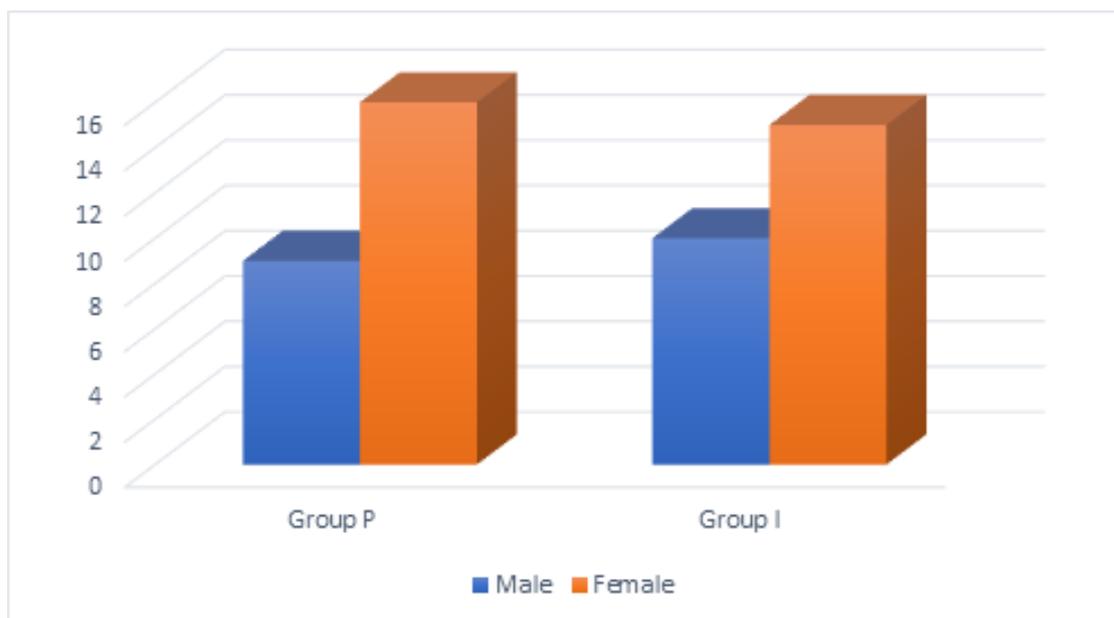
Regarding weight distribution, there was no statistically significant difference between the two groups.

**Table 3: Gender distribution in the two groups under study.**

Sex	Group P	Group I	Result
Male	9	10	NS*
Female	16	15	

\* - Not Significant

Regarding sex distribution, there was no statistically significant difference between the two groups.



**Figure 1: Gender distribution in groups P and I.**

**Table 4: The operation's duration (mins)**

Group	n	Mean (mins)	SD	Result
Group P	25	40.55	16.49	NS*
Group I	25	43.40	12.23	

\* - Not Significant

Between the two groups, there was no statistically significant difference in the length of the procedure.

**Table 5: Duration of Phase I recovery**

Group	N	Mean (mins)	SD	Result
Group P	25	12.7	2.89	NS*
Group I	25	13	2.15	

\* Not significant

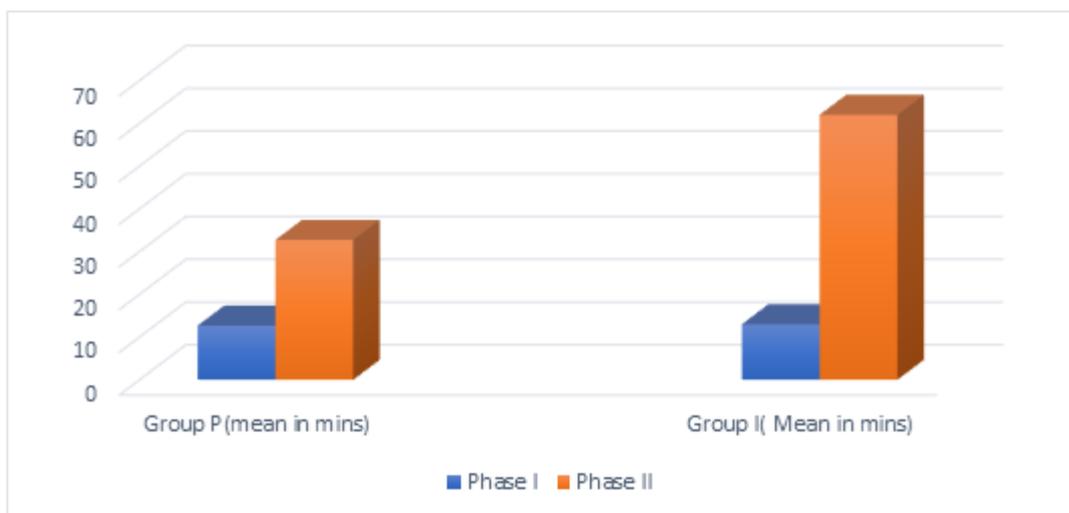
There was no statistically significant difference between the two groups for the duration of Phase I recovery.

**Table 6: Duration of Phase II recovery**

Group	n	Mean (mins)	SD	Result
Group P	25	32.75	8.78	P < 0.01
Group I	25	62	22.69	

Significant at P < 0.05

Highly Statistically significant at P < 0.01



**Figure 2: Time taken by both groups to recover in phases I and II.**

In the period leading up to "Home preparedness," there was a statistically significant difference between the two groups. When compared to isoflurane, the period until Phase II recovery was much shorter with propofol.

## DISCUSSION

Day surgery anaesthesia requires the highest standard of anaesthesia care, including the lowest risk of complications, the fewest possible side effects, and the quickest possible return to normal function. Given these considerations, it may make sense to choose for local or regional anaesthesia as a primary method of pain relief. When general anaesthesia is necessary, as it often is, the optimum anaesthetic approach has rapid and swift induction, physiologically stable maintenance with conveniently adjustable anaesthetic depth, and rapid and full recovery, permitting early return to regular activities. A short-acting intravenous anaesthetic, propofol is utilised for both the induction and maintenance of general anaesthesia. When compared to waking up following anaesthesia induction with any other medicine, this one is far faster and more comprehensive.<sup>[19-11]</sup>

Laryngeal reflex stability during Propofol anaesthesia facilitates LMA placement. As a result, the Laryngeal Mask Airway is now the standard for these kinds of patients. Compared to tracheal intubation, LMA calls for a lesser degree of anaesthetic depth and rarely results in post-operative sore throat. One of the greatest benefits of Propofol is that it facilitates a quicker recovery of awareness with fewer lingering effects on the central nervous system. Isoflurane has an extremely long half-life as an inhalant and a very poor solubility in blood and bodily tissues. It is metabolised very little and excreted mostly unaltered via the respiratory system. Maintaining anaesthesia requires a large volume of Isoflurane to be removed by the lungs. Isoflurane anaesthesia has a quick recovery time in humans because it is poorly soluble. When it comes to GA in day care patients, an LMA is favoured over a tracheal tube. According to research conducted by Joshi, Girish P., Inagaki, Yoshimi, et al; Molloy, Mary E., Buggy, Donal J., Scanlon, Patrick, and others, the Laryngeal Mask Airway is the most suitable airway for Daycase anaesthesia.<sup>[11-13]</sup> Postoperative throat discomfort after laryngeal mask anaesthesia was discovered to be related to ventilation method by Figueredo, Eduardo, Miguel Vivar-Diago, and Francisco Muoz-Blanco compared to mechanical ventilation, spontaneous breathing is much more comfortable.

In a study of medicated and unmedicated ambulatory surgery patients, McCrory, Connail R., MB and McShane, Alan J., showed that only unmedicated patients suffered stomach reflux. Adequate premedication avoided reflux and micro aspiration. Based on the research, we

chose a laryngeal mask for the study's airway management. After propofol, patients healed regardless of surgery length. Ebert T. J., Robinson B. J., Uhrich, Mackenthun A., Pichotta P. J. and Uhrich A., found that Isoflurane delayed recovery after long-duration surgeries. The body's response to drug withdrawal may explain this. Redistribution and metabolism speed up Propofol's recovery.<sup>[13,14]</sup>

Even in lengthy infusions, rapid metabolic clearance ensures that drug that returns from tissue storage sites to the circulation cannot prevent plasma concentration fall. In contrast, nearly little inhaled isoflurane is metabolized, therefore it is removed totally through the lungs. During extended anesthesia, isoflurane accumulates in fat tissues, slowing recovery. To avoid bias, we limited the study to 90-minute operations. Target-controlled infusions, where computer programs estimate plasma levels, are best for TIVA Propofol. These pumps' algorithms are based on Caucasian patients, hence they may not function for our patients. Manual stepwise infusions for TIVA are simple and effective. In a study by Sear, J. W., and Glen, J. B., manual stepwise Propofol infusions based on patient weight produced acceptable plasma levels and a smooth operation. Our trial employed slow infusions.<sup>[14,15]</sup>

Despite progressive infusions, some patients needed Propofol boluses due to uncontrollable movements. Propofol TIVA recovery was faster than Isoflurane. Joachim Boldt, Norbert Jaun, Bernhard Kumle, Martin Heck, and Klaus Mund discovered the same. Thomas J. Ebert, Brian J. Robinson; Toni D. Uhrich, Arden Mackenthun, Philip J. Pichotta, compared Propofol, Isoflurane, and Sevoflurane recovery. Propofol recovered faster (86.4 minutes) than Isoflurane (101.5 mins). The longer surgeries may explain the longer recovery times. Franklin Dexter and John H. Tinker found Propofol beneficial. Vincent, Robert D., Jr. Syrop, Craig H., VanVoorhis, Bradley J., Chestnut, David H., Sparks, Amy E.T., McGrath, Joan M., Choi, Won W. found no significant difference in duration between Propofol and Isoflurane. Propofol dramatically reduced postoperative nausea and vomiting. Propofol improved recuperation. Ashworth, Julie; Smith, Ian, found that Propofol recovery times were comparable to Isoflurane. The lipid solubility of Propofol and the increased body fat in elderly people caused both medications to have identical recovery times. Rowbotham, D. J., Peacock, J. E., Jones, R. M., Speedy, H. M., Sneyd, J. R., Morris, R. W., Nolan, J. P., Jolliffe, D., and Lang, G. found that the isoflurane group recovered faster. Isoflurane caused more nausea than Propofol, but emesis was equivalent. Isoflurane, like Moffat, A. and Cullen, P. M., wakes you up faster than Propofol. In this study, Propofol had a higher recovery rate than Isoflurane.<sup>[15-17]</sup>

Though our research just looked at how long it takes to recover, Propofol had significantly superior recovery quality overall. When Propofol was administered as the maintenance drug, there was no occurrence of postoperative nausea and vomiting, one of the most severe side effects of general anaesthesia. The pain-relieving effects of isoflurane are mild. The use of a powerful opioid such as Fentanyl plus the relatively minor nature of the procedures meant that this characteristic of Isoflurane had no bearing on the outcomes. The cost is a key consideration that was left out of this analysis. Since the research is being done at a government facility where care for the patients is provided at no cost to them, analysing the results will be extremely difficult.<sup>[17,18]</sup> The patient will not have to pay anything for the medications. When comparing the prices of Isoflurane with Propofol, many studies have found that Isoflurane is the more cost-effective option. However, the total cost of a stay in a high-dependency unit, the cost of skilled staff, and the cost of drugs used to control PONV are not compared.

## CONCLUSION

The recovery period and preparedness for home after undergoing Ambulatory Anaesthesia with Propofol as a Total Intravenous Venous Anaesthesia agent was found to be shorter when

compared to the inhalational maintenance approach with Isoflurane. During Phase I, both groups recovered at a similar rate. With Propofol TIVA, phase II recovery time was drastically reduced in comparison to Isoflurane maintenance anaesthesia. In comparison to Isoflurane maintenance, TIVA with Propofol results in a faster Home Readiness, which is preferable for day case procedures.

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