GENERAL ANAESTHESIA VS SEDATION FOR MINOR GYNAECOLOGICAL PROCEDURES - A COMPARATIVE STUDY

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ABSTRACT

Sedation using combined intravenous midazolam and fentanyl is a popular technique for minor gynaecological procedures. However, it is fraught with inconsistency in efficacy and has a greater tendency to perioperative oxygen desaturation. Fifty female ASA I patients scheduled for minor gynaecological procedures were given intravenous midazolam and fentanyl before surgery started. Intraoperative excessive movement that interfered with surgery and failure to maintain a patent airway were noted. Perioperative oxygen saturation was monitored with the pulse oximeter. In another group of 50 female ASA I patients, intravenous thiopentone was given and anaesthesia maintained with 67% nitrous oxide in 33% oxygen and 0.5% of isoflurane via a face mask. Results showed that 10% of the sedated patients had excessive movements that interfered with surgery, of which 6% needed a general anaesthetic. Twenty-two percent of the sedated patients needed maintenance of airway perioperatively. Perioperative oxygen desaturation was profound in incidence and degree in the sedated patients whereas no patient who received general anaesthesia desaturated. The perioperative incidence of desaturation in the sedated patients was 46%. Intraoperatively, 28% ($p<0.001$) of the sedated patients had oxygen saturation in the range of 85 to 90% and 18% of them ($p<0.01$) had oxygen saturation of less than 85%. Postoperatively 8% of the sedated patients had oxygen saturation of 85 to 90%.

We conclude that general anaesthesia is more efficacious and safer than sedation in patients scheduled for minor gynaecological procedures. The same minimum standard of monitoring applied to general anaesthesia should be used for sedated patients.

Keywords: sedation, anaesthesia, hypoxaemia

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INTRODUCTION

Many minor gynaecological procedures are increasingly being done in the day surgery unit and outpatient clinics. It is popular practice to perform such procedures under sedation. An informal survey revealed that the combined administration of midazolam and fentanyl is widely used.

This technique is easy to apply and thus obviates the need of the presence of an anaesthetist. Other advantages of this method include the avoidance of pollution, rapid and pleasant induction and recovery characteristics, minimal nausea and vomiting and hence encourages rapid turnover of cases.

Medical literature is, however, replete with warnings that midazolam can produce significant cardiorespiratory depression, the effect of which is even more pronounced with the concurrent administration of fentanyl.

The first aim of our study was to assess the efficacy of this technique compared to conventional general anaesthesia which consists of thiopentone-based balanced anaesthesia. Secondly, we sought to assess its safety by studying the trend of oxygen saturation of these two groups of patients using the pulse oximeter.

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METHODOLOGY

This study was approved by the Hospital Ethics Committee and informed consent was obtained from all patients.

One hundred ASA I female patients scheduled for minor gynaecological procedures were selected. Patients aged 16 to 60 in years and body weight ranging from 40 to 70 kg were selected. Patients with the following conditions were excluded: clinically significant cardiopulmonary disease, anaemia as evidenced by a haemoglobin content of less than 10 g%, polycythemia with a haemoglobin of more than 16 g%, anticipated difficult airway, pregnancy of more than 12 weeks, peripheral vascular disease, morbid obesity, drug addicts, chronic alcoholics, psychiatric patients, arrhythmias and baseline oxygen saturation levels of less than 95%.

On arrival in the operating room, intravenous access was established on the dorsum of the hand. Monitors used included a pulse oximeter, oxygen analyser, electrocardiogram monitor and Dinamap for blood pressure monitoring. Pulse oximetry readings were obtained from an Ohmeda 3700E pulse oximeter set in the fast response mode. The finger probe was placed on the thumb, index or middle finger. The plethysmographic waveform and signal strength indicator on the oximeter was observed for 3 minutes. A baseline oxygen saturation of 95% or more with not more than 1% fluctuation in the observation period, good signal quality with signal strength indicator of more than 24 pixels and a regular pulse rate of 50 to 100 beats per minute corresponding to the ECG monitor heart rate were required. Baseline blood pressure was also recorded.

Non-premedicated patients presenting for minor gynaecological procedure were consecutively assigned to Groups A and B. In group A, intravenous induction was achieved with fentanyl 1 µg/kg body weight followed by sodium thiopentone 4 to 5 mg/kg body weight injected over one minute. Loss of eyelid reflex was elicited before a face mask with 33% oxygen and 67% nitrous oxide with a total fresh gas flow of 6 litre/min was given. Anaesthesia was continued with isoflurane in the usual manner of inhalational anaesthesia. Ventilation was assisted manually by mask if apnea persisted for more than 20 seconds as judged clinically or if the oxygen satura-

Fig 1 - Oxygen Saturation
General Anaesthesia vs Sedation

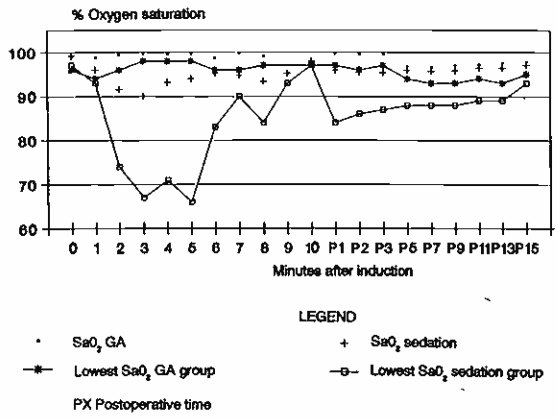

Table I - Demographic Data and Baseline Values

	GA Group	Sedation Group
No. of patients	50	50
Sex	Females	Females
Age (years)	29.9 (7.6)	29.5 (7.7)
Weight (kg)	53.1 (7.1)	51.2 (7.9)
Height (cm)	156.8 (4.8)	155.0 (4.0)
Smoker	1	0
ASA 1	50	50
Mean BP (mmHg)	83.5 (8.8)	81.7 (9.3)
Heart rate (bpm)	80.1 (11.2)	84.2 (8.2)
SaO_2(%)	99.0 (1.1)	99.2 (1.0)

tion dropped to less than 90% for more than 20 seconds.

Positioning for surgery with a Trendenlenburg tilt of 15 degrees was allowed when nitrous oxide and oxygen was administered. After the operation, the patient was placed in the supine position and allowed to breathe 100% oxygen for 3 minutes, followed by air. The patient was then wheeled to the recovery bay in the semi-recumbent position.

The pulse oximeter readings were recorded every 30 seconds, blood pressure readings every minute till the oxygen mask is taken off the patient and every 2 minutes thereafter for another 10 minutes. Apnea, respiratory obstruction, coughing and movement of fingers at the probe site were noted.

Group B patients were given fentanyl 2 to 2.5 µg/kg and midazolam 0.15 to 0.25 mg/kg over one minute. Positioning for surgery with a Trendenlenburg tilt of 15 degrees was allowed with the loss of the eyelid reflex. Intraoperative movements which might interfere with surgery, airway obstruction and apnea were noted and managed accordingly. If the oxygen saturation dropped to between 85 to 90% for more than 20 seconds, or < 85% at any time, oxygen with a flow of 6 litres/minute via a face mask and using a circle absorber circuit was given till the pulse oximeter read more than 95%. Perioperative management and monitoring were the same as for Group A patients. Recall and amnesia were noted after patients had recovered.

Statistical analyses were done using t test, X^2 and Fisher's exact test.

Table II - Incidence of Desaturation & Perioperative Events in the Sedated Group of Patients

	Intraoperative	Postoperatively
SaO_2 85-90%	14***	4
SaO_2 < 85%	9**	0
Airway support	8	4
Gross movements	5	-

\+ The above events were nil for the general anaesthesia group
*** $p < 0.001$
** $p < 0.01$

RESULTS

The 2 groups of patients were comparable with regard to age, weight, height and baseline oxygen saturation, blood pressure and heart rate (Table I).

Desaturation was taken to be an oxygen saturation reading of less than 90%. The perioperative trend of oxygen saturation was higher in the general anaesthesia group compared to the sedation group (Fig 1). The degree of oxygen desaturation was also greater in the sedation group (lowest oxygen saturation recorded was 67%) compared to the general anaesthesia group (lowest oxygen saturation recorded was 93%).

Perioperative desaturation was statistically significant in the patients given sedation compared to the group given general anaesthesia where no patient desaturated (Table II). When these patients who desaturated were given oxygen 6 litres/minute via a face mask, their oxygen saturation improved to >95% within a minute.

Twenty-two percent of the patients given sedation required assistance in maintaining their airway - 16% intraoperatively and 8% postoperatively (Table II). The airway was supported intraoperatively in the patients given general anaesthesia as this was an integral part of the anaesthetic technique. However all the patients in this group were able to maintain a patent airway postoperatively.

Five patients (10%) in the sedation group had gross movements compared to none in the group of patients given general anaesthesia. Of these five, three needed a general anaesthetic as the gross movements interfered with the surgery (Table III).

The mean arterial pressure and heart rate, however, did not vary by more than 10 and 20% respectively for both groups of patients.

The mean duration of operation was 4.5 minutes (range 2 to 8 minutes) in group A and 5.2 minutes (range 2 to 10minutes) in group B patients which was not statistically significant.

Two patients (4%) who were administered general anaesthesia each had one episode of mild postoperative vomiting which resolved spontaneously compared to none in the group given sedation.

The incidence of recollection was nil in both groups.

DISCUSSION

The ideal anaesthetic for minor gynaecological procedures of short duration should produce a rapid and smooth onset of action, intraoperative amnesia and analgesia, good surgical conditions, and a short recovery period without side-effects. Benzodiazepines can relieve anxiety, apprehension, tension and produce anterograde amnesia during unpleasant or painful procedures. These effects have been termed "intravenous sedation"[1]. The added advantage of minimal cardiorespiratory depression has made them useful for sedation during minor surgical procedures. However, some surgical procedures though

Table III - Characteristics of the Three Patients who needed a General Anaesthetic

Patient	Age (years)	Weight (kg)	Height (cm)	Duration of operation (mins)	Total Dose of Fentanyl μg	Total Dose of Dormicum mg	Lowest SaO_2 (%)
#1	18	42	155	8	120	10	81
#2	23	40	157	5	100	10	90
#3	31	40	160	6	100	10	90

minor, may be so painful that large doses of benzodiazepines are required and even then, the success of their usage depends heavily on their sedative properties. At such high dosages, cardiorespiratory depression can be profound.

Opioids also provide sedation and analgesia. When used as a sedative drug, large doses are required and respiratory depression, nausea, vomiting and pyschotomimetic effects often ensue.

A combination of benzodiazepines and opioids reduces the dosages of both drugs required. This decreases the incidence of side effects and complications, thereby improving the quality of the surgical environment[2,12]. Therefore, this combination is an attractive sedative technique for procedures like minor gynaecological surgery. It is useful as these procedures are increasingly being performed as day cases in the hospital setting as well as in the outpatient gynaecological clinics.

In our study, midazolam was the benzodiazepine used[6-8] because of its rapid onset of action, short half-life and lack of second peak phenomenon. Other advantages include minimal local venous sequelae[12] and profound amnesia. In our study where 50 patients received intravenous midazolam and fentanyl, no patient had pain on intravenous injection or recall. Fentanyl is the opioid of choice because of its potency, quick onset of action, short half-life and cardiovascular stability.

In the group of patients who received general anaesthesia, no patient desaturated. This is not surprising as administering oxygen is an integral part of the anaesthetic technique. Looking at the trends of perioperative oxygen saturation, the incidence and degree of desaturation were significant in the group of patients given intravenous midazolam and fentanyl. A significant 46% of the sedated patients had oxygen desaturation within 3 minutes of administration of fentanyl and midazolam. Therefore providing oxygen enriched air should be made routine when patients receive sedative drugs[13,14].

The high incidence of desaturation in sedated patients suggests that monitoring should be mandatory. Pulse oximetry should be made an integral part of monitoring as it can give an early warning of hypoxaemia. Early intervention may prevent many potential disasters[15]. Minimal monitoring standards as recommended by the Singapore Society of Anaesthesiologists[16] should be adhered to. These include the noninvasive blood pressure monitor, continuous electrocardiogram and the pulse oximeter[16,17].

Twenty-two percent of those patients who were given intravenous midazolam and fentanyl needed assistance in maintaining a patent airway perioperatively (16% intraoperatively and 8% postoperatively). It is significant to note that not all the sedated patients could maintain a patent airway, thus emphasising that vigilance is important in these patients. When general anaesthesia was employed, the anaesthetist held the patient's jaws intraoperatively as an integral part of the anaesthetic technique.

Five patients in the group given intravenous midazolam and fentanyl had gross movements in response to surgical stimuli. Three of them required a general anaesthetic. These three patients did not have any predictor of increased drug requirement such as obesity, a prior history of smoking or a long surgical procedure Patient #1 was a 155 cm, 42 kg, 18-year-old requiring termination of pregnancy at eight weeks of gestation. She was given a total of 120 μg of fentanyl and 10 mg of midazolam. Despite these dosages, she responded vigorously to surgical stimuli rendering it impossible for the surgeon to complete the procedure. The decision to conduct general anaesthesia was made as she desaturated (81% oxygen saturation) and further administration of midazolam would cause the oxygen saturation levels to fall further. A dose of 30 mg of propofol was administered, followed by 6 litres per minutes of 33% oxygen in 67% nitrous oxide and 0.5% isoflurane enabled the rest of the procedure to be completed. The duration of operation was 8 minutes. Patients #2 and # 3 had similar problems (oxygen saturation was 90% for both). Oxygen desaturation would not be detected if no pulse oximeter was used. Further administration of midazolam or fentanyl could have led to dire consequences.

Sedation is a popular technique used in outpatient gynaecological clinics for minor gynaecological procedures. Midazolam is given as the sole drug, or in combination with fentanyl in fixed doses regardless of the patients' weight and surgical needs. Drug dosages should be titrated to response instead of administering fixed doses for every patient. When patients move excessively to surgical stimuli, further administration of intravenous midazolam or fentanyl may not be wise, especially if the oxygen saturation shows a falling trend or the patient has already desaturated.

Benzodiazepines are not only used for "intravenous sedation"[1]. They are also used to induce general anaesthesia. The point where sedation ends and anaesthesia begins is not clear. Therefore, if such a technique is performed by non-anaesthetic trained personnel, guidelines must be drawn up to govern its usage. The Joint Commission on Accreditation of Health Care Organisation. (JCAHO) standards[18] for obstetricians may also apply here. In brief, it states that for an obstetrician to perform minor blocks (pudendal, paracervical blocks) or major anaesthesia (epidural, spinal, caudal), specialised training in airway management, cardiopulmonary resuscitation and treatment of complications is required. Similarly, before administering any sedative and analgesic drug, one should be familiar with the pharmacokinetics and pharmacodynamics of the drug used. Also, one should have training in airway management, cardiopulmonary resuscitation and management of other complications that may arise as a result of using sedation for painful and unpleasant procedures. The promulgation and wide acceptance of monitoring standards by the American Society

Anaesthesiologists as well as the Singapore Society of Anaesthesiologists[16,19] have resulted in early detection of untoward events during anaesthesia and hence an improvement in the quality of care. These guidelines should be used to promote and ensure patient safety during sedation for procedures done in the gynaecological clinics especially in the absence of an anaesthetist.

CONCLUSION

From the results of our study, general anaesthesia is preferred to sedation for minor gynaecological procedures. Sedation, though easy to administer, lacks consistency in efficacy and safety. Administration of recommended drug dosages do not always ensure good surgical conditions. There is a greater tendency to oxygen desaturation and our results showed significant incidence of perioperative hypoxaemia. The same standard of perioperative care as for general anaesthesia should be maintained. This includes monitoring, maintenance of airway patency, familiarity with drug dosages and their side effects and availability of oxygen. One should also be trained in cardiopulmonary resuscitation and management of airway obstruction and other complications.

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