

Anaesthetic Complications In The Recovery Room

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ABSTRACT

Introduction: The immediate post-operative period in the recovery room is a known period of high risk for anaesthetic complications to occur.

Aims: We wanted to know the incidence and nature of our recovery room patients in the main-theatre complex of Hospital Kuala Lumpur.

Method: A prospective study was conducted over a two-month period on all patients receiving either regional and/or general anaesthesia by an anaesthetic doctor admitted to this recovery room. Complications were documented according to predefined criteria.

Results: Out of a total of 1,995 patients, 50(2.5%) had some form of anaesthetic complication. Fifteen patients had more than one complication. The most common was pain (23 patients) followed closely by nausea and vomiting (21 patients). There were 32 patients with CNS problems (including the 23 with pain), 21 with GIT, 10 with CVS, 2 with respiratory and 3 with other problems.

Conclusion: Our recovery room complication rate is acceptably low. Knowing the type and frequency of problems (in this case, mainly pain and nausea and vomiting) can further improve the figure. The role of anaesthesiologists has expanded as they are not only expected to ascertain the safety but also the comfort of patients post-operatively.

Keywords: anaesthesia, post-operative complications; post-operative care, recovery room

INTRODUCTION

It is a widely accepted anaesthetic teaching that the immediate post-anaesthetic period in the recovery room is a period of high risk to patients, with complications being reported to be around 3.1% - 30%^(1,2). Improved standards and principles of care in the recovery room have been emphasised and quality assurance of anaesthetic care has assumed an important role. Most of the literature dealing with recovery room refer to the principles and management rather than the actual nature and frequency of complications.

We studied the incidence and nature of our recovery room complications in the main-theatre (consisting of 10 operating-rooms) in the 2,600-bedded Hospital Kuala Lumpur, a general hospital to which the National University of Malaysia is attached.

METHODS

From 1 January to 28 February 1995, all cases, elective or emergency, who had either a regional and/or general anaesthesia administered by an anaesthetic doctor and admitted to the recovery room of our main operating theatre were studied.

Anaesthetic complications arising in the recovery room were documented by the nursing staff on an assessment form according to predefined criteria (Table I)⁽¹⁾. The anaesthetic doctor-in-charge of the patient will then be informed of the complication noted, in view of further action. Details of the patient's age, sex, race, ASA Classification, technique of anaesthesia, surgical procedure, duration of operation, onset of complication and nurse-to-patient ratio in the recovery room at the time of complication were also recorded.

In our hospital, patients are routinely transported to the recovery room accompanied by the anaesthetic doctor and nurse and the case is formally handed over to the recovery room staff. All patients receive supplemental oxygen. ECG monitors, pulse oximeters, automated/manual blood pressure monitors, overhead radiant warmers, suction apparatus, oxygen masks and airway adjuncts are readily available in the recovery room. Standard observations include conscious level, colour, pulse rate, pulse regularity, blood pressure, respiration and motor movement. These parameters are scored on a 'post-anaesthetic score form' (maximum of two points each; total 14) by the recovery room nurse and finally by the anaesthetic doctor-in-charge before being discharged to the ward.

Patients bypassing the recovery room such as those sent directly to the intensive care unit are excluded. Neurosurgical, urological, obstetric and general paediatric patients have their own operating-complexes elsewhere and are not included in the study unless done on an emergency basis.

RESULTS

Out of a total of 1,995 patients admitted to the recovery room, 1,117(56%) were elective and 878(44%) were emergency cases. Fifty patients(2.5%) were documented as having one or more anaesthetic-related complications; and of these, 41(82%) had elective and 9(18%) had emergency surgeries.

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Table I⁽¹⁾ - Criteria for recovery room complications

System	Parameter	Criteria
Cardiovascular	Bradycardia	HR <60 bpm (or 20% below preanaes level)
	Tachycardia	HR >100 bpm (or 20% above preanaes level)
	New arrhythmia	ECG evidence
	Hypertension	Systolic > 170 mmHg
	Hypotension	Systolic < 90 mmHg
	Myocardial Ischaemia	Chest pain / ECG evidence
Respiratory	Cyanosis	Central cyanosis / SpO ₂ < 95%
	Laryngeal obstruction	Stridor
	Bronchospasm	Wheeze
	Aspiration	Clinical suspicion
	Reintubation	Required
	Hypoventilation	< 7 breaths/min
Gastrointestinal	Vomiting	Observed
	Nausea	Volunteered / Observed
Central nervous system	Unresponsive	To verbal command 15 mins after arrival to recovery room
	Pain (mild/mod/severe)	Volunteered
	Agitation/Dysphoria	Observed
Periphery	Residual paralysis	Clinical assessment
	Hypothermia	<35.5°C
	Hyperthermia	>38.5°C

preanaes - pre-anaesthesia
mod - moderate

Of the fifty patients with complications, 27(54%) were females. Twenty-one (42%) were Malays, 11(22%) Indians, 9(18%) Chinese and 9(18%) others and were mainly young to middle-aged, with 32 patients (64%) between 20-49 years. The anaesthetic techniques used were: relaxant anaesthesia 42 cases (84%), spontaneous ventilation 4 cases (8%) and regional combined with some form of general anaesthesia 4 cases (8%). None had regional anaesthesia (spinal or epidural) alone. The ASA Classification were: ASA I, 29 patients (58%); ASA I(E), 6 patients (12%); ASA II, 12 patients (24%); ASA II(E), 3 patients (6%). None was classified as ASA III and above. Duration of operation was between 1/2 and 2 hours in 44 patients (88%), while none was less than 30 minutes. The category of patients were General Surgery (20 patients, 40%), Orthopaedics (12 patients, 24%), Gynaecology (9 patients, 18%), Ear, Nose and Throat (5 patients, 10%), Urology, Plastic, Dental and Eye (1 patient each).

Most complications occurred in the recovery room in the first 30 minutes after arrival (46 cases, 92%), beyond which, fewer complications happened and they were all either vomiting or in pain. When complications occurred, it was noted that the nurse-to-patient ratio was <1 in 20 cases (40%), 1 in 18 cases (36%) and >1 in 12 cases (24%).

Central Nervous System

Two elective patients were unrousable in the recovery room for 60 and 70 minutes respectively. Both had general anaesthesia with narcotic and inhalational supplementation and a duration of operation between 1/2 and 1 hour. Two patients were noted to be restless. One was attributed to pain on micturition via the urinary catheter and the other was a known chronic obstructive airway disease (COAD) case who developed hypoxaemia with cyanosis in the recovery room following general anaesthesia (GA) for emergency laparotomy. Agitation was documented in 5 patients and all of them had an accompanying moderate to severe pain.

Pain, the most frequent complication, occurred in 23 patients (46%) of whom 13 were males. There were 8 Malays, 6 Indians, 3 Chinese and 6 others. Seventeen (74%) were between 10-39 years, 16 (70%) underwent elective surgery and 15 (65%) had major operations. Of those with pain, 19 had relaxant anaesthesia, one had spontaneous anaesthesia and 3 had a combination of regional anaesthesia with general anaesthesia. None had regional anaesthesia as the sole anaesthetic. Four described the pain as mild, 3 as moderate and 16 as severe. Many of those who described the pain as moderate or severe had accompanying complications such as agitation (5 cases), hypertension (1 case, an 18-year-old with no known hypertension), vomiting (3 cases) and bradycardia (1 GA case).

Cardiovascular System

Ten patients developed abnormal CVS parameters. Three had hypertension. Two were attributed to pain and required intravenous morphine while the third was a COAD patient who was tachycardic, hypoxaemic with cyanosis, restless and febrile following an emergency laparotomy. Tachycardia was seen in three patients. One was the hypoxaemic patient, another was associated with pain while the third was hypovolaemic and required blood and volume expanders. Hypotension was noted in 2 patients and both required volume expansion. One patient underwent a 3-hour femoral and tibial interlocking nail with osteotomy operation while the other who had a urethral exploration also had a concomitant pelvic fracture. Two patients had bradycardia. One was attributed to epidural given in combination with GA and the other was associated with moderate pain in a man who had relaxant anaesthesia for herniorrhaphy. The bradycardia resolved without any pharmacological intervention.

Respiratory System

Two patients had central cyanosis which occurred within 5 minutes of arrival in the recovery room. One was the COAD case described above. The other was an ASA I, a 28-year-old male who had relaxant anaesthesia for an elective orthopaedic surgery. He had intra-operative bronchospasm following induction. He improved with suctioning and a higher oxygen supplementation but was further observed in the intensive care unit.

Gastrointestinal tract

Nausea and vomiting was our second most common complication. Twenty-one patients (42%) experienced this, and almost three-quarters (71%, 15 patients) were female. All patients underwent elective surgery and all had some form of general anaesthesia. Sixteen patients (76%) were between 20-49 years. Complications in the five patients from the ENT unit were all nausea and vomiting cases. Four gynaecological patients had nausea and vomiting. In 13 patients, the symptoms subsided without any medication. Two patients were given pethidine as pain was thought to be the primary cause of the nausea and vomiting. The others received intravenous metochlopramide or droperidol.

Other complications

Other complications noted were hypothermia (2 cases), hyperthermia (1 case) and pain on micturition (1 case).

DISCUSSION

Since the first recovery room formally opened in 1923⁽¹⁾, it has evolved into a specialised area of intensive monitoring where specially trained staff care for all patients emerging from general or regional anaesthesia. The recognition that this period has a high morbidity and mortality risk, the awareness of quality assurance in anaesthesia and the advent of increasingly complex surgical procedures have resulted in guideline⁽³⁾ and standards for recovery room care, specifying general principles, design features, equipment, staffing requirements, management and supervision.

Our study showed a 2.5% incidence of recovery room complications. This figure is reduced from the 1970's to the 1980's published papers^(1,2). An improvement is expected, considering the safety standards of today's anaesthesia. On the other hand, the figures may not be comparable due to different patient population. Nevertheless, this rate requires scrutiny to determine the nature and seriousness of complications we now encounter. As such, our findings are treated as a descriptive overview of that sub-group of patients in whom complications were documented.

Our most frequent complication, pain, is a common feature in the recovery room^(1,4). It reflects the patients' expectations and the inadequacy of its management. This needs to be attended to not only for the patients' comfort but because it can cause other serious physical signs such as agitation, restlessness, hypertension, tachycardia and even cyanosis in the event of inadequate respiration. As pain was more frequent following general anaesthesia, regional anaesthesia is advocated⁽⁵⁾. The recently established acute pain service in our hospital should reduce this problem.

Post-operative nausea and vomiting, our second most frequent complication, has often been reported to be high, ranging from 10% - 80% incidence⁽⁶⁾. This is not only unpleasant for the patient but carries the

Table II - Distribution of recovery room complications in 50 patients

System	Complication	Frequency
Central nervous system (32 patients)	Unresponsive	2
	Restlessness	2
	Agitation	5
	Pain	23
Cardiovascular (10 patients)	Tachycardia	3
	Bradycardia	2
	Hypertension	3
	Hypotension	2
Respiratory (2 patients)	Cyanosis	2
Gastrointestinal (21 patients)	Nausea/Vomiting	21
Others (3 patients)	Hypothermia	2
	Hyperthermia	1
	Pain on micturition	1

serious risk of aspiration if not properly attended to in recovering patients. The retching and the act of vomiting may jeopardise certain surgical procedures such as ocular and tympanic surgeries. Known precipitating factors include female gender, obesity, previous anaesthetic history of vomiting, anxiety, motion sickness, narcotic premedication, certain anaesthetic agents, gastric distension or delay in emptying, patient movement following surgery and certain procedures such as those involving extraocular muscles, middle-ear, laparoscopic gynaecological and intra-abdominal surgery^(4,6,7). Pain is also thought to provoke nausea and vomiting and opiates have been successfully used as anti-emetics⁽⁸⁾, as occurred in two of our patients.

Although it is not surprising that some patients will be unrousable on arrival in the recovery room, prolonged unresponsiveness requires the undivided attention of a trained nurse and ultimately worsens the often congested recovery room. The lateral position should be practised to avoid airway or aspiration problems in such patients.

In the recovery room, it is important to realise that many symptoms and signs are related and the causative factor should be determined for effective treatment. In our series, for instance, restlessness was caused by pain on micturition in one case and hypoxaemia in another.

We had 20% cardiovascular and 4% respiratory problems. This is reduced from reports in the 1980's^(1,9) which cited about 50% CVS and 7.5% respiratory abnormalities. The downward trend is encouraging, because following reversal, the immediate goal of anaesthetic recovery is return of the patient's ability to independently maintain respiratory and circulatory functions. The ultimate goal is return of all mental, sensory and motor abilities to pre-anaesthetic levels⁽¹⁰⁾.

None of our patients developed new arrhythmias or myocardial ischaemia in the recovery room. These problems used to be more frequently encountered reflecting either improved judgement or higher suspicion pre-operatively or intra-operatively by the anaesthetists or such high-risk patients may have bypassed the recovery room and transferred directly to the intensive or cardiac care unit.

All patients require close attention following reversal and on transfer to the recovery room as it is known, the oxygen saturation can fall precariously during this period, especially in ill patients. Most of our complications occurred early, within 30 minutes of arrival, beyond which were vomiting or pain. Patients who develop intra-operative problems, such as hypoxaemia, must be followed closely in the recovery room as they are considered as high-risk patients to cause recovery room complications⁽¹¹⁾.

Airway and respiratory problems such as obstruction, bronchospasm, aspiration, reintubation

and hypoventilation do not appear as frequently as they used to. Credit should be given to strict anaesthetic principles and standards of today and to the advent of newer, safer and shorter-acting anaesthetic drugs.

We had two cases of hypothermia (4%) and the reported incidence varies from 5% - 65%^(12,13). Hypothermia occurs because of inevitable massive blood transfusion, prolonged operations with exposure, vasodilatation due to anaesthetic agents, especially volatile agents or regional procedures and inability to equip each operating-room with adequate warming facilities such as warming mattresses, humidifiers and individually controlled operating-room temperature.

As a general overview, our series showed that most recovery room complications occurred in elective cases mainly in the young to middle-aged with no gender preponderance. All had some form of general anaesthesia. As such, we recommend regional anaesthesia whenever feasible.

It is also noteworthy that none of our patients with complications was classified as ASA III end above. Young patients with ASA I or II undergoing elective surgery had the most problems and therefore, must be watched carefully. This finding agrees with Cohen and Duncan⁽¹⁴⁾ who found that minor postoperative complications were not associated with increasing ASA physical status but were found more frequently among ASA I and II patients, and those with higher ASA categories were less likely to have recovery room complications than ASA patients. It is thought that ill patients bypassed or did not make it to the recovery room or there are other factors more important than patients pre-operative ASA status.

Although the nurse-to-patient ratio was <1 in 40% of our complications, this may be a misrepresentation of the adequacy of staff because charting was done only when complications arose and that is during 2.5% of the total patient volume. Furthermore, our recovery room nurses have various levels of experience, not all of whom had formal anaesthetic training and these were not taken into consideration. One must bear in mind that recovery room nurses provide specialised care to diverse patient population in an environment of constant activity, high volume, rapid turnover, and intense pressure requiring quick, effective responses when emergencies occur⁽¹⁵⁾. In 40% of our complications, there was not enough nurses to attend to the patient on a one-to-one basis. Adequate well-trained staff and well-equipped recovery rooms play a vital role in reducing immediate post-operative complications.

Although anaesthetic practice is associated with low mortality rates in recent years, it is still associated with significant morbidity. A nine-year follow-up of 112,000 anaesthetics showed a rise in recovery room complications from 3.1% in 1975 - 1978 to 5.9% in 1979 - 1983⁽²⁾.

CONCLUSION

The recovery room period remains a time of high potential risk of anaesthetic morbidity but awareness of this fact, and knowing the type and frequency of complications can reduce its incidence. This is partly because pain, nausea and vomiting, which make up the majority of our complications, are remediable.

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