A REVIEW OF 6978 CONSECUTIVE ADMISSIONS TO THE RECOVERY ROOM AT A UNIVERSITY HOSPITAL

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ABSTRACT

Recovery from anaesthesia is a time of potential danger to the surgical patients. A retrospective audit of all recovery room admissions over a period of 18 months was carried out at the Aga Khan University Hospital. During this period 6978 patients were admitted to the recovery area and 695 had one or more complications. The complications were recorded by the recovery room nursing staff in a recovery log book. The breakdown of complications according to different physiological systems is discussed. Several surveys have reviewed complications in the western population, but in contrast, no study is available in Pakistani patients. It is recommended that since one in ten patients is likely to have a problem in the early post-operative period, the local hospitals should provide adequate facilities meeting the criteria laid down for the recovery rooms in modern anaesthetic practice' (JPMA 41: 2, 1991).

INTRODUCTION

Post-operative recovery rooms serve to care for patients until they have sufficiently recovered from the physiological derangements produced by operations done under general, regional or local anaesthesia. All the recent morbidity and mortality studies have emphasized on adequate recovery room facilities. These rooms have also been labelled as the Cinderalla of anaesthetic speciality with inadequate staffing and equipment, and one in five patients likely to have complications[1]. Studies have previously been carried out to define the incidence and nature of complications occurring in the recovery room. To date no such study has been done on Pakistani patients who present with more advanced pathology and different disease patterns compared to the western patient population. As part of our quality assurance programme we studied the incidence and nature of complications that occurred in all the patients admitted to the recovery room over a period of one and a half years.

PATIENTS AND METHODS

The Aga Khan University Hospital is a 358 bed teaching hospital with a present surgical workload of 5,000 to 6,000 cases per year. Since the inception of the hospital in 1985 a recovery log book has been used by the nursing staff at the institution. Data recorded includes the patient's demographics, procedure performed, anaesthesia technique that was used, whether general or local, name of the surgeon and the anesthetist and documentation of any unexpected event occurring during the patients' stay in recovery room. Data from January1988 to end of June 1989 was included in this audit. During the period under review 6978 patients passed via the recovery room after receiving general or regional anaesthesia. The patients who were shifted to the intensive care unit directly from the operating room were not included in the review. The standard care given to all patients admitted to recovery room included supplemental oxygen, monitoring of heart rate, blood pressure and respiratory rate, state of consciousness and colour of skin. All observations were recorded on a standard recovery room chart. Post Anaesthesia Recovery (PAR) score was also recorded on this chart every 15 minutes. ECG and oxygen saturation were monitored in selected cases. A nurse-patient ratio of one nurse to one

unresponsive patient was maintained. The ratio was increased to one nurse per two patients when the patients were awake. The following problems were documented in the logbook by the nursing staff; if the patient complained of any pain, the narcotic drug given and its dose, any dysrhythmias, any episode of severe hypertension, i.e., systolic blood pressure more than 200mm of Hg or hypotension, i.e., systolic blood pressure less than 80mm of Hg any drugs used for treatment of hyper or hypotension. Nausea and vomiting were recorded with the treatment given, and any respiratory problems were also recorded.

RESULTS

Of 6978 patients who presented to the recovery room, 695 had one or more complications. The overall post-anaesthesia recovery room complication rate was 9.95% (Table 1).

Table I. Distribution of complications occurring in the recovery room-n=6978.

Systems	n	Complications	Frequency & Percentage
Central Nervous	389	Pain	375
		Agitation	12
		Convulsions	2
Gastrointestinal	237	Nausea	76
		Vomiting	161
Cardiovascular	101	Bradycardia	65
		PVC's	10
		SVT	2
		Myocardial ischemia on ECG	2
		Hypertension	15
		Hypotension	6
		Cardiac arrest	1
Respiratory	16	Bronchospasm	5
		Laryngeal Spasm	3
		Hypoventilation	7
		Pulmonary oedema	1
Miscellaneous	14	Hypoglycaemia	5
		Urticaria	2
		Uncontrollable shivering	5
		Suspected transfusion reaction	1
		Hypothermia	1

n = Number of patients

* Some patients had more than one complication

Further analysis of the results showed 101 (14.6%) patients having complications referable to the cardiovascular system, 375(53.9%) complained of pain in recovery, 16 (2.3%) had complications pertaining to the respiratory system, 14 (2.1%) patients showed other complications relating to the nervous system, 161 (23.1%) had vomiting (observed) and 76 (10.9%) complained of nausea (volunteered). 13 (1.9%) had miscellaneous problems like hypoglycemia, urticaria, hypothermia, etc (Table 1). Only one (0.14%) patient had cardiac arrest in the recovery room, and could not be resuscitated. Some of the patients had more than one complication. The commonest problem in the

recovery room was pain (53.95%). The patients voluntarily complained of pain and received analgesia. Of these 36% were females. The second commonest problem was vomiting (23.85%). Only 11% of these patients had associated nausea. There was a slight preponderance of females in this group. The incidence was highest in the general surgical patients followed by gynaecological and urological surgery. These three formed 78% of the patients having vomiting post-operatively. Only 37% of the general surgery patients who complained of vomiting had surgery where gastrointestinal system was involved. Eleven percent patients complained of nausea. The distribution according to the surgical speciality mirrored vomiting and there was again a slight preponderance in females. Cardiovascular problems which needed treatment were seen in 101(14%) patients. Of the total 65(66%) had bradycardia i.e., heart rate less than 60 beats/minute. The frequency was significantly higher in males and in urological surgery. Ten (9.9%) patients had premature ventricular ectopics which required treatment with lignocaine in-fusions, 2 had supraventricular tachycardia, 2 showed evidence of myocardial ischemia on the ECG and one of them developed changes of acute myocardial infarction and had a cardiac arrest in recovery. Full resuscitation was tried but the patient died. Fifteen patients had systolic hypertension above 200 mm of Hg and required treatment, majority of these had either urological surgery or emergency caesarean section with pre-eclamptic toxemia. Six patients became hypotensive, i.e. systolicblood pressure less than 80 mm of Hg due to hypovolemia and required aggressive measures to counteract this. The frequency of respiratory complications was much less, only 16 (2.3%) patients had problems in recovery. Of these 5 developed bronchospasm, 3 laryngeal spasm, and 1 pulmonary oedema with x- ray evidence. Seven cases developed hypoventilation due to either central or peripheral cause, out of which 5 required reintubation in recovery. The other problems pertaining to the central nervous system were generalized convulsions in 2 cases, and 12 were graded as agitated and restless inspite of adequate analgesia. The other miscellaneous problems that occurred in the recovery room are given in Table 1. Five patients developed hypoglycemia and were treated with dextrose. All of these were known diabetics. Two patients had urticaria which required antihistamine, and one had a suspected blood transfusion reaction. Five patients had uncontrollable shivering and one patient had documented hypothermia.

DISCUSSION

This data identifies the subsets of patients who are at a risk of developing complications in the recovery room, and analyzes the nature and frequency of these complications. The use of the recovery room was described by Florence Nightingale in 1863[2], but it was not until 1923 that the first recovery room was opened[3]. All the recent morbidity and mortality studies have emphasized on the need of a properly staffed and equipped recovery room. Studies on morbidity and mortality associated with anaesthesia showed that 33% of the patients who died within 6 days of surgery for various reasons were denied proper recovery facilities[4]. Very few hospitals in Pakistan have this facility at hand. Among those that do have, majority lack firm guidelines as to the nurse/patient ratio, the essential equipment required, the responsibilities of various staff, discharge of the patient to the wards etc. No minimum criteria of monitoring in the recovery room has yet been put forward. The recovery room complications vary with the type of patient population, various surgical specialities, and the anaesthetic techniques employed. The majority of our surgical patients have concomitant medical problems, and the disease in some is at a far advanced stage compared to the western population where the patients are picked up much earlier by the health services. All surgical specialities are available at our university except cardiac surgery. The anaesthetic techniques and practices though similarly practiced as in the western hemisphere are limited due to the non-availability of a number of short acting drugs. An overall incidence of complications (9.9%) compares well with other similar studies[3,5]. Pain was the commonest complaint in the recovery room. It maybe a contributory factor in causing nausea and vomiting, hypoxia,

hypertension, hypotension, hyperventilation and restlessness. Therefore it should be treated on a high priority basis. Fifty five percent of our patients required analgesia in the recovery room. This probably reflects on the non-availability of short acting narcotic drugs in our country and, therefore, the judicious use of longer acting agents like pathidine, buprenorphine and morphine by the anaesthetists, due to the fear of side effects. The incidence of post-operative pain in males was about twice that of female patients. The next complication was vomiting and nausea. The combined frequency of nausea and vomiting in various studies varies from 25 - 80%[6,7]. The causes of nausea and vomiting in the post- operative period are variable, like intraoperative use of drugs with an emetic action, respiratory obstruction, pharyngeal irritation, gastric distention and intraperitoneal operations. Certain types of surgery, e.g. gynaecological surgery, ophthalmic surgery and otological operations are particularly associated with nausea and vomiting. In our survey the incidence was highest in general surgery followed by gynaecological and urological surgery. It has also been pointed out that there maybe a higher incidence in the females; in our surveythere was no difference between the two sexes for both complaints. Fourteen percent of the patients had some problem pertaining to the cardiovascular system. Bradycardia was the most common problem. Most of these patients had urological surgery performed on them. Some of these patients could have been on concomitant beta blocker therapy for the treatment of hypertension. The other dysrhythmias that were seen in recovery were premature ventricular ectopics, and supraventricular tachycardia. If the patient was not suffering from ischemic heart disease pre- operatively then hypoxemia and hypercarbia may be contributory factors in dysrhythmias in the recovery period. Myocardial ischemia was seen in two patients. Both had previous history of ischemic heart disease. One of the patients was a 54 years old, obese, hypertensive, with obstructive sleep apnea syndrome, and had uvuloplasty done, became hypertensive in recovery and started bleeding actively from the site of surgery in the mouth and subsequently had problems with the upper airway. An emergency tracheostomy was performed in the recovery room but the patient showed acute ischemic changes on the ECG, ST elevation leading to cardiac arrest. He was the only patient among the group who had a cardiac arrest in recovery. The causes of cardiac arrest in the immediate post-anaesthesia recovery period have been listed by Jolly and Lee[8] and are airway obstruction, previous cardiovascular problems, inhalation of blood or vomit, and inadequate respiratory exchange due to partial block or respiratory depression because of opiates and anaesthetic agents. There is still a lot of confusion about the incidence, significance and treatment of post-operative hypertension. The possible contributing causes are previous history of hypertension, pain, hypercarbia, fluid overload and very rarely an underlying pheochromocytoma. In our study 15 patients had hypertension with systolic blood pressure above 200 mm of Hg. All these patients required active treatment with antihypertensive drugs. This may be an underestimate since the patients who did not require active treatment were not listed by the nurses. In one study the incidence of post-operative hypertension was 20.6%[9] ,but the levels of blood pressure taken after which the patient was considered hypertensive were more than 140 systolic and 90 diastolic. The causes of hypotension in the recovery room are hypovolemia, drug overdosage, myocardial failure, dysrhythmias, septicemia, pain and rarely adrenal insufficiency. Six patients needed active treatment for hypotension. Respiratory problems accounted for 2.3% of all complications. Inadequate ventilation in the recovery has several causes[10]. Five patients had bronchospasm in recovery, 3 developed laryngeal spasm and 8 had difficulty in breathing, of these 9 required reintubation and ventilation. The incidence of reintubation compared to the total number of admissions to the recoveryroom was 0.13%. This was similar to other reports[11]. Among the patients who required reintubation, 5 were hypoventilating post- operatively which could have been due to overdosage of anaesthetic drugs, 1 had a transnasal hypophysectomy and collapsed in the recovery, 1 neonate had seizures and required intravenous phenobarbitone and 2 patients had severe bronchospasm. Three patients who had persistence of narcotic and muscle relaxant effect are examples of error ofjudgement by the anesthetist and therefore preventable. Since the use of oxygen saturation monitors has become

common during anaesthesia many of the studies have focussed on the incidence of hypoxemia in the recover2y room. One study has given this incidence as 14%[12]. Hypoxemia in recovery is caused by inadequate ventilation, the causes of which have been enumerated in Table II,

Table II Causes of inadequate ventilation in the recovery room.

A. Respiratory Depression		
1. Failure of central control	-	Drugs
	-	Carbondioxide washout
	-	Trauma
2. Failure of neuromuscular junction		
3. Limitation of chest movement	-	Pain
	-	Gastric distention
	-	Dressings
B. Respiratory Obstruction		
1. Upper airway		
a. Anatomical	-	Tongue
	-	Extraneous material
	-	Fascial or laryngeal swelling
b. Reflex		
2. Lower airway		
a. Bronchospasm		
b. Secretion		

ventilation perfusion abnormality, atelectasis, pulmonary oedema, fall in cardiac output and hypothermia. We do not routinely monitor all our recovery patients with oxygen saturation monitors except those who are critically ill. Besides pain the other problem pertaining to the central nervous system was that of 12 patients who were documented as agitated and dysphoric and the nursing staff had difficulty in controlling them. The causes of agitation in recovery are pain, hypoxia, respiratory obstruction, hypotension anxiety, use of ketamine as an anaesthetic agent and full bladder. Two patients had fits, of whom one had eclampsia and the other was a 13 days old neonate who had intestinal obstruction and had a history of seizures due to metabolic encephalopathy. Post-anaesthesia shivering is common during recovery from anaesthesia. The exact mechanism is unknown but pain, decrease in the sympathetic activity, adrenal suppression, uninhibited spinal reflexes, pyrogen release, ineffective thermoregulation and respiratory alkalosis have all been implicated. The risks associated are increase in the metabolic demands and therefore higher incidence of hypoxia, wound dehiscence, and damage to delicate surgical repair[13]. Only one patient had hypothermia in the recovery room severe enough to require special measures. The routine use of warming blankets and fluid warmers in all major surgery may account for a lower incidence of this complication. About 60-80% of post- surgical patients are said to have a temperature less than 36°C on admission to recovery[14]. Other problems seen were hypoglycemia in 5 patients, all these patients were known diabetics, urticaria in 2 patients and suspected transfusion reaction in one. Out of the total 6978 patients passing via the recovery there were

15 unscheduled admissions to the ICU due to unanticipated severe problems (0.23%). The causes in these patients which merited ICU admissions are given in table III.

Table I. Distribution of complications occurring in the recovery room-n=6978.

Systems	n	Complications	Frequency & Percentage
Central Nervous	389	Pain	375
		Agitation	12
		Convulsions	2
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		Urticaria	2
		Uncontrollable shivering	5
		Suspected transfusion reaction	1
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n = Number of patients

* Some patients had more than one complication

CONCLUSION

In our data demonstrates the necessity of vigilant monitoring of the surgical patient in the recovery room, with on patient in ten likely to have a problem during this period, which maybe potentiallylethal. The locaipractice of having operating room suites without recovery areas should be strongly condemned.

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