

Fast tracking in ambulatory surgery

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Abstract

Fast tracking after ambulatory surgery is a new paradigm which involves transferring patients from the operating room to the phase II recovery unit (i.e. bypassing the postanesthesia care unit). The success of fast tracking depends upon appropriate modification of the anaesthetic technique, which would allow rapid emergence from anaesthesia, and the prevention of common postoperative complications such as pain, nausea and vomiting using a multimodal approach. Implementation of a fast track program involves use of clinical pathways that would reduce hospital stay and ensure patient safety. Finally, the concept of fast tracking should be expanded to the overall postoperative recovery, not just bypassing the postanesthesia care unit. © 2000 Elsevier Science B.V. All rights reserved.

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1. Introduction

In the United States, ambulatory surgery now accounts for 60–65% of all surgical procedures. In addition, an increasing number of surgical procedures are being performed in offices. It is estimated that office-based procedures will increase to 15% by the year 2001. With the increasing number of patients presenting for ambulatory surgery and emphasis on cost containment and efficient resource use, the ambulatory surgery facilities are forced to be high-volume and rapid-turnover settings. Therefore, one of the important factors in the success of ambulatory surgery is safe and expeditious recovery and shorter hospital stay.

Currently, most patients are transferred from the operating room to the postanesthesia care unit (PACU) and then to the phase II (or step-down) recovery area before they are discharged home. However, the recovery care after ambulatory surgery is now in a state of flux [1]. Advances in surgical techniques (e.g. mini-

mally invasive surgery) and the availability of newer shorter-acting anaesthetic, analgesic, and neuromuscular blocking drugs facilitate the early recovery process. It is now possible to have patients who are awake, alert, and comfortable in the operating room soon after discontinuation of anaesthesia [2]. Therefore, the need for transferring all patients to the labor-intensive PACU is in question. There is a trend towards transferring patients from the operating room directly to the phase II recovery area (i.e. bypassing the PACU). This paradigm is referred to as fast tracking in ambulatory surgery [3].

The PACU is a high dependency area and may account for a significant portion of the perioperative costs [4]. Changes in the recovery paradigm should not only improve efficiency of an ambulatory facility, but also reduce healthcare costs [5]. However, it is vital to ensure that if fast tracking is adopted we are not placing the patient at any additional risk and in fact improving the patient care by the rapid recovery process. This article reviews the techniques, which might be applied to facilitate fast tracking after ambulatory surgery. The process of implementation of a fast track program and the need for quality assurance (or audit) of such as program is also discussed.

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2. Choice of anaesthetic techniques for fast tracking

Patients eligible for fast tracking must rapidly achieve PACU discharge criteria shortly after completion of the surgery. Therefore, the anaesthetic technique used needs to be modified to allow early recovery and reduce common postoperative complications, in particular pain, nausea, and vomiting. The choice of anaesthetic technique (i.e. general versus regional anaesthesia) is a major determinant of the recovery after ambulatory surgery [6,7].

Regional anaesthesia offers several advantages over procedures performed using general anaesthesia including the maintenance of alertness and cognitive function and a reduced incidence of postoperative pain, nausea, and vomiting [8]. Because of these advantages, use of regional anaesthesia techniques is increasing in popularity. A large observational study by Apfelbaum et al. [9] reported that 80% of patients receiving local anaesthesia and monitored anaesthesia care bypassed the PACU as compared with 14–42% of patients receiving general anaesthesia. Although patients receiving peripheral nerve blocks can safely bypass the PACU, those receiving spinal anaesthesia with conventional doses of intrathecal local anaesthetic usually need to be admitted to the PACU [10,11]. However, recent studies have shown that low-dose intrathecal local anaesthetic solution combined with lipophilic opioids (e.g. fentanyl and sufentanil) avoid high sympathetic blockade and allow early recovery and fast tracking [10]. Thus, it is necessary that the regional anaesthesia techniques used for ambulatory surgery be modified to achieve rapid and safe recovery [8].

An ideal general anaesthetic technique should be safe, simple, with a rapid onset of amnesia and analgesia, and a rapid recovery with minimal (if any) side effects. Because of its unique recovery profile, propofol is considered the sedative-hypnotic drug of choice for induction (and maintenance) of anaesthesia. Propofol's rapid metabolic clearance facilitates rapid emergence from anaesthesia and return to a baseline state. In addition, propofol offers an advantage over other intravenous anaesthetic drugs because of its antiemetic properties and associated euphoria on emergence. Although there is an increasing interest in total intravenous anaesthesia (TIVA), inhaled anaesthetics remain the most widely used maintenance drugs. Compared to propofol-based maintenance anaesthetic technique, inhaled anaesthetic technique may increase the incidence of PONV [12]. However, PONV after inhaled anaesthetics may be reduced by the use of prophylactic antiemetics [13]. In addition, intravenous anaesthetics (e.g. propofol) may be more difficult to titrate compared with inhaled anaesthetics. Furthermore, use of desflurane has been shown to provide a faster awakening and psychomotor recovery as compared to propofol

[14]. The low tissue solubility of the newer inhaled anaesthetics (i.e. desflurane and sevoflurane) provide a rapid onset and recovery while allowing easy titrability of anaesthetic depth. Furthermore, recent studies report that, compared with propofol, use of these newer inhaled anaesthetics for maintenance of anaesthesia resulted in earlier emergence and higher percentage of patients being judged fast track eligible [2]. In addition, maintenance of anaesthesia with desflurane or sevoflurane may still be superior to propofol, even when PONV is considered [15].

Opioids continue to play an important role in anaesthesia practice. However, opioid-related side effects including nausea, vomiting, sedation, bladder dysfunction, and respiratory depression may contribute to a delayed recovery and interfere with the ability to fast track. Fentanyl is the most commonly used opioid for intraoperative analgesia. Remifentanyl is a new ultra short-acting opioid with a rapid onset and offset regardless of the duration of its administration [16]. It provides profound intraoperative analgesia, hemodynamic stability, and reduces the requirements of inhaled anaesthetics [17]. However, because of the rapid offset of analgesic effect of remifentanyl, patients may experience pain soon after emergence from general anaesthesia. Therefore, it is necessary that transitional analgesia (with fentanyl, nonsteroidal antiinflammatory drugs [NSAIDs] or local anaesthetics) be initiated before the remifentanyl infusion is discontinued. Importantly, opioids should be used sparingly in patients undergoing ambulatory surgery [18].

Muscle relaxants are commonly used as a part of a balanced anaesthetic technique [19]. The choice of muscle relaxant is particularly crucial in the ambulatory setting. Recently, Kopman et al. [20] reported that even a minor degree of residual blockade could cause distressing residual symptoms of visual disturbances, inability to sit without assistance, facial weakness, and generalized weakness. These symptoms may be present despite the signs of clinical recovery from neuromuscular blockade. Importantly, these symptoms can prolong the recovery time and decrease the ability to fast track. Therefore, the use of muscle relaxants should be minimized in ambulatory anaesthesia. The use of newer airway devices such as the laryngeal mask airway may allow for the avoidance of muscle relaxants [21].

Shorter acting muscle relaxants (e.g. mivacurium and rapacurium) have a rapid and predictable recovery, which may reduce the degree of residual neuromuscular blockade. Rapacurium is a new muscle relaxant with a rapid onset and a short duration of action [22]. Use of these shorter-acting muscle relaxants also reduces the need for reversal drugs (e.g. neostigmine and edrophonium). Many practitioners avoid the use of reversal drugs because of their potential to increase the incidence of postoperative nausea and vomiting (PONV).

However, because of the potential detrimental effects of residual neuromuscular paralysis [20], particularly in an outpatient setting, it is necessary that reversal drugs be used (in appropriate doses) without hesitation. Recent studies reported that the incidence of PONV and the need for antiemetics did not increase with the use of neostigmine-glycopyrrolate for reversal of residual muscle paralysis [23,24].

3. Bispectral index monitoring

The electroencephalogram bispectral index (BIS) is a simple monitor of the depth of hypnosis that may improve the ability to titrate anaesthetic drugs and facilitate recovery from general anaesthesia. Song et al. [25] evaluated the ability of BIS monitoring to facilitate emergence from general (inhalational) anaesthesia. They found that titration of desflurane or sevoflurane to maintain a BIS value of 60 resulted in reduced times to awakening and tracheal extubation. Furthermore, compared with sevoflurane, desflurane had a faster emergence from anaesthesia. Similarly, use of BIS monitoring during propofol-alfentanil-nitrous oxide anaesthesia allowed faster emergence from anaesthesia and earlier discharge from the PACU [26]. The BIS monitoring has also been used to predict fast track eligibility after ambulatory anaesthesia. A recent study reported that all patients with BIS of more than 75 at the end of surgery were fast track eligible within 10 min [27].

4. Prevention of postoperative complications

In addition to early emergence from general anaesthesia, a major key to the success of fast tracking is prevention of postoperative complications. Although the overall incidence of complications in the immediate postoperative period after ambulatory surgery is very low, potential complications range from minor annoyances to potentially life-threatening situations. The most common postoperative complications which can significantly affect the recovery process include pain, nausea, and vomiting. Other postoperative complications that can impede fast tracking include cardiovascular alteration (e.g. hypotension, hypertension, rhythm disturbances), respiratory complications (e.g. airway obstruction, hypoventilation, bronchospasm, pulmonary aspiration), temperature abnormalities (primarily hypothermia), and surgical complications [28].

A relationship has been shown between respiratory complications in the PACU and decreased levels of consciousness on arrival in the recovery room [29]. The rapid awakening associated with the use of shorter acting anaesthetics may prove to reduce the incidence of airway obstruction and hemodynamic instability. In

addition, judicious use of shorter acting muscle relaxants and reversal drugs should reduce the incidence of postoperative residual paralysis and associated complications such as hypoventilation and hypoxemia.

Our ability to manage postoperative pain is the cornerstone in the success of fast tracking [30]. Although opioids remain the most commonly used analgesic in the perioperative period, there is an increased emphasis on the use of NSAIDs (e.g. ketorolac) and local anaesthetic techniques (e.g. wound infiltration and peripheral nerve blocks) as a part of a multimodal approach to pain management. It has been increasingly apparent that the combinations of multiple analgesic drugs (e.g. opioids, NSAIDs, and local anaesthetics) that have different mechanisms of analgesia provide superior analgesia with fewer side effects as compared with individual analgesic drugs [31]. An increasing number of studies demonstrate the benefits of multimodal analgesic regimens in facilitating the early recovery process [32–34].

Another major postoperative problem which can delay recovery after ambulatory surgery is PONV [6,7]. A wide range of antiemetics is available, including droperidol, metoclopramide, dexamethasone, 5-HT₃ receptor antagonists (e.g. ondansetron and dolasetron) to prevent or treat PONV. The incidence of PONV can be minimized by using prophylactic antiemetics in patients 'at risk' for developing this complication [35–37]. Similar to multimodal analgesia techniques, it has been shown that multimodal antiemetic therapy including combinations of droperidol, 5-HT₃-receptor antagonists and dexamethasone, as well as use of nonpharmacologic techniques are highly effective in reducing the incidence and severity of PONV. In addition to optimal use of prophylactic antiemetic drugs, adequate preoperative and intraoperative hydration reduces postoperative postural hypotension, dizziness, drowsiness, and nausea [38].

5. Criteria for fast tracking

The first step in the improvement of patient flow in an ambulatory facility is to change from traditional time-based discharge to criteria-based discharge. Utilization of an appropriate scoring system which is simple, clear, objective and reproducible provide a reliable guide for safe discharge of patients from the PACU (or bypass the PACU). The Aldrete criteria are commonly utilized to determine if the patient is ready for discharge from the PACU to the phase II recovery unit [39]. If these discharge criteria were met in the operating room, it would be appropriate to consider bypassing the PACU and transferring the patient directly to the step-down unit. Recently, a fast track scoring system has been proposed that incorporates the essential

elements of the Aldrete criteria plus assessments for pain, nausea, and vomiting [15]. However, further large prospective studies need to be performed to validate this scoring system and substantiate its sensitivity. Each institution should modify the established criteria according to their patient population, surgical case mix, and availability of nursing care. Furthermore, discharge criteria should be regularly reviewed and changed, if necessary, based upon the current literature.

6. Implementation of a fast track program

Implementation of a fast track program requires interdisciplinary collaborative care and management. The project team should consist of members drawn from all departments that would have a major impact on patient care after ambulatory surgery (e.g. anaesthesiologists, surgeons, and nurses). The team leader (usually an anaesthesiologist) also serves as a facilitator. The first step is to define the goals of the fast track program which would include elimination of unnecessary aspects of care, reduction in hospital stay, improvement in the quality of care, as well as improvement in patient satisfaction.

This multidisciplinary team should examine all aspects of postoperative care. The policies and procedures regarding postoperative patient care including the transfer of patients from the PACU to the phase II unit and discharge home should be examined. In addition, the factors that affect the duration of stay in the PACU and the phase II recovery unit need to be considered. The factors that could impede the implementation of a fast track program should be examined. Some practitioners incorrectly interpret policy guidelines of the Joint Commission on Accreditation of Healthcare Organizations (JCAHO) and the American Society of Anesthesiologists (ASA) that supposedly do not allow for bypassing the PACU. The JCAHO states that either a licensed practitioner discharge each patient or formal criteria be applied according to institutional needs and that such policies should be documented. But specific items of policy are not listed. According to ASA 'Standards for Postanesthesia Care,' all patients receiving anaesthesia must go to a PACU except by specific order of the anaesthesiologist, and a PACU must be available. However, if the patients can be moved more quickly and safely through the recovery areas, then the policies may be changed accordingly.

The next step in implementation of a fast track program is to develop clinical pathways to facilitate patient flow in the postoperative period. These pathways take into account the variables that can influence both early and late recovery following ambulatory

surgery including outpatients who would be eligible for fast tracking, as well as modifications in the anaesthetic techniques. It is necessary that modifications in anaesthetic techniques be based on prospectively conducted clinical investigations. Finally, physicians and nurses involved in postoperative patient care need to be educated regarding these clinical pathways.

There is also a need to develop an audit process that involves collection of appropriate outcome variables. It is important to monitor not only the hospital care but also the post hospital phase. There are number of potential benefits of an audit program. A well-designed program can minimize potential serious complications and ensure that we are not opting for substandard care. In addition, it will improve patient care and substantiate that a high level of care is being achieved. Audit programs also help to ensure compliance with regulatory and accreditation requirements and can reduce the risks of litigation. It serves an educational purpose while affording an opportunity to monitor the practices of individual physicians and clinical services. The information gathered from the audit process can be used to improve the clinical pathways.

There is obviously an optimum point beyond which there is negative benefit and a regimen is produced within which work becomes inefficient and potentially unsafe. The effect of fast tracking on the nursing workload in the PACU and the step-down unit should be examined which will allow us to achieve improvements in overall efficiency. Recently, Dexter et al. [40] used computer simulation to determine fast tracking affect upon staffing of an ambulatory surgery center. These authors found that the financial benefits from instituting fast tracking may not be realized unless changes are instituted in the use of nursing personnel. Benchmarking the data collected by the audit process can be used to compare practice between various departments and institutions [5]. As a result of these benefits, the audit process can help to reduce costs.

Apfelbaum et al. [9] designed a multicenter observational study to determine if policies and procedures could be developed that allow patients to safely bypass the PACU and if this practice would reduce total health care costs. These authors found that the PACU bypass rate after implementation of the fast track program was 14–42%, as compared with 0–2% before the implementation of the program. Significantly, there was no difference in patient outcomes between the baseline and the fast tracked groups. They concluded that a team approach to an educational intervention and paradigm implementation, and objective data-driven clinical decisions with continuing feedback to clinicians and administrators on patient and process outcomes were the key factors in the success of the fast track program.

7. Summary

Fast tracking after ambulatory surgery creates a paradigm shift in postanesthesia care after ambulatory surgery. Even though economic incentives might have been the impetus for fast tracking in ambulatory surgery, it offers numerous benefits including improved efficiency and patient care. A clear and coordinated postoperative plan implemented as a distinct clinical pathway is necessary for a successful fast track program. To achieve optimal fast tracking the entire hospital course of the patient needs to be considered. The ultimate aim should be to eliminate unnecessary aspects of care, reduce hospital stay, and improve the quality of care and patient satisfaction. Implementation of a fast track program requires interdisciplinary collaborative care and management to ensure positive patient outcomes.

It is important that anaesthesiologists participate in the clinical pathway development and implementation so that management protocols reflect our knowledge in perioperative care. In addition to modification in the anaesthetic technique to achieve rapid emergence from anaesthesia, the success of a fast track protocol depends on the prevention of common postoperative complications including pain, nausea, and vomiting. It is mandatory that patient safety is not compromised as a result of implementing a fast tracking strategy. Although there are studies suggesting that fast tracking is feasible after ambulatory surgery, larger studies are necessary to show that fast track ambulatory can be safely achieved in varied patient populations undergoing various surgical procedures and that the accelerated postoperative course is cost-effective.

Currently, bypassing the PACU is commonly referred to as fast tracking. However, this definition is too narrow because it overlooks the importance of the overall postoperative recovery. The process of fast tracking can be further extended to the phase II unit stay resulting in an earlier discharge home. Finally, fast tracking should also include earlier return to routine daily activities.

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