*Basrah Journal of Surgery*

*Review Article*

*Bas J Surg, September, 8, 2002*

# THE WAY PATIENTS ARE MANAGED IN FAST TRACK SURGERY

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## Summary

Fast track surgery is a novel concept in perioperative care of patients undergoing elective surgical procedures that combines recent advances in anesthesia, new approaches to pain control, techniques that reduce the perioperative stress response and organ dysfunction, and the use of minimally invasive techniques. These measures aimed to rapid mobilization, early feeding, rapid recovery, minimize complications, and shorter in-hospital stay.

## Introduction

Surgery is slowly undergoing revolutionary changes due to newer approaches and better understanding of several methods and issues. Fast track surgery has evolved from minimally invasive techniques and better understanding of perioperative pathophysiology. The primary aim of fast track surgery is to reduce the stress of the operation and enhance recovery, thereby reducing complications and shorter hospital stay. The methods used includes the maintenance of normal body temperature during operation, epidural or regional anaesthesia, minimally invasive techniques, optimal pain control, early enteral (oral) nutrition and mobilization [1,2].

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### *Maintenance of normal body temperature*

Mammals need to maintain a nearly constant temperature. If substantial deviation of that temperature occurred, metabolic functions generally deteriorate. The human thermorgulatory system usually maintains a core body temperature near 37°C. Normal core body temperature is maintained by three components: afferent theraml sensing, central regulation, and efferent responses. General anaesthesia removes the patient's ability to regulate body temperature through behaivour, so that autonomic defenses alone are available to respond to changes in temperature[3].

General anesthetics inhibit thermoregulation in a dose-dependent manner,

typically increasing the thresholds for sweating and vasodilatation by approximately 1°C and inhibit vasoconstriction and shivering by approximately 3°C [4]. Under normal conditions, body heat is usually unevenly distributed. Tonic thermoregulatory vasoconstriction maintains a temperature gradient between the core and periphery of 2°C to 4°C [5]. General anaesthesia reduces the threshold for vasoconstriction to a level below the current body temperature and thus opens the arteriovenous shunts [5]. Regional anaesthesia impairs both central and peripheral thermoregulation. As a result, hypothermia is common in patients given spinal or epidural anaesthetics [3]. The core temperature of patients who become sufficiently hypothermic during general anaesthesia eventually reaches a plateau when arteriovenous-shunt tone is reestablished.

Perioperative hypothermia is common as a result of the patient's exposure to a cool environment and the inhibition of thermoregulation induced by the anaesthesia. If hypothermia (even mild) develops then it leads to numerous complications, including coagulopathy, morbid cardiac events, a decreased resistance to surgical-wound infection, and possible prolonged hospitalization [3]. Therefore, unless hypothermia is specifically indicated (e.g, for protection against ischaemic), the body temperature should be measured and the intraoperative core temperature should be maintained above 36°C.

*Preventing and treating intraoperative hypothermia*: less than 10% of metabolic heat is lost through respiration, even if dry, cool gas is used for ventilation. Passive or active airway heating and humidification therefore contribute little to perioperative thermal management [3,6]. Each litre of intravenous fluid infused into adult patients at ambient temperature, or each unit of blood infused at 4°C, decreases the mean body temperature approximately 0.25°C. heating intravenous fluids to near 37°C helps prevent hypothermia especially if large volume planned to be administrated [3,6]. The skin is the predominant source of heat loss during surgery. Evaporation from large surgical wounds may also be important[3]. Because an ambient temperature above 25°C is uncomfortable for gowned theater staff, cutaneous heat loss can be minimised by using surgical drapes, blankets, or plastic bags to cover the skin. However, the use of forced-air (Bair Hugger) warming is generally the most effective available method[3,6].

**Postoperative analgesia**

Sufficient pain relief will improve the surgical outcome with reduced morbidity, need for hospitalization and convalescence.

*Effect of postoperative pain relief on surgical stress responses*: a common feature shared by all surgical patients is the widespread changes in several biologic cascade systems, including a predominance of catabolic hormones, activation of cytokines, completment, arachiodonic acid metabolites, nitric oxide, and free oxygen radicals, all of which secondarily may lead to organ dysfunction and morbidity. It has been hypothesized that a reduction in these surgical stress responses (endocrine, metabolic and inflammatory) will lead to a reduced incidence of postoperative organ dysfunction and therapy to an improved outcome[7,8]. The extent of which depends on the choice of analgesic technique. Only regional anaesthetic techniques, and preferably continuous techniques with local anaesthetic, may lead to a substantial reduction in the surgical stress response[9]. Epidural opioid techniques are less effective on the stress response, and are comparable with systemic opioid techniques and the use of NSAIDs.

High-dose opioid anaesthesia suppresses intraoperative but not postoperative responses [9]. There are insufficient data on the use of multimodal analgesic techniques on surgical stress responses.

*Effect of Patient-Controlled Analgesia (PCA) on postoperative outcome*: Although PCA is widely used for many surgical procedures, it will not provide optimal dynamic pain relief after major procedures[8]. A meta-analysis and more recent randomised studies have demonstrated clearly that postoperative morbidity (pulmonary, cardiac, and thromboembolic complications and hospital stay) is not improved by PCA compared with intermittent opioid therapy [8,10].

*Nonsteroidal Anti-Inflammatory Drugs (NSAIDs)*: Are widely used for perioperative pain control but have little effect on surgical stress responses and organ dysfunction [7,9]. However, NSAIDs provide moderate analgesia and therefore reduce opioid requirements by 20% to 30% with subsequent reduction in opioid-related side effects [11].

*Epidural analgesic techniques*: Because continuous epidural local anaesthetic techniques are the most effective in reducing surgical stress responses, a substantial reduction in postoperative morbidity may be expected [7,9]. They are also the most effective method of providing dynamic pain relief after major procedures. Rodgers et al [13] studied the effects of neuraxial blockade with epidural or spinal anaesthesia on postoperative morbidity and mortality. They reviewed 141 trials including 9559 patients, and found the overall mortality was reduced by about a third. Neuraxial blockade reduced the odds of deep venous thrombosis by 44%, pulmonary embolism by 55%, transfusion requirements by 50%, pneumonia by 39%, and respiratory depression by 59% (all $P<0.001$). There were also reduction in myocardial infarction and renal failure. Although they concluded that the size of some of these benefits remains uncertain, and suggested further research is required, nevertheless their findings support more widespread use of neuraxial blockade.

*Pulmonary complications*: The impairment of pulmonary function observed after all major procedures may contribute to the development of hypoxaemia, atelectases and pneumonia. Continuous epidural local anaesthetic or local anaesthetic-opioid mixtures have only been demonstrated to provide a reduction in postoperative pulmonary morbidity in major abdominal procedures [8]. Epidural opioid-based regimens also reduced pulmonary morbidity in abdominal (non-significantly) and thoracic procedures (significantly), but these results were largely influenced by a few studies [8].

*Cardiac morbidity*: A predominant part of postoperative cardiac dysfunction (i.e., tachycardia, arrhythmias, or infarction) may be caused by surgical stress responses and sympathetic activation leading to increased demands on cardiac function [14]. Although these responses may be abated by neural blockade techniques with local anaesthetics [9], the differential effects of various analgesic techniques on postoperative cardiac outcome remain debatable[9]. Thromboembolic complications: As mentioned earlier, Rodgers et al, showed that the regional anaesthetic techniques reduced postoperative thromboembolic complication and pulmonary embolism after lower body procedures [13]. These effects may be mediated by a reduction in intraoperative blood loss, an increase in venous blood flow, decreased coagulability and increased fibrinolysis after these technique However, no significant

positive effects have been observed with continuous thoracic epidural local anaesthetics after major abdominal procedures [9].

*Paralvtic ileus*: Postoperative paralytic ileus may last for days and prolong hospitalization and convalescence [15]. The main pathogenic factor is activation of inhibitory splanchnic reflexes, which are subject to modification by thoracic epidural local anaesthetics [15]. Therefore, it was found that postoperative continuous thoracic epidural local anaesthetics techniques significantly reduce paralytic ileus [15].

*Postoperative cognitive dysfunction*: This occurs in up to 20%o of patients after major non-cardiac surgery and may persist in about 10% of patients up to 3 months after surgery [13]. The pathogenesis of this dysfunction is not clear but may be due to many factors. These includes hypoxaemia, sleep disturbances and the use of opioids and tranquillizers. In a meta-analysis of all randomised studies comparing regional anaesthesia with general anaesthesia, no effect was found [13]. It was also concluded that the effect of postoperative continuous epidural analgesia on cognitive dysfunction is not clear [8].

*Reduction of postoperative pain* by *encouragement and instruction of patients*: Egbert et al[16] studied 97 patients after elective intra-abdominal operations. The patients were randomly divided into two groups; 51 patients (control group) were not told about postoperative pain by the anaesthetist. The other 46 patients (special care group) were told what to expect during the postoperative period and taught how to relax, how to take deep breaths and how to move so that they would remain more comfortable after operation. The authors found that patients who were encouraged during the immediate postoperative period by their anaesthetists were considered by their surgeons to be ready for discharge from the hospital two and seven-tenths days before the control patients. They also concluded, that anaesthetists need to carry out a follow up ward care to the patients whom they attended in the operating theatre [16].

*Accelerated recovery programs, sometimes known as multimodal programs* for postoperative rehabilitation, have been developed in many centres to facilitate the perioperative care of patients who are undergoing specific surgical interventions [7,8,17]. These include effective control of postoperative pain, theraby allowing early mobilization and enforcement of an early oral feeding. In addition, peroperative patient education about perioperative care has been shown to be an important determinant of various aspects of patient's outcome and satisfaction [17].

## Management of postoperative nausea and vomiting

The pathogenesis of nausea, vomiting, and ileus after anaesthesia and surgery is multifactorial, including direct surgical neurogenic stimulation of the vomiting centre, various anaesthetics, and the use of opioids [18,19]. Principles for rational prophylaxis and treatment of nausea and vomiting have been developed. These includes the use of various anti emetics[20], aims to reduce the dose of opioids [21,22], and the understanding of the causes of postoperative ileus and its management [9,14,15,22]. In regard to the use of anti emetics, although many are available with few new ones [23], each group has its advantages and adverse effects. And although it was demonstrated that a combination of anti emetics could be more effective than single drug therapy, the most effective combinations of antiemetics and their

doses have yet to be decided upon, but perhaps we should implement the concept of balanced antiemesis [23].

**Postoperative feeding**

Postoperative dysmotility predominantly affects the stomach and colon, with the small bowel recovering normal function 4-8 hours after laparotomy [24]. There is evidence that enteral feeding reverses mucosal atrophy induced by starvation [25], and increases anastomotic collagen deposition and strength [26]. Data from animal experiments and human studies suggest that enteral nutrition is associated with an improvement in wound healing [27], and may reduce septic morbidity [28]. In a meta-analysis study of early enteral feeding versus "nil by mouth" after gastrointestinal surgery, Lewis et al [29] found that early feeding reduced the risk of any type of infection, lead to reduction of anastomotic dehiscence, hospital stay and mortality. The risk of vomiting was increased among patients fed early. They concluded that there seems to be no clear advantage to keeping patients nil by mouth after elective gastrointestinal resection, and early feeding may be of benefit.

As mentioned earlier, the reduction in postoperative ileus plays an important factor in early enteral feeding. Holte and Kehlet[15] recommend the use of continuous thoracic epidural anaesthesia for at least 48 hours and the avoidance of opioid analgesia where possible. They also recommend avoidance of nasogastric intubation, and possible use of prokinetic drugs. A similar multimodal, rehabilitation program was recommended by Basse et al [30]. They found that program may significantly reduce the postoperative ileus, cardiopulmonary complications and the hospital stay in high-risk patients undergoing colonic resection.

In a meta-analysis study of selective versus routine nasogastric decompression after elective laparotomy, Cheatham et al[31], found that fever, atelactasis, and pneumonia were significantly less common and days to first oral intake were significantly fewer in patients managed without nasogastric tubes. They also concluded that although patients may develop abdominal distension or vomiting without a nasogastric tube, this is not associated with an increase in complications or length of hospital stay. They thought that for every patient requiring insertion of a nasogastric tube in the postoperative period, at least 20 patients would not require nasogastric decompression [31].

## Comments

Surgeons are becoming increasingly interested in patient outcomes, including the incidence of postoperative complications, the length of hospital stay and recovery, and the degree of patient satisfaction after an operation. In contrast, payers are focused on reducing costs. These combined interests have emphasized the delivery of more effective and efficient care. Because about half of hospital charges are related to room and board, reduction in hospital stay or earlier transfer of patients to home or other less costly facilities has been a dominant strategy for the postoperative care of patients.

Streamlined health care delivery is increasingly based on care paths that are designed for “typical patients”. However, one of the challenges in accelerated health care delivery is providing quality care to patients whose response is regarded as “not typical”. Postoperative pain relief continues to demand the attention of the caregivers. Significant advances have been made in the understanding of the neurophysiologic features of pain and the neuropharmacologic features of analgesics. Although potent analgesic agents and ways are available, much work

remains to be done to achieve effective and consistent control of postoperative pain. Accelerated multimodal post-operative recovery programs should be developed as a multidisciplinary effort, with integration of postoperative pain management into a postoperative rehabilitation program.

It seems to be that in the future, the trend will be for shorter recovery periods after major operations. The increasing use of fast track pathways will not necessarily lead to an increased burden on general practitioners as the hope that patients will be discharged without postoperative limitation of function aiming for less morbidity. With continuous improvement and success, it may not be unrealistic in the next few years to notice an increasing number and varieties of day case surgery, which at the current status are classified within the major inpatient operations.

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