Fast-Tracking Anesthetic Techniques

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The ability to deliver a safe and effective anesthetic with minimal side effects and a rapid recovery is critically important for "fast tracking" patients after surgery (1). Interest in facilitating the recovery process after anesthesia has led to controversies regarding the optimal anesthetic technique (e.g., local versus regional versus general) as well as the best type of anesthetic agent (e.g., volatile versus IV anesthetics). IV drugs remain popular for sedation as well as induction of anesthesia because of their ease of administration, rapid onset of action and recovery, and high patient acceptance. However, volatile (inhaled) anesthetics are more popular for maintenance of anesthesia because of the ease in titrating to an adequate depth of anesthesia during surgery. In addition, early recovery after general anesthesia can be facilitated by using a combination of nitrous oxide (N_2O), volatile anesthetics with low blood, gas partition coefficients (e.g., desflurane or sevoflurane), and short-acting sympatholytic drugs (e.g., remifentanil, esmolol, dexmedetomidine). The preemptive use of local anesthetics and non-opioid analgesics for prevention of pain and antiemetic drugs for prophylaxis against postoperative nausea and vomiting is also critical to the success of a fast-tracking anesthetic technique.

Fast-Tracking Anesthetic Techniques

Fast tracking after anesthesia was first introduced as an approach to decreasing the time to achieve tracheal extubation after cardiac surgery (2). Earlier extubation can lead to reduced time spent in expensive care areas (e.g., ICU, transition units) and a shorter time to discharge from the hospital, thereby reducing costs and improving resource utilization, (3) with the potential for longer-term benefits for the patient (4). The early clinical investigations pointed out the importance of using short-acting IV (propofol) and inhaled (desflurane) anesthetics, as well as minimizing the total dose of opioid analgesic medication administered during the perioperative period (2–5). To minimize the adverse effects of opioid analgesics, postoperative analgesia after major surgery is increasingly being provided by spinally administered opioids (6,7) as well as non-opioid analgesics (e.g., local anesthesia).

The use of propofol during the perioperative period has also had a major impact in facilitating the recovery process after ambulatory surgery (8). As rapid operating room (OR) turnover and early discharge are expected after ambulatory procedures, conditions must be optimized to ensure fast emergence from anesthesia with minimal side effects. The use of short-acting anesthetic drugs (e.g., propofol, desflurane, sevoflurane, nitrous oxide, remifentanil, esmolol) has allowed outpatients undergoing superficial ambulatory surgery procedures with general anesthesia to be safely discharged home within 60 min (9–12). However, consideration must be given to the prevention of postoperative pain and emesis (13). Although central neuraxis blockade is often avoided in the outpatient setting because of concerns regarding prolonged recovery secondary to delays in ambulation and micturition, as well as well-known side effects (e.g., headache, backache), (14–16) peripheral nerve block and local anesthetic infiltration techniques are increasing in popularity. Monitored anesthesia care (MAC) typically involves administering local anesthesia in combination with IV sedative and anxiolytic and/or analgesic drugs (17).

In an effort to facilitate fast-tracking after spinal anesthesia, low-dose hypobaric spinal anesthetic techniques involving lidocaine (10–25 mg) combined with small-doses of either fentanyl or sufentanil have been introduced (18,19). Recently, these small-dose local anesthetic spinal techniques have been reported to compare favorably with a propofol-based MAC technique for knee arthroscopy (20) and general anesthesia for gynecologic laparoscopy (21). However, controversy exists regarding the reliability of reduced doses of intrathecal lidocaine (i.e., failed blocks) and the occurrence of transient neuropathic symptoms. Concerns also remain regarding the increased incidence of opioid-related side effects (e.g., pruritus, nausea, vomiting) (20), difficulty with micturition, low back pain and delayed discharge compared with MAC (22) and general anesthesia (14,21). Additional studies are clearly needed comparing "optimal" regional, general and MAC techniques with respect to time to achieve fast-track eligibility in the OR.

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The availability of newer anesthetic, analgesic and muscle relaxant drugs that provide for a faster onset, easier titration, and a more rapid recovery, as well as the use of the laryngeal mask airway (LMA) device, has clearly facilitated the use of "fast-tracking" general anesthetic techniques in the ambulatory setting (23–27). Although both propofol and sevoflurane are excellent anesthetics for fast-tracking, desflurane has consistently been found to produce the most rapid emergence from general anesthesia, and the shortest time to achieving fast-track eligibility (12,23,27–32). Not surprisingly, these newer anesthetic drugs are generally more costly than the traditional agents they are designed to replace. However, in assessing the financial consequences of using these newer drugs and anesthetic techniques in the ambulatory setting, it is important to examine both direct and indirect costs associated with their use (33).

Claims regarding cost-effectiveness of anesthetic drugs should be subjected to close scrutiny, with studies specifically designed to evaluate the impact of a given technique on health care personnel costs, the ability of the surgical team to complete additional surgical procedures in the same operating room session, and the ability of the patient and their caretakers to resume their normal activities (33). It will be necessary to alter work patterns (e.g., discharge policies) to obtain the full benefits of the newer drugs and techniques in the outpatient setting. For example, eliminating the minimum lengths of stay in recovery areas, and allowing patients who achieve fast-track criteria in the OR to bypass the more labor-intensive postanesthesia care unit (PACU) (34). It has been shown that greater cost savings in the operating room can be achieved by increasing efficiency in resource use than by limiting the availability of new anesthetic drugs and techniques (35).

The use of newer monitoring devices that can improve the titration of anesthetic drugs can also facilitate the fast-tracking process (36). The bispectral index (BIS) is derived from the electroencephalograph (EEG) and has been correlated with the hypnotic component of the anesthetic state. EEG-BIS monitoring provides practitioners with information regarding the degree of sedation or hypnosis produced by centrally-acting anesthetic drugs. The BIS monitor has been found to be useful in predicting recovery of consciousness from general anesthesia when using either IV or inhaled anesthetic drugs (36,37). For example, titrating desflurane or sevoflurane to maintain a BIS index value of 60 during general anesthesia decreased the amount of the volatile anesthetics administered during the maintenance period compared with "standard practices," and resulted in faster emergence (36). Similarly, the use of a BIS titration protocol resulted in a more rapid emergence and shorter times to extubation after propofol-based anesthesia (37). The BIS value at the end of surgery correlates with the time required to meet fast-track and PACU discharge criteria (38). Recent studies with the auditory evoked potential (AEP) monitor have found that it can also be used to facilitate the fast-tracking process, leading to earlier PACU and hospital discharge.

In the present health care environment, it is also important to consider the increased costs associated with cerebral function monitoring (e.g., the cost of the monitor and its disposable accessories). Therefore, performance of a cost-benefit analysis is useful before introduction of this technology into "routine" anesthesia practice. An important step in this process is to document that these monitors actually improve the anesthesia provider's ability to administer anesthetic drugs (e.g., decreasing emergence, turnover, and recovery times) and improve patient outcome (e.g., reducing postoperative side effects). By improving the titration of propofol, desflurane and sevoflurane with these cerebral monitors, it should be possible to fast-track the vast majority of patients receiving general anesthesia for ambulatory surgery. Although cost analysis of new medical devices is complex and the benefits are difficult to measure with accuracy (39), the potential benefits of improved monitoring and titration of anesthetic drugs are obvious in a fast-tracking environment.

Finally, adjunctive drugs that can minimize the anesthetic and analgesic requirements (e.g., ketamine, α-2 agonists, β-blockers, adenosine, local anesthetics) are helpful in ensuring rapid and smooth emergence from anesthesia (40–43). Premedication with small doses of sedative-anxiolytic drugs, (44) β-blockers, (45) steroids, (46) and non-opioid analgesics (47) can improve patient outcome and facilitate the fast-tracking process.

Fast-Tracking Procedures After Ambulatory Surgery

Ambulatory anesthesia is administered with the goal of rapidly and safely establishing satisfactory conditions for the performance of a given surgical or diagnostic procedure. Not surprisingly, anesthesiologists are interested in using drugs with a fast, smooth onset, predictable recovery, and no postoperative sequelae. If the careful titration of short-acting drugs permits a safe transfer of patients directly from the OR suites to the less labor-intensive Phase II (step-down) recovery area, considerable cost savings to the institution could be achieved (39). Although bypassing of Phase I (PACU) recovery is the most common type of "fast tracking" in ambulatory surgery (34), PACU fast-tracking is an alternative to PACU bypassing for facilitating the recovery process (48). Specific fast-tracking criteria (49,50) have been developed for

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outpatients undergoing general, regional, and local anesthesia.

Decreases in OR and PACU labor costs resulting from fast emergence and PACU bypass vary depending on the amount of routine overtime, how the nursing staff are compensated, and how efficiently the OR suites are utilized (39). Cost savings can also be achieved if the mix of nurses to nursing aides is changed in the PACU. With a more rapid recovery, fewer patients will remain deeply sedated in the PACU and the duration of time they are "at risk" for airway obstruction and hemodynamic instability is decreased, along with the need for highly skilled one-on-one (or even one-on-two) nursing care. The adoption of fast-tracking concepts may permit an institution to use fewer nurses in the recovery areas. The cost-benefits from using newer fast-tracking anesthetic techniques may be easier to demonstrate in independently operated ambulatory care centers, (51) where "perioperative" nurses are cross-trained to work in both the OR, as well as the PACU and the step-down recovery areas.

The use of newer drugs and techniques could provide major benefits to society if patients could return to work earlier or their caretakers could more readily resume their normal activities. In a study involving Swedish women undergoing minor gynecologic procedures (52), the drug costs in those patients who received propofol and alfentanil for general anesthesia were obviously higher than in a "control" group receiving a standardized thiopental-isoflurane-N_2O technique. However, the patients in the propofol-alfentanil group required fewer sick leaves from their jobs (mean difference of 0.8 days/patient) and returned to work earlier than did the control group. Finally, the choice of an anesthetic technique should also include input from patients as to their personal preferences and satisfaction (e.g., "quality of life" issues). For example, patients receiving propofol and alfentanil in the Swedish study judged that they had recovered from the residual effects of the anesthetic drugs earlier than the control group (52).

Many studies have demonstrated the benefits of multimodal analgesic and antiemetic treatment regimens in facilitating the early recovery process (53–55). In addition, aggressive rehydration (56) and optimal use of prophylactic antiemetic drugs (57) can further enhance recovery and improve patient outcome after ambulatory surgery.

Management of Postoperative Pain

Postoperative pain is a common cause of delayed discharge and unanticipated hospital admission after outpatient surgery (58). Certain types of operation are associated with a higher incidence of severe pain in the early recovery period (i.e., orthopedic, urologic, and general surgical procedures). Recently, the "preemptive" use of a combination of local anesthetics, NSAIDs, and other non-opioid analgesics has been advocated to minimize the adverse effects associated with large doses of opioids and facilitate the recovery process after ambulatory surgery (59). As the complexity of ambulatory surgical procedures continues to grow, the use of analgesic techniques that are more effective in the PACU and step-down units, and provide continuing analgesia after discharge will assume increasing importance.

Opioid Analgesics

Fentanyl and its newer analogs are commonly used adjuvants during the intraoperative period (60). Although classical opioid analgesics (e.g., morphine, meperidine) have traditionally been used as the primary therapy to treat acute pain, their role in the management of pain after ambulatory surgery is changing; however, opioids are highly effective in relieving pain at rest, they are less effective in relieving the pain associated with physical activity (e.g., coughing, ambulating, exercising). Furthermore, the aggressive use of morphine and its congeners is associated with an increase in postoperative nausea and vomiting (PONV), bladder dysfunction, and sedation, all of which interfere with fast-tracking and contribute to delayed discharge after surgery. A study comparing morphine with fentanyl for postoperative analgesia found that morphine produced better quality analgesia in the early recovery period (61); however, its use was associated with a higher incidence of PONV after discharge. Oral opioid-containing analgesics also increase gastrointestinal side effects (e.g., nausea, vomiting, and constipation) in the postdischarge period (62). Therefore, small doses of fentanyl (or sufentanil) are currently considered the opioid analgesics of choice for the treatment of moderate-to-severe pain in the early postoperative period after ambulatory surgery, and non-opioid analgesics are more popular in the postdischarge period.

Local Anesthetic Techniques

Peripheral nerve blocks and infiltration (or instillation) of local anesthetics are becoming more widely used as adjuvants to general anesthesia, as well as MAC techniques, in the outpatient setting. The "preemptive" use of local anesthetics facilitates recovery by providing both intraoperative and postoperative analgesia (63). The anesthetic and analgesic-sparing effects of local anesthetics when administered before the surgical incision allow patients to be maintained at a "lighter" plane of anesthesia (or sedation) during surgery, contributing to a faster, smoother emergence and more rapid return to a functional status (64). For

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many superficial surgical procedures, general and regional anesthesia can be avoided by using a combination of local anesthetics and IV sedative-analgesic drugs as part of a MAC technique (17). These local anesthetic-based techniques decrease the incidence and severity of postoperative pain, reducing the need for both parenteral and oral opioid-containing analgesics in the recovery period, decreasing PONV, and thereby enabling earlier ambulation and discharge from the ambulatory surgical facility (12,13).

The simple infiltration of the surgical field with local anesthetic can reduce pain and postoperative analgesic requirements, thereby facilitating earlier discharge after ambulatory surgery (65). Although subcutaneous infiltration of local anesthetics may not improve postoperative pain scores after abdominal incisions, administration at the fascial (or subfacial) level improved pain control at rest and with movement (66). Compared with spinal or general anesthesia alone, the use of general anesthesia with local anesthetic infiltration significantly reduced postoperative pain and increased the length of time until the patient first requested analgesic medication after undergoing inguinal hernia repair (63). Patients undergoing vein stripping procedures also recovered faster, with less pain and fewer complications when the surgery was performed using a combined femoral and genitofemoral nerve block than with spinal anesthesia (22). Ilioinguinal and iliohypogastric nerve blocks with bupivacaine 0.25% (30 mL) prior to inguinal hernia repair also reduced pain in the PACU and decreased the need for oral analgesics after discharge (64). In children, the subfascial instillation of bupivacaine 0.25% provided comparable analgesia after inguinal herniorrhaphy to that obtained with an ilioinguinal/iliohypogastric nerve block (67).

The effectiveness of local anesthetics in preventing pain after laparoscopic procedures remains controversial (68–70). Infiltration of the mesosalpinx with bupivacaine has been shown to reduce postoperative pain and cramping after laparoscopic tubal ligations with the "banding" technique, but not when the electrocautery was used. Studies have suggested that bupivacaine sprayed on the lower surface of the liver and in the right subdiaphragmatic space adjacent to the gall bladder reduces postoperative pain and the need for analgesics after laparoscopic cholecystectomy (53). It is still controversial whether the timing of the local anesthetic administration (i.e., preincision versus postincision) effects the intensity of pain after surgery.

As orthopedic surgery is associated with a high incidence of moderate-to-severe pain, a variety of local anesthetic techniques have been studied in an effort to reduce the postoperative opioid analgesic requirement. For example, ankle blocks have been used to facilitate ambulation and decrease pain after podiatric surgery (71), and femoral nerve blocks have reduced opioid usage after anterior cruciate ligament repairs (72). The use of continuous peripheral nerve block techniques for painful orthopedic ambulatory surgery procedures involving the shoulder, knee, and foot are becoming increasingly popular (73–75). Local anesthetics are frequently injected into joints to provide analgesia after arthroscopic surgery and studies suggest that they allow for earlier mobilization (65). The addition of ketorolac, either IV (76) or intraarticularly (77), may further enhance patient comfort in the early postoperative period after arthroscopic procedures. Similarly, intraarticular morphine, clonidine, and triamcinolone have all been alleged to provide prolonged analgesia after arthroscopic knee surgery (78–80). Suprascapular nerve block has also been advocated as a simple peripheral block for postoperative pain relief after arthroscopic shoulder surgery (81). The major benefit of using peripheral nerve block (or instillation) techniques is that the risk of complications is reduced compared with more complex major nerve block procedures.

Nonsteroidal Anti-inflammatory Drugs

Nonsteroidal anti-inflammatory drugs (NSAIDs) have long been used for treating pain syndromes because of their well known antiinflammatory, antipyretic and analgesic properties. However, with the introduction of parenteral preparations (e.g., ketorolac, diclofenac), these drugs have become more popular in the management of pain associated with ambulatory surgery (59). NSAIDs are known to block the synthesis of prostaglandins by inhibiting the enzyme cyclooxygenase (COX), thereby reducing the production of mediators of the acute inflammatory response. By decreasing the inflammatory response to surgical trauma, NSAIDs have also been alleged to reduce peripheral nociception. Studies suggest that administration of ketorolac at the surgical incision site may enhance its analgesic properties (82).

Early reports suggested that NSAIDs possessed analgesic properties comparable to opioid analgesics without opioid related side effects (83). Outpatients receiving ketorolac experienced a lower incidence of PONV, tolerated oral fluids, and were judged "fit for discharge" earlier than those receiving opioid compounds (84). In children, ketorolac (1 mg/kg IV) was comparable to morphine (0.2 mg/kg IV) in preventing postoperative pain and was associated with less PONV (85). In laparoscopic cholecystectomy patients, ketorolac provided an opioid-sparing effect that resulted in less nausea, somnolence, and respiratory depression (86). For anorectal procedures, use of ketorolac (30 mg) to supplement local anesthesia at the incision site resulted in significantly less postoperative pain, a better quality of recovery, and earlier discharge compared with local anesthesia alone (82).

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When administered preoperatively to pediatric patients, both the incidence of restlessness and crying, as well as the postoperative opioid requirements, were lower in the NSAID (versus acetaminophen) treated children (87). Oral ketorolac (1 mg/kg) compared favorably with low-dose acetaminophen (10 mg/kg) for bilateral myringotomy procedures in children (88). The ketorolac treated patients recorded lower pain scores and required less analgesic medication in the early postoperative period. In children undergoing inguinal hernia repair, ketorolac (1 mg/kg IV) compared favorably with caudal bupivacaine 0.2% with respect to pain control and postoperative side effects (89). In fact, the ketorolac-treated patients had an improved recovery profile, including less vomiting, shorter times to voiding and ambulation, and earlier discharge home.

Oral NSAIDs are assuming a more important role as alternatives to the opioid-containing oral analgesics, Vicodin™ and Lortab™, in the postdischarge period. In an outpatient study involving the use of a multimodal analgesic technique consisting of alfentanil, lidocaine, ketorolac, and paracetamol, (62) oral ibuprofen (800 mg q 8h) was equi-analgesic to paracetamol 800 mg plus codeine 60 mg (q 8h) when administered during the first 72 h after discharge, and resulted in better global patient satisfaction and less constipation than the opioid-containing oral analgesic. To achieve the optimal benefit of using NSAIDs in the perioperative period, these compounds should be continued for "preventative" pain management in the early postdischarge period.

COX-2 Inhibitors

In an effort to minimize the potential for operative site bleeding complications, as well as gastrointestinal and renal damage, associated with the traditional NSAIDs, (90) the more specific COX-2 inhibitors are being increasingly utilized as non-opioid adjuvants for minimizing pain during the perioperative period. The early studies evaluated the use of celecoxib and rofecoxib for preventative analgesia when administered for oral premedication (47,91,92). Rofecoxib (50 mg PO) appears to produce more effective and sustained analgesia than celecoxib (200 mg PO) after major surgery (91). Preliminary data suggest that celecoxib (200 mg PO) is equivalent to acetaminophen (2 g PO) when administered before outpatient surgery (92). However, rofecoxib (50 mg PO) produced significantly more effective analgesia than acetaminophen (2 g PO) and the pain relief was more sustained in the postdischarge period (47). Premedication with rofecoxib also facilitated the recovery process by reducing postoperative pain and improving the quality of recovery from the patient's perspective.

More recently, a parenterally active COX-2 inhibitor, parecoxib (20–40 mg IV), has been investigated as an alternative to the classic nonselective parenteral NSAID. Parecoxib is a prodrug with an active metabolite (valdecoxib) and is similar both pharmacokinetically and pharmacodynamically to celecoxib. Both preoperative (93) and postoperative (94) administration of this investigational COX-2 drug appear to exert significant opioid-sparing effects, and these preliminary studies suggest that it may lead to an improvement in the quality of recovery and patient satisfaction with their postoperative pain management. However, cost-efficacy studies will be needed to define the role of the parenteral (versus oral) COX-2 inhibitors in the ambulatory setting.

Non-Pharmacological Techniques

Transcutaneous electrical nerve stimulation (TENS) or acupuncture-like transcutaneous electrical nerve stimulation (ALTENS), as well as percutaneous neuromodulation therapy (PNT), have all been used in the treatment of acute and chronic pain in the ambulatory setting (95). Given the inherent side effects produced by both opioid and non-opioid analgesics, nonpharmacological approaches to the management of acute postoperative pain may become increasingly popular in the future. The mechanisms by which these nonpharmacologic techniques exert their analgesic action have not been completely elucidated. However, possible mechanisms for electroanalgesia include stimulation of descending pain inhibitory pathways, inhibition of substance-P release in the central nervous system, and the release of endogenous opioid-like substances.

Prevention of Postoperative Nausea and Vomiting

Despite the many recent advances in ambulatory anesthetic and surgical techniques, postoperative nausea and vomiting (PONV) remain a "big little problem." PONV is not only distressing to patients, it is also a leading cause for delayed discharge and unanticipated hospital admission after ambulatory surgery (57). A recent survey reported that >35% of outpatients experienced PONV severe enough to delay resumption of normal activities (96). Interestingly, over half of these patients had not complained of nausea or vomited before discharge from the ambulatory surgical facility.

It is well accepted that anesthetic agents, the type of surgical procedure, and use of opioid analgesics influence the incidence of PONV (97). More recently, additional factors that increase the risk of PONV have been identified. These include age, gender, smoking

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history, phase of the menstrual cycle, history of motion sickness or postoperative nausea, pain, anxiety, and hydration status. Although anesthesiologists have little control over most of these predisposing factors, there are some relatively simple measures (e.g., adequate hydration, avoidance of nitrous oxide and reversal drugs, avoiding large doses of opioid analgesics) that can be useful in reducing the incidence of PONV. For example, outpatients hydrated with 20 mL/kg of IV fluid had less postoperative morbidity (including nausea) than those receiving only 2 mL/kg before induction of anesthesia (56). The choice of induction agent may also contribute to the reduction of PONV (8,9). Even when propofol was used as an alternative to thiopental for induction of anesthesia, there was an 18% decrease in patients experiencing nausea (98). Propofol administered to induce and maintain general anesthesia was even more effective than ondansetron in reducing PONV and was associated with fewer requests for rescue antiemetics and a faster early recovery (99).

The prophylactic administration of antiemetics has been shown to be particularly useful in the prevention of PONV in the ambulatory setting (57). With the introduction of more expensive antiemetic agents (i.e., 5-HT_3 receptor antagonists), it is important to consider the efficacy and cost-effectiveness of these drugs. Droperidol, 0.625 mg IV, was found to be more cost-effective in preventing PONV than ondansetron, 4 mg IV, in outpatients undergoing gynecologic procedures (100,101). Prophylactic antiemetic therapy improves patient outcome for operations associated with a high frequency of emesis (e.g., laparoscopic surgery, ENT, plastics, ophthalmology). Furthermore, the efficacy of prophylactic antiemetics is affected by the timing of their administration. When ondansetron, 4 mg IV, was given at the end of otolaryngologic or gynecologic surgery rather than after induction, it produced a greater reduction in the incidence of PONV and the need for rescue antiemetics (102,103). The beneficial effects of ondansetron in improving recovery were clearly evident in the post-discharge period. Ondansetron has also been successfully used for the treatment of established PONV and is superior to metoclopramide (10 mg IV) in the treatment of PONV (104).

The use of combinations of antiemetic agents may be more cost-effective than a single agent for routine prophylaxis (57,105). Droperidol, 0.625 mg IV, plus metoclopramide (10 mg IV) was more effective in preventing postoperative nausea after laparoscopic cholecystectomy than ondansetron 4 mg IV (106) Combining low-dose droperidol and the 5-HT_3 antagonists with dexamethasone may be the "optimal" combination for prophylaxis in high-risk patient population (55,107). Finally, the use of acupressure and acustimulation at the P6 acupoint has also been investigated for the treatment and prevention of PONV in the ambulatory setting (108,109). Recent studies would suggest that nonpharmacological techniques might compare favorably with antiemetic drugs (e.g., ondansetron) for the prevention of PONV (110). However, acustimulation appears to be less effective for the treatment of established PONV (111). Clearly, the most effective approach to minimizing PONV is one that uses a combination of modalities (55), notwithstanding the FDA concerns regarding its possible adverse cardiovascular side effects, droperidol (0.625–1.25 mg) remains an extremely useful drug for antiemetic prophylaxis when combined with dexamethasone (4–8 mg), a 5-HT_3 antagonist [e.g., ondansetron (4 mg), or dolasetron (12.5 mg)], and/or acustimulation (e.g., SeaBand™, ReliefBand™) (112).

Summary

The use of rapid, short-acting, fast emergence anesthetic drugs and improved titration techniques can facilitate the recovery process after ambulatory surgical procedures. Local anesthesia combined with either IV sedation (i.e., MAC) or general anesthetic techniques minimizes recovery times and postoperative side effects. However, unless outpatients can be discharged home earlier, or additional case performed with the same personnel costs, it will be difficult to realize actual cost savings from the use of the more expensive anesthetic drugs and monitoring devices. The ability to fast-track patients allows them to bypass the labor-intensive recovery areas and be discharged home earlier. A major limitation to the fast-track process has been the inability to prevent postoperative pain and nausea. Therefore, the use of adjuvant agents (e.g., local anesthetics, NSAIDs, ketamine, sympatholytics, steroids, and nonpharmacological techniques) that limit the requirements for anesthetics and opioid analgesics, as well as the cost-effective usage of prophylactic antiemetic drugs, will enable more patients to meet early discharge criteria.

The use of fast-tracking anesthetic techniques is economically justified if improvements in recovery and work patterns can be demonstrated. From an institutional perspective, earlier achievement of discharge criteria may be meaningless unless it is accompanied by earlier actual discharge times. If the use of the newer anesthetic drugs is associated with decreased recovery times, reduced payments for skilled nursing care or an earlier return to work by the patient, their preferential use can be easily justified. Moreover, anesthetic practices have advanced to the point where cost savings from variations in drug use are only apparent when system-wide improvements are made in the efficiency of resource utilization (including personnel, space, time, consumables, and capital investments).

Although there is no ideal anesthetic agent or technique for outpatients, there is an impressive array of

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pharmacologic drugs that, when combined in a rational manner and carefully titrated, can produce the desired anesthetic conditions and permit a fast-track recovery. With the available pharmacologic armamentarium and enhanced monitoring capabilities, the anesthesiologist should be able to provide all surgery patients with a relaxed and comfortable perioperative experience.

Furthermore, use of an aggressive multimodal approach to controlling postoperative pathophysiology and facilitating the rehabilitation process will allow the vast majority of patients undergoing ambulatory surgery to be fast-tracked without compromising patient safety or satisfaction.

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Table of Contents

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