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Review

Adverse outcomes in outpatient anesthesia

F Chung

Western Division, Toronto Hospital, University of Toronto, Toronto, Ontario, Canada

Day surgery, with its lower hospital costs, is increasing rapidly. The major challenge facing outpatient anesthesia care is to give the perfect outpatient anesthetic so that our patients do not have any adverse outcomes. Assessment of risk in surgical outpatients has been extrapolated largely from experience with inpatients. Further studies of adverse outcomes in outpatient anesthesia are warranted.

Key words: Anesthesia: outpatients, adverse outcomes

Day surgery with its lower hospital costs, now accounts for 60–70% of surgery performed in North America. The major challenge facing outpatient anesthesia care is to maintain favourable patient outcomes. In order to provide optimal anesthesia and superb outcome, we must understand the adverse outcomes of outpatient anesthesia.

Outpatient mortality

In the past 30 years, the anesthetic-related death rate has been approximately 1–2 $10\,000^{-1}$ inpatients receiving anesthesia[1]. The overall death rate associated with outpatient surgical care has been substantially lower[2–6]. A weakness in all of these studies is that they relied on voluntary retrospective reporting from different centres. Recently, the Federated Ambulatory Surgery Association data was updated to include 1.1 million ambulatory anesthetic cases. There were 17 deaths for an incidence of 0.15 $10\,000^{-1}$ cases[7]. Therefore the mortality rate is lower in outpatient anesthesia.

Complications

A major complication is defined as an untoward response or abnormal condition having the potential for serious harm. A minor complication is defined as an untoward response with minimal or no potential for serious harm[8]. Major complications include hemorrhage, infection, serious anesthetic complications, persistent nausea and vomiting and any medical problem that requires hospitalization. Minor complications include transient nausea and vomiting, weakness, headache, myalgia, sore throat and dizziness[8].

Adverse outcomes: specific predictors

There are very few studies on complications after outpatient anesthesia. In a prospective study of 13 433 patients at a freestanding ambulatory surgical centre, 106 medical, surgical or anesthetic complications were identified in the patient population[9].

In a study of 1553 outpatients, Meridy found that the surgical procedure and the extremes of age affected neither the duration of recovery nor the rate of complications[10]. The rate of intraoperative events was 50 1000^{-1} anesthetics (5%). Significant swings in blood pressure were experienced by 1.6% of patients, 0.5% of patients were difficult to intubate and 1.3% of patients had respiratory-related events. The most common Postanesthesia Care Unit (PACU) event was nausea and vomiting, 7.3%. In the PACU, 0.3% of patients had considerable variation in blood pressure and 0.43% had a respiratory-related event[11].

Despite the rapid growth in ambulatory surgery, many traditional predictors of adverse anesthetic-related outcomes have not been examined critically in outpatients. Assessment of risk in surgical outpatients has been extrapolated largely from experience with inpatients[12]. There is a need to do prospective outcome in outpatients.

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Correspondence and reprint requests to: Dr F Chung, Western Division, Toronto Hospital, 399 Bathurst Street, Toronto, Ontario, Canada M5T 2S8

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ASA physical status

Is American Society of Anesthesiologists (ASA) physical status a specific risk factor for outpatients? In a survey of complications among 112 000 adults, ASA physical status score was an independent predictor of intraoperative and major postoperative complications after controlling for age, gender, number of preoperative medical conditions, type of anesthesia and surgery[13]. However, there was no correlation between advanced ASA physical status and hospital admission[9,14,15].

Age

Is age a specific risk factor for outpatient anesthesia? Infants are at greater risk for anesthetic morbidity. Infants less than 1 year of age had a nine-fold higher risk of anesthetic morbidity than older children. At what point should infants be considered for outpatient surgery? Unfortunately, there is no available scientific data to assist the clinician on this issue. Each case must be decided based on the clinician's evaluation of the infant, the parents and the medical situation. Berry accepted full-term infants at 2 weeks[16]. Premature infants are not suitable for outpatient surgery as they are more prone to complications of apnoea and bradycardia than term infants[17].

Are elderly patients at higher risk for outpatient anesthesia? Advanced age is independently associated with an increased likelihood of admission in ambulatory patients (odds ratio 2.6)[14]. In a survey of elderly patients undergoing outpatient cataract surgery with conscious sedation, the admission rate was 18%. The age of patients admitted to the hospital was significantly greater than those not requiring admission[18]. We will need more specific data on geriatric outpatients as increasing numbers of surgical procedures in the elderly are being done on an outpatient basis.

Preoperative medical conditions

Duncan et al. studied 6914 adult outpatients. The relationship between adverse events and preoperative factors were determined by using a multiple logistic regression that included age, sex, duration of the procedure, and the hospital care. Major morbid events were infrequent. Patients' preoperative disease was predictive of some intraoperative events relating to the same organ system, but not to events in the PACU. Patients with preoperative respiratory problems such as asthma or chronic obstructive pulmonary disease were at higher risk for intraoperative complications, especially lower respiratory events. Similarly, those with preoperative hypertensive diseases were more likely to have difficulties with blood pressure control[11]. Patients judged obese, or inadequately fasted, were found to experience a greater rate of recovery problems as well as discomfort[11].

Persistent symptoms after outpatient anesthesia

The majority of patients can be discharged within 1–2 h after outpatient anesthesia (80%). About 96% of patients can be discharged within 3 h after outpatient anesthesia. We studied 500 patients prospectively in our outpatient unit. Four per cent of patients had persistent symptoms delaying discharge. Patients who underwent surgical procedures (laparoscopy, arthroscopy, general surgery) had a six-fold increased risk of developing persistent symptoms as compared to patients who underwent cataract extraction or dilatation and curettage (D&C)[19]. The group with persistent symptoms had significantly longer duration of anesthesia as compared to the group with no persistent symptoms (68.2 ± 6.0 min vs. 41.7 ± 1.3 min)[19].

The persistent symptoms delaying discharge were due to persistent pain, nausea/vomiting, hypotension, and unsteady gait[19]. Patients with persistent symptoms and who were subsequently sent home reported a significantly higher incidence of nausea/vomiting, dizziness, drowsiness, hoarseness, sore throat and incisional pain than patients who did not manifest persistent symptoms[19].

Delayed discharge after outpatient anesthesia

In our prospective study of 500 patients discharged after outpatient anesthesia, we found that 54% had delayed discharge[20]. The majority of delays were due to the patient's escort not being immediately available (50%). Some delays were due to recurrent pain after home-readiness criteria was met[20]. Thus, better pain management and ensuring the immediate availability of a companion would ensure a more cost-effective ambulatory surgical unit[20].

24-hour adverse outcomes

In the healthy patient, minor adverse outcomes after outpatient anesthesia can be disturbing as this will affect daily living function and work readiness. We have studied the 24-h adverse outcomes of 777 patients. Incisional pain, headache, drowsiness and dizziness were the most common complaints reported occurring in 26.5, 11.6, 11.5 and 9.7% of cases, respectively. The incidence of nausea/vomiting, fever and injection site pain was found to be 7.1, 5 and 2.1%, respectively[21].

We found that at least one adverse outcome was 3.5 times greater after general anesthesia, 2.5 times greater after a non-gynecological procedure and 1.8 times greater if anesthesia exceeded 60 min. Age, gender and ASA class were not found to be statistically significant[22]. The relationship of a number of demographic variables to common day surgery adverse outcomes are shown in Table 1.

Table 1. Adverse outcomes related to demographic variables

Outcome event	Multiple logistic regression Factor	Odds ratio
1. At least 1 complication	General anesthesia	3.5†
	Non-gyne procedure	2.5†
	Anes. duration >60 min	1.8†
2. Nausea & vomiting	General anesthesia	4.4*
	Anes. duration >60 min	2.3*
	Non-gyne procedure	2.1*
3. Pain, incision site	Non-gyne procedure	4.4†
	General anesthesia	3.7†
	Anes. duration >60 min	1.9*
4. Dizziness	General anesthesia	13.2*
	Anes. duration >60 min	3.5†
	Gender = female	2.7*
5. Drowsiness	Age <50	16.7†
	Anes. duration >60 min	2.6†
6. Fever	Anes. duration >60 min	2.2*
7. Bleeding	Gyne procedure	3.4†
	Anes. duration >60 min	2.1*

*$P<0.05$; †$P<0.01$

Unanticipated hospital admission

Unexpected hospital admission following ambulatory surgery has been used as an index of outpatient morbidity and complications. The incidence of unanticipated admission rates varies between 0.1 and 5%[10,23]. The Phoenix Surgicenter found that their admission rates increased from 0.2% overall to 0.6% for patients over the age of 64 yr[24], whereas Meridy retrospectively found no relationship between age, duration of anesthesia or PACU stay and the need for admission[10]. Patel and Hannallah reported an incidence of admission of 0.9%. One third of these admissions were for protracted vomiting[25]. In a case control study among 9616 patients, factors identified to be associated with an increased likelihood of admission were general anesthesia, abdominal procedures, lengthy procedures, postoperative vomiting and age[14]. Thus hospital admission appears to be a function of the surgical procedure such as type of surgery, type of anesthesia and length of procedure. It may be related to age, but possibly not to ASA physical status.

Levy reported that unanticipated admission due to more extensive surgery than anticipated or surgical misadventure accounted for 63.2% of the admissions. Preexisting medical diseases and perioperative complications accounted for 19.9%. Anesthesia-related reasons such as persistent nausea and vomiting, and prolonged somnolence accounted for 12.2%, and social reasons, 4.7% of unanticipated admissions[23].

Conclusion

The safe and expeditious conduct of outpatient surgical care can only succeed by careful selection of patients and surgical procedures, appropriate intraoperative and postoperative anesthetic care and prudent and timely discharge of patients. The challenge is to give the perfect outpatient anesthetic so that our patients do not have any adverse outcomes.

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