

Duration of General Anesthesia and Surgical Outcome

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Introduction

Surgical procedures are now frequently performed more and more under local anesthesia often using intravenous sedation. Regardless of this trend, general anesthesia remains the only option for a number of invasive surgical and non-surgical procedures, and many combined cosmetic procedures must by their extensive nature use general anesthesia for patient comfort and control.

General anesthesia is recognized as a risk factor for morbidity and mortality in any surgery. According to statistics cited as standard by anesthesiologists, the incidence of deaths from anesthesia is somewhere in the range of 1/185,000 to 1/300,000.¹⁻³ From these, one would be led to believe that anesthesia is now relatively safe. More recent and statistically rigorous analysis of the data from which these figures were calculated reveals a more realistic fatality due to anesthetic factors alone of roughly 1/13,000.^{1,4} These studies incorporate individuals with poor as well as good health, however. Of course many plastic surgery patients are in good health, and therefore represent lower anesthetic risks. But in any case, general anesthesia risks should not be discounted.

Analysis of data obtained from numerous studies, both prospective and retrospective, has revealed the duration of general surgical anesthesia as an independent “stand alone” risk factor for patient morbidity and mortality. A review of some of these studies follows.

Negative surgical outcome (Defined as a hospital stay of >10 days with a morbid condition or death during the hospital stay.)

- In 388 patients with operations longer than the median time of 220 minutes, negative surgical outcome was recorded for 15.6% of patients, according to a prospective study of 797 patients undergoing major non-cardiac surgery.⁵
- Duration of anesthesia in ophthalmic surgery is a significant risk factor for mortality and morbidity, as revealed in a retrospective analysis of all patients who underwent ophthalmic surgery under general anesthesia.⁶

Postoperative nausea and vomiting (PONV)

- A prospective study of 17,638 consecutive post-operative outpatients (various surgical procedures) displayed that a 30-minute increase in the duration of anesthesia increased the likelihood of PONV by 59%. General anesthesia increased the likelihood of PONV 11 times compared with other types of anesthesia.⁷

Thromboemboli

- General anesthesia lasting more than three hours was identified in a retrospective study of 1,862 consecutive gynecologic surgery patients treated with intermittent pneumatic compression as one of the statistically significant, independent intraoperative risk factors for developing venous thromboemboli.⁸
- With the exception of the duration of general anesthesia, all other risk factors for developing thromboembolic disease were distributed evenly between control patient and those in which an antithrombotic was tested, according to a prospective study to evaluate the impact of low molecular weight heparin therapy on deep venous thrombosis occurrence in 238 laparoscopic cholecystectomy patients.⁹

Postoperative Infection

- General anesthesia has been identified as a major “stand alone” risk factor for postoperative surgical site *S. aureus* infection.¹⁰ A prospective case-controlled study of 970 adult patients undergoing cardiovascular operations during a one-year period found

that the duration of surgery performed under general anesthesia was significantly associated with post-operative infection, as are advanced age, urgent intervention and blood transfusion.¹¹

Postoperative core hypothermia

- The use of a combined epidural and general anesthesia, surgery lasting longer than two hours, and extensive surgery were identified as the most significant risk factors for core hypothermia in a prospective study of 194 post-general surgical patients admitted to the intensive care unit of a large tertiary university medical center.¹²

Postoperative cardiopulmonary complications

- A retrospective literature review of studies concerning patients undergoing non-thoracic surgery reveals that, of the 28 preoperative or operative predictors for postoperative pulmonary complications that were evaluated, 16 were associated significantly with postoperative pulmonary complications. Only two, however, were significant in more than one study, one of these being the duration of anesthesia and the other being postoperative nasogastric tube placement.¹³
- Shortening the duration of surgery and anesthesia appears to decrease the risk of a prolonged stay in the ICU for patients with severe, chronic obstructive pulmonary disease undergoing non-cardiothoracic operations. This was found by a retrospective study of 105 patients in which the specific risk factors for postoperative pulmonary complications were assessed by analyzing all relevant pre- and perioperative risk factors.¹⁴
- Multivariate risk factor analysis indicated that a surgery time greater than three hours under general anesthesia was among the independent risk factors associated with perioperative cardiopulmonary complications, according to a retrospective study designed to investigate perioperative complications. The study reviewed 584 consecutive patients undergoing 679 carotid endarterectomies under general anesthesia or cervical block regional anesthesia.¹⁵

Mortality in Cosmetic Surgery

A retrospective review of patients undergoing liposuction with or without other procedures found a fatality rate of 1/47,000 for liposuction alone, 1/3000 for liposuction combined with abdominoplasty (which the authors thought reflected the underlying abdominoplasty fatality rate), and 1/7,000 for liposuction combined with other cosmetic surgical procedures. While these figures may reflect the surgical rather than anesthetic mortality, in the context of the above data they are suggestive of a relationship with anesthetic duration. Which cases were performed under general anesthesia could not be determined from the publication, so this conclusion is speculative, however. ¹⁶

Conclusion

Thus, a number of independent studies demonstrate that the risk of postoperative morbidity and mortality correlates significantly with the duration of general anesthesia, a trend that holds true across a wide range of surgical procedures and specialties and independent of most other surgical variables. It also applies to an increase in the incidence of relatively minor complications, such as postoperative nausea and vomiting, and more significant risks, including loss of neurological function, infection, thrombosis, hypothermia, and even mortality.

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