

Surgical Risk Assessment is an Important Factor in any Surgical Treatment

Franjić S*

Independent Researcher, Republic of Croatia

*Corresponding author:

Siniša Franjić,
Independent Researcher,
E-mail: sinisa.franjic@gmail.com

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1. Abstract

Surgical risk is a form of assessing the clinical conditions and health conditions of a person who will undergo surgery, so that the risks of complications are identified throughout the period before, during and after surgery. It is calculated through a physician's clinical assessment and the requirement for some tests, but to facilitate the assessment, there are also some protocols which have better directing in medical thinking. Any doctor can make this assessment, but most often it is done by a general practitioner, a cardiologist and an anesthesiologist. In this way, it is possible for each person to receive some attention before the surgery, such as seeking more appropriate tests or performing treatments to reduce the risk.

2. Introduction

As is the case of medical complications, the best and easiest way to manage a surgical complication is to prevent it from happening [1]. Prevention of surgical complications is best accomplished by a thorough preoperative assessment and comprehensive treatment plan and careful execution of the surgical procedure. Only when these are routinely performed can the surgeon expect to have few complications. One must realize that even with such planning and with excellent surgical technique, complications occasionally occur. In situations in which the dentist has planned carefully, the complication is often predictable and can be managed routinely. For example, when extracting a maxillary first premolar that has long, thin roots, it is far easier to remove the buccal root than the palatal root. Therefore the surgeon uses more force toward the buccal root than toward the palatal root. If a root does fracture, it is the buccal root rather than the palatal root, and the subsequent buccal root retrieval is more straightforward.

In planning a surgical procedure, the first step is always a thorough review of the patient's medical history. Several of the complications can be caused by inadequate attention to medical histories that would have revealed the presence of a factor increasing surgical risk.

2.1 Risk

Any surgery, even in a healthy individual, carries a risk of an adverse outcome, including death [2]. The risk associated with a surgical procedure is the relative chance of an adverse outcome as a result of that surgery in a particular patient.

Adverse outcomes are difficult to define exhaustively. An adverse outcome may be as extreme as death from pulmonary embolism or the need for a previously fit and healthy individual to require full-time nursing care for irreversible hypoxic brain damage from a respiratory arrest. A lesser adverse outcome may be an extra day in hospital after a slight chest or urinary infection.

Good preoperative assessment also involves good communication regarding adverse outcomes with the patient. It is also important to identify any issues that the patient may see as an unacceptable adverse outcome and address these.

Accurate preoperative assessment can help determine the individual risk of adverse perioperative outcomes and should identify those patients in whom appropriate intervention may reduce the risk of such outcomes. It is important to assess the potential benefit of the contemplated surgery and weigh this against the potential associated surgical risk. The final decision to proceed to operation in patients with high risk of perioperative morbidity and mortality should be multidisciplinary. The patient, the surgeon, the anesthesiologist, and other members of the healthcare team may have to reach

consensus that the potential benefits of surgery outweigh the potential associated risks.

Co-morbidity increases the risk of surgical procedures and minimizing that risk is vitally important to improve the individual outcome [3]. Risk assessment is also important in terms of outcome measures for comparative audit. Simple scales, such as the American Society of Anesthesiologists (ASA) grading system, are open to varied interpretation among experienced medical assessors, while more complex systems such as the POSSUM score, are too complex for most daily clinical applications.

Co-existing diseases can complicate even a simple operation and increase morbidity and mortality. The level of care required needs to be anticipated with consideration given to transfer to units with appropriate facilities and/or to gaining disease directed expertise to advise on pre-operative optimisation and peri-operative management of individual co-morbidities.

The concept of a 'high-risk' patient is generally understood but the key is to recognise the factors contributing to that perceived risk and repeatedly (re)assessing these patients throughout their stay in hospital to minimise the risk of developing complications.

Good surgical results reflect the quality of care. This depends on:

- surgical factors, relating to pre-, intra- and postoperative care
- patient factors, regarding disease presentation and pre-existing co-morbidities
- systemic factors that relate to the resources available for the treatment of surgical patients

Once risks have been identified and assessed, the techniques to manage the risk can be placed into four categories [4]. Risk transfer refers to the organization transferring all or part of the losses to another party (i.e. insurance company). Risk avoidance means that the facility does not participate in any activities that may place itself in a position where an event may occur. This may include refusing to schedule a procedure secondary to a patient's pre-existing medical history or surgical risk. Risk retention means that the facility retains the entirety of the losses accrued by an event. Parties that are self-insured may elect to proceed in this manner. Risk control refers to the redesign of policies and procedures in hopes that future exposures are mitigated. How an ASC (ambulatory surgery center) decides to proceed in treating a risk depends on the its unique setting and the circumstances surrounding it. The risk management team must consider factors including staffing, resources, and competencies while understanding various limitations when determining which treatment to apply. A free-standing surgery center remotely located from emergency medical services may opt to refuse a surgery while an ASC in close proximity to a large hospital may elect to perform the procedure or accept patients with a higher acuity. There are no decisions that universally

apply to ASCs. The role of a risk management team is to decide what issues are the most threatening and pertinent to its practice and plan accordingly

3. General Problems

3.1 Age

Problems occur at the extremes of life [5]. There are limits to cardiac, respiratory and renal reserves in the elderly. Fluid overload is tolerated poorly. Smaller doses of narcotics, sedatives and analgesics are required.

3.2 Obesity

This often results in poor wound healing and a higher incidence of respiratory problems. DVT (deep venous thrombosis) and PE (pulmonary embolus) are more common. Pressure sores can develop. Delay elective surgery until the patient loses weight.

3.3 Compromised host

There is reduced response to trauma and infection, e.g. immunosuppressive drugs or uraemia. Malnutrition, e.g. vitamin deficiencies or liver disease, can also be a factor. Allergies Check for these preoperatively. Unsuspected reactions may occur. In severe cases, anaphylactic shock may result. Sensitivity to surgical dressings (e.g. Elastoplast) may occur.

3.4 Drugs

Current drugs should be monitored carefully, e.g. insulin and steroids. Diabetics may require conversion to sliding scale insulin. Patients on steroids may need to continue their normal dose but with major surgery have additional steroid cover. Adjust anticoagulant therapy, e.g. conversion from warfarin to heparin over the perioperative period. Clopidogrel is contraindicated with regional anaesthesia (may cause epidural haematoma). Aspirin does not generally pose a problem in general surgical procedures. ACEI and ATII inhibitors should be stopped 24 h before surgery to prevent severe and refractive hypotension.

3.5 Breast Cancer

If we consider hereditary breast cancer development, current data coming from basic research confirm that the genetic predisposition is 5-10% [6]. Women with BRCA1 or BRCA2 mutation have a cumulative risk of invasive cancer ranging from 55 to 85% and of invasive epithelial ovarian cancer ranging from 15 to 65%. The risk of developing breast cancer increases near the age of 25 years. The identification of breast cancer susceptibility genes BRCA1 or BRCA2 was performed in 1994 and 1995 respectively according to the evidence of premature truncation of the BRCA1 or BRCA2 protein. Modern prophylactic surgery for women at high risk of breast cancer, according to the molecular tests, include total bilateral mastectomy (TBM) without axillary lymph node dissection, skin-sparing total mastectomy, and subcutaneous nipple-sparing mastectomy, reconstruction with artificial breast implants or tis-

sue reconstruction options using transverse rectus abdominis flap and the latissimus dorsi flap. A final procedure being discussed is areolar-sparing mastectomy. The efficacy of prophylactic TBM in reducing the incidence of breast cancer at three years of follow-up has been demonstrated. Prophylactic TBM reduced the risk of breast cancer by 95% in women who also had a risk-reducing salpingo-oophorectomy and by 90% in women that had intact ovaries. Prophylactic surgery is a highly personal decision and the protective effects of surgery must be weighed according to possible complications and psychological problems.

3.6 Bowel Malignancy

Surgical decision making for MBO (malignant bowel obstruction) requires the highest degree of clinical judgment and thoughtful communication with patients and families [7]. Perhaps the most fundamental decision is the one regarding the need and benefit of surgical intervention. Because MBO rarely requires intervention within the first few hours of presentation, there is usually adequate time to counsel the patient and family. Surgical intervention for MBO aims to reduce symptoms and improve the quality of life but does not address the underlying incurable malignancy. However, relieving the obstruction may improve nutritional intake, prevent perforation and ischemia and prolong life.

Patient factors associated with worse surgical outcomes include advanced age, poor nutritional status, comorbidities, persistent ascites, poor performance status, prior abdominal radiation therapy, and failed prior surgery for MBO. Poor nutritional status and poor performance status are each associated with 3 times higher odds of dying after surgery. Although not absolute contraindications to surgery, these factors greatly increase surgical risk, and potential benefits of surgery must be weighed against increased potential for complications.

Given the overall poor prognosis for patients with incurable cancer and MBO, a thorough discussion should take place before surgery between the surgeon, patient, and family to elicit the patient's goals for treatment and set reasonable expectations for recovery and outcomes. Patients have differing degrees of disease awareness, so it is helpful to initiate the conversation by determining the patient's and family's understanding of their disease and prognosis. This will allow the surgeon to place the acute MBO in the context of underlying disease. The surgeon should then inform the patient and family about the acute problem, explaining the disease course of MBO and its likely impact on the patient's health trajectory. If at all possible, it is advisable to engage other treating clinicians, including the patient's oncologist, in discussions about prognosis, potential outcomes, and treatment decisions.

3.7 Mental State

Surgery is a traumatic event and these factors have considerable potential in affecting its outcome [8]. Preoperative psychological morbidity, as well as making the assessment of presenting symp-

toms and surgical risks more difficult, increases the risk of postoperative complications such as delirium, cognitive impairment and functional disability. The changes in surgical practice, with increasing use of day surgery and the reduced length of hospital admissions, have further highlighted the need to consider these issues.

Psychiatric illness may lead to miscommunication, inaccurate diagnosis and potentially inappropriate surgery, and poor postoperative adjustment. Therefore, the evaluation of the current mental state in patients being considered for surgery is essential. The ability to comply with postoperative management, especially important in transplantation surgery where immune suppressants are required, may affect the decision to proceed with the surgery, and should be included in the preoperative assessment. The assessment should also take account of the personal circumstances of the patient, their illness and the surgical procedure itself, as these factors will affect their response. Surgery affecting body parts with significant emotional and symbolic meaning (e.g., head and neck, breast, testes) raise specific concerns and anxiety about potential disfigurement.

3.8 Stress

Because of the physiologic stress caused by surgery, catecholamines including adrenaline (epinephrine) and noradrenaline (norepinephrine) are released as a result of the activation of the hypothalamic-pituitary-adrenal axis [9]. Emotional stress has also been shown to increase the production and release of cortisol. This additional cortisol can affect the postoperative patient, for example by increasing metabolism, water excretion, cardiovascular tone, temperature, and blood glucose levels. Cortisol also diminishes inflammation by suppressing the body's immune response, thereby hindering wound healing.

As a result of the body's physiologic response to stress and the inherent surgical risk of hemorrhage and shock, regular postoperative observations are essential in maintaining patient care. The nature of the operation, the patient's condition, and the method of pain control will determine how regularly such observations need to be performed. A reduction in systolic blood pressure can indicate hypovolemic shock, which can ultimately lead to multiple organ failure. However, it is important to note that blood pressure measurements can be variable due to the body's compensatory mechanisms. Therefore, it is useful to consider the early signs of reduced tissue perfusion when detecting signs of shock. These include increased respiratory rate and tachycardia as a precursor to hypotension, low urine output (<0.5 mL/kg per hour), restlessness or confusion, and cold peripheries.

4. Tips

In TIPS (transjugular intrahepatic portosystemic shunt), a technique developed to create a portal-systemic shunt by a percutaneous approach, an expandable metal stent is advanced under

angiographic guidance to the hepatic veins and then through the substance of the liver to create a direct portacaval channel [10]. This technique offers an alternative to surgery for refractory bleeding due to portal hypertension. However, stents frequently undergo stenosis or become occluded over a period of months, necessitating revision, a second TIPS, or an alternative approach. Encephalopathy may occur after TIPS, just as in the surgical shunts, and is especially problematic in the elderly and those patients with pre-existing encephalopathy. TIPS should be reserved for those individuals who fail endoscopic or medical management and are poor surgical risks. TIPS sometimes serves a useful role as a “bridge” for those patients with end-stage cirrhosis awaiting liver transplantation. Procedures such as esophageal transection have also been advocated for the management of acute variceal bleeding, but their efficacy remains unproven, and these procedures are usually considered a last resort.

The management of bleeding gastric fundal varices, found either alone or in conjunction with esophageal varices, is more problematic, since banding and sclerotherapy are generally not effective. Vasoactive pharmacologic therapy should be instituted, but TIPS or shunt surgery should be considered because of high failure and rebleeding rates. For isolated gastric varices, splenic vein thrombosis should be specifically sought, since splenectomy is curative.

5. Proxy

Part of the preoperative assessment of any patient is consideration of underlying comorbid conditions as they relate to a patient’s overall outcome [11]. This is necessary for any patient, regardless of their age, but it is of particular importance in older patients. Older patients may not be able to handle severe stress as well as younger patients; therefore, optimal preoperative preparation is essential, and attention to detail intra- and preoperatively is essential to reduce risk. There are many tools to evaluate the affect that comorbid conditions have on surgical risk and outcomes, and risk calculators are essential to take these conditions into account.

Once a healthcare proxy has been identified and invited to join the conversation, surgeons need to then paint the picture of what the recovery process is like [12]. This should include in-hospital postoperative care and expectations beyond the hospital after the patients are discharged. When the prognosis is not clear, the most helpful approach to establish a range of outcomes is by describing the “best-case/worst-case” scenarios. This range of outcomes should be personalized to individual patients, rather than simply reporting numbers such as the expected in-hospital or 30-day mortality.

Additionally, using objective prognostic tools may be valuable in certain situations. The ACS (abdominal compartment syndrome) National Surgical Quality Improvement Program (NSQIP) Surgical Risk Calculator, which is readily available online, offers estimated risks of postoperative complications based on specific pa-

tient characteristics along with the type of planned procedure and whether it is an emergency case. For geriatric patients specifically, age or comorbidities alone do not predict outcomes; frailty has been shown to independently predict postoperative complications, length of stay, and discharge to facilities in older surgical patients. Utilizing these adjunctive tools for prognostication may provide surgeons and patients a common ground to establish expected outcomes for shared decision-making.

Once both parties agree regarding expectations, the goals of care conversation continues with gathering more information regarding their preferences for life support and advance directives. Some patients may opt out of surgery once they find out about the expected outcomes. Others may elect to have surgery but will ask to enact a do-not-resuscitate order and will indicate that if they do not recover well, they would not want to be kept alive on mechanical support. Hence, it is essential to have a GOC (goals of care) discussion preoperatively, even in the emergency setting, to ensure that patients receive the treatments that are aligned with their preferences postoperatively. The discussion about advance directives is difficult—patients have a hard time considering their own mortality, and it is especially difficult when faced with a surgical emergency. Patients may simply state that they are comfortable with a named proxy making end of life decisions on their behalf. No matter what decisions are made, this is a good time to provide assurances that the patient will be well cared for throughout their hospitalization and that these concepts can be revisited at any time. Closing the GOC discussion by determining if the patient or surrogate has any new questions, concerns, or worries may shed additional light on the patient’s wishes, goals, and even advance directives; practically speaking, addressing new concerns helps ease the patient into the next step of his or her care.

6. Conclusion

Medical evaluation performed before surgery is very important in order to better define the type of surgery that each person can or cannot do and to determine if the risks outweigh the benefits. Understanding the type of surgery that will be done is also very important, because the more complex and time-consuming the operation, the greater the risks that the patient may suffer. From the obtained data it is possible to determine the surgical risk. So if it is low, it is possible to dismiss the surgery, if the surgical risk is medium to high, the doctor can give guidance, adjust the type of surgery or request more tests to help better assess a person’s surgical risks.

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