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8

How to treat post-operative complications: An evidence-based approach

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Post-operative complication can be defined as any deviation from the normal post-operative course. The majority of post-operative complications affects the subgroup of high-risk patients, and they are clearly associated with increased hospital length of stay and mortality.

This review deals with the principal complications occurring during the post-operative period. In particular, we describe the preventive and management strategies to face pulmonary, cardiac, renal and neurological complications.

Introduction

Post-operative complication can be defined as any deviation from the normal post-operative course. It must be distinguished from sequela, which is an 'after-effect' of surgery inherent to the procedure, and from 'failure to cure', which occurs when the original purpose of surgery has not been achieved. According to the intensity of the therapy needed to treat complications, they can be classified into five severity grades (Table 1) [1]. The incidence of specific complications depends on several factors including the type of surgical procedure. However, some of them are common to all interventions. The majority of post-operative complications and deaths affect the subgroup of high-risk patients. Post-operative complications are clearly associated with increased intensive care unit (ICU)/hospital length of stay and mortality, which in turn increases the cost of assistance. This review deals with the prevention and management of the most relevant post-operative complications.

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Table 1
Classification of surgical complications.

Grade	Definition
Grade I	Any deviation from the normal post-operative course without the need for pharmacological treatment or surgical, endoscopic and radiological interventions Allowed therapeutic regimens include drugs such as antiemetics, antipyretics, analgesics, diuretics, electrolytes and physiotherapy. This grade also includes wound infections opened at the bedside
Grade II	Requiring pharmacological treatment with drugs other than those allowed for grade I complications Blood transfusions and total parenteral nutrition are also included
Grade III	Requiring surgical, endoscopic or radiological intervention
Grade IIIa	Intervention not under general anaesthesia
Grade IIIb	Intervention under general anaesthesia
Grade IV	Life-threatening complication (including CNS complications)[a] requiring IC/ICU management
Grade IVa	Single-organ dysfunction (including dialysis)
Grade IVb	Multiorgan dysfunction
Grade V	Death of a patient
Suffix 'd'	If the patient suffers from a complication at the time of discharge, the suffix 'd' (for 'disability') is added to the respective grade of complication. This label indicates the need for a follow-up to fully evaluate the complication

Adapted from Dindo et al., 2004 [1].
[a] Brain haemorrhage, ischaemic stroke, subarachnoid bleeding, but excluding transient ischaemic attacks. CNS, central nervous system; IC, intermediate care; ICU, intensive care unit.

Excluding specific complications of surgical interest (e.g., anastomotic leak, wound infection, etc.), they are respiratory, cardiovascular, renal and neurological complications.

Post-operative pulmonary complications

Post-operative pulmonary complications (PPCs) can be defined as any post-operative conditions able to impair respiratory function. They include respiratory infection, respiratory failure, pleural effusion, atelectasis, pneumothorax, bronchospasm and aspiration pneumonitis [2]. A recent multicentre European study enrolling 5099 patients undergoing non-obstetric surgical procedure showed a PPC incidence of 7.9%. Respiratory failure was the most frequent complication (4.7%), followed by pleural effusion (3.1%), atelectasis (2.4%), pulmonary infection (2.4%), bronchospasm (0.8%), pneumothorax (0.6%) and aspiration pneumonitis (0.2%) [3]. Among patients with PPCs, 65% had more than one complication and 35% had three or more. The time between surgery and the first PPC recorded was 3 (2–6) days. Development of at least one PPC was associated with a higher in-hospital mortality (8.3% vs. 0.2%, $p < 0.0001$).

The best approach to face PPCs is an appropriate preoperative evaluation of risk factors and the implementation of prevention strategy to reduce the incidence of PPCs. Preoperatively, several diagnostic tests (e.g., chest radiograph, spirometry and laboratory investigations) can be used to support the history and physical examination that continue to represent the major useful assessments to evaluate patients at risk [4]. Seven independent risk factors (ARISCAT score) have been recognized as predictors of PPC development in patients undergoing nonobstetric surgery under general, neuraxial or regional anaesthesia [2]. This scoring system (that includes the age, the preoperative value of peripheral oxygen saturation, the presence of respiratory infection during the month before surgery, a preoperative haemoglobin level < 10 g/dl, intrathoracic or upper abdominal surgery, the duration of surgery and an emergency procedure) showed a good capability of predicting PPC rate in the overall European population, even if some regional difference exists [3]. Post-operative respiratory failure is the most frequent PPC and it has a major impact on outcome, as about 80% of these patients require ICU admission [5]. A score system has also been specifically developed to preoperatively recognize this subgroup of complications [5].

Considering the patient's risk factors, the clinician has several preoperative, intraoperative and post-operative strategies to reduce the PPC rate. A recent Cochrane review showed that preoperative