

MINI-REVIEW

Assessment of late postoperative complication in the emergency department

Pablo Colsa Gutiérrez^{1,*}, Alejandra García Jiménez², Luca Ponchietti¹

¹Department of General Surgery, University Hospital San Jorge of Huesca, 22005 Huesca, Spain

²Department of Community Nursing, San Jorge University Hospital, 22004 Huesca, Spain

***Correspondence**

pablocolsa@gmail.com
(Pablo Colsa Gutiérrez)

Abstract

Nowadays, due to the shortening of the hospital stay, it is quite common for surgical patients to develop surgical complications which will declare themselves after having been discharged. Usually, the first point of contact to receive medical treatment will be the Emergency Department. Post-operative complications can be divided into early-onset, the ones which occur in the first 4 weeks, and late-onset for the ones developing more than 4 weeks after surgery. Early-onset complications are the most common, and usually they tend to appear in the immediate postoperative period. These include seromas, surgical wound infections, eviscerations, ileus, anastomotic leak, and medical complications such as pneumonia and thromboembolism. Later-onset complications are more specific to the type of procedure performed. Classic examples are jaundice due to stricture of the bile duct stenosis after hepatobiliary surgery or afferent loop syndrome secondary to gastric surgery. An early diagnosis of any complications reduce their negative impact and helps in their treatment. For these reasons, the Emergency physician must have a high index of diagnostic suspicion. Computed Tomography (CT) scan with intravenous contrast is almost always the best modality to reach a diagnosis. An early surgical consultation is always advisable.

Keywords

Postoperative complications; Abdominal surgery; Morbidity; Computed tomography contrast; General surgery

1. Introduction

Surgical complications can manifest as early as the same day of surgery to months after it. Until a decade ago, most of them were diagnosed and treated during hospital admission. However, the widespread adoption of mini invasive techniques with the consequent shortening of the length of hospital stay, means now that many complications appear after hospital discharge, and quite often need to be diagnosed by the Emergency Department (ED) [1].

It is important to stress out that the normal postoperative period is always associated with symptoms and complaints by the patients. These are caused by the expected physiological changes after the intervention. Others, on the contrary, constitute true complications [2]. Differentiating these and detecting those that require urgent treatment is a challenge for all the Emergency staff.

A good triage is extremely important and emergency nurses should be able to highlight those patients at risk of deteriorating quickly. These patients more often than not will benefit by a multidisciplinary approach with a prompt consultation of the surgeons, anesthetists, Intensive Care Unit (ICU) doctors and radiologists who will often require collaboration with radiologists and surgeons. In this paper we review the most

common postoperative complication trying to focus on an ED approach.

2. Common Complication

A good number of patients can go to the Emergency Room with symptoms secondary to immediate postoperative complications that have arisen or have worsened after discharge.

The secretion of serous fluid from the surgical wound can be caused by a simple seroma which usually does not require any treatment. On the contrary, the secretion of a salmon-pink serohematic fluid can indicate the existence of an evisceration, which needs promptly surgical review [3].

If the fluid discharging from a surgical wound is purulent and there are signs of local/systemic inflammation, it means that there is an infection. In these cases, it is always advisable to obtain a surgical review to evaluate the severity of the infection in view of the previous surgery (abdominal wall mesh, vascular graft, *etc.*). A sample should always be taken and sent to cultivate; blood tests will be essential in septic patients and in the cases who will need surgery. Surgical site infections, as well as sepsis, are two postoperative complications after major operations which have been associated with negative economic impact, increased morbidity, extended postoperative hospital

stay, readmission, and death [4].

Postoperative ileus, which is the absence of bowel movements with/without nausea or vomiting, is common after abdominal surgery. It is seen most often in hospitalized patients after major surgeries (colectomies, *etc.*) but, less frequently can be a cause of admission to ED after less invasive procedures (appendicectomies, laparoscopic hernia surgery, *etc.*) that are discharged early. Usually it resolves spontaneously with supportive treatment. It is important, though, to keep in mind that it can be a sign of intra-abdominal complications such as anastomotic leak, an abdominal collection, a contained evisceration or a late, albeit very rare, hemorrhage. For these reasons we strongly advise to investigate all the patients with bowel obstruction/ileus after discharge by means of ultrasound (US)/computed tomography (CT) scan to rule out complications. A nasogastric tube is essential in case of nausea/vomiting non responsive to medical treatment. Supportive treatment is paramount, and should be done with great care to the electrolyte balance, the kidney function and maintaining urinary output [5].

Anastomotic leaks are still one of the leading causes of morbimortality after gastrointestinal surgery, in particular after colorectal resections. The diagnosis of anastomotic leak is often made in the first 7 days after surgery, but in a not insignificant number of cases it can manifest up to 5–6 weeks in the postoperative period. This is due to the fact that it is often masked by the systemic inflammatory changes typical of surgery (ileus, fever, tachycardia). It is not uncommon, for the reasons explained above, that the patient becomes symptomatic after having been discharged from the hospital and ED will be their first point of contact. Anastomotic leaks may present with soft or strong clinical signs of suspicion.

Strong signs are, for example, the discharge of feces through the wound or the drain, sepsis, diffuse peritonism. Soft signs range from asthenia, anorexia, fever, *etc.* [6]. In a patient with a recent anastomosis a high grade of suspicion is mandatory. It is recommended to ask for a prompt surgical review prior to start any investigation, and most of all to decide on the type of CT scan to request (with oral contrast, Gastrografin® enema, *etc.*) [6, 7].

Symptoms of abdominal pain, vomiting, and distension sometimes reflect intestinal obstruction that may be secondary to internal hernia, adhesions, anastomotic stricture, or progression of a possible neoplasm. Although an abdominal radiograph may show bowel aeration, contrast-enhanced CT provides information about the cause, location, and possible existence of bowel distress.

Urinary tract injuries are not very common, and are usually seen after pelvic surgery (hysterectomy, resection of the rectum). When they happen, they are usually diagnosed in the first hours after surgery. In the uncommon cases which present later on, they may course with oliguria, prolonged ileus, vomiting and fever. Radiological investigation, ultrasound and/or CT scan are the diagnostic modalities.

In addition to the aforementioned complications, operated patients have an increased risk of suffering thrombotic events and decompensation of their baseline pathologies (Table 1). A patient who comes with symptoms of dyspnea may be showing symptoms of pneumonia, heart failure, exacerbation of COPD

or pulmonary embolism (PE). Thromboembolism is an entity whose risk is increased in the patient as a result of the surgery itself, postoperative immobility, the insertion of central venous catheters or concomitant tumors and/or chemotherapy. In these cases, D-dimer can be used initially due to its Negative Predictive Value (NPV) close to 95%. Unfortunately, most surgical patients will have an elevated D-dimer test. Heart ultrasound and Electrocardiogram (ECG) can show indirect signs of PE; diagnostic confirmation is usually achieved by means of CT pulmonary angiography, where available.

3. Specific Complications

Late-onset complications usually reflect changes that are more dependent on the type of intervention performed. Sometimes they are undesired side-effects of the anatomical changes produced by the surgery itself (resections, organ removal, *etc.*).

4. Gastric or Bariatric surgery

Patients may report vomiting, bloating and intolerance to food intake. The plain radiograph is usually of little help, and the CT scan should be used quite liberally. Depending on the severity of the symptoms it may be obtained with or without oral Gastrografin® (diatrizoate solution). CT helps at differentiating between gastroparesis due to gastric denervation, bezoar obstruction or anastomotic stenosis. It also helps diagnosing internal hernias, adhesions, abdominal wall incisional hernias, which are not easily detected during the clinical exploration in an obese patient. It is important to keep in mind that internal hernias in bariatric patients are often diagnosed late, when necrosis of the bowel has already occurred. For this reason, they are associated with a high morbi-mortality and are still one of the main causes of small bowel transplantation [8].

Diarrhea is a common cause of consultation after bariatric surgery. It is mainly caused by non-compliance to the dietary recommendations, but it can also be caused by a bacterial overgrowth. The treatment is based on resuscitation with attention to electrolyte replacement and a thorough nutritional evaluation (vitamins levels, iron, magnesium, *etc.*). Surgical consultation is always mandatory.

Bariatric surgery patients are almost always very difficult to manage, and are prone to a rapid decompensation. To avoid diagnostic delays, there should be no hesitation in requesting an abdominal CT in the first 6 hours after the appearance of alarm symptoms such as fever, vomiting and abdominal pain.

5. Pancreatic surgery

Patients may consult for vomiting and plenitude, which are usually due to a delayed gastric emptying. In these cases, we advise to obtain an abdominal CT to rule out complications such as a collection or pancreatic fistulas. In the latter case, the leakage of pancreatic fluid rich in enzymes and amylase can generate a direct chemical inflammation of the small bowel and the colon, and in rare cases can trigger a hemorrhage due to direct erosion of a vessel [9]. In all situations, the patient should be promptly evaluated by a surgeon, better with Hepato Pancreato Biliary (HPB) subspecialty.

TABLE 1. General complications that may occur during the postoperative period.

Symptom Guide	Possible Diagnoses	Attitude
Outflow of serous or serohematic fluid from a surgical wound	Seroma, hematoma, evisceration	The surgeon will determine the need for complementary imaging tests or instrumental exploration of the wound.
Outflow of purulent or enteric fluid from a surgical wound	Surgical wound infection, anastomotic dehiscence, fistula	
Abdominal distension without intestinal transit or oral tolerance.	Ileus (surgery, deep infection, hemorrhage...) and Mechanical obstruction (adhesions, internal hernia, stenosis...)	Hydro electrolytic replacement. Abdominal CT (Computed Tomography) with IV (intravenous) contrast and joint assessment by radiologist and surgeon.
Dyspnea, cough, expectoration	Pneumonia, atelectasis, pleural effusion, pulmonary thromboembolism.	D-dimer, angioCT (Computed angiotomography), pulmonary auscultation and ECG (Electrocardiogram)

TABLE 2. Specific postoperative complications according to the surgical history and the course of action to follow.

Surgery Performed	Symptom Guide	Possible Diagnoses	Attitude
Gastric or Bariatric	Vomiting and abdominal distension.	Gastroparesis, bezoar or anastomotic stricture.	
	Abdominal pain relieved by bilious vomiting.	Afferent loop syndrome.	CT with oral and intravenous contrast.
	Diarrhea.	Malabsorption, bacterial overgrowth, dumping, rapid transit.	
Pancreatic	Vomiting and abdominal distension.	Delayed gastric emptying, ileus, subocclusion.	The surgeon will decide the most appropriate treatment in each case
	Severe abdominal pain.	Pancreatic fistula, pseudoaneurysm, adhesion syndrome.	
Hepatic and Biliary	Jaundice, choluria, vomiting.	Cholestasis due to bile duct stenosis or dislodged stones.	Abdominal ultrasound, CT with oral and intravenous contrast.
	Abdominal pain, jaundice and fever.	Cholangitis, biloma, hepatic necrosis.	Specialist assessment to drain the bile duct.
Bowel or colorectal	Spiking fever, progressive poor condition, sepsis.	Intra-abdominal abscess, anastomotic dehiscence.	Abdominal ultrasound, CT (computed tomography) with oral and iv contrast. Surgical assessment.

6. Gallbladder or Biliary tract surgery

The most common complication after gallbladder surgery is an infected collection in the gallbladder fossa. Patients present 5–10 days after surgery with fever, asthenia and anorexia. An ultrasound is the test of choice to detect the complication and, in many cases, to perform the US-Guided drainage.

Occasionally, patients who have undergone gallbladder or biliary tract surgery may develop jaundice weeks or months after the operation. Laboratory tests will show elevation of bilirubin, and liver function tests (LFT). Ultrasound will show as a dilatation of the biliary tree proximally to the obstruction to the bile flow [10]. This may be caused by retained gallstones in the common-bile duct (CBD) or by iatrogenic injuries to the CBD (clips, ischemic or thermal injuries).

If the patient has signs of biliary obstruction with fever, it is probably an acute cholangitis. It is caused by bacterial colonization of the bile. Analytically, LFT are very deranged with transaminases that can exceed 1000 IU/L, suggesting hepatic necrosis secondary to microabscesses. These patients need to be treated as with sepsis, blood cultures need to be taken and broad spectrum antibiotic therapy should be started. The surgeon will determine the course of action to follow in these patients, which will usually involve draining the bile duct through endoscopic or percutaneous access or after surgical revision.

Another complication that can be seen is the intraabdominal collection of bile, which is called biloma. They are caused by a leak along the biliary tree, and course with non-specific symptoms such as fever, asthenia, pain, or moderate jaundice.

They are easily detected by ultrasound or CT. The type of management (observation, surgery, percutaneous drainage) needs to be decided by the surgical team on an individual basis.

Liver failure such as non-obstructive jaundice, coagulopathy, ascites and encephalopathy, is a dangerous complication. It may occur in resections of more than 75% of the hepatic parenchyma of a healthy liver, or in minor resections of a cirrhotic liver. If the insufficiency develops in a patient who has received a transplant, it may be manifesting cellular rejection that must be confirmed with a biopsy.

Post-transplant liver failure may be due to a vascular complication (thrombosis or aneurysm of the hepatic artery and thrombosis or stenosis of the portal vein). Although the incidence of these complications is low, they should be ruled out by ultrasound evaluation of the liver vasculature [11]. When a patient with these characteristics arrives at the Emergency Service, an evaluation by the transplant team will be requested.

7. Colorectal surgery

All the patients admitted to ED for abdominal pain after a recent colorectal surgery must be assessed to rule out septic complications, anastomotic leak and intraabdominal abscesses. A CT with iv contrast is usually the best imaging modality (Table 2). Adding oral contrast or Gastrografin® enema (diatrizoate) can be useful and should be discussed with the surgeons.

Blood cultures should be drawn and empirical antibiotic therapy should be started to cover gram-negative and anaerobic germs [12]. After confirmation in imaging tests, the collaboration with the surgeon will be requested to determine the management.

8. Anal surgery

Anal surgery is common due to the high incidence of benign anal pathology in our environment (hemorrhoids, fissure, fistula-abscess...). Many of its complications, such as acute urinary retention, pain, and fecal impaction, occur in the immediate postoperative period, during hospital admission. Some patients go to the ED after discharge with symptoms ranging from incontinence to severe constipation. Symptoms of soiling, nighttime leaks, and minor incontinence are usually due to injury to the internal anal sphincter during surgery, and in most of the cases are self-limited. On the contrary, constipation together with a careful anal exploration can manifest an anal stenosis after a hemorrhoidectomy with insufficient skin bridges [13]. On other occasions, postoperative patients consult due to the presence of perianal skin folds that they erroneously attribute to hemorrhoidal symptoms. In these cases, a careful inspection will rule out said origin.

9. Conclusions

Postoperative complications affect the recovery of patients after surgery, prolong their hospital stay and increase their mortality. Currently, technical advances and improvements in peri-surgical care have generally reduced these complications. Emergency physicians are often called to diagnose and manage

them. The different interventions and their complexity make it difficult to systematize their diagnosis and management. The attitude to be taken may vary depending on the characteristics of the intervention and the patient's tolerance. In this challenge, it is especially important to know the most frequent and serious complications, and to develop a close collaboration and a fluid communication with the surgical and the radiological team, as well as good communication with other specialists involved in the case.

AVAILABILITY OF DATA AND MATERIALS

Not applicable.

AUTHOR CONTRIBUTIONS

PCG and LP designed the research study, performed the research and analyzed the data. PCG and AGJ wrote the manuscript. All authors read and approved the final manuscript.

ETHICS APPROVAL AND CONSENT TO PARTICIPATE

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CONFLICT OF INTEREST

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