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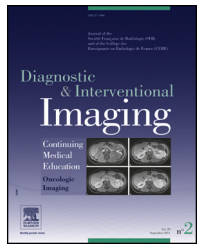

CONTINUING EDUCATION PROGRAM: FOCUS...

Postoperative abdominal bleeding

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Abstract Postoperative bleeding following abdominal surgery is relatively rare and mainly depends on the type of surgery. Although bleeding is usually controlled by simple local treatment of symptoms, specific treatment including surgery or interventional radiology is sometimes necessary. This article reviews the clinical features that must be recognized depending on the type of surgery and especially focuses on the role of the radiologist in the management of this complication.

Background

The major causes of postoperative bleeding, all types of surgery combined, are a digestive ulcer especially during a stay in intensive care (stress ulcer), rupture from direct arterial or venous trauma and delayed rupture from a previously existing pseudoaneurysm. Erosion of a vascular structure due to digestive or pancreatic fistula is the fourth most common cause of postoperative bleeding. The first section describes these different causes of bleeding in relation to the type of surgery.

Post-hepatectomy

Post-hepatectomy hemorrhage has been classified by the International Study Group of Liver Surgery [1]. Significant hemorrhage is defined as a decrease in hemoglobin of more than 3 g/dl compared to preoperative values. The mortality rate increases rapidly depending on the number of transfusions and bleeding is classified according to treatment (Table 1): grade A corresponds to a transfusion of 2 units of packed red blood cells with a mortality rate of 1.4%, grade B to more than 2 units of packed red blood cells with a mortality

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Table 1 Classification of post-hepatectomy hemorrhages according to the International Study Group of Liver Surgery [1].

	Grade A	Grade B	Grade C
Clinical	No risk	Deteriorated	Life-threatening risk
Symptoms	None	Hypotension tachycardia possible	Hemodynamic instability, potential shock
Response to transfusion	Yes	Yes or no	No
Requires radiological diagnosis	No	Yes	Yes
Radiological diagnosis	Hematoma and or hemoperitoneum	Hematoma, hemoperitoneum. Active leak possible	Hematoma, hemoperitoneum. Active leak visible
Duration of stay	Not extended	Often extended	Extended
Treatment	Stop AC, transfusion (2 units of packed red blood cells or less)	Stop AC, Transfusion (more than 2 units of packed red blood cells)	Embolization and or laparotomy

AC: anticoagulant.

rate of 25% and grade C to a recurrent hemorrhage requiring specific surgical treatment or embolization with a mortality rate of approximately 50%.

The causes of bleeding are injury to a hepatic vein in 33% of cases, superficial bleeding in 25% of cases, an arterial injury in 16% of cases and no specific cause in 25% of cases [2,3]. It should be noted that in case of a second surgical intervention, the estimated mortality is approximately 9% if surgery is performed within 6 hours after bleeding begins and 25% 6 hours after bleeding begins [4]. Because of the lower risk, interventional radiology should be considered the first-line treatment in these cases.

After liver transplantation

This is a relatively rare complication, which occurs in an estimated 9% of transplantations. Bleeding occurs a mean 6.1 days after transplantation and the most common causes are bleeding from a right phrenic, and right or left epigastric arteries, or from an intercostal artery. The first-line treatment option should be endovascular but surgical treatment remains indicated for venous bleeding, especially if the source is the vena cava or portal anastomoses [5].

After pancreatic surgery

Once again a decrease in hemoglobin of more than 3 g/dl compared to preoperative values is considered to be postoperative bleeding [6].

This complication is relatively rare and estimated to be between 3.3% and 10%, all types of pancreatic surgery combined [7]. In 21% of cases it develops early, within 24 hours after surgery and is generally an extraluminal hemorrhage. In 79% of cases, the onset is late, more than 24 hours after surgery, and it occurs a mean 12 days after surgery. In 69% of cases bleeding is due to intraluminal hemorrhage of digestive anastomoses [8]. There are numerous causes for bleeding from digestive anastomoses or damaged vascular structures [9]. Post-surgical pancreatic hemorrhages have been classified by The International Study Group of Pancreatic Surgery (Table 2).

After digestive tract surgery

Overall, the estimated rate of postoperative hemorrhage following gastrointestinal surgery for cancer is approximately 0.9%, with a high estimated mortality of approximately 20% [10].

Bleeding is the cause of postoperative mortality in 9% of patients following esophageal surgery. Once again, endovascular treatment is advised in most studies in the literature.

The estimated rate of hemorrhagic complications following gastrectomy is 0.9% (in a series of more than 1500 patients) [11], with a mortality rate of 20%. Endovascular treatment, performed as first-line treatment in 80% of cases, is associated with a success rate of 80% [11].

Ileocolic anastomoses are associated with hemorrhagic complications in 5 to 19% of cases, depending on the surgical technique. Only 1.4% are severe [12].

During colon surgery, perioperative bleeding is the cause of 9% of coelioscopic conversions to open surgery [13]. However the risk of bleeding is not greater with coelioscopy than with laparotomy [14].

In case of rectal surgery, the risk of bleeding is mainly perioperative (3% of presacral bleeding) [15].

After nephrectomy

Nephrectomy, especially partial nephrectomy, is associated with a high rate (4.7%) of postoperative hemorrhage [16]. More than 250 ml of blood loss should alert the clinician [17]. Embolization is the first-line treatment in almost all studies, whether bleeding occurs early or late. [17,18]

Role of diagnostic radiology

Standard examination: computed tomography

A diagnosis of bleeding is suggested by a poor clinical condition that may include a state of shock, a decrease in hemoglobin and/or the presence of blood in the drain [2].