Diagnostic and Therapeutic Approaches to Bleeding From Lower Parts of the Digestive System

S. Antić, I. Dimitrijević, V. Marković, J. Petrović
Institute for Digestive Diseases, Clinical Center of Serbia, Belgrade

Bleeding from the gastrointestinal tract represents a relatively common diagnostic and therapeutic challenge in clinical work of gastroenterologists and surgeons. Bleeding from the lower GI (LGIB) is mostly caused by pathologic conditions of the colon, although the source of bleeding cannot always be exactly localized, thus rendering optimal and prompt therapy difficult. During two year period, at III department of the First Surgical Clinic in Belgrade, we performed 424 colonoscopies for LGIB. According to our results the exact diagnosis was established in about 76% (324 patients) showing a great similarity with the results of other published studies (varying between 74% and 89%). The most common causes of bleeding were diverticulosis (37.11%), polyposis (10.3%) and colorectal cancer (46.14%). Besides that we have mentioned some specific facts involving the diagnosis and treatment of LGIB with an accent on some rare conditions, like angiodysplasia. Review of the diagnostic procedures and treatment modalities of the LGIB is useful for everyone who meets with this type of pathology in clinical practice. The diagnostic approach and the surgical treatment of these patients may represent a great problem, since the planning of the operative procedure can be very difficult and with uncertain result. Based on the literary data and our experience we have tried to set the algorithm of the diagnostics and treatment of the LGIB.

Key words: bleeding, lower parts of gastrointestinal system, diagnosis, treatment, angiodysplasia

INTRODUCTION

LGIB is defined as any bleeding distal to the ligament of Treitz. Most often, the cause of bleeding is localized in the colon and rectum. According to the duration it can be acute or chronic. Even though we usually expect the benign anal pathology to be the reason for LGIB, we should always have in mind that malignant tumors and polyps may also be the cause of bleeding. The bleeding itself can seriously endanger the patient. Incidence in this kind of bleeding varies depending on several factors and cannot be acknowledged with certainty. Based on the published data the incidence of LGIB in the USA is about 20/100,000 patients and LGIB is responsible for about 0.7% of all emergency surgical hospitalizations. 2-4% of mortality shows that in most of the cases LGIB does not endanger otherwise healthy individuals, but it is higher in elderly patients with other conditions such as chronic renal, liver, coronary or malignant tumors (up to 10%).

Depending on the intensity of bleeding, clinical presentation of LGIB varies from occult blood in the stool, melena, to hematochesia causing the disturbance in haemodynamic status. It requires immediate aggressive diagnostic procedures and treatment.

Accurate diagnosis and potential treatment have great importance, since in a number of cases bleeding stops spontaneously, regardless of the amount of the blood lost, but with the tendency of recurrence.

REVIEW OF THE LITERATURE AND OUR EXPERIENCE

Many factors can influence the morbidity and mortality in patients with LGIB. Some studies analyzed the indications for surgical treatment, prognostic and risk factors, morbidity, mortality and the incidence of the recurrence in acute LGIB.

In 2007 Rios et al. have published the results of the research concluding that it is very difficult to estimate which patients with LGIB require emergency surgical treatment. The research showed that in 61% of the patients the source of bleeding was identified by emergency colonoscopy and in 14% immediate surgery was necessary. Morbidity was 6.4% and mortality 4.7%. The most
common cause of bleeding was diverticulosis of the colon (25%). The recurrent bleeding occurred in 30% of the patients.

High incidence of morbidity and mortality is explained by the presence of other conditions and emphasizing the need for emergency surgical treatment.

Majority of authors favour colonoscopy as a method of choice in identifying the cause of LGIB. Fernandez et al. in 1996 showed that causes of LGIB discovered by colonoscopy in 25.1% were polyps, in 24% colonic diverticulosis, in 12.6% tumors, in 9.4% IBD, in 2.4% nonspecific proctitis, in 2.4% ischemic colitis, in 1.9% angiodysplasia, in 1.1% colitis and in 0.7% other conditions.

In 1997 Vernava and al. had managed to establish the origin of LGIB in 74%-82% of examined patients. They showed that selective angiography is sensitive in only 42-86% and that in 10-15% of the cases the cause of bleeding in the digestive tract distal from the ligament of Treitz is located in the small intestine.

During the period from December 2004 to December 2007, at III Department of the First Surgical Clinic, Institute for the Digestive Diseases at the Clinical Center of Serbia, 424 colonoscopies were performed with the LGIB as a primary indication for the procedure. The final diagnosis was established in 324 patients (76%) and the distribution of patients according to the diagnosis is presented in chart 1.

In our sample as many as 72% of patients some perianal conditions presented as bleeding from LGIB. This record has not been mentioned in the other publications, but could state that colonoscopy is not the diagnostic method of choice for the haemorrhoidal or other bleedings from the perianal region.

In 100 patients examined (24%) the exact cause of bleeding was not established. All of them had spontaneous cessation. This percentage seems high, but, as mentioned in other publications, it is expected in this pathology. Because of the danger for the patients' condition as well as the tendency of the bleeding to spontaneously stop and reappear, it is important to perform the diagnostic procedures as soon as possible.

In 12 patients (2.8%) the bleeding could not be stopped with conservative procedures, so these patients had to be managed surgically. Apart from hemodynamic instability and the great amount of the transfusions, the comorbidity, general condition of the patients and the risk of the recurrence were considered during evaluation for the indicated for surgical treatment. In 10 patients the operative treatment was indicated by the recurrent bleedings from the diverticulum of the left colon. In one patient we found a real diverticulum of caecum and in the other the cause of LGIB was angiodysplasia, verified by consequent pathohistologic examination. The distribution of operative procedures is shown in table 1.

In one patient, as we mentioned above, with postoperative pathohistologic confirmation of the angiodysplasia of the colon (pictures 1 and 2), angiography, as a method of choice, could not be carried out because of the serious general condition caused by long lasting bleeding, other chronic conditions and the old age. After the investigation by video capsule, we performed preoperative and intraoperative colonoscopy, but we failed to discover the exact localization of bleeding. As it is recommended by the majority of authors, in this case we performed total colectomy.

**DISCUSSION**

**Etiology**

There are numerous conditions that could be the cause of LGIB and most of them are localized in colon. Some of these conditions are: diverticulosis of the colon, inflammatory bowel disease, arteriovenous malformations, tumors, ischemic colitis, aorto-enteric fistulae, etc.

Finding the exact cause of bleeding is often difficult. Initially we should distinguish whether the bleeding originates from the upper or lower GI. In a great number of
cases a spontaneous cessation of bleeding may occur even before we initiate the examination. The algorithm of the diagnostic procedures for GI bleeding is very complex (chart 2) and it is necessary to be aware of the diagnostic procedures that are used.

Of course, before diagnostic procedures the patient must be hemodynamically stable. In tachycardic and hypotensive patients two i.v. lines should be opened. The same is advisable for those who are stable, since the procedure may intensify the bleeding and endanger the patient.

Proper patient history may give us a clue about the origin of bleeding. Tar-like black stools, could point to the bleeding from the upper GI. It is important to point out that in a case of massive bleeding from the upper GI, lighter, bloody stools could also be seen, usually followed by the signs of the acute hypovolemia or, even, hemorrhagic shock. In elderly patients with peripheral vascular or coronary diseases, who complain of abdominal pain with present LGIB, we should suspect the ischemic colitis. Coronary valve conditions and chronic renal insufficiency could be associated with angiomias of the digestive tract. Any information about the previous bleeding from the digestive tract with the known localization leads the investigation in that direction. The same is for patients who were previously managed for diverticulosis, peptic ulcers, IBD or hemorrhoids. The site of recent polypectomy should always be inspected for any post procedural bleeding. Typical signs for malignancy of the GI can be helpful in orientation. In patients with abdominal aneurism, regardless whether they were previously operated on or not, the existence of the aorto-enteric fistula should be suspected.

Before any diagnostic procedures, we should be informed about any medicament the patient has received. NSAID, as well as any other drugs that alter coagulation (anticoagulant, antiagregational medications) are quite often the cause of LGIB.

DIAGNOSTICS AND TREATMENT

Physical examination is mandatory and may provide some information, but mostly it does not have the crucial importance.

Necessary laboratory investigations are: RBC examination, thrombocytes, prothrombin time (PT), partial thromboplastin time (PTT). The packed cell transfusion is advised in patients whose hemoglobin levels are lower than 9g/dl or in the case of obvious massive bleeding. Coagulation anomalies should be corrected by fresh frozen plasma or the thrombocyte transfusion.

Placement the nasogastric tube should be one of the first steps in the approach to the patients with heavy hematochesia and/or hypotension. Inspecting the aspirate we can exclude the bleeding from the upper GI although, according to some publications, in 1% of the cases the bleeding from the duodenum may present with clear liquid from the stomach.

After eliminating the upper GI as the origin of bleeding, we should also exclude the anorectal area as the possible location of bleeding (anoscopy, rectoscopy). In case of hemorrhoids, these procedures can also be therapeutic (eg: elastic band ligation).

Possible further investigations of LGIB are as follows:

Colonoscopy – in cases of the abundant LGIB, emergency colonoscopy is a procedure of choice. Many studies confirmed its accuracy, acceptable tolerability and efficacy in establishing the origin of bleeding with possible simultaneous haemostasis justifying its routine use.

Endoscopic injection therapy is one of the simplest methods of hemostasis. It is reliable, cheap and efficient method and could be performed in the emergency conditions with existing instruments. The agents that could be used are adrenalin, alcohol, cyanoacrylic glue, ethanolamine, thrombin, fibrin glue, polydoconal, hypertonic NaCl solution, etc. as well as some of their combinations.

Metal clips could also be used for simple, cheap hemostasis that permanently and reliably causes the occlusion of lumen of the damaged blood vessel. Using this method we can visually check the effect of hemostasis.

Elastic band ligation is also used in endoscopic hemostasis. The most common indications for this method are bleeding caused by artero-venous malformations, previous polypectomies or diverticula.

Endoscopic terminal coagulation is performed by monopolar or bipolar diathermy in order to achieve hemostasis.

Nowadays the other coagulation methods that use laser or microwaves in order to stop the bleeding are being developed. These procedures are not readily performed because of the bulky, expensive equipment which has not shown much of the advantage over the previously mentioned procedure.
The accuracy of colonoscopy in diagnosis of LGIB is between 74 and 89%, and the ability to immediately achieve hemostasis, in case the lesion is found, is around 67%. Colonoscopic examination can even be performed 12 to 24hrs after the emergency hospitalization and bowel preparation. Additionally, it should be performed by an experienced endoscopist, who is not always available.

**Barium enema** – a method not advisable as an initial diagnostic procedure. Most of the times it does not show the source of bleeding and complicates additional emergency angiography or colonoscopy. The haemostasis by tamponade can be seen in practice and in some cases may be effective.

**Angiography** - when the origin of bleeding cannot be localized by endoscopic methods, it is indicated to perform selective angiography or scintigraphic examination. The angiographic examination is performed by selective catheterization of the celiac plexus and upper and lower mesenteric arteries. In the case of LGIB, the contrast is initially injected in the lower mesenteric artery. Angiography could detect the bleeding with 0.5-1 ml/min minimal intensity. Sensitivity of the angiography is 27–77% without false positive results. The presence of non bleeding angiomas of the small and large bowel can be detected by this method. (pict. 3)

There is a possibility of therapeutic use of angiography by supraselective embolisation of the blood vessels involved in bleeding. However, the studies investigating this method described a high percentage of intestinal necrosis (64%) together with a high mortality rate (55%). Candidates for this procedure, are those not eligible for surgical management. Recently, CT angiography is in wider use, showing the ability to discover angiectasy, with the sensitivity of more than 70%.

**Scintigraphy** - a method more sensitive than angiography. According to some reports it can discover bleeding of 0.1 ml/min. At the moment there are two methods available in the scintigraphic examination for LGIB: technetium sulphur–colloidal scintigraphy (Tc99m) and technetium (Tc99m) labeled RBCs.

Initially, for the performing of this method sulphur–colloidal solution was used. Unfortunately, this agent accumulates in liver and spleen, thus greatly compromises visualization of the origin of bleeding in the upper and the middle portion of the abdomen. Therefore, nowadays we use technetium labeled RBCs. Even if there is no bleeding at the moment of the examination, any bleeding episode that occurs within 12h can be revealed.

In spite of all the diagnostic procedures available the accuracy in localizing the exact origin of bleeding varies. It could be between 26–78%, and false positive results may occur in 3–59%. Large bowel preparation for colonoscopy can adversely influence the accuracy by shortening colonic transit time. The sensitivity of colonoscopy depends on the quality of the equipment as well as on experience and education of the investigator. Some studies reached 97% sensitivity once the optimum conditions were achieved. We should keep in mind that scintigraphy is not the procedure of choice in unstable patients with massive bleeding. The duration of the procedure, itself, delays the appropriate therapy. In such cases emergency angiography is recommended.

**Video capsule** – a new promising procedure in LGIB diagnosis. It is indicated only in patients with suspected origin of bleeding in the small bowel and in whom all previous procedures of investigation failed to locate the origin of LGIB.

Algorithm of the treatment of bleeding from the digestive tract is shown in chart 1.

Since the treatment depends on the actual cause of, we will present most often conditions that are met in our clinical practice.

**Colonic diverticulosis** is a frequent disease in the western countries. About 50% of population in these countries has diagnosed diverticulosis. In most of the cases those are pulsion pseudodiverticuli, which are, actually, prolapsed mucosa and submucosa through the muscular layer of the colon on the insertion point of the vasa recta.
The exact mechanism of divericular bleeding is not known. Mayers and al. have defined it as the one occurring from the ruptured v. recta in the diverticulum. Microscopically the structural changes in the wall of the blood vessel are noticed as thickening of the intima and thinning of the media, what may explain the grounds for bleeding. It should be emphasized that, contrary to widely accepted opinion, the inflammation is not associated with the cause of bleeding, as proved by several studies.

Since the diverticulosis is very frequent, it is difficult to define the percentage responsible for LGIB. According to that we can classify diverticulosis in several groups: Incidental diverticulosis (the one that is not in correlation with the active bleeding) is found in 54% of cases. Suspected diverticulosis counts for 29% of cases. It is defined as a verified presence of a divericulum without the signs of recent bleeding, but without any other cause of bleeding found.

Certain bleeding from a diverticulum is the one verified by endoscopy as active bleeding from the blood vessel itself or presence of the coagulum resistant to intensive rinsing. It is defined as a verified presence of a diverticulum without the signs of recent bleeding, but without any other cause of bleeding found.

Certain bleeding from a diverticulum is the one verified by endoscopy as active bleeding from the blood vessel itself or presence of the coagulum resistant to intensive rinsing. It is defined as a verified presence of a diverticulum without the signs of recent bleeding, but without any other cause of bleeding found.

Angiodysplasia was first described in 1960 by Margolias and al. as a radiographic anomaly during intraoperative angiography performed for colonic bleeding. It was later defined as a communication between thin walled arteries and veins, localized in the intestinal mucosa or submucosa. Acquired angiodysplasia is probably caused by a deformation of postcapillary venules following increased intraluminal pressure. This elevation of pressure within the venulles is caused by the malfunction of precapillary sphincter with a consequential raise of intraluminal pressure.

The cause of this phenomenon has not been clearly established, but the present theory based on the loss of the integrity of the vessel wall due to the disturbed signaling cascade of the TGFβ or the deficit in collagen type IV.

Angiodysplasia in most of patients is rarely seen before the age of 60. Its incidence increases with age and can be associated with the aortic stenosis (Heyds syndrome), chronic renal insufficiency, and von Willebrand’s disease and within Osler-Weber-Randy syndrome (hereditary hemorrhagic telangiectasie) describing the occurrence of lung, nervous system, skin and intestinal telangiectasie.

Unless there is visible bleeding from the angiodysplasia found during angiography or colonoscopy, it cannot be accused with certainty to be the actual cause of bleeding. But if another possible origin of bleeding is not found, angioysplasia is the most probable cause.

The increased use of colonoscopy as a screening method for colorectal cancer explains the greater incidence of discovering angiodysplasia by this method. It was believed that these kind of changes is predominant in the right colon. Jensen and Machicado showed in the 437 patients angiectasies in more than 70% in the right colon, 22% in the descendent and sigmoid and 6% in the transversal colon. Some studies published later showed the equal incidence in both sides of the colon.

Apart from the causes of LGIB mentioned above, some other pathological conditions and several entities may be responsible:

**Colorectal cancer**, an often cause of bleeding which varies from occult to massive, occurring in approximately 11% of cases.

**Polyps**, often found in colon and rectum, account for only 2-10%.

**Ischemic colitis** may be the cause of massive LGIB. Apart from abundant presence of blood in stool, patients complain of abdominal pain and in a case of colonic gangrene they appear with the signs of the acute abdomen. According to most of the authors it accounts for less than 10% of bleeding.
Inflammatory bowel disease could also be the cause of LGIB. Frequent massive bleeding is rare in ulcerative colitis, and usually results from complications like toxic megacolon, colonic perforation or malignity based on this disease\textsuperscript{28}. According to literature data complications of UC are related to 10% of all emergency colectomies\textsuperscript{29}.

Incidence of massive bleeding in Crohn disease is between 1 and 13%. It is rarely active bleeding, and in most cases it originates from colon. Cirocco et al. report that massive bleeding caused by Crohn disease requires emergency surgical intervention in as many as 91% of cases\textsuperscript{30}.

Surgical treatment of LGIB

Surgical management of intense LGIB is sporadic. It is accompanied with significant mortality, but presents a definitive treatment in most of the cases. Bleeding usually stops spontaneously during medicamentous treatment, therefore not many patients are candidates for surgical intervention.

Emergency surgical treatment is reserved for patients who cannot be hemodynamically stabilized or bleeding persists despite of medicamentous and other conservative methods of treatment.

Mortality increases with the amount of blood lost, leading to inevitable surgical intervention, especially if bleeding has not stopped even after 6 units of blood.

Although the actual surgical approach depends on the preoperative information given to the surgeon, thorough exploration of all intraabdominal organs is mandatory. During the exploration the source of bleeding from the upper GI should be excluded, followed by inspecting all the intestines distal to the ligament of Treitz in order to eliminate any possible origin of bleeding such as Meckel’s diverticulum, existing ileitis, colitis or eventual GIST. If the evident cause of bleeding is not found after all, intraoperative enteroscopy or colonoscopy should be considered. This procedure allows detailed examination of mucosa, as well as illumination through the intestinal wall, allowing the visualization of the vascular anomalies, small ulcers and tumors. This is a very demanding procedure, although it does not seem so. Two surgeons or a surgeon and an experienced endoscopist are usually required for this procedure.

If the bleeding point is not established, total colectomy is advised with the additional inspection of rectum in order to exclude any bleeding from this region. If the patient has stable vital signs, a primary anastomosis can be performed, otherwise, it is safer to create terminal ileostomy for this procedure.

It is advised with the additional inspection of rectum in order to exclude any bleeding from this region. If the patient has stable vital signs, a primary anastomosis can be performed, otherwise, it is safer to create terminal ileostomy for this procedure.

Mortality associated with this type of surgery varies between 10 and 35%\textsuperscript{31}. As already mentioned the greater the blood loss, the greater is mortality, and it is sometimes not advisable to further postpone the surgery. It is very important to emphasize that the mortality is not in correlation with extension of the resection, while on the other side the percentage of recurrent and persistent bleedings limited resections is significantly higher.

CONCLUSION

Emergency surgical treatment is required in 10-25% of cases of LGIB, usually in those resistant to conservative management\textsuperscript{32}. In general, the patients with 6 or more blood transfusions are candidates for surgical management. It is, of course, essential to precisely locate the exact origin of bleeding before the operation in order to plan the extent of surgery, but if this fails, intraoperative colonoscopy and enteroscopy are advised. If we still cannot identify the source of bleeding, after we’ve performed these procedures, total colectomy with ileo-recto anastomosis is the procedure of choice. "Blind" segmental resections are not advisable due to a very high risk of the recurrent bleeding (75%) and high mortality rate (up to 50%)\textsuperscript{32,33,34}.

SUMMARY

STRATEGIJA U DIJAGNOSTICI I LEČENJU KRVARENJA IZ DONJIH PARTIJA DIGESTIVNOG TRAKTA

Krvarenje iz gastrointestinalnog trakta, kao realtivno česta pojava u kliničkom radu gastroenterologa i hirurga može predstavljati veliki dijagnostički i terapijski problem. Krvarenje iz donjih partija digestivnog trakta je najčešće uzrokovano patološkim stanjima kolona, ali optimalna i pravovremena trepaja može biti jako teška, s obzirom da je izvor krvarenja često nemoguće precizno i bez sumnje identifikovati. Osvrt na elemente strategije i lečenja krvarenja iz donjih partija digestivnog trakta je od koristi svima koji se susreću sa ovom vrstom patologije, koja je uzrok mortaliteta, srećom, u malom procentu slučajeva. Narodići problem je strategija u pristupu, dijagnostici i lečenju ovih bolesnika od strane hirurga, zato što je planiranje operativnog zahvata na tako nesigurnom terenu puno poteškoća i neizvesnosti u pogledu ishoda.

Ključne reči: krvarenje, gornje partije gastrointestinalnog sistema, dijagnostika, lečenje, angiografija

REFERENCES


