Frequency of complications after upper and lower gastrointestinal endoscopy

Aleksandra Truskowska, Zuzanna Tulej, Kamila Tura, Magdalena Wasilewska, Kamila Weremko

Students of nursing, Faculty of Health Sciences, Medical University of Lublin

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Abstract

Endoscopy is the main study used by gastroenterologists – both for diagnostic and therapeutic purposes. Unwanted events are very rare when an experienced person carries out the test using modern equipment and monitoring of the course. In the case of upper gastrointestinal endoscopy the most common complications are cardiopulmonary incidents which constitute about 60% of all complications of endoscopic procedures. The others include: bleeding, perforation, infection, Mallory Weiss syndrome. When it comes to colonoscopy, a typical complication is perforation. The risk factors for gastrointestinal endoscopy complications include premedication, ischemic heart disease and advanced age, therefore a balanced indication is important, especially in elderly patients. The article contains information of the complications of endoscopic examinations of the upper and lower gastrointestinal tract and the frequency of their occurrence.

Corresponding address:
e-mail: kamila.weremko@onet.eu
tel. 798 753 315

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Introduction

The possibility of gastrointestinal examination using endoscopic methods has contributed to revolutionize the diagnosis and treatment in gastroenterology [1]. Gastrointestinal endoscopy is a common diagnostic and therapeutic method. With the modernization of techniques and equipment, the therapeutic potential of endoscopy has increased. An increase in the prevalence and frequency of therapeutic endoscopy resulted in an increased probability of adverse events – therapeutic endoscopy carries a much higher risk of complications compared to diagnostic endoscopy. By taking appropriate steps before, during and after endoscopic procedure it is possible to minimize the prevalence and mortality of the adverse event [2,3].

Endoscopy of upper gastrointestinal tract

Endoscopy of the Upper gastrointestinal (GI) tract includes the examination of the oesophagus, stomach and the first section of the small intestine – duodenum. It is performed in diagnostic purposes (it is possible to take material for histopathological examinations) and treatment (e.g by removing foreign bodies or lesions).

If caring for proper preparation of the patient for the procedure, endoscopy is a safe procedure with low risk of complications. Current data suggests complications on a scale of 1 per 200 to 1 per 10000 procedures and mortality rate from 0 to 1 in 2000 procedures [4]. They mainly include:

- cardiopulmonary adverse events,
- perforation of upper gastrointestinal tract,
- bleeding,
- infection,
- Mallory-Weiss syndrome.

The most common complications associated with upper GI endoscopy are cardiopulmonary adverse events [5]. They are responsible for 60% of upper GI endoscopy adverse events, while the incidence in large national studies ranges between 1 per 170 to 1 per 10000 procedures [6]. A systematic review of randomized controlled trials of patients undergoing esophagogastroduodenoscopy (EGD) reported 6%-11% incidence of hypoxemia and 5%-7% hypotension [7]. In contrast to these results, a retrospective review of the CORI database in almost 325000 gastrointestinal endoscopic procedures reported cardiopulmonary adverse events occuring in 0,9% of these procedures [6]. Patient-related risk factors for cardiopulmonary adverse events include advanced age, higher American Society of Anesethesiologists classification (≥ASA class III), preexisting cardiopulmonary disease or comorbidities. Procedure-related risk factors include prolonged procedure time, proneposition and difficulty with intubating the esophagus when upper GI endoscopy is performed [5].

Perforation rates with upper GI endoscopy are reported to be 1:2500 to 1:11000 procedures [8]. Perforation usually occurat sites of existing pathology, e.g. Zenker's diverticulum, esophageal stricture or malignant obstruction, when the endoscope is pushed blindly. Perforation of the cervicalesophagus can result in neck pain, hoarse voice, pharyngeal dysphagia, sternocleidomastoid spasm and subcutaneous emphysema. Intra-thoracic and intra-abdominal perforations can present with chest pain, respiratory difficulties, increasing abdominal pain, hemodynamic instability, desaturation, subcutaneous emphysema and later with rising inflammatory markers. Identification many cases of the adverse events is possible with careful endoscopic inspection during the procedure and at the end of it. If signs or symptoms will appear, suspected perforation should be assessed with chest X-ray, water soluble contrast swallowing study or chest CT. Early identification and quick management reduce perforation associated morbidity and mortality [5].

Significant bleeding after upper gastrointestinal endoscopy is a rare complication. Mucosal injuries occur in less than 0. 5% of diagnostic endoscopies and very rarely develop into clinically significant bleeding. This complication is more likely in patients with thrombocytopenia. Patients with a platelet count above 50,000 /ml belong to 4% of clinically significant bleeding, therefore some suggest a threshold of 20,000 /ml for diagnostic endoscopy and 50,000 / ml if biopsy may be necessary [5]. It should also be remembered that anticoagulant therapy increases the risk of haemorrhage after endoscopy, so you should consider the urgency of the procedure, the risk of bleeding during the procedure, the effect of the anticoagulant and the risk of thromboembolic event. The patient who is suspected of significant bleeding should be observed and his haematocrit should be examined at close intervals. Treatment consists mainly of coagulation or vasopressin injection and in very rare cases surgery is necessary [9,10].

Infections during diagnostic endoscopy are very rare. Transient bacteraemia, which occurs in 8% of patients, very rarely develops into infectious consequences such as Infectious endocarditis; therefore, according to the current guidelines, antibiotic prophylaxis for diagnostic endoscopy is not recommended [5].

Mallory-Weiss syndrome is a rupture in the esophageal mucosa. A study in the UK of 10,000 endoscopies showed 7 cases of the above mentioned syndrome. Of these seven patients, six of them had an esophageal hernia. If this syndrome occurs, the patient is immediately admitted to hospital for observation, haematocrit tests, and intravenous fluid administration, but in most cases the complication stops spontaneously [10,11].

Endoscopy of the lower gastrointestinal tract

Endoscopy of the lower gastrointestinal tract includes examination of the entire large intestine, from the rectum to the caecum, or possibly also the end of the small intestine (colonoscopy). It is also used to assess the condition of the rectum to be bent in the sigmoid rectum (rectoscopy) and to visualize the rectal canal accurately (anoscopy). It is performed for diagnostic and prophylactic purposes, because during the examination the light of the gastrointestinal tract is assessed and there is a possibility to take clippings for histopathological examination. The endoscopic examination of the lower gastrointestinal tract is also performed for therapeutic purposes (injecting or clipping of bleeding blood vessels, irritating constrictions, e. g. rectum, cutting out lesions, e.g. polyps) [12].

Endoscopy is an invasive procedure and therefore carries potential risks for the patient. However, the risk and extent of complications depends on the patient's condition (for example, it increases in the elderly, with accompanying inflammatory changes, diverticula or cancer) and the type of procedure (for example, performance of polypectomy – removal of polyps of the large intestine).

According to current reports, after the procedure, it is estimated that one third of patients may experience pain of varying severity or flatulence, which, however, quickly pass away. Fortunately, more serious complications are very rare. In the United States the frequency of complications is estimated to be between 0.1% and 1.9% [5,10].

Based on 57,742 colonoscopies performed in patients at medium risk, the overall incidence of serious adverse events was 2.8 per 1000 procedures. The most important, apart from adverse cardiopulmonary incidents, are intestinal perforation (0.2%) or bleeding (0.3%) [5,13].

A recent meta-analysis showed an overall perforation rate of 0.5 per 1000 colonoscopy, with 0.4 per 1000 after diagnostic colonoscopy and 0.8 per 1000 after polypectomy. Also in this study, polypectomy was associated with a fourfold increase in perforation. However, in contrast to the perforation rate, which did not decrease significantly in the years of research covered by the meta-analysis, the bleeding rate decreased from 6.4/1000 to 1/1000. Other studies reported bleeding occurring in 0.1-0.6% of colonoscopy [5].

A systematic review of studies of patients undergoing colonoscopy shows that the incidence of hipoxemia as a complication of lover gastrointestinal endoscopy is 6-11% and hypotension 5-7% [5].

According to Iqbal et al., intestinal perforation may occur as a result of thermal factors, polypectomy and blunt trauma, where the latter is the cause of the most serious injuries [19]. Most cases of colorectal perforation (50-60%) concerns sigmoid and rectum [16]. Under the influence of slight mechanical trauma, usually small perforations occur; however, the most extensive perforations may be caused by high pressure, caused by strong pressure on the side wall of the large intestine [18]. If the patient is diagnosed with peritoneal symptoms, the diameter of the perforation hole exceeds 1 cm and conservative treatment does not bring the desired effects, surgical treatment should be introduced [17]. The mortality rate in case of perforation is relatively high; however, quick detection of damage significantly increases the prognosis of a patient [14]. Bleeding from the lower gastrointestinal tract, which is a complication of lower gastrointestinal endoscopy, requires medical management in the form of endoscopic blood damming, blood transfusion or surgery [15]. Bleeding after diagnostic endoscopy is very rare and usually follows the biopsy. On the first day after the polipectomy, immediate bleeding may occur; after 24 hours to 14 days, delayed bleeding may occur [14].

Cardiopulmonary disorders are the cause of 50% of serious colonoscopy complications and 50% of

perioperative deaths [21]. They may occur in the form of transient episodes of arterial hypotension, i. e. a decrease in systolic blood pressure below 90 mmHg, caused by a decrease in the minute capacity of the heart and total resistance of peripheral vessels. This is related to the vasovagal reflex and the effect of the drugs used during the sedation of the patient. Cardiac arrhythmias during endoscopy of the lower gastrointestinal tract are common, while most of them are transient and harmless. However, in all patients with history of cardiac disorders, it is necessary to use a cardiomonitor and observe the electrocardiographic curve [20]. Hypoxia is one of the most common cardiopulmonary and respiratory complications associated with sedation during lower gastrointestinal endoscopy. The frequency is 1. 5-70%. Hypoxaemia can have serious consequences and usually starts after 5 minutes of intravenous sedation [22].

Summary

Endoscopy has become a standard diagnostic procedure in the case of gastrointestinal disorders, but its use for therapeutic purposes is increasing. In addition to the undoubted benefits, there is a risk of complications. This is a small risk and this test is considered safe. However, for the sake of the patient's well-being, it is so important to analyse his condition, as well as indications and contraindications for the examination. It is not possible to prevent all the complications, but thanks to proper preparation of the patient for the procedure and proper care during and after the examination, the occurrence of adverse events may be minimized.

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