This research has presented two cases of clinically silent perforation of the large intestine. The first symptoms were the following: subcutaneous emphysema of the neck, nasal speech, and extensive phlegmon of a lower limb. In both cases diagnoses were difficult and the treatment was delayed due to intestine perforation into the retroperitoneal space and lack of acute abdominal symptoms. This article explains the anatomical base of spreading infection from the retroperitoneal space to distant areas. The possibility of such uncommon complications reminds of holistic approach to every patient and thorough physical examination.

Key words: large intestine perforation, subcutaneous emphysema, phlegmon, retroperitoneal space

There are only some small segments of intestines which are located in the retroperitoneal space. These are: descending duodenum, ascending and descending colon and rectum. Both vertical segments of the colon are covered by peritoneum only on the frontal and side surface whereas the posterior surfaces are conjoined with the back part of the abdominal cavity. The rectum is covered by peritoneum only in 2/3 of the upper part on the frontal and side surface. The range of organs’ covering by peritoneum is individually variable.

The proportion of a large intestine and peritoneum effects that perforation does not have to – in each case – be combined with full-symptomatic, easy to diagnose diffuse peritonitis, and next, with a rapid decision of performing laparotomy.

Perforation to retroperitoneal space may proceed silently, without acute abdominal symptoms. The only symptoms may be: higher temperature, elevated levels of the inflammatory markers (leucocytosis, C-reactive protein), mild abdominal pain. Sometimes a patient shows symptoms of some irrelevant, hard to interpret facts combined with spreading of contents of the perforated intestine. It is possible thanks to the existence of anatomical connections between retroperitoneal space and mediastinum and fascial compartments of the limbs.

CASE REPORTS

1. Patient C.M, aged 58 (medical history of the patient nr 9769/05) taken to surgical department due to abdominal pain which had lasted for 2 days, with diarrhoea and temperature of 39 C. In the anamnese: ischemic heart disease, crural varices, cataract of the left eye, rheumatoid arthritis treated chronically with prednisone. In 1970 the patient underwent a caesarean section.

In a physical examination when admitted to hospital: the patient walked on crutches, the joints contour distorted, on auscultation: normal vesicular breath sounds, heart rate (HR) 90/min.
During surgery the following was found: a lesion, the patient was operated on urgently. Though the symptoms were unclear and there was a suspicion of the large intestine perforation, no free air under the diaphragm was found. Even fatty tissues of the retroperitoneum. No free tissues of the neck and the chest and also in the abdominal cavity were performed and then CT examinations of the chest and the abdominal cavity were performed and then CT. Imaging examinations. The patient was under doctors’ constant control. The latest results of the studies – including rectoscopy and biopsy of the anastomosis area – performed in October, did not confirm the relapse of cancer.

For the lack of acute abdominal symptoms some additional tests were planned. An abdominal ultrasonography (USG) was performed which revealed a 45x50 mm structure with non-homogenous echo suggesting a tumour in the left hypogastric region. During colonoscopy on the depth of 40cm an infiltration was found that covered ½ of the circumference of the intestine stiffening its wall and some biopsy were taken for the histopathological examination. During the physical examination the abdomen below the level of the chest, the scar of the lower median incision, mild tenderness to palpation was marked in the left hypogastric region – in this area a palpable pathological mass. Neither voluntary muscle guarding nor the rebound tenderness was observed. Peristalsis was normal. A rectal examination showed nothing abnormal. In the laboratory tests – which focused the attention was the significantly elevated levels of the inflammatory markers (WBC 22 000 cu.mm and C-reactive protein 200 mg/l). An abdominal and chest X-ray revealed no pathology.

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During the diagnosis the patient was administered the antibiotics: cefuroxime, metronidazole, prednisone, non-steroidal anti-inflammatory drugs and low-molecular-weight heparin in prophylactic doses. On the second day after colonoscopy the patient informed about her malaise, a pressure on the neck, a sore throat and the change of the tone of her voice – a nasal speech. Except these the patient did not complain about any other ailments.

During the physical examination subcutaneous emphysema on the neck and the upper part of the chest was found. The abdomen was soft, non-tender on palpation, without peritoneal irritation symptoms.

An ECG and some enzymatic tests were carried out, the patient was seen by a laryngologist – no worrisome symptoms were found during the examination and the tests. The X-ray examinations of the chest and the abdominal cavity were performed and then CT of the chest – there were: pneumomediastinum and subcutaneous emphysema in the soft tissues of the neck and the chest and also in the fatty tissues of the retroperitoneum. No free-air under the diaphragm was found. Even though the symptoms were unclear and there was a suspicion of the large intestine perforation, the patient was operated on urgently. During surgery the following was found: a tumour of the descending colon and a necrotic part of the intestine above the tumour till the splenic flexure, a limited cistern of faecal contents in the nearby the tumour, which was emptied during its preparation. No diffuse peritonitis was observed. The Hartman’s left hemicolecction was carried out, and an one-barrel transversostomy was performed. The abdomen was drained.

In the histopathological tests of the intestine with the tumour no cancer cells were found – the diagnosis – inflammatory purulenta chronic. Culture, taken during surgery revealed E. coli sensitive to the majority of available antibiotics. The postoperative course was uneventful. During the next days the subcutaneous emphysema receded gradually. Five days after the operation the control chest X-ray was performed and the presence of the pneumomediastinum was not revealed. The patient was discharged from hospital in a good state and with the healed postoperative wound.

2. Patient P.M., aged 60 (medical history of the patient nr 467/08) admitted to hospital due to intense pain in his right lower limb which had lasted for 2 weeks, with temperature of 40°C. He did not complain about abdominal pain, he moved his bowels regularly, stool of thin consistency. In 2000 he underwent radiotherapy and then was operated on due to rectal cancer. 07.04.2006 anterior resection of the rectum was carried out. Afterwards chemotherapy was accomplished. On 27.11.2007 the patient was, again, operated on due to metastasis to the liver, and on 17.04.2007 explorative laparotomy was carried out which excluded a local relapse suspected after the imaging examinations. The patient was under doctors’ constant control. The latest results of the studies – including rectoscopy and biopsy of the anastomosis area – performed in October 2007, did not confirm the relapse of cancer.

When the patient was taken to hospital he was cachectic, couldn’t walk on his own, his skin and conjuctivas were pale. HR 100/min, breath sounds normal, RR 100/70, the abdomen below the level of the chest, the scars of the median lower and transverse incision in the epigastric region. The abdomen soft, non-tender to palpation, with no pathological masses and acute abdominal symptoms. Peristalsis was correct. During a rectal examination: the anus area with no abnormalities, on the depth of about 5 cm – sclerosal, circular
stenosis, not allowing penetration, beneath, just behind the anal canal, large perforation of the rectum towards the sacral bone.

The right lower limb swollen from the groin to the toes, the skin tense, reddish, warmer than normal, the whole limb with acute pain during palpation. On the thigh and around the knee palpable cracking and fluctuation. During the laboratory tests the elevated level of the inflammatory markers was significant (CRP 209 mg/l, WBC 20 000 mm.cu), slight anaemia, and thrombocytosis. CEA was normal. An abdominal X-ray did not reveal any free-air under the diaphragm, yet there was some air in the retroperitoneum and the soft tissues of the hypogastric region. An chest X-ray — no pathology. CT of the pelvis and the lower limb showed: in the pre-sacral area there was a thick-walled liquid cistern surrounded by some fibrous masses. The extensive infiltrative areas with gas bubbles reaching the sacral bone and the bladder. That suggested the local relapse complicated with an inflammatory process. In the subcutaneous tissues of the thigh and the groin and the fascia areas of the thigh — visible gas bubbles and the infiltrative masses indicating phlegmon and gas gangrene.

The patient was qualified for surgery urgently. Laparotomy was performed. Neither peritonitis nor intestinal obstruction was observed, the liver beyond our reach during the examination due to the postoperative peritoneal adhesions. In the pelvis there was a sclerosal infiltration covering the sacral bone and the bladder. A loop — colostomy on the descending colon was carried out and after closing the abdomen fasciotomy on the lower limb was performed. After fasciotomy, some thick foul faecal-purulent contents were evacuated and lots of gas and necrotic tissues as well. The open space was rinsed heavily with the solution of chlorhexidine. Some irrigation drains and gas setons were placed. Additionally, the incision between the coccyx and the anus was performed — and through it — the soft Pezzer drain was introduced to the presacral space. The same contents were evacuated from that space as well. During the following days — every day — in intravenous general anaesthesia, the open spaces were washed out heavily with the solution of betadine or chlorhexidine, the successive incisions were performed on the purulent cisterns that were forming on the limb. From the first day of hospitalization the patient was administered piperacillin-tazobactam in a dose of 4.5 g every 8 hours, and then an antibiotic therapy was continued accordingly to antibiogram. (The culture of the contents taken from the thigh’s interfascial space was done — E. coli and Pseudomonas aeruginoa were identified. No anaerobic bacteriae were identified. The blood culture was negative).

The patient got regularly an analgesic therapy — opioids and some non-steroidal anti-inflammatory drugs, PPI and low-molecular-weight heparin in a prophylactic dose. During the treatment 4 units of erythrocte concentrate (EC) and 2 units of fresh frozen plasma (FFP) was transfused. From the beginning a high caloric oral diet was applied and when the patient got better — a motor rehabilitation. Finally, after a long treatment (42 days) the extensive wounds on the limb got healed, the ailments decreased, and the general condition of the patient improved.

The patient, when discharged from hospital, was able to walk on his own on crutches, he did not need to take analgesic drugs, gained his weight, accepted stomy. The control CT of the pelvis — before being discharged from hospital -there was still a suspicion of the local relapse — but the patient gave up further diagnostics.

DISCUSSION

In the literature many cases were described in which pneumomediastinum, subcutaneous emphysema on the neck, pneumothorax, and even pneumopericardium (3) have had a cause beneath the diaphragm. In the presented studies the source of the air were perforations of sigmoid diverticulum (4), complications of ulcerative colitis (5), perforations of duodenal and gastric ulcers (6), a damage of intestines during colonoscopy (7), and even anastomotic leakage (8).

The origin of these complications explains air translocations from retroperitoneal space along anatomical tracks connecting tissue compartments of abdomen, chest and neck. One of the compartments called the visceral space surrounds the trachea and oesophagus in the neck, follows an oesophagus through mediastinum, and next, through the diaphragmatic hiatus into retroperitoneal soft tissue space (9). Also the aortic hiatus and caval vein
opening may be a junction between mediastinum and retroperitoneum.

It does not seem probable that some air would get out from the tight peritoneal cavity, which – like the pleura – is an effective barrier for gas diffusion. Yet it is possible, and there are few reports on pneumomediastinum and pneumothorax occurrence due to pneumoperitoneum made on purpose during laparoscopic surgery (10, 11).

In our patient’s case the occurrence of subcutaneous emphysema on the neck and – which worried her most – the change of her voice tone to nasal, obliged us to look for the cause of that uncommon ailment and quicken the decision as to performing laparotomy. One may not rule out that the intestine tumour perforation and the gas translocation to the retroperitoneal space took place during colonoscopy that was performed 2 days earlier.

Intestine perforation is not only a source of gas translocation upwards, accordingly to physical principles. Whole contents of the intestine can get into retroperitoneal space which leads to abscess forming in this area. Hence an intestine content – translocating accordingly gravitation – stratifying tissues may cause spreading of infection along fascial compartments to the pelvis, and even a lower limb. Thus proceeding silently perforation of the large intestine may appear as abscess of a buttock, hip, thigh and even shank (12). There are some studies describing anatomical ways of spreading infections along muscle attachments, vessels and fasciae, and uncommon cases of retroperitoneum abscess spreading towards the pelvis and a thigh. As a source of infections the authors describe: perforation of retrocecal appendicitis (14, 15), complications of acute pancreatitis (16) and diverticular disease (17) perforations of neoplastic tumour of coecum (18), descending colon (19) and sigmoid (20).

In our case, the cause of extensive phlegmon of the whole lower limb and the pelvis was perforation of the rectum, in its back, non-covered with peritoneum part. The cause of perforation was not totally explained and the performed examinations and tests did not confirm a relapse of tumour.

Although the presented cases of perforations of the large intestine are very uncommon, one must take them into account for a silent course of disease and a misleading location of symptoms may result in a delay of diagnosis and treatment, and this leads to a high mortality rate.

REFERENCES

14. Hsieh CH, Wang YC, Yang HR.: Extensive retroperitoneal and right thigh abscess in a patient with ruptured retrocecal appendicitis: an extreme-
The most common complication of endoscopic procedures of the large intestine is perforation of intestinal wall. Patients at high risk of such complications are mainly those with diverticuli and bowel inflammation, such as ulcerative colitis, and subjects undergoing removal of polyps with wide stalk. Number of these complications is usually inversely correlated to experience of the doctor who performs the procedure. Perforation complicating the procedures occurs in 0.14% of cases and related mortality is 0.02% (1).

Peritonitis is a very serious disease, characterized by high mortality and requires treatment by an experienced surgeon. It must be emphasized that it is better to “needlessly” refer a patient to hospital, admit and observe him/her than to miss the disease and therefore delay the proper treatment.

Possibly virtual colonography using computed tomography scanning will lead to reduced number of performed colonoscopies and in consequence will decrease the number of such complications as perforation of the large intestine (2, 3).

Authors report in their paper that attempting to make a diagnosis, they used chest CT—detecting pneumomediastinum, subcutaneous atelectasis within the neck and thoracic soft tissues and within fatty tissue of retroperitoneal space. Unfortunately, abdominal computed tomography that could confirm diagnosis of septic complications, was not performed (4).

Usually air can be seen on a plain abdominal x-ray in the event of intraperitoneal perforation of the large intestine, while in the case of extraperitoneal perforation, air can communicate to the mediastinum or even to the neck (5).

Fasciitis of the abdominal wall and thigh can also occur (6, 7).

Disorders of blood clotting occur as well. Therefore, in such case it is very useful to determine prothrombin time that may be prolonged and activated partial thromboplastin time (8). Possibly more widespread use of laparoscopy in the future will allow to adequately diagnose and repair perforation (9, 10).

REFERENCES
7. Tsai HL, Liu CS, Chang JW et al.: Severe necrotizing fasciitis of the abdominal wall secondary to


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