Diaphragm perforation during laparoscopic left adrenalectomy

Stanisław Głuszek[1, 2], Monika Kozłowska[2]

[1]Clinical Department of General, Oncological and Endocrinological Surgery, Voivodship, Hospital of Kielce

[2]Department of Surgery and Surgical Nursing, Faculty of Health Sciences of the Jan Kochanowski University, Kielce

Videosurgery and other miniinvasive techniques 2009; 4 (4): 168-170

Abstract

The use of laparoscopic methods of surgery accessible to classic surgery until now involves a risk of intra-operative and postoperative complications. Here we report a case of a 74-year old female patient with a very rare iatrogenic lesion of the left leaf of the diaphragm that occurred during laparoscopic adrenalectomy, resulting in parietal incarceration of the colon's splenic flexure followed by necrosis and perforation of the intestine and, subsequently, colo-pleural fistula with faecal pleuritis and pleural empyema. The case study shows that perforation of the diaphragm resulted from the use of monopolar electrosurgery during the intervention. There is also a possibility that the large intestine could have burned and perforated in the same way. It appears, however, that colo-pleural fistula was caused by incarceration of the large intestine in the hole of the diaphragm. Subsequently necrosis of the large intestine appeared and faecal contents got through to the pleura. The aim of the corrective procedure was to close the fistula, to suture the injured diaphragm and to eliminate the thoracic empyema by videothoracoscopy. Complications which may appear in laparoscopic surgeries related to the use of electrocoagulation are an important clinical issue endangering human life.

Key words: *laparoscopic adrenalectomy, electrocoagulation, diaphragm.*

Introduction

The dynamic development of laparoscopic surgery enables its use in types of surgery reserved for classic surgery until now. Apart from the advantages of laparoscopic techniques, commonly noticed both by patients and surgeons, there is a possibility of new complications. Among them it is possible to specify:

1) complications related to pneumoperitoneum,
2) complications related to insertion of trocars,
3) intraoperative complications – bleeding, problems in haemostasis,
4) postoperative complications requiring reoperation – caused by electrocoagulation – diaphragm and intestine thermal injury [1-4].

Complications in minimally invasive surgery can also be classified as complications depending on:

- surgeon: his education, skills, experience, but also humility and criticism,
- patient: his other illnesses and pathologies, sometimes unpredictable, unconfirmed in preoperative research,
- specificity of operation: using monopolar coagulation in a closed space [1].

Complications caused by electrocoagulation in minimally invasive surgery appear in 0.1-0.3% of all cases. There are described cases of thermal injuries of large vessels, adjoining organs, intestines or – very rarely – injuries of the diaphragm [4-8].

The aim of this study is to present a case of a 74-year old female patient with inadvertent thermal

Address for correspondence:
Stanisław Głuszek, Clinical Department of General, Oncological and Endocrinological Surgery, Voivodship, Hospital of Kielce, Grunwaldzka 45, 25-736 Kielce, phone +48 41 367 15 73, e-mail: sgluszek@wp.pl

diaphragm injury that occurred during laparoscopic adrenalectomy.

Case report

A 74-year old female was admitted as an emergency patient to the Division of General, Oncological and Endocrinological Surgery on 1 November 2008 for sudden, strong pain under the rib cage on the left side accompanied by dyspnoea. She was shivering as well. Her past medical history included: untreated hypothyroidism, hypertension (treated by amlodipine, indapamide when needed); cholecystectomy (30 years ago). Her recent history included: left side laparoscopic adrenalectomy due to inactive hormonal tumour performed on 23 October 2008 in another hospital (Figure 1).

Physical examination showed dull percussion sound and muffled breath sound, both on the left side of the chest. Palpable examination revealed soft abdomen, tender in the upper left quadrant, unremarkable resistance, normal bowel sounds and no other significant changes. Laboratory tests discovered leucocytosis (18.6 K/µl) and anaemia (RBC 3.71 M/µl). A chest X-ray showed left-side pneumothorax, and level of the liquid on this side. Suspicion of diaphragmatic hernia was implied. A USG examination confirmed the presence of approximately 250 ml of liquid in the left pleural cavity. A decision to perform left-side chest drainage was made and antibiotic therapy was applied. The drained secretion was serous.

Due to the lack of improvement in the patient's general condition, further examination was decided on. A CT scan of the chest and abdominal cavity with the use of contrast revealed elevation of the left diaphragmatic leaf with displacement of bowel loops into the chest, atelectasis in the lower part of the left lung, a remarkable quantity of liquid in the left pleural cavity, and thickened layer of the pleural cavity. The patient was qualified for exploratory laparotomy. During the operation it was discovered that the patient had undergone left-side adrenalectomy, perforation in the left diaphragmatic leaf (1 cm diameter) with parietal incarceration of the colon's splenic flexure followed by necrosis and perforation of the intestine and the colo-pleural fistula which resulted in faecal pleuritis and pleural empyema. The colo-pleural fistula was removed, the damaged diaphragm was sutured, and the intestinal fistula was closed similarly and covered by omentum. During surgery, while releasing the left flexure of the large intestine, the capsule of the spleen was damaged. It was necessary to remove the spleen. One chest drain and two abdominal cavity drains were inserted. In the early postoperative period the patient suffered from 38.5°C fever. *Enterococcus faecium* was cultured from intraoperatively taken pleural liquid and a postoperative wound swab. Guided antibiotic therapy (metronidazole, ceftriaxone, teicoplanin, vancomycin, ciprofloxacin) and antifungal (fluconazole) treatment were commenced.

On the fourth day after surgery in the abdominal drains intestinal contents were noticed. A separation of the suture line of the fistula and development of a new faecal fistula was reported. At the beginning 300 ml of intestinal contents were drained, and over the following days the drains were gradually pulled out, which resulted in reduction of the amount of intestinal contents.

The control chest X-ray revealed numerous levels of liquid in the upper and the middle field of the left lung corresponding to thoracic empyema. The patient was transferred to the Division of Thoracic Surgery of the Provincial Health Care Centre of Tuberculosis and Lung Diseases where during video-assisted thoracoscopy pleural adhesions were released and pleural empyema was removed. The patient's

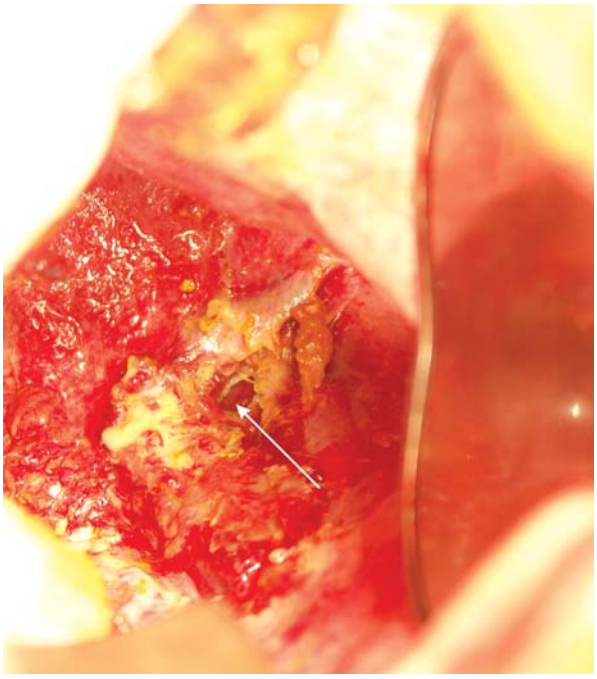

Figure 1. The site of perforation of the diaphragm

postoperative course was uncomplicated and her hospitalization was continued in the Division of General, Oncological and Endocrinological Surgery, where further treatment was conservative. Abdominal drainage, broad-spectrum antibiotic therapy and parenteral nutrition were sustained. In the abdominal drains a decreasing (to nil) amount of intestinal contents was observed.

The next control chest X-rays also showed almost complete regression of the previously described changes and pulmonary fibrosis in the middle and lower field of the left lung and elevation of the left diaphragmatic leaf. The drains were finally removed. The patient was discharged from hospital on 12 December 2008 in a stable condition, orally fed.

Discussion

Recently, the percentage of laparoscopic complications has visibly decreased; now it is under 1% of all cases. Despite that fact laparoscopic complications remain a clinical problem because of their gravity [1].

We report a case of a 74-year old woman with an iatrogenic lesion of the left leaf of the diaphragm that occurred during laparoscopic adrenalectomy resulting in parietal incarceration of the colon's splenic flexure followed by necrosis and perforation of the intestine and, subsequently, pleuro-faecal fistula with faecal pleuritis and pleural empyema. The case study shows that diaphragm injury resulted from the use of monopolar electrosurgery. It appears that the enteropleural fistula was caused by perforation of the left leaf of the diaphragm by a monopolar electrode, resulting in incarceration of the intestine in the resultant hole. Subsequently necrosis of the intestine appeared and faecal contents got through to the pleura. The aim of the corrective procedure was to close the fistula, to suture the injured diaphragm, and to eliminate the thoracic empyema by videothoracoscopy.

Complications related to electrocoagulation in minimally invasive surgery appear in 0.1-0.3% of all cases. Thermal injuries are usually caused by careless use of the instruments or bad technical condition of coagulation (electric leak). The specific characteristic of coagulation in laparoscopic conditions is that the ending of the instrument is not fully visible, which is the reason for unintentional burning of distant tissues. The two-dimensional field of vision may cause difficulties with definition of anatomical relations in the operation field, which usually is the reason for missing the appearance of the thermal effect away from the ending of the coagulating instrument. It is particularly important to pay attention to a non-isolated ending. It should always stay in the field of vision of the operator. It is crucial to be aware of consequences of contact of a warm ending with adjoining structures. Another important precaution is to avoid uncontrolled dislocation of the instrument, even though the field of vision is limited. For these reasons the surgeon should always remember the basic rules of using electrocoagulation during operations:

1) to keep the entire non-isolated ending of the instrument in the field of vision,
2) to not leave an active electrode unattended because accidental start of the device might cause burns,
3) to apply an appropriate force of the electrocoagulation,
4) to use a bipolar electrode when possible [5-7].

Conclusions

Complications of laparoscopic surgery related to the use of electrocoagulation may pose an important clinical risk endangering human life. Repair of these injuries depends on the surgeon's ability to predict the potential complications but also humility and a critical approach to his own clinical actions.

References

1. Głuszek S, Bonek Z. Stan wideochirurgii kamicy żółciowej w województwie świętokrzyskim. Videosurgery and other miniinvasive techniques 2008; 3: 1-8.
2. Głuszek S, Stanowski E, Herjan L. Cholecystectomia laparoskopowa w Polsce – wyniki i powikłania. Pol Przegl Chirurg 1995; 67: 386-94.
3. Kot M, Głuszek S, Matykiewicz J, et al. Cholecystektomia laparoskopowa – czy jest to bezpieczna metoda operacyjna? Doświadczenia własne. Videosurgery and other miniinvasive techniques 2006; 1: 113-120.
4. Głuszek S, Kot M. Cholecystektomia laparoskopowa – powikłania, możliwości leczenia. Wideochirurgia 2002; 7: 25-28.
5. Zdrożny D, Śledziński Z. Odrębności stosowania elektrokoagulacji w czasie operacji laparoskopowych. Pol Przegl Chirurg 2000; 72: 757-63.
6. Barrat C, Capelluto E, Champault G, et al. Intraperitoneal thermal variationsduring laparoscopic surgery. Surg Endosc 1999; 13: 136-8.
7. Vancaillie TG. Active electrode monitoring: how to prevent unintentional thermal injury associated with monopolar electrosurgery at laparoscopy. Surg Endosc 1998; 12: 1009-12.
8. Croce E, Golia M, Russo R, et al. Duodenal perforations after laparoscopic cholecystectomy. Surg Endosc 1999; 13: 523-5.