CASE REPORT

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Radiologic Aspect of Rare Case: Intraperitoneal and Extraperitoneal Colonic Perforation Following Diagnostic Colonoscopy

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ABSTRACT Iatrogenic colonic perforation (ICP) is one of the rare complication of colonoscopy procedure, which is performed commonly and considered safe. Although ICP is infrequent complication, it is very serious with high morbidity and mortality rate. We report a case of a patient who has a history of Crohn's disease, presented with both intraperitoneal and extraperitoneal colonic perforation that manifest bilateral pneumothorax, pneumomediastinum, pneumoperitoneum, pneumoretroperitoneum, and subcutaneus emphysema after colonoscopy. Radiologic modalities, particularly computed tomography (CT) scan provides immediate, definitive and effective diagnostic information for not only treatment decision but also follow-up process. CT can detect free air that is not always clinically significant and also the presence of micro-perforations and abscess.

Keywords: Microperforation; pneumoretroperitoneum; pneumomediastinum; pneumothorax; subcutaneous emphysema

Colonoscopy is a widely used procedure for a broad spectrum of colorectal diseases such as ileitis, colitis, inflammatory bowel disease, various types of polyps, diverticula, both diagnosis and treatment of colorectal cancer (CRC), etc.[1] It is also one of the colorectal screening recommendations of the American Cancer Society for average risk patient over the age of 50.[2]

Although iatrogenic colonic perforation (ICP) is infrequent complication, it is very serious with high morbidity and mortality rate. Triple pneumo is a severe condition, characterized by the combination of pneumothorax (PTX), pneumomediastinum and pneumoperitoneum after procedure.[3] This complication should be considered in a worsening patient after colonoscopy as it requires urgent diagnosis.

We report a patient who presented to the emergency department after colonoscopic procedure, presented with both intraperitoneal and extraperitoneal colonic perforation that manifest bilateral PTX, pneumomediastinum, pneumoperitoneum, pneumoretroperitoneum and subcutaneus emphysema after colonoscopy.

CASE REPORT

A 54-years-old woman following with Crohn's disease for 10 years complained of a severe backache with moderate shortness of breath three hours after colonoscopy.

On physical examination crepitus was palpated around the cervical region as a sign of subcutaneous emphysema, respiratory sounds were decreased slightly in both hemithoraces and there was abdominal distension end tenderness. No abnormality was detected in her routine vital parameters.

The chest roentgenogram demonstrated bilateral PTX and linear radiolucencies in chest wall tissues consistent with subcutaneous emphysema. Intraab-

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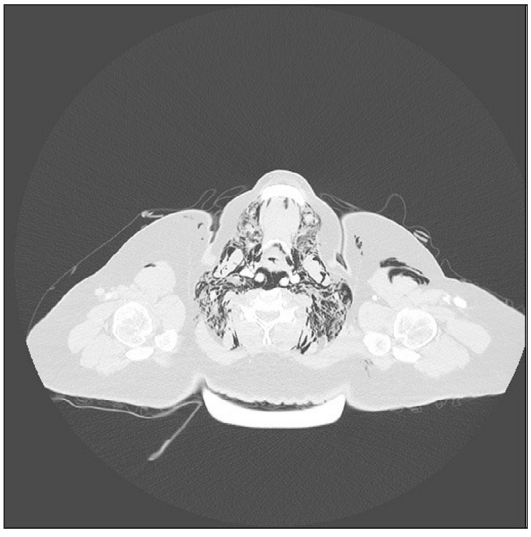

FIGURE 1: Axial computed tomography of the chest demonstrating bilateral diffuse subcutaneous emphysema in the root of the neck.

FIGURE 2: Axial computed tomography of the chest revealing bilateral pneumothorax.

dominal free air and subdiaphragmatic air are detected on the erect abdominal radiograph. On contrast-enhanced computed tomography (CT) of the chest, diffuse subcutaneous emphysema around the neck, pneumomediastinum and bilateral PTX occupying roughly 10% of both thoracic cavities are seen (Figure 1, Figure 2, Figure 3). CT scan of abdomen and pelvis revealed right subdiaphragmatic, retroperitoneal and intraperitoneal as well as parauterine free air (Figure 4).

In view of the clinical findings, laparotomy was decided. The perforated area could not be identified. There was no enteric content in the abdominal cavity. So it was considered as a microperforation. After surgery, the patient transfered to the intensive care unit for close observation and conservative management. Her condition improved gradually with bowel rest, intravenous fluids and broad-spectrum antibiotics. Informed consent was obtained from patient for this case report.

DISCUSSION

Colonoscopy has been used as a quite reliable diagnostic procedure since 1970s.[3] However it is an in-

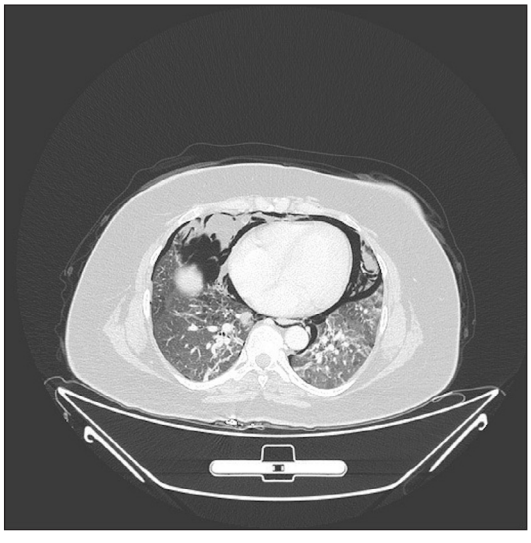

FIGURE 3: Transverse computed tomography scan of the chest showing pneumomediastinum and free air around the heart.

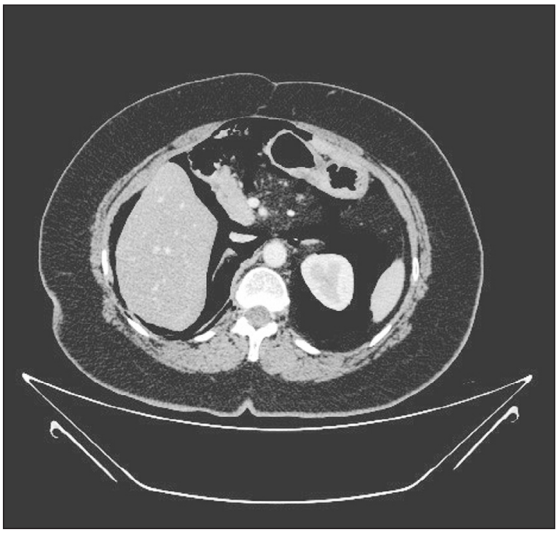

FIGURE 4: Axial abdominal computed tomography scan demonstrating subdiaphragmatic, intraperitoneal and retroperitoneal air at the left perinephric area.

vasive procedure so can lead some complication such as bleeding, perforation, infection. There is no exact consensus on the incidence of iatrogenic colon perforation. According to 2017 World Society of Emergency Surgery guidelines, the incidence is reported 0.016-0.8% for diagnostic colonoscopy and 0.02-8% for therapeutic colonoscopy, globally.[4]

There are evident risk factor for ICP such as reason of performing colonoscopy, age, presence of comorbitidies, pre-existing diseases of colon (diverticulosis, inflamatory bowel diseases), use of corticosteroids, endoscopic interventions. The risk of colonoscopic perforation is 4-6 times higher in patients over 75 years old compared to young patients.[5] Levin et al, also reported that over 60 years of age is 5 times higher risk for perforation.[6]

In a review of studies detecting ICP with sample size more than 30.000 published between the years of 2001-2009 reveals some comorbid factors such as diabetes mellitus, chronic pulmonary disease, congestive heart failure, myocardial infarction, cerebrovascular disease, peripheral vasculary diseases, renal insufficiency, liver disease and dementia.[7]

Therapeutic colonoscopies have considerably higher risk for ICP than diagnostic colonoscopies. Several studies have reported that some interventions such as polyp excision (the polyps bigger than 10 mm in the ascending colon and 20 mm in the descending colon, sessile morphology and multiple polyps), endoscopic balloon dilatation for Crohn's disease associated strictures, endoscopic argon plasma coagulation, mucosal resection and submucosal dissection for colorectal mass lesion increase the rate of perforation.[7,8]

As the literature is reviewed, there are limited studies regarding the prevalence and risk factors of perforation during endoscopy in the inflammatory bowel disease patient. Makkar et al, identified that the diagnosis of Crohn's disease and ulcerative colitis is the independent risk factor for perforation during colonoscopy.[9] Therefore, our case has a risk of perforation as she has Crohn's disease.

In our case, the whole spectrum of extraluminal air developed including extensive subcutaneous emphysema, PTX, pneumomediastinum, pneumoperitoneum after perforation.

Maunder et al revealed the potential mechanism for the formation of subcutaneous emphysema, pneumomediastinum and PTX by explaining the anatomical relations between the neck region, mediastinum, retroperitoneum. The visceral space begins from the cervical region, extends to the upper mediastinum and enters into the abdominal cavity through the diaphragmatic hiatus, by surrounding the esophagus. After perforation, free air spread into the intraperitoneal cavity and between the retroperitoneal tissue planes. There is continuity between the visceral space of the neck, thorax and abdomen via a fascial planes. Along the facial layers air is able to continue from the retroperitoneum to the mediastinum. After that, rupture of the mediastinal pleura leads to insert the air into the pleural cavity and causes a PTX.[10,11] Because of the communication of cervical spaces directly with the mediastinum, air can spread from the mediastinum, along with the muscles, fascia, blood vessels and nerves to the subcutaneous tissue (subcutaneous emphysema). Congenital or acquired fenestrations in the diaphragm are accepted the another route providing airflow to the chest cavity.[12]

In a literature review of 31 reports of only extraperitoneal and concomitant intraperitoneal perforation following endoscopic colonic procedures, Tiwari et al, reported that pneumomediastinum is the most frequently seen complication and the most common bowel part of extraperitoneal perforation is the rectosigmoid.[13] Perforation secondary to colonoscopy can be treated nonoperatively (medical treatment) or operatively (urgent laparotomy or laparoscopy). The treatment decision is assigned by the clinical status, site of perforation, whether there is a concomitant disease at the perforation site, dimension of the perforated area in the colon and accompanying diseases or comorbid factors.[10,14]

Be aware of perforation before contamination and peritonitis is crucial as the first step of management. Delayed management can cause mortality related with iatrogenic endoscopic perforation. Radiological examinations, primarily a CT scan, come into prominence to avoid diagnostic delay. Important diagnostic information can be obtained by CT examination in patients with ICP, whether conservatively or surgically managed. Cho

et al. reported that plain radiography is a useful and low-cost diagnostic method with a 92% sensitivity ratio in determining subdiaphragmatic free air (SFA). Nevertheless, SFA may not always be defined by plain radiography. In case of doubt about the presence of free air in the radiograph examination, CT scan should be obtained. Besides SFA, CT can detect free air that is not always clinically significant and also the presence of micro-perforations and abscess.[15] In addition to these advantages, CT scan is a widely available, fast, noninvasive and painless imaging method. However, the disadvantages are radiation exposure and the use of contrast material in most cases.

In conclusion, although colonoscopy considered safe procedure, it carries some life threatening complications. Radiologic modalities, particularly CT scan provides immediate, definitive and effective diagnostic information for not only treatment decision but also follow-up process.

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Conflict of Interest

No conflicts of interest between the authors and / or family members of the scientific and medical committee members or members of the potential conflicts of interest, counseling, expertise, working conditions, share holding and similar situations in any firm.

Authorship Contributions

Idea/Concept: *Melis Koşar Tunç;* ***Design:*** *Melis Koşar Tunç;* ***Control/Supervision:*** *Suzan Deniz Önol;* ***Data Collection and/or Processing:*** *Melis Koşar Tunç;* ***Analysis and/or Interpretation:*** *Suzan Deniz Önol;* ***Literature Review:*** *Melis Koşar Tunç;* ***Writing the Article:*** *Melis Koşar Tunç;* ***Critical Review:*** *Suzan Deniz Önol;* ***References and Fundings:*** *Melis Koşar Tunç, Suzan Deniz Önol;* ***Materials:*** *Melis Koşar Tunç, Suzan Deniz Önol.*

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