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Case Report

Colonic perforation during laparoscopic hernia repair presented as delayed generalized subcutaneous emphysema: a clue to intra-abdominal complication

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ABSTRACT

Laparoscopic operations are generally safe procedures. Complications of carbon dioxide (CO_2) insufflation are rare but can be life threatening. That's why it is very important for whoever handling this type of patients to be familiar with those complications and consequences. We are presenting a 61 year old woman who underwent laparoscopic repair of umbilical hernia. Surgery was uneventful; patient discharged home next day. Eight days later patient presented with generalized subcutaneous emphysema, started on the third postoperative day. CT scan showed extensive, generalized, subcutaneous emphysema with pneumomediastinum and penumoperitoneum. Laparotomy showed perforation at cecum, with gross faecal contamination of peritoneal cavity, right hemicolectomy with double barrel stoma performed. Colonic perforation may be due to thermal iatrogenic injury during surgery predisposed by presence of adhesions and diseased bowels as confirmed by histpathologic examination. We concluded that long operative time, higher CO_2 pressure, more surgical ports and older age can be predisposing factors for this rare of presentation for colonic perforation.

Keywords: Laparoscopic surgery, Colonic perforation, Hernia repair, Emphysema

INTRODUCTION

Laparoscopic surgical approach became the slandered technique for most intra-abdominal diseases. This approach, being minimally invasive, it was able to reduce the duration of general anesthesia, morbidities and hospitalization period. Nevertheless, potential morbidities can occur.[1] It is established now, the safety and reliability of carbon dioxide (CO_2) gas for creation of pneumo-peritoneum, besides being cheap, stable, inert, non-toxic and provide clear surgical field, CO_2 gas can rapidly absorbed into circulation and safely eliminated by the lungs. Gas remains in peritoneal cavity after pneumoperitonium for about 5 to 7 days after laparoscopic surgery.[2]

However, complications due to escape of the gas in to mediastinum, through vena cava and aortic opening, with may affect lung compliance and increases the airway pressure. Which necessitate conversion to open surgery.[3] It is not rare to see minor form of subcutaneous emphysema after a laparoscopic procedure. This occurs due to diffusion of carbon dioxide it to body tissues. It can be aggravated by insertion of more than six large ports below umblicus, longer operation time (more than 200 minutes), higher CO_2 pressure and elder patients.[4]

CASE REPORT

A 61 year old woman with history of granulomatous inflammatory bowel disease, admitted for laparoscopic hernia repair. Planned for intraperitoneal only mesh (IPOM) for her umbilical hernia. Pneumoperitoneum was induced with CO_2 insufflation at a pressure of 12 mmHg through 10 mm umbilical port. End tidal capnography ($ETCO_2$) was between 30-35 mmHg. Two more ports were placed along the left anterior axillary line. Extensive adhesions found, which was gently released. A physiomesh, Ethicon Physiomesh® flexible composite mesh (Ethicon, Somerville, NJ, USA) was fixed to the anterior abdominal wall using tackers. The surgery was uneventful, except taking longer time than expected (120 minutes), due to adhesinolysis. No drain inserted. All ports removed in sequence after releasing the pneumoperitoneum through the umbilical port. Oxygen saturation maintained within normal range during the perioperative period. The patient recovered well and discharged on the next day.

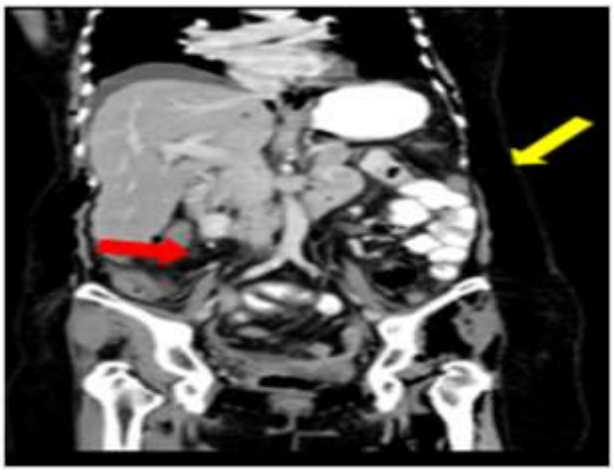

Figure 1: A coronal view of CT scan of the abdomen and chest showing generalized subcutaneous emphysema of abdominal wall (yellow arrow) and pneumoperitoneum (red arrow).

On the eighth postoperative day, the patient came to emergency department complaining of progressive swelling of lower limbs, abdomen and chest wall up to the neck for the last five days. Patient found septic with fever and lecucytosis. CT scan of chest, abdomen and pelvis showed generalized extensive subcutaneous emphysema with pneumomediastinum and small penumoperitoneum in between bowel loops, with suspicion of bowel perforation as shown in Figures 1and 2.

Due to position of the mesh at anterior abdominal wall, the laparoscopic exploration of the patient was converted to open, large perforation in the cecum was noted, around 1×2 cm size with gross fecal contamination of peritoneal cavity, right hemicolectomy was done together with resection of the distal one meter of the ilium because seemed unhealthy, then creation of double barrel stoma and removal of the mesh. Histopathological examination of the bowel showed features, which are consistent with ischemic bowel with perforation. Postoperatively, patient recovered well, aside from superficial surgical site infection, patient discharged home after seven days.

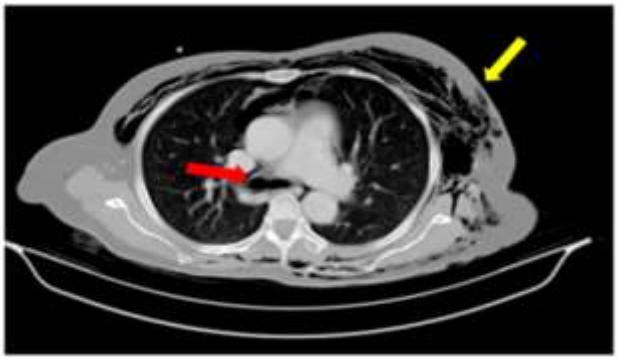

Figure 2: An axial view of CT scan of the chest (lung window) showing subcutaneous emphysema of chest wall (yellow arrow) and pneumomediastinum (red arrow).

DISCUSSION

Advantages of laparoscopic surgery include smaller abdominal wall wounds and less postoperative pain, make it the modality of choice for many intra-abdominal operations. Nevertheless, it has unique complications which we do not see with traditional open laparotomy.[5] Subcutaneous emphysema was associated with laparoscopic procedures, in intention to identify which factor can be related to development of this complication, Murdock et al, reported that there is significant increase in the risk of subcutaneous emphysema if age of the patient above 65, using more than six laparoscopic ports, long operations (more than 200 minutes) and hypercarbia ($ETCO_2$ more than 50 mmHg).[6] Other authors proposed that development of subcutaneous emphysema is due to leakage of CO_2 from trocar sites.[10] Usually, abdominal wall layers, muscles and skin, acts as seal around the trocars, preventing leakage, in conditions where the seal is loose, such as below arcuate line inserted trocars, or the presence of thick subcutaneous tissue all can predispose for the development of subcutaneous emphysema.[4] There is an anatomical connection between the cervical fascia of the neck and retroperitoneum. The investing layer covering trachea and esophagus extend from the neck inferiorly through the hiatus in to the retroperitoneal space.[7]

There is no reports regarding the exact rate of incidence of subcutaneous emphysema accompanied by pneumothorax and pneumomediastinum, but, the incidence of subcutaneous emphysema alone was reported between 0.43% and 2.34%.[8] It is believed that most of subcutaneous emphysema, pneumothorax and pneumomediastinum, goes undiscovered, making the real incidence higher than the reported one.[4]

In our case, the hernia size was 5×5 cm, three working ports were used, size 10 mm for camera was placed 2 cm below costal margin along the left anterior axillary line, another two 5 mm working ports inserted in the left lumber and left iliac fossa along the same line. Mesh was fixed using tackers. The colonic perforation may be due to unrecognized thermal injury or during release of adhesions, predisposed by underlying non-specific granulomatous inflammation as confirmed by histopathological examination.

We believe that laparoscopic procedures carry a small risk of developing gas related complications. We recommend routine examination of all patients underwent laparoscopic procedure looking for subcutaneous emphysema and other related complications. Insufflated gas must be completely and cautiously evacuated at the end of the procedure. Minimizing operative time, slow insufflation at lower pressure, continuous monitoring together with good surgical techniques can reduce those complications.[9]

The colonic perforation may be due to unrecognized thermal injury or during release of adhesions, predisposed by underlying non-specific granulomatous inflammation as confirmed by histopathological examination. Longer the operations, the higher $ETCO_2$ together with greater number of surgical ports, as well as older age group are the main predisposing factors to this complication.[2]

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