

Boerhaave's syndrome after successful laparoscopic cholecystectomy – Case Report

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ABSTRACT

Minimal invasive surgery has extended its frame of reference enormously. It has been the favored methodology in many surgical procedures, like laparoscopic cholecystectomy. It is the most common laparoscopic procedure done nowadays, for cholelithiasis and other gallbladder pathologies. Boerhaave's Syndrome (BS), with a classical triad of vomiting and retching, chest or abdominal pain and Subcutaneous Emphysema (SE), is an uncommon condition. It is described by a transmural tear of the distal esophagus initiated by an abrupt increase in intra luminal pressure. Making a diagnosis is challenging and treatment might be conservative, endoscopic or surgical. This case report presents a patient with postoperative surgical emphysema. A thirty-three-years old female patient presented in out-patient surgery with history of right upper quadrant pain and was diagnosed with cholelithiasis who developed surgical emphysema of upper part of the body after a successful laparoscopic cholecystectomy.

Keywords: Laparoscopic, Cholecystectomy, Boerhaave's syndrome, Oesophageal tear, Subcutaneous emphysema

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INTRODUCTION

There is no doubt that cholecystectomy procedure has been greatly influenced by the appearance of laparoscope. It is also true that laparoscopic cholecystectomy is the most common procedure nowadays for routine cholelithiasis and its pathologies. New techniques are constantly introduced to improve the outcome, and to reduce the complications, related to this procedure¹. Boerhaave syndrome is not common, which occur in a small number of population. It was first portrayed by the Dutch physician Hermann Boerhaave in 1724². It is a type of barogenic rupture brought about by a sudden increase in intraluminal pressure in the distal oesophagus³⁻⁵. Classic presentation includes chest or abdominal pain, dyspnea and shock, trailed by strong retching and vomiting. The syndrome is the most evil reason for

oesophageal perforation with a mortality rate of 20 – 40%. In 90% of cases the tear is in left lateral and lower third of the oesophagus, which is the weakest point. The tear is around 2 cm long vertically and 3 – 6 cm proximal to the diaphragm with uncommon significant bleeding⁶.

CASE REPORT

A thirty-three-years old lady presented at out – patient surgical clinic with right upper quadrant area for the last few weeks, which was associated with meals. She was investigated for that and her ultra sound showed multiple calculi in the gall bladder. Her blood test along with liver function test were within normal range. The patient was admitted for elective laparoscopic cholecystectomy. She was otherwise fit and well with no underlying pathology. She was assessed by the anesthetist and labeled as ASA grade I. On the day of surgery her pre – operative vitals were as; Heart rate: 78 per min, blood pressure 110/78 mmHg and Temp 98.6°F. The patient underwent uneventful endotracheal intubation and received prophylactic antibiotic. The patient was placed in supine with slightly head up and tilted to left side. Four ports technique was used to gain abdominal cavity access. The umbilical port entry was placed by Hassan technique. Pneumoperitoneum was produced with 10 – 14 mmHg carbon dioxide (CO₂) with 20L/min flow, which was maintained throughout 90 minutes procedure. Ryle's tube was placed to decompress the stomach and standard laparoscopic cholecystectomy dissection was carried out and the gallbladder along with stones was delivered through the umbilical port. The gall bladder bed was assessed and haemostasis was secured. A drain was placed in

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the gall bladder bed. The patient was transferred to the recover area, where after 15 to 20 minutes, she developed nausea and vomiting. It was noted that she had some blood stain in the vomitus. Anaesthesia team was informed and it was delt promptly with antiemetic injection intravenously and topical nasal spray. The patient was transferred to the ward after about 45 minutes from recovery area. Patient’s vitals were stable, when she had a forceful vomiting in the ward, which proceeds to chest pain, and subcutaneous emphysema, on her chest and neck. The only systemic abnormalities were borderline tachycardia and oxygen saturations between 94% to 95% on air. ECG was not showing any evidence of acute coronary syndrome. Chest X-ray Figure-1. suggested pneumomediastinum with no evidence of pneumothorax.



Figure-1
 Chest x-rays with subcutaneous emphysema encircled
 Pre-Operative Chest x-rays without subcutaneous emphysema

With this timeline the provisional diagnosis was of transmural tear of the esophagus. The patient was treated conservatively and urgent call was sent to the nearest tertiary hospital for intensive care unit (ICU) management and computerized tomography (CT) scan of the neck, chest and abdomen. The patient was transferred, on the very same day. She was reviewed by the general and thoracic surgeon and had CT scan of neck, chest and abdomen on the next day figure 2, which showed

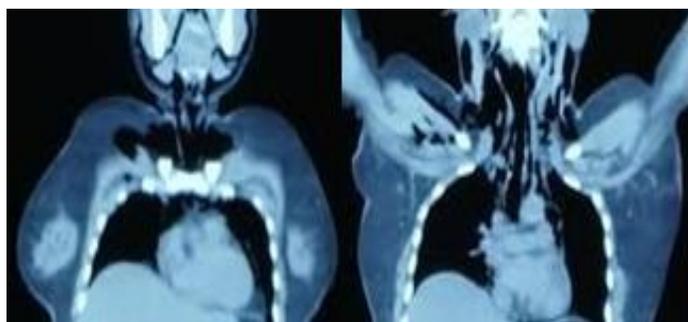


Figure-2: CT scan of the neck and upper chest showing subcutaneous emphysema encircled

(SE) of upper chest and neck. The patient was treated conservatively with intravenous antibiotics, proton pump inhibitors for few days and was later discharged from the hospital with a follow – up plan.



Figure-3: Contrast study of the oesophagus showing no leakage

She had a contrast study of the oesophagus after few weeks Figure-3, which did not show any stricture or leakage from the oesophagus.

DISCUSSION

Post – laparoscopy (SE) can occur in an isolated area or in any other parts of the body. It can occur in areas like external genitalia, legs, anterior abdominal wall, thoracic region, head, and neck. Number of hazard factors that have been involved in the development of (SE) are listed in Table-I⁷. In one report, it has shown that (SE) is associated with prolonged hypercarbia, pneumomediastinum and retroperitoneal involvement, during laparoscopic surgery⁸. Other has shown unilateral periorbital edema after laparoscopic radical prostatectomy⁹. Luckily, periorbital emphysema settles down through the span of a couple of days without causing any visual disturbance⁷. Seldom, gas or air advancing through the fascial planes can reach to the face and periorbital areas.

Table-I: Major risk factors for development of surgical emphysema⁷

Insufflator (high gas flow and high gas pressure setting)
Intra-abdominal pressure >15 mm Hg
Positive end-tidal CO ₂ >50 mm Hg
Procedures lasting >3.5 hours
Use of >5 cannulas, Number of trocars >4
Size of trocars is ≥10 mm, Type of trocar (valveless trocar)
Multiple attempts at the abdominal entry
Veress needle or cannula not placed in the peritoneal cavity
Improper cannula placement, causing stressed angulation
Skin/fascial fit/seal around the cannulas is not snug
Soft tissue dissection and fascial extension
Gas dissection leading to more dissection
Torqueing with traumatic expansion of the fascia
Long arm of the laparoscope is a force multiplier
Laparoscope used as a lever
Cannula acting as a fulcrum
Structural weakness caused by repetitive movements
Tissue integrity compromised by repetitive movements
Age > 65years
Coexisting metabolic diseases
Lack of external visualization during robotic procedures
Lack of haptic feedback during robotic procedures
Increased mechanical advantage without recognition during robotic surgery
Integrity of the anesthesia circuit, position of the endotracheal tube, inadequate respiratory exchange, underlying COPD... etc

Clinically, subcutaneous emphysema delivers a bizarre snapping sensation on palpation as the gas is pushed through the tissues. The severity of SE can be categorized into grades. One of the grading system ranges from Grade (0); no (SE) to Grade (3); Massive (SE) extending to neck, face and chest area Table-II¹⁰. Other system, which was designed by Aghajanzadeh Table-III, states as Grade (1); (SE) at the base of neck to Grade (5) Involves scalp, orbit, neck, chest wall, upper limbs, abdominal wall, and scrotum¹⁰.

Table-II: Grading the severity of subcutaneous emphysema post laparoscopy¹⁰ (Adopted from Sain et al.)

Grade 0	No subcutaneous emphysema.
Grade 1	Mild emphysema with crepitus at trocar insertion site.
Grade 2	Mild emphysema with crepitus extending to the abdomen and thighs and grade.
Grade 3	Emphysema extending to the chest, neck and face.

Table-III: Classification for severity of SE by Aghajanzadeh¹⁰

Grade 1	Surgical Emphysema at the base of the neck.
Grade 2	All of the neck area.
Grade 3	Subpectoralis major area only.
Grade 4	Chest wall and all of the neck.
Grade 5	Involves chest wall, neck, orbit, scalp, abdominal wall, upper limbs, and scrotum.

The management of (BS) remains a disputable issue. Three strategies for treatment are recognized, which are conservative, an endoscopic and surgery^{11,12}. In perforation of the oesophagus, it is discovered that the mortality rate is under 25% whenever interceded within 24 hours, though it steeply increases to around 85%, if operated after or more than 48 hours^{13,14}. This drastic increase of mortality rate shows the significance of early diagnosis and treatment. Depending upon clinical experience and evidence based medicine, an algorithm¹⁵ was developed which is showed in figure below.

Conservative: It involves a small set of number of patients. According to Ivey et al¹⁶. who reported three cases, which were treated conservatively. They concluded in their study that conservative management of oesophageal perforation is reasonable, if the perforation is five days old with no signs of pleural space contamination or severe sepsis and the contrast study of the oesophagus shows a wide – mouthed tract draining freely into the oesophagus. The treatment includes restriction of oral intake, parenteral antibiotics, proton pump inhibitors, and percutaneous drainage of mediastinal or pleural abscess in indicated cases.

Endoscopic: The use of endoscope is helpful in patients who are diagnosed earlier, without major contamination and sepsis. The study has shown that placement of endoluminal self – expandable metallic stent to bypass the oesophageal tear has shown encouraging results, but there are few side effects such as failure of the stents, stent migration, localized pressure necrosis and oesophageal reflux¹⁷. Siersema et al¹⁸. studied eleven (BS) patients. Five patients were treated with metallic stents and their pleural cavities were drained with chest tubes. One patient did not give any promising result due to multiple abscesses and had thoracotomy with oesophagectomy. After seven weeks all the stents were removed.

Surgery: Factors that determine surgical intervention include, extent of the perforation, degree of mediastinal or pleural contamination along with sepsis and patient's co – morbidities. In general, surgical treatment consists of strategies for early <24 hours or late >72 hour diagnosis of (BS).

Lawrence and his team¹⁹ reviewed a ten years data of 21 patients retrospectively. The surgical approach was primary repair of the tear with single layer of interrupted sutures along with gastrostomy. Most of the patients were treated after a day. The mortality rate in this study was 3 out of 21 patients. Another study done by Nesbitt and Sawyers²⁰ included 22 patients who were treated within 24 hours. In their experience all patients treated within this time frame survived. On the contrary patients treated after 24 hours, the study showed mortality rate of 2 out of 7, and for treatment after 48 hours it was 2 out of 5. Therefore, it was recommended that, primary closure should be done whenever the patient is coming within 48 hours. Another study done by Kiernan et al in 2006, recommended surgery regardless of time of diagnosis for thoracic oesophageal perforations,²¹ according to Kiernan and his team, primary repair gives good results. Whereas resection and reconstruction was suggested where significant distal obstruction or phlegmon render primary repair. Patients who were too ill to undergo more formidable surgery, diversion procedure was advised. Brauer et al.²² categorized the treatment on the bases of the size of the perforation. They recommended oesophagectomy, if a rupture is >3 cm and presented after 24 hours or more. However, if the tear was <3 cm and diagnosed before 24 hours of less, then these patient should be treated by primary suture and fundoplication.

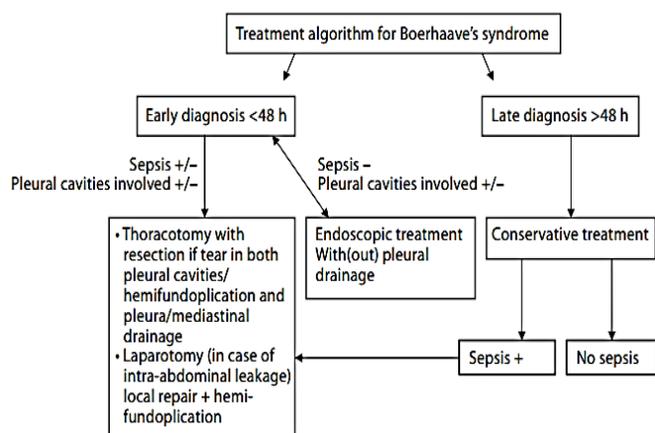


Figure-2: Treatment algorithm for Boerhaave's syndrome¹⁵. (Adopted from Sain et al.)

CONCLUSION

Subcutaneous surgical emphysema is a uncommon with many

risk factors, which should be detected early and in majority only conservative treatment and close monitoring are needed, however surgical drainage may be required in some case.

AUTHOR'S CONTRIBUTION

Yousaf A: Operative surgeon, Conceived idea, Literature research, Manuscript writing, Manuscript final reading

Naseem MY: Assistant surgeon, Manuscript writing

Arif MA: Manuscript writing, Data collection

Rehman PM: Manuscript writing, Data collection

Qadir NA: Manuscript writing, Data collection

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