



## SUBCUTANEOUS EMPHYSEMA AND PULMONARY EDEMA DURING LAPROSCOPIC HYSTERECTOMY : A CASE REPORT

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### ABSTRACT

Although having many benefits, laparoscopic surgeries are associated with serious complications as a result of pneumoperitonium and trendelenburg positioning. Subcutaneous emphysema and pulmonary edema are rare complications of laparoscopic surgery. In our patient steep trendelenburg position was given as requested by the surgeon. This may have increased the pulmonary capillary hydrostatic pressure and caused pulmonary edema. Secondly, our patient was planned for laparoscopic hysterectomy which required the insufflation of CO<sub>2</sub> and creation of pneumoperitonium. This pushed the diaphragm upwards combined with steep trendelenburg position causing endobronchial displacement of ETT and accidental single lung ventilation. All this could have lead to pulmonary edema and subcutaneous emphysema.

**KEYWORDS :** Subcutaneous Emphysema, Pulmonary Edema, Laproscopic Hysterectomy, Hypercarbia.

### INTRODUCTION

Laparoscopic approach to surgery has expanded its horizon tremendously. It is a preferred approach in many general, urological, gynecological and thoracic procedures. Although having many benefits, laparoscopic surgeries are associated with serious complications as a result of pneumoperitonium and trendelenburg positioning. Subcutaneous emphysema and pulmonary edema are rare complications of laparoscopic surgery. We report here such complications after laparoscopic hysterectomy using carbon dioxide (CO<sub>2</sub>) as an insufflating gas.

### CASE REPORT

A 38 year old female posted for surgery in our hospital for laproscopic hysterectomy. Indication was multiple subserosal and intramural fibroids with h/o dysmenorrhoea for 8 years.

### PREANAESTHETIC CHECKUP

K/C/O hypertension x 8 years  
On Tab Telmisartan 40 mg + Tab Amlodipine 5 mg OD.  
No H/o any other co-morbidity.

### Vitals

PR-93/min  
BP-148/98 mmhg  
RR-12/min

### Investigations

Hb- 14.6g/dl  
B.urea- 21 mg/dl  
Plt-3.43 lakh  
S.creat-0.8 mg/dl  
Na+ /K+ /Cl- 140/3.8/99  
Chest xray- NAD  
ECG-left ventricular hypertrophy

### On day of surgery

11:00 am- patient was taken in OT  
IV line secured with 18 g cannula in left hand and normal saline drip started.  
All monitors attached and preop vitals recorded  
HR-92/min  
BP-134/93 mm Hg  
SpO<sub>2</sub>-96%

It was decided to give GA to the patient as the surgeon requested for the same.

Pre-oxygenation done with 100% oxygen x 3 min

Inj Midazolam 1 mg iv stat  
Inj Ondansetron 4 mg iv stat  
Inj Glycopyrrolate 0.2 mg iv stat  
Inj Fentanyl 100 mcg iv stat

Inj Loxicard 60 mg iv stat

INDUCTION- Inj Propofol 100 mg iv+ Inj Succinylcholine 100 mg iv with IPPV

Endotracheal intubation done with cuffed ETT 7.5mm under DLS

B/l air entry checked and tube fixed at 20 cm mark.

MOA-O<sub>2</sub>:halothane  
99%:0.8-1.2%

Inj, Atracurium 25 mg iv stat + 5 mg iv sos

Extreme trendelenburg position given to the patient on surgeons request.

At 1:00 pm:

Tachycardia, hypertension, fall in saturation

Chest auscultated- b/l basal crepitations +

Facial puffiness noted, on palpation crepitations present all over the face, chest and upper limbs suggestive of subcutaneous emphysema.

Endobronchial displacement of tube suspected and it was pulled out and fixed again at 19 cm mark.

Suctioning of ETT done- Pink frothy secretions noted

Pulmonary oedema suspected.



Figure 1: Facial Puffiness Noted Intraoperatively.

Treatment given:

Inj Lasix 20 mg iv stat  
Inj Morphine 7.5 mg iv stat  
Inj Hydrocortisone 200 mg iv stat  
Inj Esmolol 5mg + 5mg + 5 mg iv stat  
1:30 pm- BP-170/98 mmhg ; SpO<sub>2</sub>-88%

Inj NTG ( 20ug/cc) started at 20 drops/min and titrated accordingly.

2:00 pm- BP- 140/83 mm hg , stablized  
SpO2-90%

2:45 pm- Surgery completed

Reversal-Inj Neostigmine 3mg iv+ Inj Glycopyrrolate 0.6 mg IV  
Recovery is smooth, complete, uneventful and satisfactory.  
Patient is kept on venturi mask with FiO2 -40% with O2 flow at 10 lit/ min.

Post op vitals- HR-93/min  
BP-110/68 mmhg  
SpO2-95%

Intraop blood loss- 350ml

IV Fluids- NS+NS+NS

Urine output- 700ML

Post op monitoring

3:00 pm-HR-90/min o/e-  
BP-104/70mmhg Basal crepts+  
Spo2-92 %

Inj lasix 10 mg iv stat .

Inj Deriphyllin 1 amp iv slowly .

3:15 pm-HR-110/min 500ml NS rushed  
BP-90/62 mmhg  
SpO2-88%

3:30 pm- HR-104/min ABG sent  
BP-98/68 mmhg

Inj SodaBiCarbonate 50 mg in 100 ml NS given over 20 min.

3:45 pm-HR-100/min  
BP-100/71 mmhg  
SpO2-90%  
RR-18/min

4:00 pm-ABG report arived-pH-7.215  
pO2-74.5mmhg  
pCO2-47.4mmhg  
SO2-90.2%  
BE--9.0 mmol/l  
HCO3- 18.8 mmol/l

4:30 pm- Patient shifted to ICU with vitals-  
HR95/min  
BP126/73 mmhg  
SpO2-92%

Subcutaneous emphysema managed conservatively.

Post op stay of the pateint was unventful and patient is discharged after 3 days.

## DISCUSSION

Perioperative pulmonary edema (PE) causes body fluids to extrude from pulmonary arterioles and capillaries into interstitial tissue and alveoli. This results in life threatening symptoms of hypoxia. Common causes of typical PE include heart failure, aspiration, trauma and erythrocytosis. Causes of atypical PE are upper respiratory obstruction, sudden reexpansion of a collapsed lung, low serum albumin levels, changes in diffusion gradient or gravitational factors of arterioles, extruding pleural effusion, and laparoscopy. Diagnosis is difficult because it can result from a sole etiologic factor or as a complicated combination of more than two. Early diagnosis can also prove to be difficult, especially in atypical cases.

Position during an operation is also a factor causing pulmonary edema. Several reports suggest that a steep trendelenburg position could be one of the risks for perioperative pulmonary edema. Shim et al in a case report of bi lateral upper lobe pulmonary edema during gynecologic laparoscopic surgery in the trendelenburg position suggested that steep trendelenburg position caused pulmonary edema.<sup>1</sup> Stoelting in a case of severe PE in total

pelvic exenteration concluded that steep trendelenburg position was the possible cause.<sup>2</sup> Steep trendelenburg position cause increased hydrostatic pressure in pulmonary capillaries and exudation of fluid into the alveoli causing pulmonary edema. Re-expansion pulmonary edema ( RPE) can occur after single lung ventilation. Yajima et al reported a case of RPE in a patient who underwent laparoscopic gastric banding. In that case accidental single lung ventilation occurred due to upward migration of the diaphragm associated with pneumoperitonium.<sup>3</sup> Laparoscopic approach gained popularity in early 1990 due to small incisions and minimum invasiveness. However, insufflation can cause CO<sub>2</sub> to diffuse into subcutaneous tissue, causing subcutaneous emphysema and hypercarbia.<sup>4</sup> The resulting complications include acidosis, hypercarbia and increased sympathetic tone manifested as hypertension and tachycardia. The incidence of subcutaneous emphysema during laparoscopic surgery is 0.3 to 3%. Risk factors for developing subcutaneous emphysema during laparoscopy includes increased age, extraaperitoneal laparoscopic procedures, multiple surgical ports, high insufflation pressures, and prolonged surgical time.

In our patient steep trendelenburg position was given as requested by the surgeon. This may have increased the pulmonary capillary hydrostatic pressure and caused pulmonary edema. Secondly, our patient was planned for laparoscopic hysterectomy which required the insufflation of CO<sub>2</sub> and creation of pneumoperitonium. This pushed the diaphragm upwards combined with steep trendelenburg position causing endobronchial displacement of ETT and accidental single lung ventilation. This is supported by intraoperative hypertension, tachycardia and fall in oxygen saturation, acidosis, hypercarbia in ABG. As the tube is re-fixed at 19 cm mark that caused lung re-expansion and re-expansion pulmonary edema. The combination of above two factors may have caused pulmonary edema in this case. Subcutaneous emphysema in this case was precipitated due to high insufflation pressures up to 30 mmHg combined with loose subcutaneous plane because of multiparity. Due to high insufflation CO<sub>2</sub> got leaked into subcutaneous plane and caused subcutaneous emphysema.

## REFERENCES

- [1] Shim J H, Shin W J, Lee S H. Bilateral upper lobe pulmonary edema during gynecologic laparoscopic surgery in the Trendelenberg position. Korean J Anesthesiol. 2010; 59: 63-6.
- [2] Stoelting R K. Acute pulmonary edema during anesthesia and operation in healthy young patient. Anesthesiology. 1970; 100: 366-9.
- [3] Yajima k, kanda T, Tanaka R, Sato Y, I Takashi, Kosugi S I, Honda T, Hatakeyama K. Reexpansion pulmonary edema following laparoscopy-assisted distal gastrectomy for a patient with early gastric cancer. Case reports in surgery. 2012: 68-72.
- [4] L Stephanie. Subcutaneous carbon dioxide emphysema following laparoscopic salpingo-oophorectomy. AANA Journal. 2008. Vol 76: 282-3.