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Case Report

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Spontaneous combustile pneumoperitoneum

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ABSTRACT

Fire and explosions in the operation theatre during surgery in the era of cautery usage have been reported since many years. Significant complications or death can ensue as a result of such fires or explosions and surgeons should be aware of these hazards. A 38 year old female patient on the 6th day of admission, developed abdominal distension. Patient was managed conservatively with flatus tube insertion and serial x-ray monitoring. On the 8th day, repeat x-ray showed gas under diaphragm. Emergency laparotomy was undertaken. On opening the peritoneum using cautery, a hissing escape of gas was heard and this caught fire. On attempting to stem gas flow from the peritoneal hole, the operating surgeon sustained burn to his index finger and the glove melted. The peritoneal cavity was surprisingly free of any spilled contents. Small bowel was opened through a small enterotomy and decompressed. The colon steadfastly refused to collapse. This necessitated a transverse colotomy which, after decompression, was converted into a loop transverse colostomy. She underwent colonoscopy after three weeks wherein the colon was found to be free of any obstruction. The colostomy was closed. If there is free gas on entering a peritoneum, it will be wiser to avoid electro surgery. Instead, scissors or a scalpel should be used.

Keywords: Electro surgery, Fire, Explosion, Pneumoperitoneum

INTRODUCTION

Fire and explosions in the operation theatre during surgery in the era of cautery usage have been reported since many years. For an explosion to occur, three conditions have to be fulfilled. There must be fuel, a source of oxygen and an ignitor. Surgical fires and explosions have been described with electrosurgery using fuels such as alcohol-based skin preparations, plastic endoluminal tubes, intra-colonic gas and, rarely, free peritoneal gas following bowel perforation.[1-3] Several case reports have described ignition of intra-colonic gas on entering the colonic lumen with an electrocautery.[4] Few reports have also described explosion while opening a pneumoperitoneum with electrocautery in bowel perforation.[3,5] Significant complications or death can ensue as a result of such fires or explosions and surgeons should be aware of these hazards.

CASE REPORT

A 38 year old female was admitted to our hospital with an alleged history of consumption of Thimate, an organo phosphorus compound, with an attempt to commit suicide. She was treated with atropine, pralidoxime and needed ventilatory support. On the 6th day of admission, patient developed abdominal distension for which a surgical opinion was sought. On examination, abdomen was tense. Bowel sounds were present but no guarding or rigidity was observed. Per rectal examination suggested fecal impaction. X-ray abdomen showed gaseous distension of small and large bowel without any gas under the diaphragm. Patient was managed conservatively with flatus tube insertion and serial x-ray monitoring. On the 8th day, repeat x-ray showed gas under diaphragm (Figure 1). CT abdomen (plain) was done which showed gas intra-peritoneally. Hence, emergency laparotomy was undertaken.

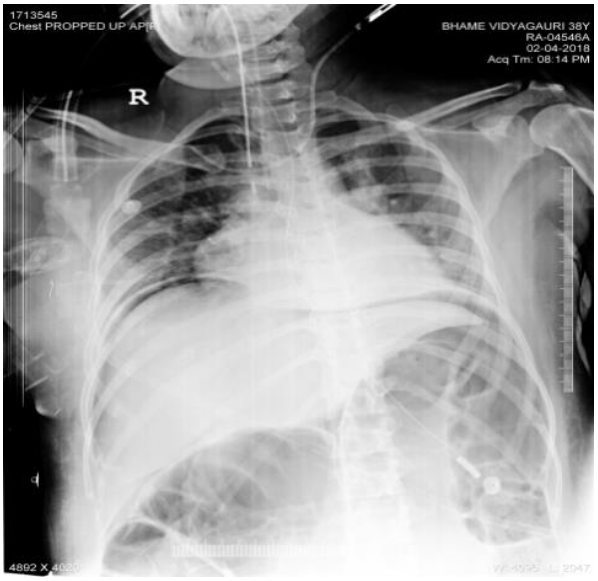

Figure 1: Air under diaphragm.

Figure 2: Index figure burnt.

Laparotomy was performed by a midline supra and infra umbilical incision. On opening the peritoneum using cautery, a hissing escape of gas was heard and this caught fire. On attempting to stem gas flow from the peritoneal hole, the operating surgeon sustained burn to his index finger and the glove melted (Figure 2). The peritoneal cavity was surprisingly free of any spilled contents. Bowel was explored thoroughly for perforation, but none was found. The large and small bowel was distended with gas. Trial of evacuation of gas via flatus tube passed per-rectally and milking the bowel was of no avail. Hence, small bowel was opened through a small enterotomy and decompressed. The colon steadfastly refused to collapse. This necessitated a transverse colotomy which, after decompression, was converted into a loop transverse colostomy.

The patient showed steady improvement and was discharged with the colostomy. She returned after three weeks to undergo a colonoscopy wherein the colon was found to be free of any obstruction. The colostomy was closed. Even this procedure needed a segmental resection and anastomosis since there were intense adhesions of the stoma wall to the parietal wall.

DISCUSSION

At all levels of the gastrointestinal tract, flammable gases are produced. This is a result of the digestive process, bacterial fermentation, diffusion from blood stream and by swallowing.[3] Methane and hydrogen constitute a major part.[6] The proportion of gases vary with diet, metabolism and degree of bacterial fermentation. Hydrogen concentration depends on bacterial activity and pre-operative bowel preparation. Methane production is independent. Explosive range of hydrogen is 4% -72% and of methane is 5% - 15%, but neither can burn if oxygen is less than 5%. Oxygen concentration in bowel increases with the use of O_2 and N_2O during general anaesthesia.[7]

In this case, fuel causing explosion on entering peritoneum was intra-peritoneal gas, which was ignited by cautery. Fire with a blue flame may have been because of methane. Thomas and Wilson have reported a case of a 41 year old woman who presented to the emergency surgical team with peritonitis. They further stated that on dividing the peritoneum, there was an explosion and the most likely fuel causing the explosion on entering the peritoneum was free intraperitoneal bowel gas, ignited by the handheld electrosurgery device. The laparotomy demonstrated two small bowel perforations.[5] Dhebri et al also reported one similar case.[3] Several case reports have described the ignition of intracolonic gas on directly entering the colon using handheld diathermy.[6,8]

In our situation, there was no bowel perforation and still inflammable gas was present intra-peritoneally which caused injury to operating personnel. This led to questions in our mind. Where did this colonic methane come from and how? We theorise that due to some chemical interaction of the poison with colonic mucosa, translocation of gas occurred which led to pneumoperitoneum. Was this same colonic reaction responsible for the intense adhesions to stomal site? More reports need to be studied for a better understanding of this phenomenon with a view to prevention and better patient management.

CONCLUSION

If there is free gas on entering a peritoneum, it will be wiser to avoid electrosurgery. Instead, scissors or a scalpel should be used.

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