

CASE REPORT

Fatal Air Embolism Following Dilatation and Curettage and Attempted Tubal Ligation

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ABSTRACT

Fatal air embolism especially venous air embolism is probably one of the most common embolic events to occur with the increased use of invasive techniques in medicine. The overall incidence of air embolism in any laparoscopic surgical procedures can be upto 69% of the patients. Death from air embolism commonly occurs within few minutes and usually is not delayed beyond 45 minutes. A 31 years old lady with one and half month's amenorrhea came to hospital for medical termination of pregnancy and tubal ligation. Accordingly dilatation and curettage was successfully done and when pneumoperitoneum was created for laparoscopic tubal ligation she collapsed on the operating table and immediately ligation procedure was aborted. She died within one hour of the procedure. On postmortem examination crepitus was felt on palpation of uterus and air columns were present in the pulmonary and cardiac vessels.

Key Words: Air embolism, MTP, pneumoperitoneum

INTRODUCTION

Fatal air embolism especially venous air embolism is probably one of the most common embolic events to occur with the increased use of invasive techniques in medicine. Laparoscopic obstetrics and gynecological procedures accounts for 11-97% of incidence of fatal air embolism.¹

The overall incidence of air embolism in any laparoscopic surgical procedures can be upto 0.0014% to 0.6% of the patients.² Death from air embolism commonly occurs within few minutes and usually is not delayed beyond 45 minutes.³

CASE REPORT

A 31 years old lady, G3P2 came to the OPD of Obstetrics and Gynecology in a hospital at Agartala with history of one and half months amenorrhea for medical termination of pregnancy and tubal ligation. She was taken to OT and at first dilatation and curettage was done successfully. Then for laparoscopic tubal ligation spinal anesthesia was given and pneumoperitoneum was gradually created. During the air insufflations procedure suddenly the patient collapsed. Immediately the procedure was aborted and resuscitation was done. However the patient died within one hour of commencement of whole procedure. There was no history of hypertension and heart disease. The history and the circumstances led to the suspicion of embolism.

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AUTOPSY FINDINGS

She was of obese built. On autopsy, laparotomy wound was seen, i/v needle prick marks were seen on the dorsum of left hand and spotting of blood was seen from the vagina. On dissection, the skin was reflected and checked for the presence of pneumothorax. The sterno-clavicular joint was spared as pulling back the sternum may cause the air to be sucked into the veins. The lower part of sternum was cut and at the manubrium the ascending aorta and venecava were clamped. Incision was given over the pericardium and the pericardial cavity filled with water. The heart was punctured at the right ventricle with a scalpel and multiple air bubbles were seen coming out. On examination, the epicardial veins of the heart showed beaded appearance with numerous air columns along the whole length especially at the great cardiac veins. (Figure 1).



Figure 1 Epicardial veins showing multiple air columns along the whole length

The right side of the heart, venecava, pulmonary artery and pulmonary veins showed presence of bright red colour frothy fluid. All the other organs were congested. The uterus weighed 200Gms with dimensions of 13cmX10cmX3cm. On palpation of the uterus; crepitus was felt due to the entrapment of air within the muscle layers. The uterine cavity was empty. One uterine tumour (4cmX3cm) was present over the fundus of the uterus. There were multiple dilated open sinuses near uterine tumour and also in other parts of the myometrium (Figure 2).



Figure 2 Leiomyoma (one bullet) and multiple dilated uterine sinuses (two bullet)

The cervix was contused with superficial laceration. The ovaries were congested and on cut section corpus luteum was present in the left ovary (Figure 3).



Figure 3 Corpus luteum in ovary

Multiple air bubbles were also present within the layers of the mesentery, intestinal walls and over the capsules of both the kidneys (Figure 4). Multiple petechiae were present in the white matter of the brain (Figure 5).

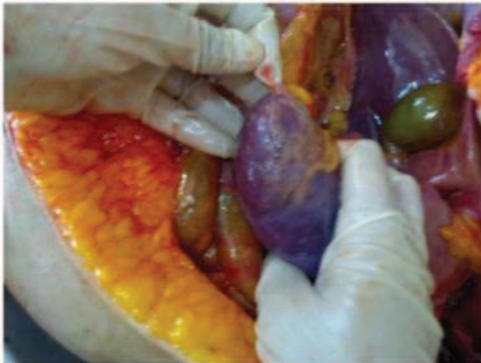


Figure 4 Presence of air bubbles at multiple places

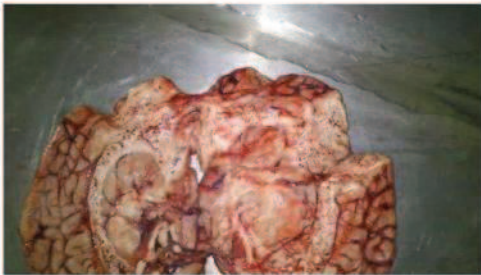


Figure 5 Petechial hemorrhages in white matter of brain

The whole uterus along with appendages was sent for histopathological examination. The histopathological examination revealed the uterine growth as leiomyoma and the presence of dilated sinuses in the uterus. The toxicological analysis report of the viscera was negative for the presence of benzodiazepines and ethyl alcohol. The cause of death was given as shock as a result of air embolism consequent upon dilatation and curettage and attempted pneumoperitoneum.

DISCUSSION

Air embolism is entrainment of air or gas from operative field or other communications into the venous or arterial vasculature.¹⁻⁴ Orebaugh suggested that entry of 300-500 ml of air at a rate of 100 ml/sec can produce fatal air embolism.⁴ Durant⁵ in the year 1947 studied air embolism in dogs and suggested that the amount of air entering the blood stream, the speed of entry and the position of the

body were the factors which determined mortality in cases of air embolism. Cormack⁶ in 1850 reported the first case of venous air embolism in obstetric population. When a large bolus of air enters the venous system, air being compressible mixes with blood and forms froth thereby creating "air lock" in the right atrium and ventricle. This air lock causes obstruction in the right ventricular outflow, pulmonary hypertension, right ventricular strain and eventually cardiac failure²⁷. Geissler et al⁹ gave another proposed mechanism for cardiac failure. They proposed that increased right ventricular after load and arterial hypotension, possibly with subsequent right ventricular ischemia is the primary mechanism for cardiac dysfunction in venous embolism. Venous air embolism is a potential complication of laparoscopic, neurosurgical, pelvic, and orthopedic procedures. Although a venous gas embolism is a rare complication of laparoscopic surgeries, seen in 0.0014% to 0.6% of laparoscopic cases, it is associated with a 28% mortality rate.³ During pregnancy, injection of air or fluid mixed with air or soap water into the pregnant uterus for procuring abortion⁴ or blowing of air into the vagina during orogenital sex⁷, can be the causes of fatal air embolism as the enlarged uterine sinuses provides more exposure to entry of air. Other causes include trauma to the chest and neck, intravenous injections, artificial pneumothorax and barotraumas in scuba divers.¹⁻¹⁰

In this case, dilatation and curettage conducted for medical termination of pregnancy, the dilated uterine sinuses and insufflations of air for laparoscopic tubal ligation were the causes for air embolism.

Air embolism is a life-threatening complication of obstetric or gynecologic procedures.¹¹ Usually gas embolism can occur in laparoscopic procedures from puncture of veins by the trocar or veress needle. But sometimes it may occur from laceration of the vessels due to separation of the tissues by the increasing volumes of the gases injected.¹² Air embolism is known since the early nineteenth century but its incidence has significantly increased in the last three decades due to the fact that the numbers of laparoscopic surgery have increased considerably. Proper monitoring of the vitals and position of the patient in the left lateral decubitus position with the head tilted downwards will place the right ventricular outflow tract below the right ventricular cavity which will allow the air to migrate up and escape out of the ventricular tract, thereby preventing the complications of air embolism.^{4,13}

CONCLUSION

Air embolism is a recognized risk in laparoscopic procedures especially in obstetrics and gynecology and is associated with high morbidity and mortality. It is therefore very essential for the operating surgeons and anesthesiologist to recognize and treat venous air embolism to avoid such mishaps on the operating table.

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