

Trocar insertion complication during laparoscopy – Role of the Anaesthetist

Sunny Malik, Arun Puri, Devesh Loshali, Ravi Bhaskar

ABSTRACT

Reported is a case of abdominal aortic injury during laparoscopic assisted vaginal hysterectomy following initial trocar insertion. The patient was managed successfully by virtue of intense monitoring and alertness on part of the anaesthetist. Prompt diagnosis in time and early conversion to median laparotomy saved the patient's life.

Keywords: Aortic injury, laparoscopy, pneumoperitoneum, trocar

Department of anaesthesiology, Max Super Speciality Hospital, Patparganj, New Delhi

Corresponding Author mail: dr.sunnymalik@gmail.com

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INTRODUCTION

In the modern era of minimally invasive surgical techniques, laparoscopy is increasingly being used in various gynaecological procedures. Although it is advantageous over the open surgical procedures by reducing postoperative pain and discomfort with a shorter hospital stay, but it is not without complications.¹⁻⁶

Access to the abdomen through small incisions and creation of pneumoperitoneum for increasing the visualization is the most crucial step in any laparoscopic surgery. The insertion of the first trocar can result in potential catastrophic events resulting in major vascular or visceral injury. Reports have proven that over 50 % of these bowel and vascular injuries occur during the initial entry into the abdomen, out of which 30-50

% of bowel and 15-50 % of vascular injuries remain undiagnosed at the time of initial presentation which has contributed to significant mortality of about 30 %.^{7,8}

Apart from the physiological effects of carbon dioxide (CO₂) insufflations leading to cardiovascular and respiratory perturbations, major vascular injuries should be kept in mind. Despite the improvement of surgical skills and instrumentation during laparoscopy, anaesthesiologist should be aware to cater such catastrophe because the complication rate has been found to be quite similar over the past 25 years.

We have reported a case of distal abdominal aortic injury that occurred during the initial trocar insertion while starting laparoscopy assisted vaginal hysterectomy managed successfully due to

early recognition, thus preventing any mortality.

CASE REPORT

A 41 year old female suffering from uterine fibroid was admitted to our hospital for laparoscopic assisted vaginal hysterectomy. She was thin built with a body weight of 48 kilograms (kg) and height of 165 centimetres (cm) {Body mass index BMI = 17.64}. The only positive history in preanaesthetic checkup was that the patient was hypothyroid and was on medications from the past 5 years. Thyroid profile was well controlled.

Pre-operative blood investigations

Preoperative investigations revealed hemoglobin – 13.2 gram per deciliter (gm/dl), total leucocyte count TLC – 8040/mm³, platelet count PLT – 2,19 lakhs/mm³, blood sugar –87 milligrams (mg) %, blood urea – 26.6mg%, serum creatinine – 0.7mg%, electrocardiogram – sinus rhythm. Patient had normal coagulation parameters and serum electrolytes.

After premedication (midazolam 1 mg, fentanyl 100 microgram and glycopyrolate 0.2 mg intravenous i.v) and preoxygenation, patient was induced with propofol 100 mg i.v alongwith sevoflurane. After relaxation with atracurium 40 mg i.v bolus, oral intubation done with cuffed

endotracheal tube size 7.0 and the patient was maintained on oxygen and air mixture on intermittent positive pressure ventilation alongwith sevoflurane and atracurium 10 mg i.v intermittently. “Veress-pneumoperitoneum-trocar” technique was used.

Immediately after trocar insertion systolic blood pressure suddenly dipped from 122 to 60 mm of Hg with tachycardia up to 150/minute. As blood was noticed at trocar site, immediate opening of the abdomen was done. Fluid resuscitation and invasive monitoring was started. Two rents in abdominal aorta at L4 level were repaired and sutured by vascular surgeon. Surgery commenced for a total duration of 4 hours and a total blood loss of 2200 ml was noted. The patient was successfully resuscitated as denoted by serial arterial blood gas analyses which showed us a decreasing trend in lactate and acidosis levels.

She was shifted to intensive care unit on propofol, nitroglycerine, fentanyl and vecuronium infusion. The patient was electively ventilated overnight and extubated the next day. The postoperative course was uneventful except for a systolic ejection flow murmur due to anemia for which blood was transfused. The patient was shifted to ward on the 4th day.

DISCUSSION

The first laparoscopic procedure in humans was done by Jacobeus of Sweden in the late 1910.⁹ Creation of CO₂ pneumoperitoneum is the first vital step in any laparoscopic surgery worldwide and abdominal access using “veress needle-pneumoperitoneum-primary trocar” technique was popularized by Raoul Palmer of France in 1947.¹⁰ Since then it is in wide practice in gynaecological laparoscopy surgeries.

The primary trocar used for camera head is inserted blindly and the secondary trocars are usually introduced using its real time guidance. So, primary trocar is the chief culprit in causing major vascular and bowel injuries.

Literature reviews showed that 40 % of the surgeons are using veress needle insufflations prior to primary trocar insertion, while 30 % use a direct (no insufflations) trocar insertion method and the remaining 30 % have been found to be using the open Hasson technique.^{11,12} Various tests such as manometer test, hissing sound test, aspiration test, saline insertion test, hanging drop and measuring pressure at the tip of insufflators are conducted by surgeons to help in safe entry to the peritoneal cavity, but none of these tests except the last one noting actual

insufflations pressure of ≤ 8 mm of Hg along with a free flowing gas, is foolproof.¹³ Delay in identifying and misdiagnosing vascular injury is the main culprit that leads to mortality. It is not only important for the operating surgeon but also for the anaesthetist to be alert during the conduct of confirmatory tests for safe entry into the abdominal cavity.

Vascular injuries to distal aorta, inferior vena cava and iliac vessels have been reported in the past.^{14,15} Our patient suffered injury to the distal abdominal aorta leading to retroperitoneal hematoma despite using “veress-pneumoperitoneum-trocar” insertion technique alongwith confirmation with saline insertion and pressure monitoring. Out of the multiple factors (surgeon inexperience, inadequate pneumoperitoneum, anatomical and skeletal deformities, previous abdominal surgery, etc) that have been implicated in causing vascular injuries, extreme thinness with a flat abdomen was contributory in our case.¹⁶ The suspicion occurred after blind trocar insertion when severe hemodynamic instability occurred leading to a sudden drop in systolic blood pressure from 110 mm of Hg to 60 mm of Hg. EtCO₂ also decreased from 32 to 12 leading to a differential diagnosis of CO₂ microembolism or bleeding complication.

As the decrease in EtCO₂ was not preceded by an increase, embolism was excluded. Moreover, trocar site bleeding noted by the surgeon confirmed some vascular lesion and an urgent decision for laparotomy was taken.

Alcazar MT et al also reported hypotension due to abdominal aortic injury in a 58 year old patient undergoing laparoscopic cholecystectomy under general anaesthesia.¹⁷ Similar to our case, she was treated with median laparotomy, volume replacement and aortic tension repair. Although hemodynamic instability with a low blood pressure is the usual presentation in vascular injuries but it can present with hypertension too. This unusual presentation was reported by Anne M et al in 2000 who postulated that retroperitoneal hematoma formation and high intraabdominal pressure due to pneumoperitoneum causing a decreased venous return can restrain the bleeding by tamponade effect. The increased systemic vascular resistance induced by the tamponade effect on aortic blood flow and high sympathetic activity as a result of intact baroreflexes explains the cause of hypertension.¹⁶

Our patient was managed successfully as signified by serial arterial blood gas analyses and was extubated the next day.

Timely opening of the abdomen due to suspicious vascular injury saved our patient's life. This case report highlights the role of anaesthetist during initial trocar insertion at the start of laparoscopy. Monitoring during this crucial period is must and it is important to be a part of the surgical team during first trocar insertion by behaving as a keen observer. A proper vigilance on part of the anaesthetist regarding the proper conduct of confirmatory tests and noting whether "veress-pneumoperitoneum-trocar" sequence is followed, can save a precious life because early diagnosis and timely intervention is the key to successful resuscitation in vascular injury during laparoscopy.

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