Case Report

Anesthetic Management of a Giant Mucinous Cystadenoma of the Ovary

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Abstract

Huge intra-abdominal tumors like mucinous cystadenomas in the ovary exert mechanical compressive effects on the great vessels, solid organs, and bowel. These give rise to numerous anesthetic concerns in the perioperative period, inattention to which can lead to disastrous complications on table. A thorough understanding of the physiological effects and a meticulous management are required to avoid these complications. We have discussed in great detail the anesthetic concerns and the management goals in patients with such complications.

Key words: Anesthetic concerns, giant mucinous cystadenoma, hemodynamic stability

Introduction

Mucinous cystadenomas are benign tumors that arise on the surface epithelium of the ovary. These tumors would, in the past, often grow to huge sizes before they were diagnosed. However, it is rare to encounter such giant tumors in current surgical practices. Such giant tumors can cause significant morbidity and mortality owing to their size rather than their biology.[1] Hemodynamic instability during surgery, respiratory compromise due to tumor size, and the fluid shift occurring due to rapid tumor decompression are all major anesthetic concerns.[2] Though most of the times the case may proceed in an uneventful manner, overlooking a minute detail can give raise to serious complications. We discuss about the perioperative anesthetic concerns and the management of a middle-aged lady diagnosed with a giant mucinous cystadenoma in her ovary. Through this, we remind the lessons not to be forgotten for a safe anesthetic management.

Case Report

A 37-year-old lady presented with gross abdominal distension that had progressively worsened over the past 8 months. She had been diagnosed with hypertension 2 weeks prior to the admission, for which she was being treated with 2.5 mg of amlodipine perorally. She had no other associated comorbid conditions. On physical examination, her abdomen was found to be grossly distended (corresponding to a uterine size of 34 weeks of gestation). Review of all other systems, airway, and spine was unremarkable.

Preoperative hematological and biochemical parameters were within normal limits. Electrocardiogram and 2D echocardiography of the patient were normal. Chest X-ray showed blunting of the right-sided costophrenic angle suggestive of mild pleural effusion. Computed tomography of the abdomen revealed a large, well-encapsulated multilobulated cystic lesion with thick septae that minimally enhanced on contrast administration. A solid tumor area located inferiorly did not enhance. The radiology report was suggestive of mucinous cystadenoma in the right ovary of the patient [Figure 1a]. The lesion measured 25 × 15 × 28 cm and occupied the entire abdomen and pelvis, extending from the epigastrium to the suprapubic region (vertebral levels T11 to Co1) [Figure 1b and 1c]. There was significant displacement of all the abdominal organs and the urinary bladder [Figure 1a]. The abdominal aorta and the inferior vena cava were seen to be compressed by the lesion [Figure 1d].

The patient was scheduled to undergo laparotomy and excision of the tumor under general anesthesia (with controlled ventilation) supplemented by epidural analgesia. Intravenous injection of ranitidine (50 mg) and metoclopramide (10 mg) were administered to prevent acid aspiration as was tab. alprazolam (0.5 mg) for anxiolysis. The patient was preloaded with 600 ml of 6% hetastarch and Ringer's lactate.

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With the patient in the left lateral decubitus position, the epidural space was identified at T12-L1 and an epidural catheter was threaded in and fixed at a depth of 9 cm. A test dose of 2 ml of 2% lignocaine with adrenaline was administered. The patient was then positioned supine with a wedge placed under her right hip. She was preoxygenated for 3 min (flow of 6 l/min). Rapid sequence induction was performed by administering thiopentone (200 mg), succinylcholine (100 mg), morphine (4 mg), and midazolam (1.5 mg), and the patient was intubated with a size 7.0 ID cuffed endotracheal tube. Cricoid pressure was applied and maintained from the point of loss of consciousness till the inflation of the cuff of the endotracheal tube. Three milligrams of morphine (diluted to 8 ml with sterile normal saline) was then administered through the epidural catheter.

Anesthesia was maintained with isoflurane (end tidal concentration >0.8) in an O2:N2O 50:50 mixture. Intermittent boluses of vecuronium were used to maintain the muscle relaxation. The patient was ventilated using the volume control mode set to deliver a tidal volume of 450 ml. The peak airway pressures were high (>25 cm H2O) before the cyst contents were emptied. Subsequently, however, once the cyst was debulked, the airway pressures fell to below 18 cm H2O. After the completion of the surgery, the patient was reversed and could be extubated on table. The tumor weighed 12 kg [Figure 2a and 2b].

Discussion

Mucinous cystadenomas are benign tumors in the ovary that may grow to large sizes. Added to the effects of a term gravid uterus, these tumors could alter the normal circulatory and respiratory physiology. Huge tumors could cause aortocaval compression.[3] Positioning a patient supine would aggravate this compression, a situation termed the "supine hypotension"

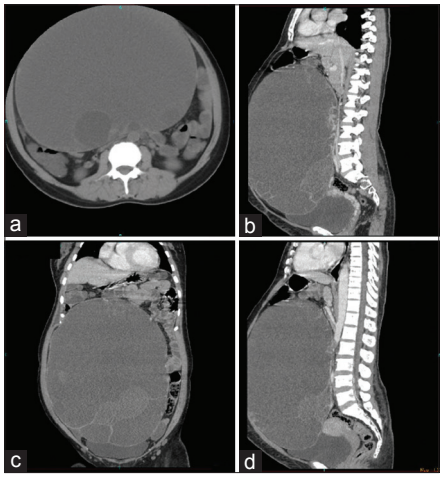

Figure 1: Computed tomography images of the tumor: (a) axial section of the tumor with displacement of the abdominal viscera, (b) sagittal section of the tumor showing its vertical extension from T11 to coccyx, (c) coronal section showing a multiloculated tumor extending from the epigastrium to the suprapubic region, (d) tumor causing aortocaval compression

syndrome. The supine hypotension syndrome is characterized by decreased venous return due to the compression of the inferior vena cava. A fall in venous return would result in decreased cardiac output (Bezold-Jarisch reflex) and systemic hypotension.[4] To obviate such an occurrence, irrespective of the choice of anesthetic technique, volume preloading the patient would be essential to maintain venous return to the heart. The placement of a wedge under the right hip would also ameliorate the situation partially. The administration of a central neuraxial block, however, would cause a sympathetic blockade and aggravate these effects, leading to cardiovascular collapse in patients with such giant tumors.[1] Spinal and epidural anesthesia, therefore, are fraught with risks in these patients.

During the surgery, a sudden decompression of the tumor, resulting in a rapid increase in venous return, could lead to cardiac failure, especially in the elderly.[2] However, in a contrary effect, tumor removal could also cause splanchnic vasodilation and venous pooling, resulting in hypotension. Relief of the aortocaval compression, causing a fall in the systemic vascular resistance, would be another potential cause of hypotension.[2]

Large sized tumors could possibly displace the domes of the diaphragm superiorly and interfere with diaphragmatic excursions due to a splinting effect. The superior displacement of the domes of the diaphragm would reduce the functional residual capacity of the lungs, thereby increasing the risk of desaturation while under anesthesia. The pressure exerted by the tumor on the basal regions of the lungs would lead to an increase in the number of atelectatic alveoli. This could increase the risk of postoperative pulmonary complications. Owing to the basal alveolar atelectasis, the inspiratory airway pressures required to distend such alveoli and deliver a set tidal volume would be higher than normal. This phenomenon can be explained by the Laplace law which states that the pressure (P) required to distend a sphere of radius R is directly proportional to the tension (T) and inversely related to the radius of the sphere, i.e., $P = 2T/R$.[5]

Such large tumors would also affect the spread of a drug administered into the subarachnoid space. Compression of the inferior vena cava caused by the tumor would result in engorgement of the epidural venous plexus and reduction

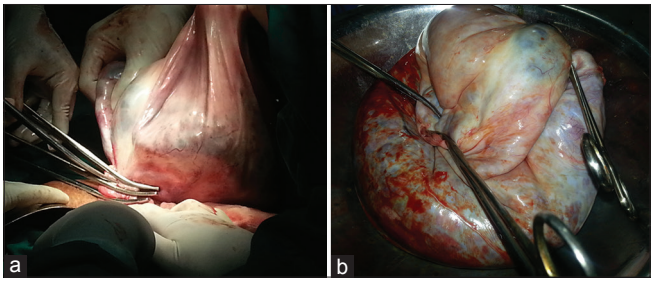

Figure 2: Intraoperative images of the tumor: (a) debulking of the tumor prior to its excision, (b) image of the excised tumor

of the volume of cerebrospinal fluid contained in the spinal subarachnoid space. Administration of the usual dose of an anesthetic drug via the intrathecal route would result in an exaggerated cephalad spread of the drug. Besides this, identification of the epidural space and placement of the epidural catheter itself could be technically challenging (as in a term pregnant patient), with a higher attendant risk of accidental intravascular catheter placement and drug injection.

Giant abdominal tumors could displace the stomach and obliterate the gastroesophageal angle, increasing the risk of acid reflux and aspiration under general anesthesia. Rapid sequence induction and intubation would, therefore, be required to prevent acid aspiration syndrome.

All the above mentioned concerns were addressed in the anesthetic plan formulated for the present patient. General anesthesia with controlled ventilation supplemented with epidural analgesia was used. The patient was preloaded with a combination of a colloid and crystalloid so as to maintain adequate intravascular volume prior to induction of anesthesia. Acid aspiration prophylaxis was administered and rapid sequence induction and intubation were performed. A wedge was placed under the right hip to reduce the pressure on the inferior vena cava. Epidural analgesia was provided using an opioid alone prior to tumor debulking (so as to prevent abolition of sympathetic tone). Bupivacaine was injected only after tumor excision to provide an adequate analgesia top-up. The anesthetic and surgical plans could be executed successfully in synchrony. The postoperative period was uneventful.

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