7 Anesthesia Considerations

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7.1 Preoperative Evaluation

1. Thorough preoperative history.
2. Complete physical examination.
3. Identifying underlying medical conditions.
4. Length of procedure.
5. Severity of disease.
6. Routine versus additional blood investigation.
7. Blood loss assessment with surgeon.
8. Chest films (if required).
9. Electrocardiogram (if required).

7.2 Premedication

1. Topical anesthetic (EMLA) cream is applied to the skin to relieve the pain of peripheral venous access.
2. Cessation of oral intake prior to the procedure depending on hospital protocol.
3. Oral administration of midazolam (0.5–1.0 mg/kg body weight; maximum dose of 15 mg) 30 min prior to the procedure.

7.3 Induction of Anesthesia

1. Induction of anesthesia can be done by inhalation or the intravenous route.
2. Peripheral intravenous access must permit rapid fluid and blood administration in major procedures.
3. Venous access above the diaphragm is preferred to bypass the elevated intra-abdominal pressure compression of the inferior vena cava.

7.4 Muscle Relaxants and Analgesics

1. Good muscle paralysis provides optimal surgical conditions and a more secure airway. This also facilitates controlled ventilation in the case of elevated intra-abdominal pressure.
2. Rocuronium and cis-atracuronium are the muscle relaxants of choice.
3. Ventilation must be appropriate to maintain end-tidal carbon dioxide within the physiological range of 35–45 mmHg.
4. Do not use nitrous oxide as it supports combustion and crosses swiftly to any gas-filled space.

7.5 Decompression

1. After induction of anesthesia a nasogastric tube is inserted to deflate the stomach. This tube is left in place for intermittent suction and gravity drainage.
2. Decompression of the stomach improves visualization and reduces the risk of accidental stomach perforation.
3. Placement of a urethral catheter allows urinary bladder decompression and monitoring of intraoperative urine production.

7.6 Intraoperative Monitoring

1. Continuous electrocardiography.
2. Blood pressure monitoring.
3. Pulse oximetry.
4. Temperature.
5. Capnography.
6. Invasive monitoring (in high risk patients):
   a. Arterial blood pressure.
   b. Central venous pressure.

7.7 Intraoperative Cardiovascular Complications

7.7.1 Venous Gas Embolus

A venous gas embolus can occur due to inadvertent placement of a Veress needle into a vessel. When large volumes of gas reach the right ventricle, an airlock is created in the pulmonary outflow tract. This leads to a sudden drop in pulmonary venous flow and left ventricular output and evident drop in end-tidal CO_2.

7.7.1.1 Management of a Venous Gas Embolus

1. Cessation of abdominal insufflation.
2. Immediate deflation of intra-abdominal gas.
3. Place the patient in the head-down, left lateral decubitus position to minimize the right ventricular outflow tract obstruction.
4. Increase the fraction of inspired oxygen to 1.0.
5. If possible, the central venous pressure catheter should be advanced to aspirate the gases from the right side of the heart.

7.7.2 Hypotension

Factors involved in hypotension are:

1. Decreased venous return and cardiac output due to high intra-abdominal pressure.
2. Drop in the volume of circulating blood.
3. Bradycardia resulting from vagal stimulation.
4. Hypoxia.
5. Venous gas embolism.
6. Pneumothorax.
7. Anesthetic overdose.

7.7.2.1 Management of Hypotension

1. Immediate deflation of intra-abdominal gas.
2. Rapid intravenous fluid administration.
3. Place the patient in the head-down position.
4. Atropine may be administered.
5. Vasopressors may be necessary.
6. Chest tube placement in case of pneumothorax.
7. Reduction of anesthetic concentration.

7.7.3 Hypertension

Hypercarbia may stimulate the sympathetic nervous system, resulting in tachycardia and hypertension. Other contributors to hypertension are inadequate depth of anesthesia, hypoxia, and increase in superior vena cava return. Treatment involves removal of the causative factor and administration of vasodilatory agents.

7.7.4 Dysrhythmias

Dysrythmias can occur:

1. During abdominal insufflation
2. Stretching of intra-abdominal structures
3. Inadequate anesthesia levels
4. Hypoxia
5. Myocardial sensitization to halothane (if used).

Treatment includes removal of the causative factor, immediate deflation, and administration of lidocaine.

7.8 Intraoperative Pulmonary Complications

7.8.1 Hypoxia

The major causes of hypoxia are ventilation–perfusion mismatch and increased pressure on the diaphragm due to increased intra-abdominal pressure. Hypoxia can also occur due to displacement of the endotracheal tube. Treatment involves removal of the causative factor.

7.8.2 Hypercarbia

Hypercarbia occurs secondary to absorption of insufflated CO_2 into the vascular system and ventilation–perfusion mismatching during surgery. Hypercarbia can be managed by increasing minute ventilation and reducing the insufflation pressure.

7.9 Postoperative Management

7.9.1 Patient Care

Monitoring must continue because excessive CO_2 must be cleared from the body. Patients with respiratory disease may have problems removing CO_2. Postoperative chest films must be obtained in certain procedures after laparoscopy and all procedures after video-assisted thoracoscopic surgery for careful evaluation of pneumothorax or pneumomediastinum.

7.9.2 Pain Management

- Local anesthetic infiltration (0.25% bupivacaine) at the port sites can help reduce pain in the incisions.
- Nonsteroidal anti-inflammatory drugs and opioids are used in general postoperative pain management.
- Regional blocks via epidural or intrapleural catheters can be beneficial after thoracic procedures.

Recommended Literature

1. Bickel A, Yahalom M, Roguin N, Frankel R, Breslava J, Ivry S, Eitan A (2002) Power spectral analysis of heart rate variability during positive pressure pneumoperitoneum: the significance of increased cardiac sympathetic expression. Surg Endosc 16:1341–1344
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