Anaesthesia for acute abdomen in developing countries

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Abstract

Acute abdomen is an emergency that requires immediate surgical intervention. In developing and low-income countries, there is limited modern drugs and medical equipment and personnel. General anaesthesia is administered for emergency abdominal surgeries. Ketamine is used in hospitals without trained personnel in the administration of anaesthesia. In other hospitals in developing countries with anaesthetist, ketamine is used for induction of anaesthesia and muscle relaxant administered to facilitate endotracheal intubation and maintain anaesthesia with inhalational agents to avoid awareness under anaesthesia.

Introduction

The term *acute abdomen* denotes an episode of severe abdominal disorder, which requires urgent intervention usually best treated by surgery, and encompasses a spectrum of surgical, medical, and gynaecological conditions ranging from trivial to life threatening conditions.[1-4] The incidence of acute abdomen during pregnancy is 1 in 500-635 pregnancies.[3] Many medical and gynaecological diseases manifest as acute abdomen, therefore it is sometimes difficult to differentiate them.[1]

Acute abdomen usually manifests by pain, emanating from the perineum, hollow intestinal viscera, mesentery, or pelvic organs and may be caused by inflammation or by a mechanical process such as obstruction, acute distension, or vascular disturbances. Patients presenting with abdominal emergencies often come to hospitals in Africa very late especially if payment for treatment is required. They have often been sick for some days with a perforated or obstructed bowel. It is due to high environmental temperature and third space loss (fluid in the body, which is not available to the circulation for example oedema, ascites or other collections). The possibility of drug or herb ingestion should be considered by asking about visit to the local healer or ingestion of local or traditional medications.[5]

Resuscitation and preoperative optimization are likely to improve outcome. If prolonged, this develops into hypovolaemia, hypokalaemia, hypochloraemia, and metabolic alkalosis.[4] The outcome and survival of the patient depends on the surgical disease, extent of the surgery, urgency, degree of preparation and anaesthetic technique.

Anaesthetic considerations

All emergencies are considered as full stomach and usually the preoperative fasting guidelines are not feasible with the risk of regurgitation and vomiting. The patient may have underlying poorly controlled medical illness. There may not be adequate time for detailed history taking.

The patient may be dehydrated, hypovolaemic from bleeding or vomiting with electrolyte derangement. Every patient with an acute abdomen is severely dehydrated unless proven otherwise.[5] Hypotension and tachycardia will follow as the vascular volume decrease in relation to the size of the vascular bed.[6] Abdominal distension occurs from intestinal obstruction or other causes of acute abdomen; it splints the diaphragm and decreases respiratory reserves.[7] If the abdominal distension is long standing, a chest infection may have developed.[7]

Preoperative assessment

Preoperative diagnosis of acute abdomen is crucial to minimise the morbidity and mortality especially where the diagnostic facilities are limited.[4,8] The main purpose of the preoperative treatment is to optimize the patients' condition and maximise their chance of survival.[5] Effective preoperative assessment requires accurate identification of pare-existing problems, risk assessment, preoperative preparation, plan of anaesthetic technique and anticipation of difficulties that might result during or after anaesthesia.[7]

Resuscitation and optimization

Treatment depends on the cause.[9] Through appropriate planning, the patients' preoperative condition can then be optimized.[7] The first step in the resuscitation process is to obtain reliable venous access with large bore intravenous cannulae in a peripheral vein. Optimization of the patient is done as far as possible to allow surgical intervention with minimal risk to the patient.

Nasogastric tube should be connected for gastric decompression to remove fluid and air from the stomach to lessen the likelihood of aspiration of gastric contents into the tracheobronchial tree during the induction of anaesthesia.[2,4,6,7,10] The nasogastric tube should be connected to a reservoir that the effluent can be measured and allowed to drain freely.[11] In some developing countries like Nigeria, an uribag is connected to the nasogastric tube. In some very poor settings, latex disposal gloves are used. Resuscitation may run concurrently with surgery.

Fluid and electrolyte disturbances as well as the metabolic imbalances should be corrected prior to the theatre.[7,12] Timely decision to carry out surgery when reasonable correction of electrolyte and fluid deficiencies has been achieved should be made.[12] The goals of preoperative fluid management are to restore vascular and intestinal volumes, to correct electrolyte and acid-base balance, normalise systemic vascular resistance and optimise oxygen delivery. Whole blood or packed cells may be used to restore circulating red blood cells.[6] Urine output is a good indication of renal and tissue perfusion and should be monitored.

Choice of anaesthesia

In an abdominal emergency, it is always assumed that the stomach is full and that an emergency rapid sequence crash induction technique with cricoid pressure and intubation of the trachea is carried out.[4,11-14] The endotracheal intubation is to prevent aspiration.[15] Rapid sequence induction also balances the risk of losing control of the airway against risk of aspiration. The report of the investigation results should be known prior to induction of anaesthesia especially haemoglobin estima-

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tion, urinalysis, serum electrolyte, urea, and creatinine. Cardio stable drugs will be used. Because the vital organs of the body such as liver and kidney can be damaged by electrolyte imbalances and dehydration, lower doses of intravenous anaesthetic drugs should be used.

Technique of anaesthesia

Induction

Rapid sequence induction with the application of cricoid pressure will be used at the induction of anaesthesia. Drugs with little or no depressant properties on the cardiovascular and respiratory system will be used. The majority of patients requiring laparatomy will present an aspiration risk and therefore, require intermittent positive pressure ventilation. The nasogastric tube is aspirated and removed. The patient is preoxygenated with 100% oxygen by facemask for five minutes ketamine is used as the induction agent which is readily available in developing countries as has good cardiovascular and respiratory stability and a potent analgesic. A major feature that distinguishes ketamine from other intravenous anaesthetics is stimulation of the cardiovascular system.[16] Ketamine increases the sympathetic nervous system and circulatory levels of adrenalin and adrenaline consequently leading to heart rate, cardiac output, blood pressure, and central venous pressure.[17,18] The respiratory rate may be increased and the laryngeal reflexes relatively preserved.[18] Ketamine is an effective agent in poor risk patients and those with a tendency to hypotension example relative hypovolaemia and shock.[19] Salivation is increased requiring therefore antisialogue premedication is recommended prior to the use of ketamine.[14,20,21] It is difficult to detect the patient when sleep commences, as the patient appear to gaze into space and not close their eyes for several minutes. There is no loss of eyelash and corneal reflexes.[14] Loss of verbal response in conscious patients can be used to determine when the patient starts sleeping. There is dissociation from the surroundings.[12] Ketamine causes vivid and unpleasant dreams, hallucinations, and delirium following its use[14] which often are frightening[20] which may be reduced by the concurrent use of benzodiazepines.[16,18,20] Intubation is facilitated by the administration of suxamethonium, a depolarizing muscle relaxant. The greatest danger during the induction of anaesthesia is vomiting or regurgitation of gastric contents into the pharynx and into the tracheobronchial tree.[6] To aid and prevent this complication, an assistant is required at induction of anaesthesia to apply cricoid pressure once consciousness is lost after administration of the induction agent. Fasciculations may increase intra-abdominal pressure and induce regurgitation.[6] Once the trachea is intubated by direct laryngoscopy, it is connected to the breathing circuit and intermittent positive pressure ventilation commenced. Confirmation of correct placement of the endotracheal tube is done by the absence of cyanosis, auscultation for breath sounds, equal chest movement with positive pressure ventilation and fill of the reservoir bag. In patients with pre-existing tachycardia or hyperthermia, atropine or glycopyrrolate is omitted.[6] The nasogastric tube is put in place after anaesthesia has been induced and the patient intubated.

Maintenance

Atracurium of pancurium may be used for muscle relaxation. Atracurium has minimal cardiovascular effects and it releases histamine.[21] To prevent awareness under anaesthesia, an inhalational agent is administered. The depth of anaesthesia is hard to assess when using ketamine infusion for maintenance of anaesthesia. Two disadvantages that may be encountered with technique are hypertension and hallucinations. If the patient is moribund, ventilation is done with 100% oxygen and a small dose of ketamine. Shocked patients need small doses of drugs but a higher concentration of oxygen.[14] The most important monitoring of the patient is clinical including pulse, blood pressure, color, respiration, pupil size, lacrimation in addition to monitoring the surgical field, blood loss, urine output, and fluid input.[13]

Reversal and recovery

The end of surgery is the beginning of the next challenging period[13] and requires planning to ensure that the sequence of timing of cessation of the inhalation agent, reversal of muscle relaxant with atropine and neostigmine return of spontaneous ventilation, suction of the mouth and pharynx and extubation of the patient occur smoothly. The assistant must be ready to start suction and tilt the table if required.[13] There has to be some return of neuromuscular function before patients can be reversed with neostigmine and atropine.[14] Extubation is done only return of airway reflexes. The patient is extubated until the protective reflexes have returned, as the risk of regurgitation is present.[22] In the absence of a nerve stimulator, the presence of adequate neuromuscular function at the end of anaesthesia may be crudely determined by grip strength, the patient being able to lift their head off the pillow for at least five seconds and the ability to generate a tidal volume between 15 and 20 mL/kg.[23] The patient in recovery should continue oxygen, have continuous monitoring of the airway, breathing and circulation and be given analgesia as required.

Postoperative care

In the recovery ward, the patient should be given oxygen and vital signs monitored and analgesics given.[12] The postoperative respiratory problems are those related to hypoventilation. Although the intestinal obstruction has been relieved, there may still be significant abdominal distension that will inhibit diaphragmatic motion and the patient may develop hypoxia and hypercapnia. As the patient gradually regains respiratory adequacy, ventilation returns to normal and the patients can be extubated.[6] If a drain site was put in place in the course of surgery, effluent from it should be noted and documented such as color, smell, amount and presence or absence of blood. In some developing countries, uribag is used as it does not soil the beddings, is transparent and graded. Where there is no recovery room/ward as in rural hospitals, the patient should be monitored closely. The patient must be transported on a trolley with supporting sides and which easily tips into the head down position with facilities for oxygen delivery. Intravenous fluid, antibiotics, and analgesics should continue. Blood transfusion is given when necessary. The required level of postoperative care will be influenced by the patients' general condition.[4]

Prognosis

The prognosis of the patient with acute abdomen depends on the time of presentation, presence, or absence of peritonitis, onset, and progression of symptoms, age of patient, aetiological factor, level of care, preoperative optimization, and resuscitation and the premormid condition of the patient.

Conclusions

Acute abdomen is an emergency and a diagnostic dilemma. It is regarded as a full stomach and associated with shock, sepsis, electrolytes and fluid deficits and losses, compromised respiration, acid/base balance. Treatment depends on the cause but the patient must be resuscitated by the administration of intravenous fluid, nasogastric aspiration, close monitoring of pulse and blood pressure. In hypotension and patients in shock, ketamine is the better induction agent. The patient must be intubated to prevent aspiration and regurgitation. The principles of the management of intestinal obstruction are provision of analgesia, intestinal decompression, intravenous fluid therapy and if appropriate surgery. The care of the patient

includes routine observations, airways, state of the cardiovascular and respiratory system, oxygen therapy, analgesia, urine output, and early ambulation postoperatively to prevent deep venous thrombosis. The postoperative management of the acute abdomen patient includes postoperative pain relieve and monitoring postoperative pain management is essential for improved mobility, patient comfort, enhanced breathing and prevention of gut immobility. Other aspects of the treatment include administration of antibiotics and sometimes intensive care admission. Good understanding of how to handle emergencies helps reduce morbidity and mortality. Proper evaluation, resuscitation and optimization is paramount in urgent interventions as it reduces the incident of morbidity and mortality.

References

1. Chhetri RK, Shrestha ML. A comparative study of pre-operative with operative diagnosis of acute abdomen. Kathmandu Univ Med J 2005;3:107-10.
2. Smith GCS, Paterson-Brown S. The acute abdomen and intestinal obstruction. In. Garden OJ, Bradbury AW, Forsythe J, eds. Principles and practice of surgery. London; Churchill Livingstone: 2002. pp 198-220.
3. Augustin G, Majerovic M. Non-obstetrical acute abdomen during pregnancy. Eur J Obstet Gyn R B 2007;131:4-12.
4. Gemmell LW, Rincon C. Anaesthetic management of intestinal obstruction. Brit J Anaesth 2001;1:138-41.
5. Bojarska A. Fluid management for emergency laparotomy in rural hospitals. Update in Anaesthesia 2005;20:7-11.
6. Yao FF, Artusio JF. Anaesthesiology problem oriented patient management. Philadelphia, PA: Lippincott 1998. pp 303-11.
7. Foulkes MA, Crabbe DJO, Badoe EA. Pre, peri and postoperative care. In: Badoe EA, Archampong EQ, da Rocha-Afodu JT, eds. Principles and practice of surgery including pathology in the tropics. Accra: University of Ghana medical school; 2000. pp 189-220.
8. Famewo CE. Lectures in anaesthesia and intensive care for medical students and practitioners. Ibadan: Lovemost printers limited; 2004. pp 6-149.
9. Naadar SB. The acute abdomen. In. Badoe EA, Archampong EQ, da Rocha-Afodu JT, eds. Principles and practice of surgery including pathology in the tropics. Accra: University of Ghana medical school; 2000. pp 503-4.
10. Cephas M. Anaesthesia for the patient with a full stomach. Update in Anaesthesia 1994;4:1.
11. Doods C, Kumar CM, Servin F. Anaesthesia for the elderly patient. Oxford: Oxford University Press; 2007. p 81.
12. Elegbe EO. Oduntan and Oduro's handbook of anaesthesia for medical students and general medical practitioners. Ibadan: HEBN Publishers Plc.; 2007. pp 8-77.
13. Phillips G, Aigeeleng H, Didei G. Anaesthesia for the patient requiring emergency abdominal surgery. Update in Anaesthesia 2002;15:17.
14. Cavill G, Kerr K. Pre-operative management. In: Pinnock C, Lin T, Smith T, eds. Fundamentals of anaesthesia. Cambridge: Cambridge University Press; 2003. pp 3-24.
15. Bryson G, Kitts JB. Preoperative evaluation and risk assessment. In: Sullivan P, ed. Anaesthesia for medical students. Ottawa: Department of anaesthesia Ottawa Civic Hospital; 1999. pp 9-20.
16. Reich DL, Silvay G. Ketamine: an update on the first twenty-five years of clinical experience. Can J Anaesth 1989;36:186-97.