Technique for prevention and treatment of abdominal compartment syndrome

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JP was a 19-year-old female referred to Queen Elizabeth Central Hospital from Nsanje District hospital. She presented with a five-day history of abdominal pains, distension and inability to pass stool or flatus. The pain was constant and not radiating. There was no history of vomiting. Past medical and drug histories were unremarkable. She was not married but was sexually active.

On examination she was in pain, febrile with temperature of 38.5°c,tachycardic with a pulse rate of 110 bpm of good volume, not cyanosed and with normal blood pressure (110/60 mmHg). Examination of head and neck, chest, heart and extremities was normal. The abdomen was distended, rigid, tense, and tympanic with high-pitched bowel sounds. Digital rectal examination revealed an empty rectum but there was a mass that could be felt anteriorly.

Haemoglobin was 7.7g/dl. Group and cross matching were done. Intravenous normal saline was given, and a nasogastric tube and an indwelling catheter inserted which initially drained 800mls of urine. After resuscitation, a laparotomy was performed. Intraoperatively, she was given intravenous Gentamicin 240mg and Metronidazole 500mg. The findings at laparotomy were:

- 4 litres of pus spread over all four quadrants of the abdomen
- oedematous small bowel
- left ovarian abscess with an inflamed fallopian tube on the same side

All the pus was drained and a left oophorectomy was done. Four litres of tepid normal saline was used for washout after retrograde emptying of the small bowel. Intraoperatively, she had a stable blood pressure and pulse but oxygen saturations ranged from 80% and 93%. The abdomen was closed using the so-called "Bogota bag" technique (see below). The patient was then admitted to ICU for cardiovascular and respiratory support because of her low haemoglobin, sepsis and hypoxia. Antibiotic treatment with Gentamicin and Metronidazole was continued.

A planned relaporotomy was carried out 72 hours later. Upon removal of the Bogota bag, she was found to have less oedematous bowel and some serous fluid in the abdomen. Decompression of small bowel was done and washout with tepid normal saline done. A secondary fascial closure was then performed using PDS and the skin was closed with interrupted Ethibond 2/0. Apart from a minor wound infection warranting removal of two of the stitches, she made an uneventful recovery and was discharged two weeks later.

Discussion

After abdominal surgery, primary fascial closure is desirable but not always possible. This may be the case in severely injured patients requiring massive resuscitation and also in patients with oedematous bowel due to generalized peritonitis as was the case in this patient. Resuscitation, capillary leakage and reperfusion injury all contribute to tissue swelling; if combined with intra-abdominal packing or retroperitoneal haematoma, this may render the abdomen impossible or difficult to close without undue tension [1,2,3]. If in those circumstances, the abdomen is closed primarily, intra-abdominal pressure (IAP) will rise which may eventually lead to serious multiple organ dysfunction causing significant morbidity and mortality. A rise in IAP will compress the inferior vena cava reducing venous return and by Starling's law reducing cardiac output. The splintage of the diaphragm by this increase in abdominal pressure will lead to an increase in airway and intrathoracic pressure followed by a reduction of venous return to the heart, barotraumas and exacerbation of acute respiratory distress syndrome. Oliguria and anuria will follow due to compression of the renal vein and renal parenchyma.[1,2,3] A rise in intrathoracic pressure also leads to a rise in central venous pressure because of compression of the superior vena cava and which may cause and increase in intracranial pressure. Abdominal compartment syndrome (ACS) will therefore result in organ damage and multiple organ dysfunction1.

Diagnosis of abdominal compartment syndrome

- ACS should be suspected in any multiple trauma patient who has undergone a period of profound shock[1].
- Clinically ACS should be suspected when there is a fall in urinary output associated with a rise in central venous pressure
- The diagnosis can be confirmed by measuring of the intra abdominal pressure. The technique involves inserting a Foley catheter in the bladder and connecting to a pressure transducer. The normal IAP is 0 mm Hg or subatmospheric. Readings of 20 mm Hg or more are considered diagnostic of ACS[2,3,4].
- ACS should be suspected in patients who have severe peritonitis with oedematous bowel and in those in poor condition with hypotension and/or oliguria due to trauma or an acute abdomen.

Management of ACS - the Bogota bag

It is better to anticipate development of ACS and therefore plan a wound covering technique that will not further exercebate the condition, especially when the abdomen cannot be closed without undue tension[3]. The open abdomen (laparostomy) is a large surface area for fluid loss, it exposes the viscera to trauma and will dry them out. It is also a route of infection. Management of the open abdomen is aimed at preventing these problems and one of the techniques of protecting the abdominal viscera is the use of the "Bogota Bag". In this technique, a sterile intravenous bag is emptied and cut open. The edges are trimmed and sutured to the skin edges using a continuous suture. It thus provides a cheap, transparent and compliant sheath through which the abdominal cavity and bowels can be inspected visually.[5].

A few holes are made to allow seepage of the fluid there in although some authors advocate use of a sterile absorbent drape inside the abdomen to soak up some of the fluid. An absorbent dressing is placed over the bag which will not conceal any fluid coming out. If the fluid is pus or bowel content then this will obviate an earlier relaparotomy. The main indication for apply

ing a Bogota bag is to prevent the development of an ACS, but it can also be applied when a relaparotomy is planned in the next 72 hours.

Indications for relaparotomy and the use of a Bogota bag

The decision to do a relaparotomy is part of the initial management plan. The aim mainly should be to diminish the severity of systemic inflammatory response syndrome and multiple organ failure. Failure to obtain adequate source control during the index operation is also an indication. An example is typhoid perforation where subsequent perforations are expected.[1] Faecal peritonitis or severe faecal contamination during the initial operation is another indication since a peritoneal toilet can be adequately achieved at the next operation [1]. Patient instability during the initial operation should alert the surgeon to do a damage control type of procedure and a relaparotomy for a definitive procedure done later. Other relative indications may include suspicious looking bowel after initial surgery and high risk anastomoses, though others would argue that a colostomy would be a safer bet [1].

If there is a likelihood of a re-operation and the patient is either at a centre that cannot deal with the problem, then the patient should be referred with a Bogota bag.

Conclusion

The use of the Bogota bag is a cheap and safe way to offer temporary cover in the management of the open abdomen. The main indications of a laparostomy are the prevention of abdominal compartment syndrome and a relaparotomy which has been planned in the next 72 hours. Prevention of the ACS also limits the progression of the systemic inflammatory response syndrome and multiple organ dysfunction syndrome. It may reduce morbidity and mortality and is a safe and easy procedure which can be done in a district hospital setting.

References

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