

Infectio[®] Surgery

A Quarterly Magazine

5th Issue, 4th Quarter 2018



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Current News

Chemotherapy after resection of locoregional breast cancer recurrence

For women who have undergone resection of an isolated, locoregional recurrence (ILRR) of breast cancer, the use of adjuvant chemotherapy has been controversial. In the final analysis of a trial of 162 patients with ILRR, adjuvant chemotherapy improved 10-year disease-free survival (DFS) compared with no chemotherapy in patients with estrogen receptor (ER)-negative, but not ER-positive, ILRR. However, interpretation of the study is limited by the small patient number and variation in the treatments administered prior to locoregional recurrence. As such, we generally offer adjuvant chemotherapy to women with ER-negative ILRR and adopt an individualized approach for those with ER-positive ILRR, taking into account the patient's prior therapy and likelihood of response to endocrine therapy alone

Source: <https://www.uptodate.com/contents/whats-new-in-general-surgery>

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Introduction

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International Association of Pancreatology (IAP) / American Pancreatic Association (APA) evidence-based guidelines for the management of acute pancreatitis

Summarized by:

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Resident Surgeon Ward 2 JPMC, Karachi.

A. Diagnosis of acute pancreatitis and etiolog

1. The definition of acute pancreatitis is based on the fulfillment of '2 out of 3' of the following criteria: clinical (upper abdominal pain), laboratory (serum amylase or lipase >3x upper limit of normal) and/or imaging (CT, MRI, ultrasonography) criteria.(GRADE 1B, strong agreement)

2. On admission, the etiology of acute pancreatitis should be determined using detailed personal (i.e. previous acute pancreatitis, known gallstone disease, alcohol intake, medication and drug intake, known hyperlipidemia, trauma, recent invasive procedures such as ERCP) and family history of pancreatic disease, physical examination, laboratory serum tests (i.e. liver enzymes, calcium, triglycerides), and imaging (i.e. right upper quadrant ultrasonography).(GRADE 1B, strong agreement)

3. In patients considered to have idiopathic acute pancreatitis, after negative routine work-up for biliary etiology, endoscopic ultrasonography (EUS) is recommended as the first step to assess for occult microlithiasis, neoplasms and chronic pancreatitis. If EUS is negative, (secretin-stimulated) MRCP is advised as a second step to identify rare morphologic abnormalities. CT of the abdomen should be performed. If etiology remains unidentified, especially after a second attack of idiopathic pancreatitis,

genetic counseling (not necessarily genetic testing) should be considered.(GRADE 2C, weak agreement)

B. Prognostication/prediction of severity

4. Systemic inflammatory response syndrome (SIRS) is advised to predict severe acute pancreatitis at admission and persistent SIRS at 48 hours.(GRADE 2B, weak agreement)

5. During admission, a 3-dimension approach is advised to predict outcome of acute pancreatitis combining host risk factors (e.g. age, co-morbidity, body mass index), clinical risk stratification (e.g. persistent SIRS) and monitoring response to initial therapy (e.g. persistent SIRS, blood urea nitrogen,

creatinine).(GRADE 2B, strong agreement)

C. Imaging

6. The indication for initial CT assessment in acute pancreatitis can be: 1) diagnostic uncertainty, 2) confirmation of severity based on clinical predictors of severe acute pancreatitis, or 3) failure to respond to conservative treatment or in the setting of clinical deterioration. Optimal timing for initial CT assessment is at least 72e96 hours after onset of symptoms.(GRADE 1C, strong agreement)

7. Follow up CT or MR in acute pancreatitis is indicated when there is a lack of clinical improvement, clinical deterioration, or especially when invasive intervention is considered.(GRADE 1C, strong agreement)

8. It is recommended to perform multidetector CT with thin collimation and slice thickness (i.e. 5mm or less), 100e150 ml of non-ionic intra-venous contrast material at a rate of 3mL/s, during the pancreatic and/or portal venous phase (i.e. 50e70 seconds delay). During follow up only a portal venous phase (monophasic) is generally sufficient. For MR, the recommendation is to perform axial FS-T2 and FS-T1 scanning before and after intravenous gadolinium contrast administration.(GRADE 1C, strong agreement)

D. Fluid therapy

9. Ringer's lactate is recommended for initial fluid resuscitation in acute pancreatitis. (GRADE 1B, strong agreement)

10. Goal directed intravenous fluid therapy with 5e10 ml/kg/h should be used initially until resuscitation goals (see Q10b) are reached.(GRADE 1B, weak agreement) 10b. The preferred approach to assessing the response to fluid resuscitation should be based on one or more of the following: 1) non-invasive clinical targets of heart rate < 120/min, mean arterial pressure between 65-85 mmHg (8.7e11.3 kPa), and urinary output > 0.5e1ml/kg/h, 2) invasive clinical targets of stroke volume variation, and intrathoracic blood



volume determination, and 3) biochemical targets of hematocrit 35-44%.(GRADE 2B, weak agreement)

E. Intensive care management

11. A patient diagnosed with acute pancreatitis and one or more of the parameters identified at admission as defined by the guidelines of the Society of Critical Care Medicine (SCCM). Furthermore, a patient with severe acute pancreatitis as defined by the revised Atlanta Classification (i.e. persistent organ failure) should be treated in an intensive care setting.(GRADE 1C, strong agreement)

12. Management in, or referral to, a specialist center is necessary for patients with severe acute pancreatitis and for those who may need interventional radiologic, endoscopic, or surgical intervention.(GRADE 1C, strong agreement)

13. A specialist center in the management of acute pancreatitis is defined as a high volume center with up-to-date intensive care facilities including options for organ replacement therapy, and with daily (i.e. 7 days per week) access to interventional radiology, interventional endoscopy with EUS and ERCP assistance as well as surgical expertise in managing necrotizing pancreatitis. Patients should be enrolled in prospective audits for quality control issues and into clinical trials whenever possible.(GRADE 2C, weak agreement)

14. Early fluid resuscitation within the first 24 hours of admission for acute pancreatitis is associated with decreased rates of persistent SIRS and organ failure.(GRADE 1C, strong agreement)

15. Abdominal compartment syndrome (ACS) is defined as a sustained intra-abdominal pressure > 20 mmHg that is associated with new onset organ failure.(GRADE 2B, strong agreement)

16. Medical treatment of ACS should target 1) hollow-viscera volume, 2) intra/extra vascular fluid and 3) abdominal wall expansion. Invasive treatment should only be used after

multidisciplinary discussion in patients with a sustained IAP >25mmHg with new onset organ failure refractory to medical therapy and nasogastric/ rectal decompression. Invasive treatment options include percutaneous catheter drainage of ascites, midline laparostomy, bilateral subcostal laparostomy, or subcutaneous linea alba fasciotomy. In case of surgical decompression, the retroperitoneal cavity and the omental bursa should be left intact to reduce the risk of infecting peripancreatic and pancreatic necrosis. (GRADE 2C, strong agreement)

F. Preventing infectious complications

17. Intravenous antibiotic prophylaxis is not recommended for the prevention of infectious complications in acute pancreatitis.(GRADE 1B, strong agreement)

18. Selective gut decontamination has shown some benefits in preventing infectious complications in acute pancreatitis, but further studies are needed. (GRADE 2B, weak agreement)

19. Probiotic prophylaxis is not recommended for the prevention of infectious complications in acute pancreatitis.(GRADE 1B, strong agreement)

G. Nutritional support

20. Oral feeding in predicted mild pancreatitis can be restarted once abdominal pain is decreasing and inflammatory markers are improving. (GRADE 2B, strong agreement)

21. Enteral tube feeding should be the primary therapy in patients with predicted severe acute pancreatitis who require nutritional support. (GRADE 1B, strong agreement)

22. Either elemental or polymeric enteral nutrition formulations can be used in acute pancreatitis.(GRADE 2B, strong agreement)

23. Enteral nutrition in acute pancreatitis can be administered via either the nasojejunal or nasogastric route. (GRADE 2A, strong agreement)



24. Parenteral nutrition can be administered in acute pancreatitis as second-line therapy if nasojejunal tube feeding is not tolerated and nutritional support is required. (GRADE 2C, strong agreement)

H. Biliary tract management

25. ERCP is not indicated in predicted mild biliary pancreatitis without cholangitis. (GRADE 1A, strong agreement). ERCP is probably not indicated in predicted severe biliary pancreatitis without cholangitis (GRADE 1B, strong agreement). ERCP is probably indicated in biliary pancreatitis with common bile duct obstruction (GRADE 1C, strong agreement) ERCP is indicated in patients with biliary pancreatitis and cholangitis (GRADE 1B, strong agreement)

26. Urgent ERCP (<24 hrs) is required in patients with acute cholangitis. Currently, there is no evidence regarding the optimal timing of ERCP in patients with biliary pancreatitis without cholangitis. (GRADE 2C, strong agreement)

27. MRCP and EUS may prevent a proportion of ERCPs that would otherwise be performed for suspected common bile duct stones in patients with biliary pancreatitis who do not have cholangitis, without influencing the clinical course. EUS is superior to MRCP in excluding the presence of small (<5mm) gallstones. MRCP is less invasive, less operator-dependent and probably more widely available than EUS. Therefore, in clinical practice there is no clear superiority for either MRCP or EUS. (GRADE 2C, strong agreement)

I. Indications for intervention in necrotizing pancreatitis

28. Common indications for intervention (either radiological, endoscopic or surgical) in necrotizing pancreatitis are: 1) Clinical suspicion of, or documented infected necrotizing pancreatitis with clinical deterioration, preferably when the necrosis has become walled-off, 2) In the absence of documented infected necrotizing pancreatitis, ongoing organ failure for several weeks after the

onset of acute pancreatitis, preferably when the necrosis has become walled-off. (GRADE 1C, strong agreement)

29. Routine percutaneous fine needle aspiration of peripancreatic collections to detect bacteria is not indicated, because clinical signs (i.e. persistent fever, increasing inflammatory markers) and imaging signs (i.e. gas in peripancreatic collections) are accurate predictors of infected necrosis in the majority of patients. Although the diagnosis of infection can be confirmed by fine needle aspiration (FNA), there is a risk of false-negative results. (GRADE 1C, strong agreement)

30. Indications for intervention (either radiological, endoscopic or surgical) in sterile necrotizing pancreatitis are: 1) Ongoing gastric outlet, intestinal, or biliary obstruction due to mass effect of walled-off necrosis (i.e. arbitrarily >4-8 weeks after onset of acute pancreatitis), 2) Persistent symptoms (e.g. pain, 'persistent unwellness') in patients with walled-off necrosis without signs of infection (i.e. arbitrarily >8 weeks after onset of acute pancreatitis), 3) Disconnected duct syndrome (i.e. full transection of the pancreatic duct in the presence of pancreatic necrosis) with persisting symptomatic (e.g. pain, obstruction) collection(s) with necrosis without signs of infections (i.e. arbitrarily >8 weeks after onset of acute pancreatitis). (GRADE 2C, strong agreement)

J. Timing of intervention in necrotizing pancreatitis

31. For patients with proven or suspected infected necrotizing pancreatitis, invasive intervention (i.e. percutaneous catheter drainage, endoscopic transluminal drainage/ necrosectomy, minimally invasive or open necrosectomy) should be delayed where possible until at least 4 weeks after initial presentation to allow the collection to become 'walled-off'. (GRADE 1C, strong agreement)

32. The best available evidence suggests that surgical necrosectomy should ideally be delayed until collections have become walled-off, typically 4 weeks after the onset of pancreatitis, in all patients



with complications of necrosis. No subgroups have been identified that might benefit from earlier or delayed intervention.(GRADE 1C, strong agreement)

different treatment strategy. (GRADE 2C, strong agreement)

K. Intervention strategies in necrotizing pancreatitis

33. The optimal interventional strategy for patients with suspected or confirmed infected necrotizing pancreatitis is initial image-guided percutaneous (retroperitoneal) catheter drainage or endoscopic transluminal drainage, followed, if necessary, by endoscopic or surgical necrosectomy.(GRADE 1A, strong agreement)

34. Percutaneous catheter or endoscopic transmural drainage should be the first step in the treatment of patients with suspected or confirmed (walled-off) infected necrotizing pancreatitis. (GRADE 1A, strong agreement)

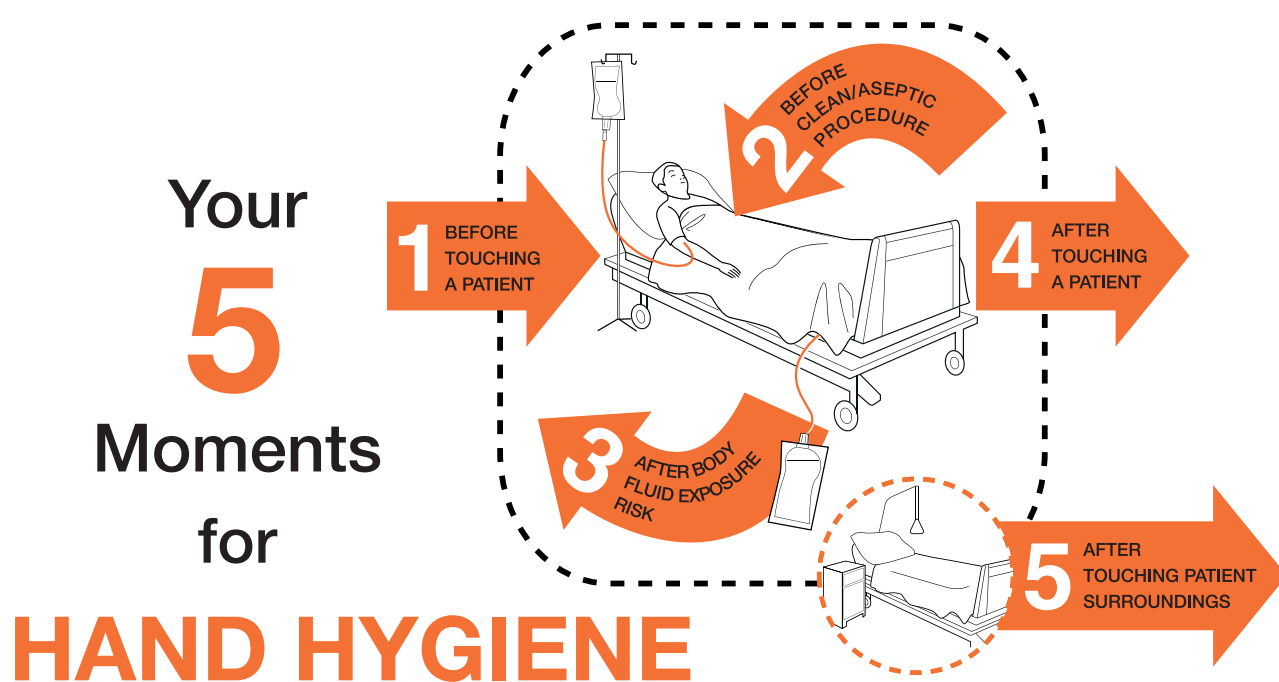
35. There are insufficient data to define subgroups of patients with suspected or confirmed infected necrotizing pancreatitis who would benefit from a

L. Timing of cholecystectomy (or endoscopic sphincterotomy)

36. Cholecystectomy during index admission for mild biliary pancreatitis appears safe and is recommended. Interval cholecystectomy after mild biliary pancreatitis is associated with a substantial risk of readmission for recurrent biliary events, especially recurrent biliary pancreatitis. (GRADE 1C, strong agreement)

37. Cholecystectomy should be delayed in patients with peripancreatic collections until the collections either resolve or if they persist beyond 6 weeks, at which time cholecystectomy can be performed safely.(GRADE 2C, strong agreement)

38. In patients with biliary pancreatitis who have undergone sphincterotomy and are fit for surgery, cholecystectomy is advised, because ERCP and sphincterotomy prevent recurrence of biliary pancreatitis but not gallstone related gallbladder disease, i.e.biliary colic and cholecystitis.(GRADE 2B, strong agreement)



Improves Colonoscopy Diagnostics in Prospective Trial



A computer trained by artificial intelligence (AI) to diagnose diminutive non neoplastic polyps located in the distal colon performs well enough to allow endoscopists to safely diagnose while leaving the polyps unresected, a Japanese study indicates.

"To our knowledge, this was the first large-scale prospective study to assess the reliability of real-time use of [computer-aided diagnosis (CAD)] for optical assessment of diminutive colorectal polyps

Investigators compared the diagnostic performance of real-time CAD with gold-standard pathology of resected polyps among 791 patients undergoing colonoscopy for screening, surveillance, or symptomatic indications. Endoscopists, both expert and non-expert, first used CAD with narrow-band imaging (CAD-NBI), followed by stained mode (CAD-stained) analysis. The primary end point was whether CAD-stained analysis achieved a 90% or greater negative predictive value (NPV) for diagnosing diminutive (≤ 5 mm) rectosigmoid adenomas, which is the recommended threshold for a diagnose-and-leave nonneoplastic polyp strategy.

Overall, 466 diminutive polyps were assessed by CAD, of which 250 were rectosigmoid polyps. CAD

was able to differentiate neoplastic from nonneoplastic polyps with a 98.1% accuracy rate. Of the 250 rectosigmoid polyps analyzed by CAD, the CAD-NBI analysis had a NPV of between 95.2% and 96.5%, whereas the in CAD-stained analysis, NPVs ranged between 93.7% and 96.4%. In contrast, for polyps in the proximal to rectosigmoid colon ($n = 216$), the NPVs were 60.0% for both types of CAD.

Interestingly, in an ad hoc analysis, the researchers found that CAD had a higher NPV for diminutive rectosigmoid adenomas, at 96.4%, than did either expert endoscopists (91.8%) or nonexperts (86.6%).

"[T]he median time required to obtain the first CAD output was 19...seconds for CAD-NBI and 73...seconds for CAD-stained analysis ($P < 0.001$)," the researchers observe.

Given that endoscopists detected, on average, two diminutive polyps per patient in the current study, the use of CAD-NBI would take between 60 and 90 additional seconds per colonoscopy, an acceptable amount of time, they suggest, given the high performance value of CAD-NBI.

Ann Intern Med. Published online August 13, 2018. Article extract, Editorial extract

At exploratory laparotomy there was a jelly-like collection within the peritoneal cavity – pseudomyxoma peritonei, also known as (jelly belly). This is a slow-growing cancer, which usually begins in the appendix, occasionally in the ovary or bowel. The mucin is usually not deposited on the small bowel or its mesentery because of its constant mobility. Extensive deposits in the whole abdomen make it difficult to excise completely. Cytoreductive surgery with or without hyperthermic intraperitoneal chemotherapy is often recommended

Source: British Journal of Surgery, Aug-2018

HEMOPERITONEUM SECONDARY TO SNAKE BITE

Summarized by:

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Department of Surgery, Ward 2, Jinnah Postgraduate Medical Centre, Karachi, Pakistan



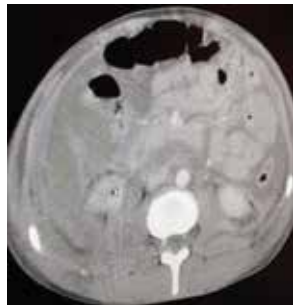
INTRODUCTION

Snake venom toxins affecting haemostasis may exert their effects by secreting:

- 1) Coagulant (the thrombin-like enzymes and pro-thrombin activating toxins)
- 2) Anti-coagulant (toxins activating Protein C etc.)
- 3) Platelet-activating and anti-platelet factors (including the disintegrins)
- 4) Fibrinolytic activators
- 5) Haemorrhagins

Systemic manifestations of complex viperidae venoms include spontaneous bleeding and coagulopathy. Thrombosis of the internal iliac vessels resulting in ischemic colitis with colonic stricture has been reported from viper toxin. Here we present a case of snake bite which resulted in hemoperitoneum

We present a case report of a teenage boy who had a history of snake bite 10 days ago and he presented with signs of abdominal distension and was diagnosed as psoas abscess on ultrasound abdomen in Emergency department



CT SCAN ABDOMEN shows collection of 7 cm in right paracolic and right lumbar region just anterior to the psoas muscle. Active intra-abdominal bleeding. Small collection in the pre-caval region & few organized hematoma are also appreciated.

METHOD

17 years old boy presented in ER with c/o, Abdominal pain for 5 days
History of Snake bite 10 days back
His Hb was 6.6gm/dl and INR was 1.77. LFTs, Amylase was normal
XRAY chest: Normal

XRAY abdomen: Insignificant

US ABDOMEN showed Collection of 8.7 x 3.7 cm with internal septations seen beside the right psoas muscle

Mild to moderate amount of fluid in peritoneal cavity, possibly ruptured psoas abscess

On CT scan abdomen, there was collection in right iliac fossa. Image guided intervention was not safe as the collection was close to the major vessels Patient was optimized & exploration was planned

Pre-operative findings:

1100ml of blood found in the peritoneal cavity.

Multiple hematoma were drained from the zone II (right side) of the abdomen.

No active bleeding from IVC & aorta



Procedure:

Exploratory laparotomy + packing (4 packs) of right iliac fossa & retro-peritoneum (zone II) + drain placement.

Drain output/24 hours:

- On DAY 1: 1050 ml,
2: 850 ml,
3: 600 ml &
4: 450 ml

Re-exploration (4 days later):

200ml of serosanguinous fluid was drained + Removal of 4 abdominal packs + placement of fibrillar and spongstone. No active bleeding was noticed



OUTCOME

Post operatively, he remained vitally stable. His deranged clotting profile & renal function got settled with optimization. Overall he took 14 days to recover completely

CONCLUSION

The venom of Vipers has a thrombin-like enzyme, arginine ester hydrolase, which can affect fibrinogen to form unstable clots. Such clots could lead to fibrin deposits in the microcirculation which could lead to platelets & coagulation factors being consumed (consumption coagulopathy). Secondary fibrinolysis is initiated, leading to bleeding. The tissue suffers from ischemia through

vessel obstruction. The clinical manifestations of this obstruction are bleeding or thrombosis. Systemic manifestations of complex viperidae venoms include spontaneous bleeding and coagulopathy.

Specific & Supportive Management:

Anti-venom therapy, antibiotics, Methyl Prednisolone, PCVs, FFPs, prevention and treatment of hypotension

Surgical treatment for correction of coagulopathy:

Packing/ embolization of bleeding vessels
Resection of hemorrhagic/ischemic viscera

1, Rathod K, Sheth R, Chavhan G, Asrani A, Raut A, Hemoperitoneum Complicating Snake Bite: Rare CT Features, Abdom Imaging, 2003 Nov-Dec;28(6):820-1.
2, Ahn JH, Yoo DG, Choi SJ, Lee JH, Park MS, Kwak JH, Jung SM, Ryu DS, Hemoperitoneum caused by hepatic necrosis and rupture following a snakebite: a case report with rare CT findings and successful embolization, Korean J Radiol, 2007 Nov-Dec;8(6):556-60.

Surgical Safety Checklist



World Health Organization

Patient Safety
A World Alliance for Safer Health Care

Before induction of anaesthesia

(with at least nurse and anaesthetist)

Has the patient confirmed his/her identity, site, procedure, and consent?

Yes

Is the site marked?

Yes
 Not applicable

Is the anaesthesia machine and medication check complete?

Yes

Is the pulse oximeter on the patient and functioning?

Yes

Does the patient have a:

Known allergy?

No
 Yes

Difficult airway or aspiration risk?

No
 Yes, and equipment/assistance available

Risk of >500ml blood loss (7ml/kg in children)?

No
 Yes, and two IVs/central access and fluids planned

Before skin incision

(with nurse, anaesthetist and surgeon)

Confirm all team members have introduced themselves by name and role.

Confirm the patient's name, procedure, and where the incision will be made.

Has antibiotic prophylaxis been given within the last 60 minutes?

Yes
 Not applicable

Anticipated Critical Events

To Surgeon:

What are the critical or non-routine steps?
 How long will the case take?
 What is the anticipated blood loss?

To Anaesthetist:

Are there any patient-specific concerns?

To Nursing Team:

Has sterility (including indicator results) been confirmed?
 Are there equipment issues or any concerns?

Is essential imaging displayed?

Yes
 Not applicable

Before patient leaves operating room

(with nurse, anaesthetist and surgeon)

Nurse Verbally Confirms:

The name of the procedure
 Completion of instrument, sponge and needle counts
 Specimen labelling (read specimen labels aloud, including patient name)
 Whether there are any equipment problems to be addressed

To Surgeon, Anaesthetist and Nurse:

What are the key concerns for recovery and management of this patient?

This checklist is not intended to be comprehensive. Additions and modifications to fit local practice are encouraged.

Courtesy by:
World Health Organization

A Case Study: Colonic Injury by Compressed Air

Summarized by:

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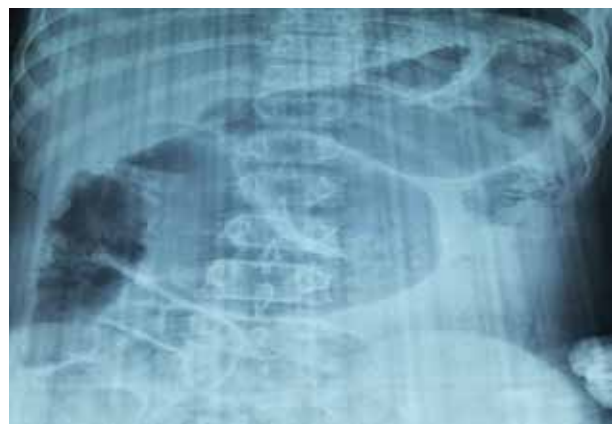
Case Report

14-year-old male boy admitted with complaint of severe abdominal pain for last two hours and multiple episodes of vomiting after his friend tried to blow the compressed air at his anal canal for a joke. Immediately after the action patient experienced severe abdominal pain that was initially localized to the left lower quadrant and then became generalized. On admission, he was having blood pressure of 130/80 millimeters of mercury, heart rate of 86 beats per minute, respiratory rate of 18 breaths per minute and temperature of 98 degree Fahrenheit. Patient was pale and clammy. Abdomen was tender generalized with rebound tenderness more marked in left lower quadrant of abdomen. Digital rectal examination showed blood stained finger with normal anal tone. On lab blood workup his WBC count was 9.8×10^9 and hemoglobin was 12.1 g/dl. X-Ray abdomen showed markedly dilated large bowel. Emergency Exploratory laparotomy was done in supine position. On exploration, 100ml of blood was found in the peritoneal cavity. Multiple seromuscular tears were found throughout the colon along with marked dilatation of the large intestine from rectum to caecum. There was a large transverse seromuscular tear in transverse colon and seromuscular tear in rectum. Ileocecal junction was competent and normal and small intestine was also found to be normal. There were multiple hemorrhagic patches all over the transverse, ascending colon and caecum. Overall gut was viable. Multiple serosal tears were repaired with vicryl. Since it was highly likely that large intestine will give way, diversion loop ileostomy was made to rest the large intestine and prevent post-operative complications especially perforation. Re look laparotomy was planned if required but Post operatively patient had smooth recovery and patient was discharged after 10 days. He is advised to follow up and later will be planned for reversal once seem feasible

Literature Search

Pneumatic colonic injury was first reported by Stone in 1904. Since then many cases have been reported and case analysis often reveals unwise behavior as in this case where his friend tried to blow the pressurized air near his anal canal for a joke. Those not involving misbehavior occur in industrial settings during cleaning of clothes with blows of

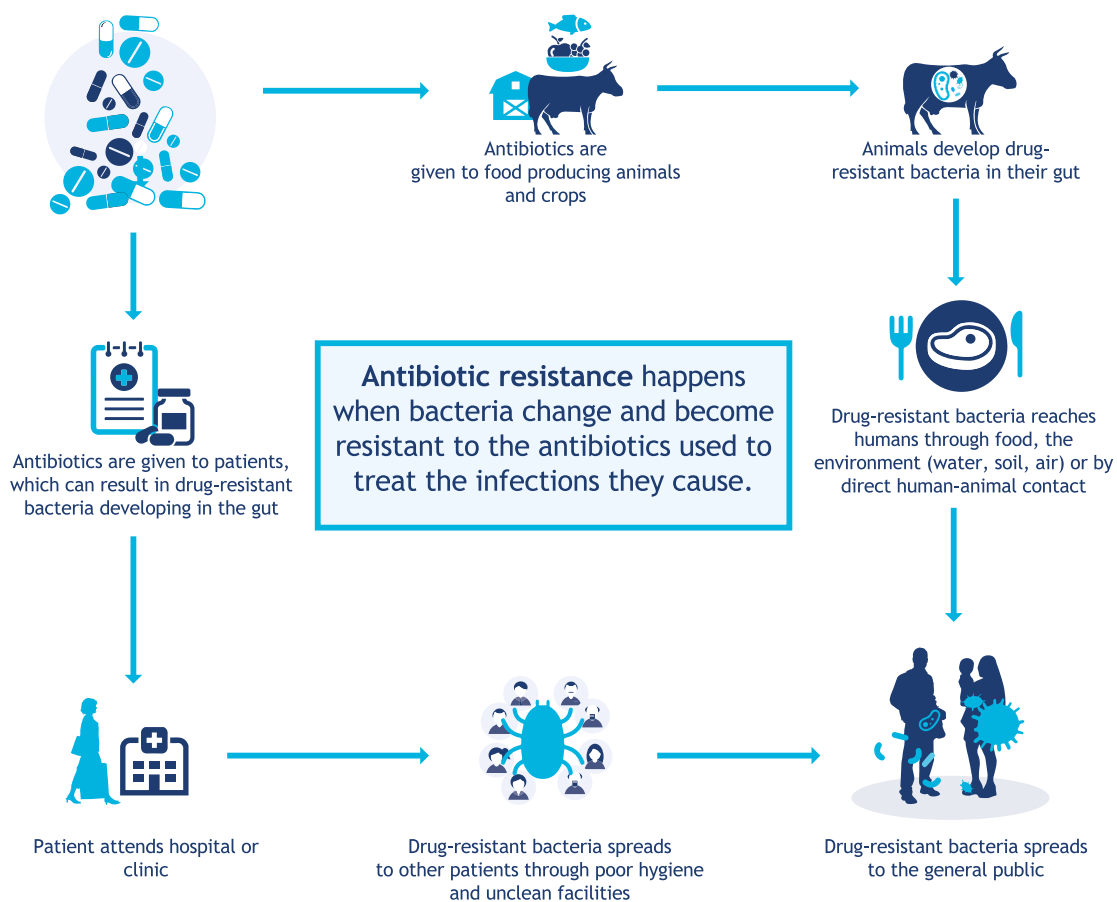
pressurized air. Andrew using compressed air to distend the intestine of a dog, found that normal intestine gets ruptured at pressure of 0.49-0.88 kg/cm². But showed that average human gut gets completely ruptured (full thickness) at pressure of 0.29 kg/cm². Industries use compressed air at pressure of 10 kg/cm². Caecum is the most susceptible area for iatrogenic barotrauma meanwhile most compressed air related injuries occur in rectosigmoid, however colon perforation can occur at other sites including transverse and ascending colon. After recovery from the initial shock peritonitis due to fecal contamination should be checked for and treated immediately. On radiologic examination, a distended colon filled with air or a large amount of free air in the peritoneal cavity is observed. Colonic injury itself should be treated according to the general principles of treatment of colonic perforation.





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Quiz & Winner of Lucky Draw

Reported by:
Dr. Shuja Ajaz



Question:

A 50-year-old woman underwent exploratory laparotomy for progressive abdominal distension. What is the diagnosis?



Winners of Lucky Draw

The editorial board of *Infectio® Surgery* is pleased to announce the names of winners for quiz from the 4th edition. Due to high response and appreciation from readers, the board has decided to increase the number of winners to **15** from the quiz participants of 4th Edition.

The lucky draw was held in a meeting at Jinnah Postgraduate Medical Centre, Karachi, September 2018. Following are the names of Lucky Draw winners drawn at randomly by Prof. Salim Ahmed Soomro and his team. We congratulate the winners and once again thanks all contestants for their participation in quiz.

1. Dr. Muhammad Qasim, Holy Family Hospital - Islamabad
2. Dr. Anwar ul Haq, Mushtaq Mohiuddin Hospital - Kotli
3. Prof. Waris Farooka, Services Hospital - Lahore
4. Dr. Sadia Erum, Abbotabad Teaching Hospital - Abottabad
5. Prof. Ehsaan ul Haq, DHQ Teaching Hospital - Sahiwal
6. Dr. Ali Raza Zaidi, Sheikh Zayad Hospital - RahimYarKhan
7. Dr. Umair Ahmed, King Victoria Hospital - Bahawalpur
8. Dr. Munir Ahmed, Khyber Teaching Hospital - Peshawar
9. Dr. Farukh Uzair, Hayatabad Medical Complex - Peshawar
10. Dr. Aneela Malik, NMC, Karachi
11. Dr. Maria Anwer, JPMC, Karachi
12. Prof. Raheel Rehman, ASH, Karachi
13. Dr. Resham Memon, (Gynae), Nawabshah
14. Prof. Humera Zafar, Islamabad
15. Prof. Riaz Hussain Dab, Sarghoda