# Perioperative care in perforation peritonitis: Where do we stand?

Perforation peritonitis either chemical or infective is a clinical scenario which remains challenging for all the specialists involving surgeons, anesthesiologists, and intensivists. There are limited research publications discussing or evaluating various aspects of perioperative care of such patients.

This issue is accompanied with a review article wherein some important aspects of the management of perforation peritonitis have been discussed.[1] However, due to lack of evidence certain issues still remain unanswered.

Perforation peritonitis is usually considered a surgical emergency; however, we need to rigorously evaluate evidence-based guidelines concerning the need for an emergent procedure in a hemodynamically unstable patient.[2] Should we consider all perforation peritonitis patients as acute surgical emergencies and wheel in the patient to operating room immediately or is there a window for optimization before wheeling into the operating room? What are the end points for optimization in all cases prior to surgical intervention?

Time of presentation to hospital for definitive management is an important factor for the morbidity associated with these patients. It has been well-reported that majority of patients of perforation peritonitis present late in our subcontinent, usually with well-established generalized peritonitis with purulent or fecal contamination and septicemia.[3] End points of optimization measures in these group of patients still remains a grey area as regards to an evidence-based approach. Recently, the World Society of Emergency Surgery (WSES) has published an evidence-based recommendations for management of patients with intra-abdominal infections.[4] They have reiterated that any source of infection for intra-abdominal sepsis should be managed at the earliest.[4] The proposed surgical procedure depends on the anatomical site of infection, the degree of peritoneal inflammation, the generalized septic response, the patient's underlying condition, and the available resources of the treatment center.[4] Do we have an option of some minimally invasive surgical strategy or some other initial, temporizing, resuscitative procedure in physiologically unstable patients?[5] There are some data on the use of abdominal drain placement instead of an invasive laparotomy in clinically unstable patients of perforation peritonitis with sepsis until optimal resuscitation has been done.[6] This technique of drain placement has been reported for sick infants with necrotizing enterocolitis, while simultaneously aggressively resuscitating the infants to stabilize the hemodynamic status.[6,7] The meta-analysis comparing primary peritoneal drainage versus laparotomy for necrotizing enterocolitis in a total of 475 children confirms that there was no statistically significant survival advantage between the two procedures.[8] The resuscitation measures included stabilization of intravascular volume status (crystalloid primarily, and/or colloid, blood products), maintaining tissue oxygenation with appropriate respiratory support or hemodynamic support, correcting acid, base and electrolyte imbalances, renal function optimization, and evaluating and optimizing coagulopathy.[8] In adults, it has been reported that laparoscopic peritoneal lavage may be considered safely as an alternative to conventional management in the treatment of perforated diverticulitis with diffuse purulent peritonitis.[6,9] The aim remains to obtain some level of physiological stability at the earliest and then plan for definitive surgical intervention. A multispecialty multicentric well-controlled randomized trial might be able to define end points of optimization measures.

The management of perforation of bowel due to tumor mass obstruction or rupture is not straightforward in view of surgical complexity. Colonic perforations are seen in majority of colonic carcinomas.[10] The treatment plan in such cases needs evaluation, stabilization, and intervention. Such cases entail not only the risk of sepsis due to bowel perforation, but also have a potential for peritoneal dissemination of tumor cells in the abdomen. This may be further enhanced by inflammation and tissue destruction.[11,12]

The laparotomy for perforation peritonitis is usually accompanied with "abdominal wash" and "peritoneal wash".[2] The impact of "peritoneal wash" in the presence of sepsis and bacteremia remains to be scrupulously evaluated. The patients of perforation peritonitis with features of sepsis undergoing laparotomy are prone for hypothermia in view of disease *per se*, large fluid shifts, fluid resuscitation, and general anesthesia which impairs temperature regulation along with major surgical

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procedures exposing larger peritoneal surfaces.[13] It has been reported that correction of perioperative hypothermia improves survival after sepsis by appropriately modulating the early inflammatory response.[13] It is well-documented that neutropenic patients are at increased risk for bacterial infections, including sepsis.[14,15] Also, hypothermia may decrease neutrophil function at the early critical phase of an infection.[16] Increasing the number of neutrophils during the early phase of bacterial invasion may help to augment the clearance of the pathogens.[13]

The authors have summarized certain aspects of management of intra-abdominal infections; however, this needs to be seen in the light of additional updates.[1,4] The role of early detection of severe sepsis and prompt, aggressive treatment of the underlying organ dysfunction to prevent global tissue hypoxia, direct tissue damage, and multiple organ failure has been emphasized; but the method of its early detection remains limited at many centers in the Indian subcontinent.[4]

The impact of laparoscopy and associated pneumo-peritoneum in patients of septic perforation peritonitis remains to be evaluated. It has been recommended that "laparoscopic repair of perforated peptic ulcers can be a safe and effective procedure for experienced surgeons" and "laparoscopic peritoneal lavage with placement of drainage tubes is a safe approach for cases of perforated diverticulitis".[4] The various predictors of morbidity and mortality in patients has been well-described by the authors in this issue of the journal and elsewhere as well.[1,17,18] Currently, many markers and indices have been described, but a single best marker still needs to be elucidated, especially for assessing such patients of perforated peritonitis with sepsis. These markers may be important for healthcare facilities with limited resources. The increased blood urea and serum creatinine has been described as independent predictors of mortality in patients with perforation peritonitis.[17] Derangement in renal profile may occur due to dehydration, sepsis, and hemodynamic compromise. These derangements do respond to resuscitation, but the role of renal replacement therapy should be considered in future.

The role of regional blocks like epidural neuraxial anesthesia, transverse abdominis plane (TAP) block, etc., needs evaluation in patients of perforation peritonitis with sepsis. Randomized trials on this issue have been found lacking; however, this issue reports an case of perforation peritonitis where bilateral TAP block as an sole anesthetic technique with dexmedetomidine infusion for sedation has been successfully administered.[19] The role of epidural blockade in perioperative period for laparotomy has been well-emphasized in the literature in view of various benefits like enhancing gut perfusion, preventing leukocyte endothelium interaction during gut hypoperfusion, and protecting against bacterial translocation during splanchnic ischemia.[18-23] It's role in patients with generalized sepsis or bacteremia has not been evaluated with objective parameters. As a general norm, sepsis is considered a relative contraindication for epidural blockade by several anesthesiologists and no concrete benefit has been reported by it's use in septic patients of perforation peritonitis.[24] Antibiotics are usually administered in the preoperative period, hence an epidural infection may not manifest clinically; and thus prevent us from evaluating the actual incidence of epidural block infection in patients of sepsis. The evidence for central nervous system infection after an epidural block in a sepsis patient remains unestablished.[25] The sepsis induced coagulopathy has been reported to be a factor for not inserting epidural catheter.[25] The availability of better options like patient controlled intravenous analgesia, regional nerve blocks remains a viable option lest to cause even a slight risk of morbidity in the absence of a robust safety of an epidural block.

To summarize, the management of perforation peritonitis is quite complex. Keeping in mind the latest updates in various specialities, we need to modify our management plans for such patients as well. There is a need of creating evidence regarding the best management protocols for patients with perforation peritonitis with or without sepsis.

**Rakesh Garg**

Department of Anaesthesiology, Pain and Palliative Care, DR. B.R.A. Institute Rotary Cancer Hospital, All India Institute of Medical Sciences, New Delhi, India

**Address for correspondence:** Dr. Rakesh Garg, 35, DDA Flats, East Punjabi Bagh, New Delhi - 110 026, India.
E-mail: drrgarg@hotmail.com

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