Bowel Preparation

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Administration of various drugs to achieve mechanical cleansing of the large bowel and to reduce the bacterial load contained within is known as bowel preparation.

Clearing the bowel is normally done before any surgery which is to be done under general or regional anaesthesia since the relaxed sphincters would otherwise cause soiling and contamination on table. It is also done prior to radiological investigations such as barium enema and endoscopic procedures done on the colon both diagnostic as well as therapeutic. Anorectal surgeries such as piles, fissures and fistulae also requires clearing of the anorectum so as to achieve a clean operative field.

Before surgeons realized that the contents of the colon were primarily composed of live and dead bacteria, operations on the large bowel were uniformly followed by significant infections, which of itself almost as frequently caused the death of the patient. Faecal loading of the colon has been considered as a major causative factor in anastomotic leakage and sepsis. When bowel function returns, a bolus of faeces may become impacted at the anastomotic site and result is ischaemia at the suture line. The ingenuity of the surgeons thus reasoned that if the large bowel could be cleared of all contained bacteria, then this type of surgery would be converted into a near clean category. Two methods thus evolved towards achieving this goal, first being mechanical cleansing of the large bowel and the second, use of antimicrobial agents to sterilize the GI tract. Although the total number of colonic microorganisms is reduced by mechanical cleansing, it alone does not alter the concentration of residual bacteria and therefore administration of antibiotics is also important.

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Mechanical Bowel Preparation

Though widely accepted as sensible and logical it has never been subjected to any really stringent scrutiny. The ideal method of mechanical preparation should be simple, inexpensive, without distress and side effects to the patient. However, such an ideal method does not exist. It must be chosen with respect to patient acceptability, efficiency, influence on fluid and electrolyte imbalance and on faecal microflora. The conventional method involves a 3 day regimen consisting of low residue and clear liquid diet combined with purgation using laxatives and enemas. Although satisfactory in bowel cleansing in about 70% of patient, it is rather exhausting due to reduced calorie intake. It is time consuming and may result in dehydration if the patient drinks inadequate amount of fluids. These disadvantages stimulated the development of more reliable, efficient and quicker methods which includes:

Elemental Diets

Low residue liquid or elemental diets were used with the intention that nutrients could be absorbed in the small intestine. Although, these result in a low faecal bulk, satisfactory cleansing is obtained in only 17% of the patients. Nausea and vomiting can occur and evidence does not favour elemental diets as a sole means of bowel preparation.

Whole Gut Irrigation

Saline : Normal saline is instilled through a nasogastric tube at a constant rate of 50 to 70 ml per minute in 4 hours requiring a total of 10 to 14 litres of fluid. Cleansing effect is achieved in 90% of the patients however the concentration of colonic bacteria is not reduced unless antibiotics are added.[1,2] Many patients complain of abdominal distension, nausea and vomiting. Other drawbacks of this method include the large volume of irrigant, need of nasogastric tube, risk of electrolyte disturbance and water retention and nursing care required to assist the patient. It is contradicted in patients with gastrointestinal obstruction, perforation, toxic colitis and has to be used with caution in patient with cardiac problems.

Castor Oil : (30-60 ml) orally achieves good cleansing but requires large volume minimas or magnesium citrate purgative to achieve the desired results and requires to be given to days before surgery followed by anal washouts a day prior which entails preoperative admissions for 3 to 4 days. Unpalatibilty is another drawback.

Mannitol **:** Mannitol is a nonabsorbable oligosaccharide which acts as an osmotic agent by pulling fluid into the bowel and producing a purgative effect by irritating the colon. Being a sugar it is quite palatable and can be flavoured by mixing with fruit juice. Usually 4 litres of 5% solution are consumed over 4 hours which can be difficult and can result in abdominal discomfort and nausea. To avoid these side effects, hypertonic solutions (10% to 20%) can be used but these predispose to dehydration and electrolyte losses. Overall, good cleansing is produced in about 80% of the patients[2,3] a high wound infection rate probably by acting as a bacterial nutrient and production of explosive gases as a result of fermentation into methane and hydrogen by anaerobic bacteria is seen. The same can be overcome by using of an antibiotic[4].

Polyethylene Glycol : To overcome the drawbacks of mannitol, polyethylene glycol (PEG) in a balanced electrolyte solution was introduced which also acts as an osmotic purgative. To achieve satisfactory cleansing in more than 90% of the patients, an average of 2 to 4 litre of PEG solution must be ingested with tea and lemon. Studies using PEG have shown significantly lower incidence of fluid retention and lesser aerobic and anaerobic faecal bacterial counts compared to other agents. It is nowadays used as an agent of choice for preparations of the bowel before endoscopy and colonic surgery in a non – obstructed patients.

Picolax : It (sodium picosulphate and magnesium citrate) is a stimulant purgative that acts mainly on the left colon after activation by colonic bacteria and on osmotic laxative that cleanses the proximal colon. Two sachets in 2 litres of water are administered with dietary restriction to improve effectiveness. Although acceptable cleansing is achieved in 85% of patients undergoing barium enema and colonoscopy, its efficacy for elective colorectal operations is poorly documented. Picolax is well tolerated but does produce fluid and electrolyte losses.

Antibiotic Bowel Preparations

Mechanical cleansing alone has failed to achieve a significant reduction in the total bacterial load of the colon and therefore the associated septic complications. Addition of antibiotics oral as well as parenteral to mechanical cleaning has resulted in significant reduction of the infection rate from 30 to 60 % in an uncovered patient to 2 – 10%[5] in an otherwise patients covered with wide spectrum anti biotics.

Oral Antibiotics

Because the aerobic Escherichia coli and the anaerobic bacteriodes fragilis are frequently involved organisms in septic complications following colorectal operations, oral antibiotics active against both types of bacteria must be given. Oral administration of erythromycin, neomycin and metronidazole are popular. Several studies have documented the efficacy of oral antibiotics however antimicrobial used alone without mechanical cleansing has little impact on the post operative infection rate.

Parenteral Antibiotics

Since parenteral antibiotics are effective only when adequate tissue levels are present at the time of contamination, systemic administration should start immediately before the operation. A second or third generation cephalosporin with metronidazole are the most commonly preferred agents. Studies have shown conflicting results when parenteral antibiotics were compared with oral or both.

Whether antibiotics bowel preparation should be oral, systemic or both is still a controversial issue.[6,7] Majority of the surgeons would prefer parenteral antibiotics or with concomitant administration of oral antimicrobials together with oral PEG electrolyte solution as the method of choice of pre-operative bowel preparation.

Though observational data suggest that mechanical bowel preparation before colorectal surgery reduces faecal mass and bacterial count in the lumen, but the practice has been questioned because the bowel preparation liquefies faeces, which could increase the risk for intraoperative spillage, and may be associated with bacterial translocation and electrolyte disturbance. Though commonly practiced without the benefit of evidence from randomized trials, and 2 of 3 meta-analyses suggest a higher rate of anastomotic leakage with mechanical bowel preparation thus calling for an end to the practice of mechanical bowel preparation in view of the possible disadvantages of this practice, patient discomfort, and the absence of clinical value.[8,9]

There are others who accept that though routine preoperative bowel cleansing is no longer justified prior to colorectal surgery in general, they call for further evaluation in cases such as total mesorectal resection with low anastomosis where it may still have a role and therefore to consider each case carefully, otherwise the chance of making an inappropriate decision exists with great consequences for patients.[10,11]

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