



Role of Water Soluble Contrast in Management of Post- Operative Adhesive Small Bowel Obstruction

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Abstract

This study "Role of water soluble contrast in management of post-operative small bowel obstruction" was conducted in Department of surgery N.S.C.B. medical college between August 2013 to October 2014 to assess the therapeutic role of water soluble contrast in post operative adhesion induced small bowel obstruction in relieving obstruction. Total of 17 patients were included in study in age group 30-50yrs with majority of males. These patients were having main complaints of abdominal pain, distention vomiting, not passing flatus and motion. During diagnostic tests X-ray abdomen showed multiple bowel loops and air fluid levels. 13 patients were given gastrograffin and continued in conservative management however 4 were referred for surgery. In majority of patients (46%) Ryle's tube aspiration stopped within 24 hrs and bowel sound reappeared in first 2 days of admission (76%) on giving gastrograffin. Also 65% passed flatus and motion within 24 hrs however mean hospital stay was 8.85 days in gastrograffin treated patients compared to 16.5 days in surgically treated patients. Thus by result of this study it can be emphasised that Gastrograffin which is used as contrast media for CT scan purpose as diagnostic support can also be tried as therapeutic agent in patients with small bowel obstruction due to post-operative adhesions and have significant outcome both clinically and also statistically. Hence it can be recommended that with a specific selection criteria for patients and high range of vigilance and suspicion Gastrograffin can be used therapeutically and safely in patients of small bowel obstruction specifically due to post op adhesions to get relief from obstruction and with an advantage that if it fails then CT scan can use this dose as contrast for imaging and confirm obstruction and can be proceeded for surgery as per need.

Introduction

Post-Operative adhesions is one among the most common problem faced by every surgeon in his career. Adhesions are bands of tissues that connect anastomotic sites at locations, where there should be no connections. Post-operative surgical

adhesions are formed as result of trauma, infection or injury to tissues. A surgical incision made into abdominal wall in an aseptic injury yet it may get infected and lead to adhesions.

Over last two decades, concern regarding ways of reduction of post-operative adhesion have taken

flights of ideas like alternative ways to enter abdominal cavity, use of different instruments, use of laparoscopic technique etc. but there is little evidence regarding reduction in adhesion formation by any means used.

Post-operative adhesions lead to very high morbidity for patients (ie 40-60%). Intestinal Obstruction which is one of most common emergency dealt by general surgeon and is major cause of morbidity and also a major financial burden worldwide has post-operative adhesions as documented leading cause of its aetiology. It is more common in adult who underwent previous abdominal surgery. Adhesive small bowel obstruction is most common surgical cause for admissions and its treatment till date is still controversial.

There are two line of management i.e.

1-Surgery

2-Non operative i.e. conservative.

Non operative conservative management is indicated till there is no sign of bowel strangulation and in case of strangulation surgical management should be done.

Adhesive obstruction can occur at any time after surgery in any kind of abdominal surgery. Studies indicates that Appendectomy and colorectal surgery are the most common cause with other like cholecystectomy and gastroduodenal surgeries.

The management of adhesive obstruction has remained controversial. Most patients receive conservative treatment in initial period unless there is suspicion of bowel strangulation. However the optimal duration of this conservative trial is not clear. There is no definite criteria as to when this conservative trial should be considered unsuccessful and when patient should undergo surgery.

Among different studies Cox et al stated that 88% obstruction resolve within 48hrs of conservative treatment, Assalia et al recommended that surgery should be considered if obstruction fails to improve after 48hrs of conservative treatment,

Sossa and Gardener found that patients without signs of strangulation can be treated non operatively for 24-48 hrs.

Our study was aimed at evaluation of therapeutic and decisive value of Gastrograffin (a contrast media used for CT scan) for selected patients of post-operative adhesions induced small bowel obstruction who had failed primary conservative management.

The randomised control trial had confirmed that gastrograffin has therapeutic value in adhesive small bowel obstruction. however the final study showed that the routine administration of gastrograffin does not shorten length of hospital stay probably related to significant breach of protocol.

Gastrograffin is the contrast medium most commonly mentioned. It is an ionic, bitter flavoured mixture of sodium diatrizoate, meglumine diatrizoate and a wetting agent (polysorbate 80). Its osmolality is 1900mosm/lit which the is approximately 6 times the extracellular fluid. As it reaches bowel it promotes shifting of fluid into bowel lumen and thus increases pressure gradient in obstructive site, the bowel content is diluted and in presence of wetting agent passage of bowel content through a narrow lumen is facilitated, it also decreases bowel wall oedema and enhances its motility.

Barium has not been considered as it is not easily diluted by enteric fluid as gastrograffin. though it provide a better mucosal image on radiography, however it can inspissate and completely block bowel also it can spread into peritoneal cavity if perforation occurs and lead to lethal reaction.

Complications with gastrograffin are rare however it can lead to anaphylactic reaction and aspiration.

Gastrograffin can also shorten postoperative ileus and relieve intestinal obstruction caused by impacted *Ascaris lumbricoides* and Bezoar.

Material and Methods

Patients admitted in surgical wards of N.S.C.B medical college from august 2013 to October

2014 were included in study fulfilling these criteria-

- 1) Adult patients i.e.>18 years of age.
- 2) History of previous abdominal surgical procedure.
- 3) Clinical and radiological evidence of adhesive small bowel obstruction without signs of strangulation and peritonitis.
- 4) Patients who were not responded to primary conservative treatment within 48 hrs.

However other patients were excluded from study and were treated with classic protocol.

Patients with clinical evidence of adhesive small bowel obstruction were given trial for conservative management and those who responded were continued on same lineup, while patients with no clinical or radiological improvement in initial 48hrs were randomized to undergo either gastrograffin meal/follow through study or surgery. Pts fulfilling above notified criteria were taken for contrast study with their due consent. Contrast that appeared in the large bowel within 24 hrs were regarded as partial obstruction and conservative treatment was continued. Patients in whom gastrograffin failed to reach the colon after 24 hrs were considered to have complete small bowel obstruction and underwent abdominal CT scan and subsequently laparotomy should be done.

Results

Total of 17 patients were included during study period among which 4 patients needed surgery while 13 patients resolved by gastrograffin administration. 6 patients were females while 11 were males. Among these 35.3% patients belonged to 41-50 yrs incidence was highest in this age group. Most common symptom was abdominal distention and c/o not passing flatus and motion which was seen in all 17(100%) patients while abdominal pain in 16 (94.1%) patients and vomiting in 8 patients (47.1%). X-ray finding in included patients includes multiple air fluid level in 12 pts (70.6%) while 5 pts have only dilated

bowel loops. Mean hospital stay for patients treated conservatively is 8.85 days with standard deviation of 4.240 while for patients who underwent surgery was 16.50 days with standard deviation 12.021 this was statistically significant ($p<0.01$). Ryle's tube aspiration stopped in 7pts (41.2%) on 4th day. Bowel sound reappeared in majority of cases in 2 days i.e. in 13 patients (76%). 41.1% patients passed motion on 4th day while all 76% patients passed motion till 6th day. Similarly flatus was passed by 76% patients on 6th day. P value came out significant for mean days of passing motion, flatus and hospital stay.

Discussion

Any patient undergoing abdominal surgery that involves opening of peritoneal cavity, will have increased lifetime risk for formation of adhesions, which may cause bowel obstruction at any time. Adhesions are common cause of small bowel obstruction in India which constitutes 70% of admissions for acute intestinal obstruction.

Weibel et al^[1] studied 752 autopsies and found that 67% of those who undergo abdominal surgery developed adhesion compared to 28% of those who does not undergo surgery.

Menzies et al^[2] analysed 210 patients undergoing elective laparotomy, they found that in patients who previously had one or more intra abdominal operation among those 93% had intra peritoneal adhesions that were considered direct result of surgery.

Lower abdominal and pelvic surgery have larger risk of adhesion as they damage large peritoneal surface.

Gynaecological operation have 11.1 % incidence of post op adhesion (0.1% in caesarean section while 23.9% in open adnexal surgery).

Elective colonic resection resulted in 3.6% incidence of small bowel obstruction. About 58% of those who developed small bowel obstruction were readmitted in the first year and 22% needed resurgery.

7.1% incidence of adhesion seen in open cholecystectomy compared to 2% in laparoscopic cholecystectomy.

15.6% in open total hysterectomy vs 1% in laparoscopic hysterectomy.

However appendectomy does not present with any difference in SBO following lap or open procedure.

Other causes of postsurgical infection are foreign bodies, glove powder, mesh, sutures postoperative leak and infection and spilled gall stones.

Post op Adhesions present with still another problem i.e. about 32% will have recurrence of small bowel obstruction after adhesiolysis surgery. it is a challenging problem.

Risk of adhesions increases with age as older patients have weak intestinal movements.

Menzies et al found that 39% of those who developed small bowel obstruction did so within first year of surgery and 20% within one month.

Around 30% of patients admitted with small bowel obstruction require surgery while other resolve with non operative intervention but these have significant recurrence rates. 5 year recurrence rate was 10-29% in surgically managed patients however was around 17-53% in those who were managed conservatively and resolved at first instance. However incomplete follow up, missing data, inappropriate analysis, selection bias and that most studies are retrospective can also lead to variation in these rates. Variation can be due to inclusion criteria such as inclusion of patients with recurrent abdominal malignancy, a history of abdominal radiation and other causes of small bowel obstruction other than adhesions.

The time interval between type of surgery and development of adhesive obstruction varies with surgery like appendectomy have longer time period than colorectal and pelvic surgery.

Colorectal and vertical incision surgery tend to predispose to multiple matted adhesions rather than adhesive band and this is associated with higher recurrence. Patients with adhesive band had a 25% recurrence rate compared to 49% rate for matted adhesions. The number of previous

operation does not appear to affect the risk for recurrence of obstruction.

The reported complication rate varies from 18-30% following division of adhesions and 22-40% following small bowel resection. commonly encountered complications are pneumonia, prolonged ileus, respiratory failure, wound infection, urinary tract infection, systemic sepsis and wound dehiscence.

Rate of morbidity and mortality increase with age exponentially i.e. above 60 yrs. of age predicted morbidity is 40-56% and surgery, presence of adhesions during surgical exploration makes surgery difficult and increases risk of complications. They are associated with prolonged operating time, more blood loss.

Adhesions-Pathophysiology and Treatment

Adhesions are of two types-

1. Band –have low risk of recurrence
2. Matted-high risk of recurrent small bowel obstruction.

Treatment

- 1) Conservative-ie no oral intake, nasogastric suction, pain control, and intravenous fluids and electrolyte resuscitation.
- 2) Surgical-if conservative management fails to resolve obstruction or patient having signs of strangulation of bowel. This results in resolution in- 40-70% cases.

Adhesions can occur from days to years after primary surgery breaching peritoneum. However they may be beneficial sometimes i.e. they can localize infection or can contain leak from anastomotic site and prevent development of generalised peritonitis on other hand they can lead to obstruction.

The process of adhesion formation is rather complicated and involves

Different cell types, cytokines, coagulation factors, and proteases all acting together to affect healing process. This process involves complex interactions between inflammation, tissue repair, angiogenesis and remodelling. Activation of coagulation factors and proteases all act together

to affect a healing process. This process involves complex interaction between inflammation, tissue repair, angiogenesis and remodelling. Activation of coagulation cascade result in conversion of fibrinogen into fibrin which gets deposited on raw surfaces. This is followed by activation of fibrinolysis. Fibrinolysis allows for proliferation of mesothelial cells and prevents adhesion of adjacent structures. If fibrinolysis does not occur in few days fibrin will persist and form base for infiltration of collagen producing fibroblasts. Normally fibrinolytic activity exceeds coagulation but these change after surgery i.e. up regulation of adhesion molecules such as ICAM -1(Intracellular adhesion molecule) and VCAM-1(Vascular cell adhesion molecule),Transforming growth factor beta and Interleukin -1 are thought to contribute to adhesion formation probably by reducing fibrinolytic activity. Substance-P seems to play a significant role in this process.

It is almost certain that adhesion formation occur after any abdominal operation and there is no effective treatment to prevent it and its recurrence. However perform surgery laparoscopically somehow reduces adhesion, also use of Seraphim membrane and hyaluronic acid, carboxy cellulose membrane can reduce incidence. Other material are also being tried with variable successes are steroids, NSAIDs, Dextran 70 adenosinase, dextran, hydro polymeric coating and heparin.

Pathophysiology of Small Bowel Obstruction

Obstruction can progress in two ways ie

- 1) Simple presenting with obstipation, abdominal distention, colicky abdominal pain, nausea and vomiting.
- 2) Strangulated-present with tachycardia fever, peritoneal irritation, along with leucocytosis, hyperamylemia and metabolic acidosis due to pathophysiologic response to ischaemic necrosis of bowel.

Presentation

Patient present with colicky abdominal pain with past history of surgery which could be from few

weeks to few decades. Bilious vomiting following severe cramps and sometimes nausea, later vomiting which may become feculent. Bowel sounds are increased and described as rumbling sound. Loss of appetite with thirst increasing constipation and obstipation is found in most patients. Abdominal distention occur after few hours. Constant pain is a warning sign that the patient may have a closed loop obstruction or ischaemic injury of the affected bowel. Parea et al prospectively studied the patients and found similar signs in these patients ie vomiting (77%), abdominal pain (68%), absence of flatus and faeces (52%) and constant pain (12%).abdominal distention was most frequent clinical sign with prevalence of 56%.similarly they reported abdominal pain (92%) vomiting (82%),abdominal tenderness (64%)and distention (59%) are most frequent sign and symptoms.

Pt is distressed with pain and some dehydration. Central abdominal distention, visible peristalsis might be visible in some patients. Abdomen is usually soft and tenderness indicates small bowel strangulation. Peristaltic rushing sound with an empty rectum on per rectal examination.

Diagnosis

History and clinical examination have 75% sensitivity and 99% specificity. Other diagnostic tools are Abdominal x-ray showing multiple air fluid level, CT abdomen with water soluble contrast. However there are no reliable confirmatory laboratory investigations. Also raised TLC may be found in few pts.

Classic finding on x ray abdomen is centrally located dilated bowel loops, multiple air fluid level and absence of gas in the colon. Barium meal follow through is 85% sensitive but cannot be used for closed loop obstruction and strangulated obstruction. But now water soluble contrast have improved study and reduced risk.

Treatment

The traditional treatment regime use to say that the sun should never rise and set with obstruction.” But now a daysnon-operative

treatment with Ryle's tube decompression of bowel and fluid and electrolyte resuscitation so long as there is no sign of small bowel strangulation. Mortality rate for SBO had reduced from 50% to 3% in past 100 yrs. However downfall of non operative management there is possibility of strangulated SBO being missed, prolongation of hospital stay and risk of complications. Of those managed non-operatively 17% require surgery ultimately over a duration of 4.4years.

Nelson et al and Harris et al in the 1960 suggested that Iodinated radiopaque media in the small bowel may cause loss of fluid from the interstitial space of small bowel into the bowel lumen precipitating hypovolemia and dehydration, which may be significant in the elderly with cardiovascular disease and in patients with severe dehydration. This also indicates that these contrast media act as osmotic laxative.

Gastrograffin the most commonly used contrast media for detection of anastomotic leaks, its advantage over the traditional use of barium is that it is safe and does not lead to fibrotic inflammatory reaction when it leaks from gut lumen. Gastrograffin contain sodium amidotrizoate 100mg/ml and meglumine amidotriazoate 660mg/l. it also contain disodium edetate, saccharin sodium, polysorbate 80, anise oil and purified water. Its osmolality is 1900mosm/l, which is approx. 6 times of extracellular fluid (ie interstitial space).it promotes shifting of fluid in bowel lumen which increases pressure gradient across an obstructive site. The bowel content is diluted and in the presence of wetting agent, passage of bowel contents through narrow interstitial lumen is enhanced. it is also thought to reduce edema of bowel wall and enhance bowel motility.

Conclusion

This study was conducted in dept of surgery, NSCB medical college Jabalpur between August 2013 to October 2014 with on total 17 patients were included majority of them were between 30-

50 yrs with males were 64%and female 36%. Having main complaints of abdominal pain, abdominal distention, vomiting, not passing flatus and motion .X ray abdomen showing dilated bowel loop and multiple air fluid level.13 patients were relieved of their symptoms after giving Gastrograffin and continue for conservative treatment and remaining 4 were taken for surgery. Those who responded to gastrograffin in them Ryle's tube aspiration stopped in 46% within 24 hrs however bowel sound heard in first 2 days in76% while 65% passed motion and flatus within 24 hrs. Mean hospital stay for conservative managed pts was 8.85 days while for surgical management was 16.5 days having p-value <.01 which is statistically significant. in our study we studied therapeutic and decisive role of gastrograffin in post-operative small bowel obstruction who did not respond to primary conservative treatment. We found gastrograffin a safe and effective mode to treat post-operative small bowel obstruction. Hospital stay in gastrograffin treated patient is significantly low so it is helpful to reduce hospital burden. Gastrograffin gives a fine idea about decision making of which patient should be refer for surgery. Gastrograffin should use for decisive help in postoperative small bowel obstruction who did not respond to primary conservative management. Thus by result of this study it can be emphasised that Gastrograffin which is used as contrast media for CT scan purpose as diagnostic support can also be tried as therapeutic agent in patients with small bowel obstruction due to post-operative adhesions and have significant outcome both clinically and also statistically. Hence it can be recommended that with a specific selection criteria for patients and high range of vigilance and suspicion Gastrograffin can be used therapeutically and safely in patients of small bowel obstruction to get relief from obstruction and with advantage that if it fails than CT scan can use this dose as contrast for imaging and confirms obstruction and can be proceeded for surgery as per need.

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