

Small Bowel Obstruction Following Appendectomy: A Retrospective Study

Jyothi S Karegoudar*, Prabhakar PJ**, Rajashri S Patil***, Vijayanath V****

*Asso. Prof in General Surgery, ** Prof & HOD in General Surgery, ***Asst. Prof (biostatistician), S. S. I. M. S & R. C., Davangere, Karnataka State, ****MD, DNB, MNAMS, Associate Professor, Department of Forensic Medicine & Toxicology, Vinayaka Mission's Kirupananda Variyar Medical College & Hospital, Salem, Tamil Nadu, India.

Abstract

The incidence of post-operative small bowel obstruction after standard, open appendectomy was calculated during five year duration at S. S. Institute and Research Centre, Davangere, Karnataka State.

Post-operative small bowel obstruction is one of the adverse effects of appendectomy but its frequency varies from centre to centre. The incidence of small bowel obstruction is significantly high in perforated appendicitis, midline incisions, and chronic appendicular pathology. The midline incision has increased the frequency of post-operative adhesions.

This study was conducted to determine the incidence of this complication among our patients who had open appendectomy and identify the factors which may increase the chances of developing such complications.

Keywords: Bowel obstruction; Appendectomy; Retrospective; Study; Postoperative.

Introduction

Appendectomy is nearly the most commonly performed abdominal emergency operation throughout the world. Post

appendectomy adhesive small bowel obstruction occurs in 1 to 1.5% of all patients within 14 years of the operation.[1]

Appendectomy is one of the most frequently performed emergency surgery, and it is associated with various short and long term morbidities. Postoperative small bowel obstruction is recognized as long term adverse effect of appendectomy.[2]

The frequency of this complication is not well known but the reported risk ranges from 0.2- 10.7%.[3] The post-operative adhesions are a significant problem after colorectal surgery. However, the basic epidemiology and clinical burden are unknown.[4]

Postoperative adhesive small bowel obstruction is one of the most important complications after any abdominal or pelvic surgery. It accounts for about 32% of all cases of acute small bowel obstruction.[5]

It was considered that previous appendectomy is the most important cause of adhesion causing mechanical bowel obstruction. Adhesive bands are usually the cause of obstruction in such patient.[6]

The management of postoperative adhesions is still debatable; some authors recommend conservative treatment and others urges early operative intervention.[7]

The management is very important as adhesive small bowel obstruction is clinically challenging and at the same time, mortality rate rises a lot if the bowel becomes necrotic or perforated.[8]

Dr. Jyothi S Karegoudar, Asso. Prof in General Surgery, S. S. I. M. S. & R. C. , Davangere, Karnataka state.

E-mail: jkaregoudar@gmail.com

Patients and Methods

This is a retrospective hospital based study conducted in S.S. Institute of Medical Sciences & Research Centre, from June 2005 to June 2010. The only patients whose appendices were physically removed and subjected to histopathology were included. The patients readmitted for adhesive bowel obstruction were traced and their clinical data was analysed. The patients suspected to have malignant adhesive intestinal obstruction were excluded from this study.

The data collected was interval between the appendectomy and bowel obstruction, type of intervention, clinical data, radiological and laboratory investigations, days elapsed between admission and operative intervention, operative findings including type of adhesions, degree of obstruction, intestinal complications, need for resection, postoperative complications and mortality.

The investigations done were complete blood picture, serum creatinine, serum electrolytes, random blood sugar, chest x-ray, erect plain abdominal x-ray on admission.

The arterial blood gases were not done routinely in all patients. The immediate operative intervention decision was taken according to the clinical assessment of patients.

The patients who were explored immediately had different combinations of clinical presentation; fever, severe vomiting, rebound tenderness, tachycardia, total count > 12000/dl. All the other patients were given a chance for conservative management.

The conservative management included:

1. No oral intake completely.
2. Nasogastric tube insertion for aspiration.
3. Urinary catheterization.
4. Fluid & electrolyte replacement.
5. Daily twice abdominal examination.
6. Maintaining vital signs chart.
7. Daily blood count.

8. Amount & nature of Nasogastric tube aspiration.

The result of the histopathological examination was recorded as normal, inflamed, suppurative, perforated appendicitis and designed to record the data statistical analysis. The statistical analysis was done using Statistical Package for Social Science [SPSS] version 15.0 (trial version). The presentation of data was done in the form of numerical and tabular forms as appropriate. Statistical significance level was considered at p value <0.05.

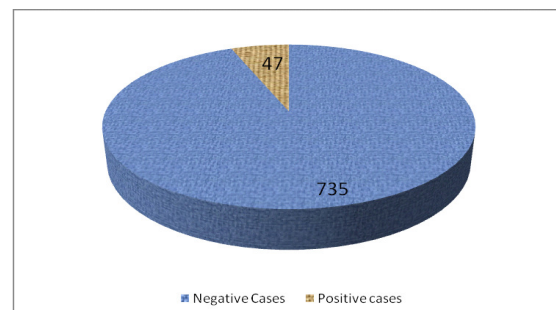
Chi square test or Fisher's exact test were used to determine statistical differences between categorical variables.

Results

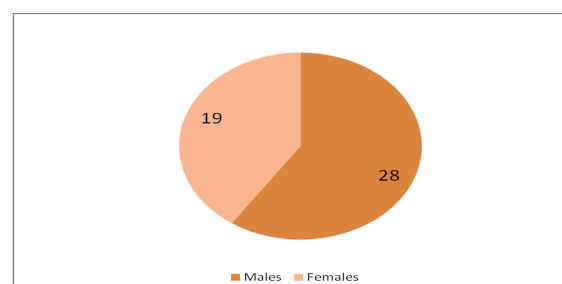
Seven hundred eighty two patients had undergone open appendectomy during June 2005 to June 2010 at S. S. Institute of Medical Sciences & Research Centre.

Only 47 patients presented with small bowel obstruction. Out of these 28 [3.6%]

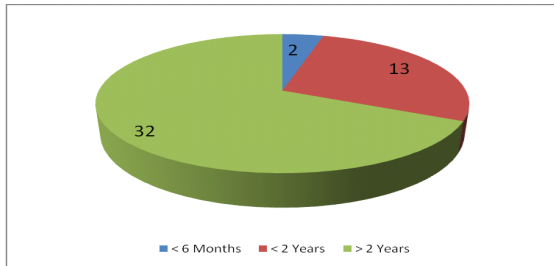
The number of affected patients



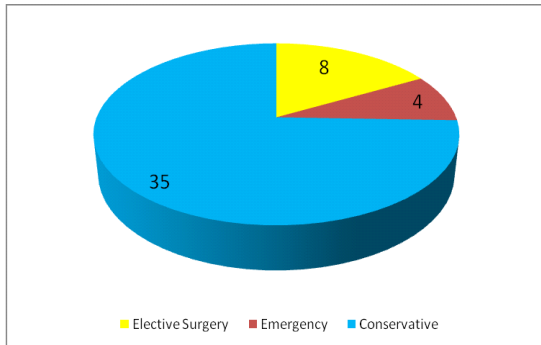
Sex incidence in this study



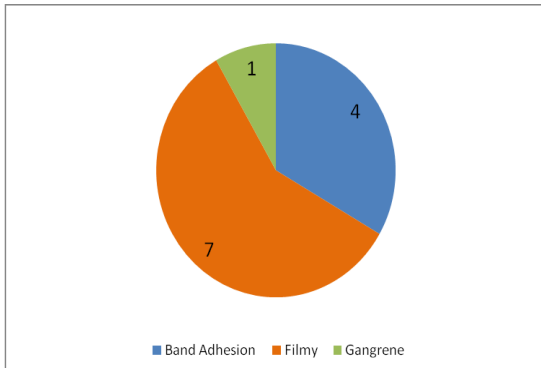
Time of presentation of patients



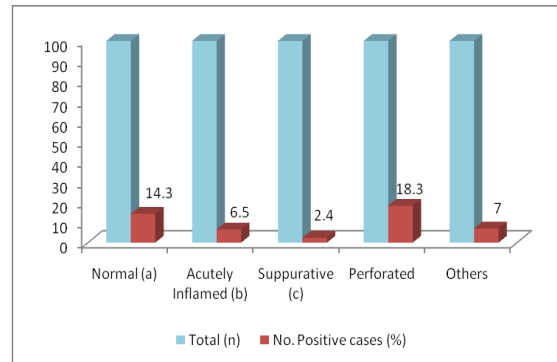
Treatment modalities of obstructive patients



Intra-operative findings of the patients



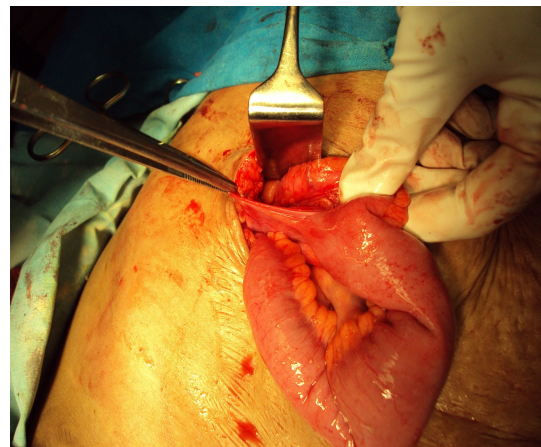
Histopathology results of appendectomy patients



patients were males and 19 [2.4%] patients were females. The age of these patients ranged from 10years to 48years, mean age was 29 years. Two patients [0.2%] had early post-operative small intestinal obstruction within 6 months of appendectomy, 13 [1.6 %] patients presented within two years of appendectomy, and the remaining 32 [4%] patients presented after two years of appendectomy operation. The suture material used in the first surgery was 2-0 vicryl , silk and linen. All patients are operated by surgeons.

All patients presented to the hospital in the emergency ward with abdominal pain of different degrees and clinically significant abdominal distension suggesting small bowel obstruction. The other clinical findings include fever, tachycardia, vomiting, dehydration, exaggerated bowel sounds, rebound

Obstruction Due To Bands



Histopathology	Total (n)	No. Positive cases (%)
Normal (a)	63	9(14.3)
Acutely Inflamed (b)	108	7(6.5)
Suppurative (c)	458	11(2.4)
Perforated	82	15(18.3)
Others	71	5(7.0)
Total	782	47(6.0)

$X^2= 37.2, P<0.001$ HS, 3 d.f

Bands Causing Obstruction



tenderness. The silent abdomen has not been found in all patients.

Four patients were explored immediately after short period of pre-operative resuscitation. 8 patients developed rising tachycardia, fever, leukocytosis or rebound tenderness were considered for exploration. 35 patients improved with conservative management and were discharged after complete resolution of obstructive signs.

Intra-operatively, band adhesion with complete obstruction was found in 4 patients, 1 patient had resection of a part of the bowel because of strangulating gangrene of that part, at the site of band adhesion. Other 7 patients had filmy adhesions hence adhesiolysis done without intestinal resection. No case of small bowel obstruction due to bite through bowel,

Gangreneous Bowel Due To Constricted Band



Constriction Band With Gangrene Bowel



if so they present within few days of appendectomy.

Post-operatively, there was no mortality and all patients were discharged. Three [0.3%] patients had wound infection during post-operative period which was managed accordingly.

In this study the incidence of small bowel obstruction is high in whom linen was used to ligate the base of the appendix compared to vicryl and silk.

The histopathology result of patients [N=782] who underwent appendectomy. 648 of the appendices were inflamed, suppurative or perforated as shown in Table 2.

- Normal: no evidence of inflammation
- Acutely inflamed: macroscopic and microscopic evidence of inflammation
- Suppurative: macroscopically inflamed

Discussion

Small bowel obstruction can be caused by a variety of conditions including post-operative adhesion, malignant tumour, hernia, inflammatory bowel disease, volvulus and intussusception. The most common cause of small bowel obstruction in United States is adhesion from a previous laparotomy accounting for approximately 60% of all

cases.[9] The mechanical obstruction remains the most common surgical emergencies.[10]

There has been considerable alteration in the nature of the causes of intestinal obstruction with post-operative adhesions as the most common cause of intestinal obstruction.[11]

In many earlier studies appendectomy has been the most common prior operation.[12] Intra-abdominal adhesions usually develop after injury of the peritoneum. They may develop after intra-peritoneal procedures or after non-operative peritoneal irritation. Post-operative intra-abdominal adhesions are a major and challenging problem for all surgeons. There are clinical developments in the pathophysiology, epidemiology, diagnosis and treatment of intra-abdominal adhesions.[13] There are trials to control the formation of adhesions post-operatively never stopped, but till now limited success is the result.[14]

Post-operative adhesion occur in 95% of all patients after any intra-peritoneal procedures, most of them are clinically insignificant but some of them are the principal cause of serious complications [15]; of them small bowel obstruction, either simple or strangulated, is the most serious one.[16]

Acute appendicitis and appendectomy are nearly the most important cause of intra-peritoneal adhesion formation.[17] Most authors considered early post-operative adhesive small bowel obstruction if it occurred within the first 3 weeks of appendectomy.[18]

In this series, clinically significant adhesive small bowel obstruction presented after 6 months of the appendectomy. One patient who presented early post-operative period was operated upon.

The high incidence of suspicion is vitally important in the early diagnosis of postoperative adhesive small bowel obstruction, as early in the disease. The symptoms and signs are usually non-specific and radiological findings are minimal. The late presentation was also the main cause for gastrointestinal resections.

The most patients presented with post-appendectomy adhesive intestinal obstruction had single band adhesion with complete intestinal obstruction. But why this dominance of single band adhesion post-appendectomy is still a question to be answered. The appendicular stump may play an important role, as it may be a part of the adhesive band. The presence of pus in the pelvis may lead to the formation of pelvic adhesions, mainly perforated appendix. It has been found that the probability of post appendectomy adhesive intestinal obstruction is significantly increased in patients who had normal or perforated appendix.[19]

The higher incidence of intestinal obstruction in patients with normal appendix may be due to the fact that finding of normal appendix triggers the search for other pathology, leading to more trauma to the serosa of the small intestine, hence increasing the chances of post-operative adhesive obstruction.

On the other hand, the degree of inflammation in case of a perforated appendix correlates to the magnitude of the healing response, leading to formation of more fibrous adhesions, which could precipitate intestinal obstruction. In support to this notion, our findings that infection and mechanical trauma constitute the most essential causes of adhesions. Some investigators concluded that minimal invasive surgery can reduce the risk of small bowel obstruction in comparison to open appendectomy, but further observation and follow up is needed before a reliable conclusion can be drawn regarding the place of laparoscopic appendectomy in reducing such complication.

Many recent publications have reported reduction of the formation of post-operative adhesion after an abdominal operation, with the use of different substances. The use of an off-the-shelf biomaterial, which does not complicate the surgical procedure or impede healing, while controlling the formation of post-surgical adhesions, would be a significant achievement. The ideal material would be

easy to use in the operating environment, biocompatible, prevents adhesion during healing, and would facilitate re-entry if required for subsequent surgery. However, all the currently available substances need further evaluation to confirm their efficiency.

Conclusion

The overall risk of small bowel appendectomy in children is low (0.7%) and is significantly related to perforated appendicitis. Post-appendectomy small bowel obstruction is a serious, unpredictable complication. It is usually complete obstruction caused by tight single band adhesion with unexpected spontaneous resolution.

Early operative intervention is recommended strongly in patients with early post appendectomy adhesive small bowel obstruction.

Small bowel obstruction after laparoscopic appendectomy appears statistically less common than open appendectomy but this study has not included the laparoscopic appendectomy and it needs further follow up to come to the conclusion.

References

1. Khairy GA, Afzal MF, Murshid KR, Guraya S, Ghallad A. Post appendectomy small bowel obstruction. *Saudi Med J*. 2005; 26: 1058-60.
2. Andersson RE. Small Bowel Obstruction after appendectomy. *Br J Surg*. 2001; 8: 1387-1391.
3. Riber C, Soe K, Jorgensen T, Tonnesen H. Intestinal Obstruction after appendectomy. *Scand J Gastroenterol*. 1997; 32: 1125-1128.
4. Parker MC, Ellis H, Moran BJ, Thompson JN, Wilson MS, Menzies D, Mc Guire A, Lower AM, Hawthorn RJ, O' Briena F, Buchan S, Crowe AM. Dis Colon Rectum: 2001; 44(6): 822.
5. Ellis H, Moran BJ, Thompson JN, Parker MC, Wilson MS, Menzies D, et al. Adhesion related hospital readmissions after abdominal & pelvic surgery: a retrospective cohort study. *Lancet*. 1999; 353: 1476-80.
6. Fuzun M, Kaymak E, Harmancioglu O, Astarcioglu K. Principal causes of mechanical bowel obstruction in surgically treated adults in Western Turkey. *Br J Surg*. 1991; 78: 202-3.
7. Shou- Chaun Shih, Kuo- Shyang Jeng, Shee-Chan Lin, Chin- Roa Kao, Sun-Yen Chou, Horng-yuan Wang, et al. Adhesive Small Bowel Obstruction: How long can patients tolerate conservative treatment? *World J Gastroenterol*. 2003; 9: 603-605.
8. Williams SB, Greenspon J, Young HA, Orkin BA. Diseases of the Colon & Rectum. 2005; 48: 1140-6.
9. Bass KN, Jones B, Bulkley GB. Current Management of Small Bowel Obstruction. *Adv Surg*. 1997; 31: 1-34.
10. Tamijmarane A, Chandra S, Smile SR. Clinical aspects of adhesive intestinal obstruction. *Tropical Gastroenterology*. 2000; 21: 141-143.
11. McEntee G, Pender D, Mulvin D, Mc Cullough M, Naseder S, Farah S, et al. Current Spectrum of Intestinal Obstruction. *Br J Surg*. 1987; 74: 314-315.
12. Stewart RM. The incidence & risk of early postoperative small bowel obstruction. *Am J Surg*. 1987; 12: 643-647.
13. Dijkstra FR, Nieuwenhuijzin M, Renijnen MMPJ, Goor Van H. Recent clinical development in pathophysiology, epidemiology, diagnosis & treatment of intra-abdominal adhesions. *Scand J Gastroenterol Suppl*. 2000; 232: 52-9.
14. Al- Musawi D, Thompson JN. Intra-abdominal adhesion: formation & management. In: Taylor I, Johnson CD. *Recent advances in surgery*. 2001; 24: 1-19.
15. Menzies D, Ellis H. Intestinal obstruction from adhesions: how big is the problem? *Ann R Coll Surg Engl*. 1990; 72: 60-3.
16. Ellis H. The magnitude of adhesion related problems. *Ann Chir Gynaecol*. 1998; 87: 9-11.
17. Menzies D. Prospective adhesions: their treatment & relevance in clinical practice. *Ann R Coll Surg Engl*. 1993; 75: 147-53.
18. Mishev G. Early adhesive ileus after appendectomy. *Khirurgiia (Sofia)*. 1990; 43: 113-7 (abst) [Bulgarian].
19. Andersson REB. Small bowel obstruction after appendectomy. *Br J Surg*. 2001; 88: 1387-91.