

POST APPENDICECTOMY ABDOMINAL PAIN- A CLINICAL EVALUATION IN OPEN APPENDICECTOMY PATIENTS

Sankaran Nair Kailasanadhan¹

¹Additional Professor, Department of General Surgery, Government Medical College, Kottayam.

ABSTRACT

BACKGROUND

Appendicitis is the most common cause of acute abdomen in surgical practice and appendectomy is the most common abdominal emergency surgery performed in any surgical hospital. Acute appendicitis and appendectomy are potent causes of adhesions, which in turn can lead to small bowel obstruction, infertility etc., and hence are a major source of morbidity. This study aims at evaluating the cause of post appendectomy abdominal pain and the major causes leading to the same.

MATERIALS AND METHODS

Study Design: Cross sectional study.

Inclusion Criteria- All patients presenting with abdominal pain after appendectomy, during a period of one year from 2005 January to 2006 January were studied.

Exclusion Criteria- 1) Pain due to wound infections were excluded from the study. 2) Children aged below 12 were also excluded.

Setting - Department of General surgery, Govt. Medical College Kottayam. Kerala.

Period of Study- A period of one year from 2005 to 2006.

RESULTS

Fifty cases of abdominal pain in post-appendectomy patients, who had full details of their appendectomy surgery, were studied during a period of 12 months.

Most of the patients were admitted through casualty and only 7 patients were admitted electively.

CONCLUSION

In this study of 50 patients readmitted for post appendectomy abdominal pain, 35 i.e. 70% had adhesions. Out of the 35 patients with adhesions 20 had small bowel obstruction due to adhesions and bands and 13 of these patients required surgical intervention. Adhesiolysis was done in 8, resection anastomosis in 2, right hemicolectomy was done in 2, and hernia repair in 1.

In early appendectomy group (surgery within 48hrs.), the adhesions responded to conservative treatment which shows adhesions were less aggressive in them.

In late appendectomy group (i.e. surgery after 48 hours) with perforated appendicitis, negative appendectomy group and extremes of age, aggressive adhesions occurred leading on to surgical intervention.

KEYWORDS

Appendectomy, Post Appendectomy abdominal pain, Adhesiolysis, Perforated appendicitis, Negative Appendectomy.

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BACKGROUND

Appendicitis is considered as the most common cause of acute abdomen in surgical practice¹ and Appendectomy is the commonest intra-abdominal surgery.² Appendicitis usually affects young individuals between the ages 15 -30 years. Management vary from emergency appendectomy to conservative treatment and elective appendectomy at a later date. Acute appendicitis and appendectomy are potent causes of adhesions. Post appendectomy readmissions contributed over 7% of the total lower abdominal surgery

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Corresponding Author:

Dr. S. Kailasanadhan,

'Kausthubham', Gandhi Nagar P.O.,

Medical College, Kottayam, Kerala.

E-mail: nadhankailas@gmail.com

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patient readmission burden.³ Intra peritoneal adhesions can cause serious morbidity. Adhesions can cause Intestinal obstructions, secondary infertility etc., and can be the cause of chronic abdominal and pelvic pain. Post appendectomy abdominal pain may be due to various reasons including- Adhesive colic, Intestinal Obstruction, Missed Pathology, other co-existing diseases etc.

Aim

To find out the aetiology of Post appendectomy abdominal pain.

Objectives

- To compare the outcomes of early and late interventions in appendicitis.
- To find out the risk factors of developing complications in post appendectomy patients.



MATERIALS AND METHODS

This study was conducted for a period of 12 months in a tertiary health care centre in Kerala.

Inclusion Criteria

- All patients presenting with abdominal pain after appendicectomy, were studied for a period of one year.

Exclusion Criteria

- Pain due to wound infections were excluded from the study.
- Children aged below 12 were also excluded.

Procedure

Clearance from scientific review committee and ethical committee were obtained first.

A total of 50 cases came to the preview of this study. A detailed questioner was prepared including the demography and clinical history of the previous symptoms leading to appendectomy and also the present clinical symptoms. Investigations including blood examination and imageology of the previous admission was collected. Alvarado score was noted. Pre-operative findings, Type of Incision and details of operation including time interval between onset of symptoms and surgery, were noted separately. Events during post-operative period were studied. Histopathology report of specimen was collected for most of the cases.

RESULTS

Fifty cases of abdominal pain of post appendectomy patients with full details of their appendectomy surgery were studied during a period of 12 months.

Most of the patients were admitted through casualty, only 7 patients were admitted electively. 60% of the patients were between 15 to 30 years. In this study of 50 patients readmitted for post appendectomy abdominal pain, 35 patients i.e. 70% had adhesions. Out of the 35 patients with adhesions 20 had small bowel obstruction due to adhesions and bands and 13 of these patients required surgical intervention. Adhesiolysis was done in 8, resection anastomosis in 2, right hemicolectomy was done in 2, and hernia repair in 1. Women showed a slightly lower risk than men in developing post appendicectomy adhesions.

In early appendectomy group (surgery within 48 hrs.), the adhesions responded to conservative treatment which shows adhesions were less aggressive in them.

In late appendectomy group (i.e. surgery after 48 hours) with perforated appendicitis, negative appendectomy group and extremes of age aggressive adhesions occurred leading on to surgical intervention.

Age of Incidence

Since appendicitis was common in the age group between 15 to 30, this age contributes to most of the cases of readmission, 60% of the cases were between the age group of 12 to 30.

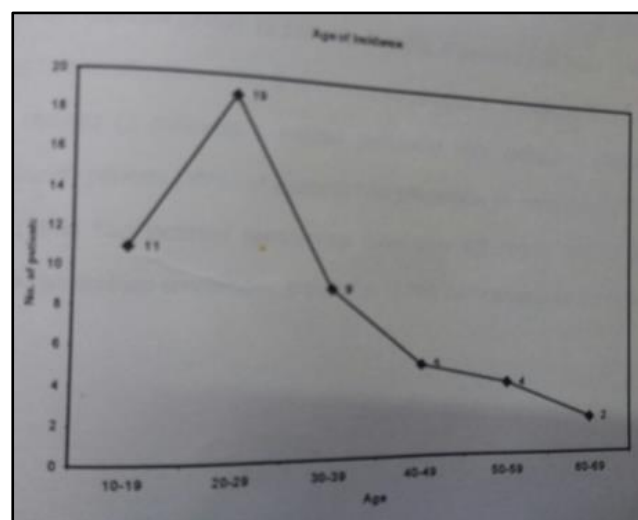


Figure 1. Age of Incidence

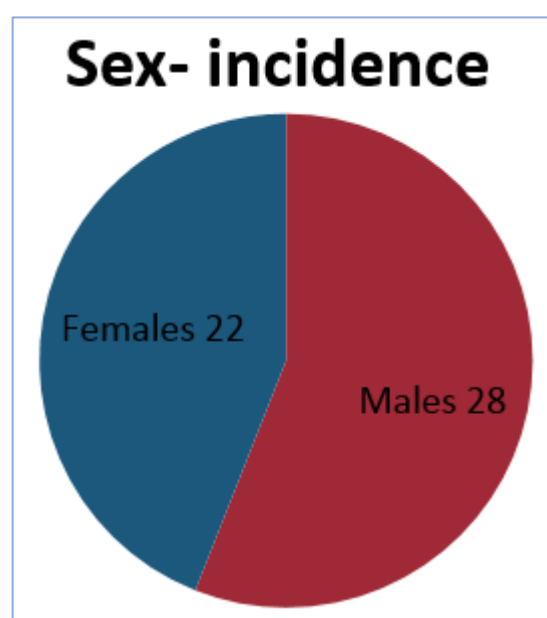


Figure 2. Sex Incidence

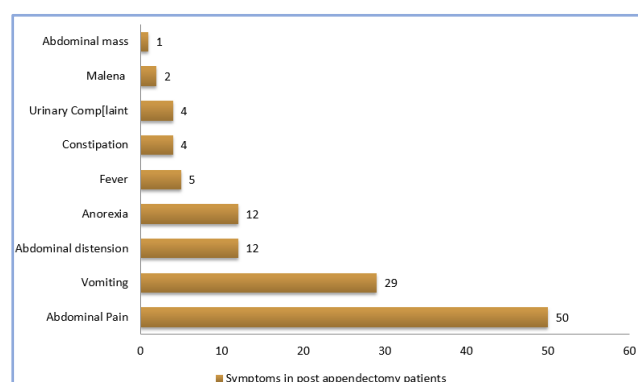


Figure 3. Symptoms of Post Appendectomy Patients at the Time of Re-admission

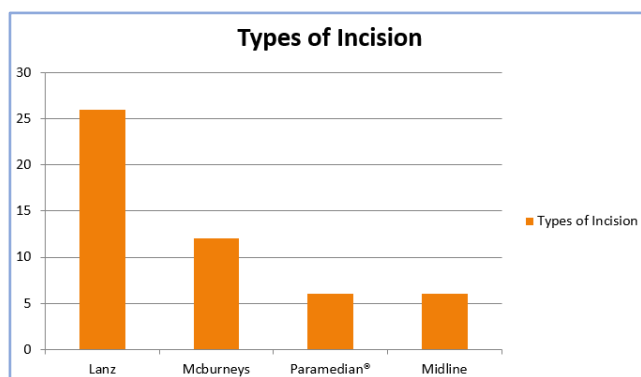


Figure 4. Types of Incision

Majority of the patients had Lanz incision.

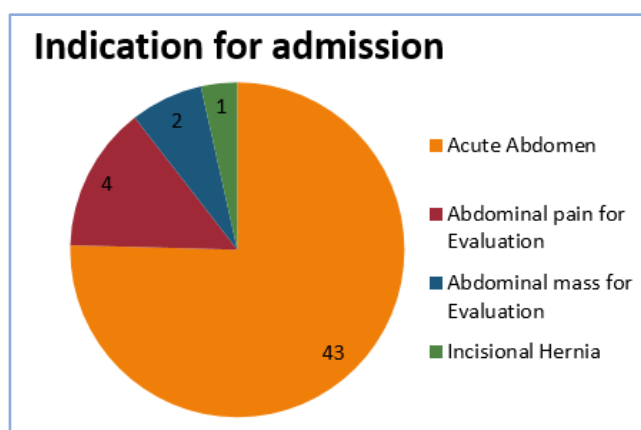


Figure 5. Indications for Admission

Main Indication for admission was acute abdomen. 86% of the cases were admitted for acute abdomen.

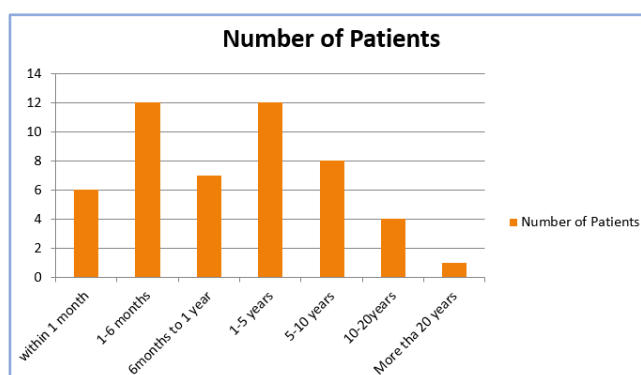


Figure 6. Analysis of Time Interval between Appendicectomy and Readmission

Investigations at the time of admission

All Routine Blood Investigations, i.e. Blood and urine X-ray and Sonological examinations were done to all patients. Hb below 10 gm% was observed in 8 patients 16%, elevated total blood cell count of more than 11000 was observed in 10 patients, 20%. Urine examinations showed presence of RBCs in 8 patients and pus cells in 4 patients.

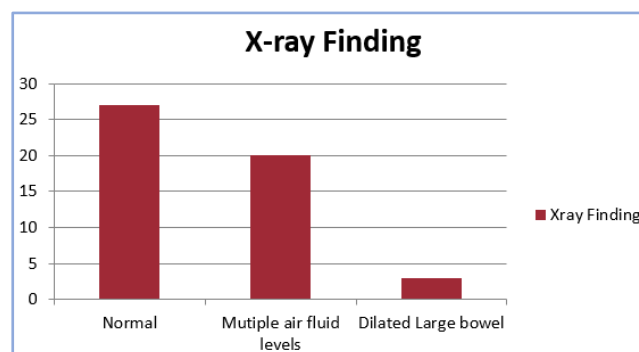


Figure 7. X-ray Findings

Plain X-ray were taken for all, 20 patients showed multiple air-fluid levels.

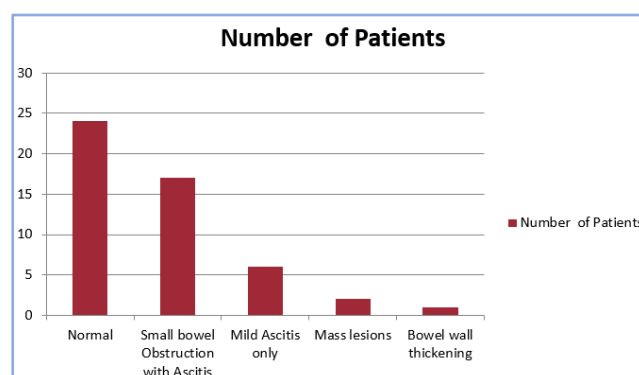


Figure 8. USG Finding

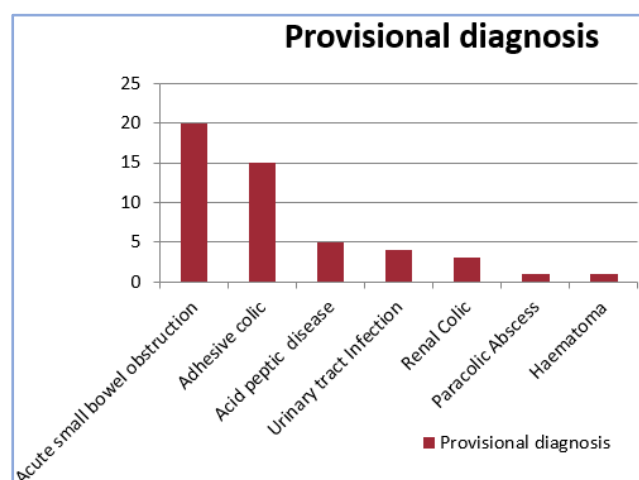


Figure 9. Provisional Diagnosis

Acute small bowel obstruction topped the list in the study 40%.

Surgery Performed

Out of the 50 cases studied 13 underwent surgery on admission with 11 emergency surgeries and 2 elective ones.

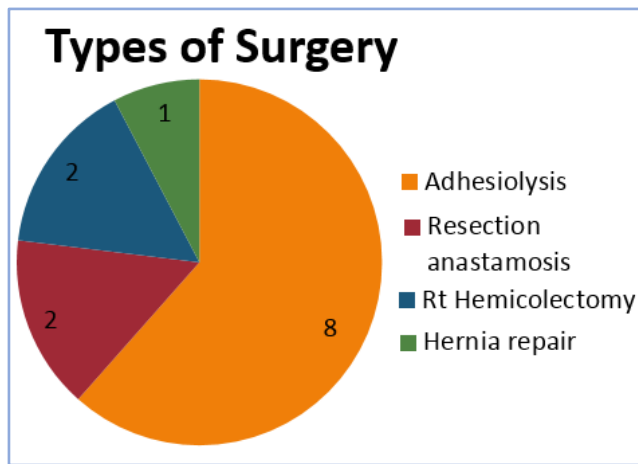


Figure 10. Types of Surgery Performed

Analysis of Per Operative Findings

Among the 13 patients who had surgical interventions on admission all of them underwent laparotomy.

1. Adhesions and Bands-8 patients

All patients had multiple adhesions. Most of the adhesions were between ileocaecal region to the scar tissue of the abdominal wall 5 patients. Two adhesions from ileum to anterior abdominal wall scar and one from jejunum to the scar tissue. One band was between ileocaecal region to abdominal wall scar and another band between ileum to parietal peritoneum.

One patient had adhesion between small bowel and uterus. 4 patients had omental adhesions. Adhesiolysis and release of band were done in these 8 patients.

2. Small bowel stricture with skip lesions-2

These Patients underwent resection anastomosis.

3. Ileocaecal mass—2

They underwent Right hemi-colectomy.

4. Hernia-1

Underwent hernia repair with mesh.



Figure 11. Adhesions between Small Bowel Loops of Intestine

Diagnosis	Appendicectomy done before 48 hrs	Treatment on Readmission	
		Conservative	Surgical
Acute Small bowel obstruction	5	5	0
Adhesive colic/NSAP	14	14	0
UTI	4	4	0
APD	5	5	0
Urolithiasis	3	3	0
Hernia	0	0	0
Haematoma	1	1	0
Paracolic Abscess	1	1	0

Table 1. Early Appendicectomy Group (33 Patients)

Diagnosis	Appendicectomy done after 48 hrs	Treatment on Readmission	
		Conservative	Surgical
Acute Small bowel obstruction	15	3	12
Adhesive colic/NSAP	1	1	0
UTI	0	0	0
APD	0	0	0
Urolithiasis	0	0	0
Hernia	1	0	1
Haematoma	0	0	0
Paracolic abscess	0	0	0

Table 2. Late Appendectomy Group 17 Patients

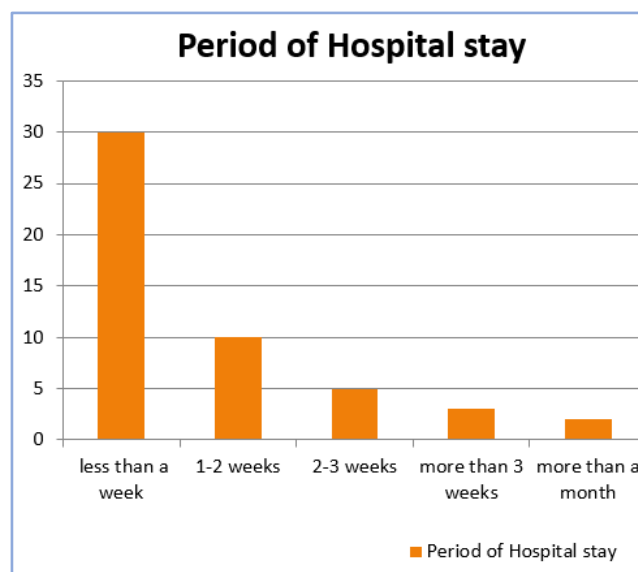


Figure 12. Period of Hospital Stay on Admission

Majority of patients were discharged early.

Histopathology Report	Number of Patients	Conservative Management	Surgical Management
No evidence of active inflammation	3	3	0
Resolving/acute appendicitis	13	13	0
Perforated gangrenous appendicitis	17	6	11
Chronic Granulomatous appendicitis	2	0	2
Total	35	22	13

Table 3. Histopathological Correlation with Present Management

Histopathology was available for only 35 patients. 17 of these patients had gangrenous perforated appendicitis and 70% of these i.e. 11 cases required surgical intervention. 2 patients had an HPR of chronic granulomatous appendicitis and they underwent right hemicolectomy.

DISCUSSION

A total of 50 patients with post appendectomy abdominal pain were studied. In the study 56% were males and 60% were between the age group of 12 to 30 years. The study showed a higher risk among younger age group and male patients. Women are at lower risk than men and this is comparable with other published literature.⁴ Out of the 50 patients 25 patients presented within 1 year of surgery. In a study on readmission related to abdominal surgeries by Harold Ellis et al 22.1% of all outcome readmissions occurred in the first year after initial surgery, but readmissions continued steadily throughout the 10-year period.⁵

In our study of 50 patients with post appendectomy pain, 29 had vomiting, abdominal distension and anorexia were found in 12 each. The features that lead to diagnosis of mechanical small bowel obstruction are the classical triad of colicky abdominal pain, vomiting and absolute constipation, together with the physical sign of abdominal distension and tenderness.⁴ 20 patients (40%) were diagnosed to have small bowel obstruction and 15 patients (30%) were diagnosed with Adhesive colic. In a similar study by Einar Arnbornsson MD et al of 3,536 patients who underwent previous appendectomy 67 were re-admitted and were operated for small bowel Obstruction due to adhesion.⁶

Majority i.e. 52% of the patients had Lanz Incision followed by McBurney's in 24%, Paramedian and Midline incisions were found in 12% each. One patient with McBurney's incision had an incisional hernia.

Time interval between appendectomy and readmission varied widely in this study i.e. 1 to 45 years, but most of the patients were readmitted within 1 year. A similar study by REB Anderson et al at Ryhov hospital Sweden⁷ showed the risk of surgically treated small bowel obstruction after open appendectomy was highest within 1 year after appendectomy which is comparable with our study.

Another study by Einar Arnbornsson MD and associates showed that the danger of intestinal obstruction persists for a very long period after appendectomy. The time elapsing between the appendectomy and occurrence of small bowel obstruction because of adhesions varied from 4 to 9 years.⁷ This is supported by previous studies.

Plain X-ray abdomen - erect view and Abdomen USg were done for all patients. Twenty patients i.e. 40% showed multiple air fluid levels with small bowel obstruction. Out of this 13 patients needed surgical intervention. The plain X-ray is crucial in that if the dilatation is gastric or colonic, then the problem is rarely mechanical and if the distension is

largely of the small bowel with paucity of colonic gas then the diagnosis is almost always mechanical ⁴

USG abdomen showed features of small bowel obstruction with ascites in 17 patients, ileocaecal mass was confirmed in 2 patients and mild ascites was confirmed in 6 patients. 24 patients had normal USG abdomen. Three patients had multiple renal calculi.

In this study of 50 patients with post appendectomy abdominal pain 20 patients were diagnosed with acute small bowel obstruction and 15 patients were diagnosed with adhesive colic. Among these 20 patients 13 required surgery admission, with 11 emergency and 2 elective surgeries. Pomata M⁸ in a report on a series observed over 14 years consisting of 63 patients (71 cumulative hospital admissions) found that Surgery was required in 42 cases (59.2%), 23 cases were treated in emergency and 19 cases after failure of conservative treatment. Majority of the surgeries were for small bowel obstruction due to adhesion and bands. In 8 patients adhesiolysis were done, 2 patients underwent small bowel resection and anastomosis for skip lesion and stricture of ileum and 2 patients underwent right hemicolectomy for ileocaecal Tuberculosis and Crohn's disease. Most of the adhesions were between ileum and scar of the abdominal wall-5.

All patients had multiple adhesions from scar tissue of the abdominal wall to other structures like omentum jejunum and uterus.

The study divided the group into two-early appendectomy group (those who underwent surgery within 48 hrs of onset of abdominal pain) and a late appendectomy group (those who underwent appendectomy after 48 hours of onset of pain) Out of the 55 patients 33 came under the early appendectomy group and included 5 cases of small bowel obstruction and 14 cases of Adhesive colic. None of them needed surgical intervention on admission and were treated conservatively. Seventeen patients came under late appendectomy group and included 15 cases of small bowel obstruction 1 case of adhesive colic and 1 case of hernia. Out of these 13 patients that is 76.47% needed surgical intervention on admission. Only 4 patients could be treated conservatively. This study reveals an increase in rate of complications and morbidity of those patients who came under the late appendectomy group. The study also revealed that the early appendectomy group the postoperative adhesions responded well to conservative treatment.

In a similar study by J Wilson⁹ in one hundred and ninety-three patients showed that patients who waited longer for surgery had a significantly higher post-operative complication rate, greater use of antibiotics, and longer stay in hospital.

37 patients who underwent conservative treatment and out of this 30 were discharged within a week of admission and the rest were discharged within 1-2 weeks Out of the 13 patients who underwent surgical intervention only 3 could be discharge within-2 weeks. 5 patients were discharged within 2-3 weeks and 3 after 3 weeks. Two patients were discharged after 1 month.

Histopathological report was available only in 20 cases of the 50 patients studied among these 17 patients had gangrenous perforated appendicitis and out of this 17 patients 11 patients required surgical intervention. Adhesion formation is part of the innate peritoneal defence mechanism in peritonitis.¹⁰ In 13 patients the HPR was acute appendicitis with serositis and these patients were treated conservatively. 3 patients had no evidence of active inflammation and were treated conservatively. 2 patients with granulomatous appendicitis underwent right hemicolectomy. These results showed that it is infection and mechanical trauma that cause adhesions and the best way of preventing formation of adhesion is to attack these two factors.⁵ Study by Zbar RI¹¹ showed that anatomical position and/or the likelihood of perioperative infection associated with open, abdominal surgery plays a significant role in subsequent adhesion formation and development of Small Bowel Obstruction. The frequency of small bowel obstruction is highest in the group of patients operated on for gangrenous or perforated appendicitis. The infectious part of it can be handled by extreme careful handling of infectious material during the operation and by treating the infectious foci before they lead to peritonitis. In a similar study by Andesson et al⁶ the highest risk was found after operation for other diagnoses (adjusted hazard ratio 5.2 (95 per cent confidence interval 4.6-5.8)), followed by operation for perforated appendicitis (adjusted hazard ratio 3.5 (3.1-3.8)), non-specific abdominal pain (adjusted hazard ratio 2.6 (2.3-3.0)) and mesenteric lymphadenitis (adjusted hazard ratio 2.4 (2.0-2.8)) compared with operation for non-perforated appendicitis.

The high frequency of intestinal obstruction after an appendectomy of a normal appendix can be explained by mechanical trauma. The surgeon once finding a normal appendix in a symptomatic patient will try searching for some explanation of patients' symptom leading to damage of peritoneum. Sparing the peritoneum from infection and mechanical trauma is a reliable means for preventing adhesions.^{6,3}

Koepsell et al¹² found that age and duration of symptoms were strong predictors of perforation. In young adults a perforation rate of about 25% was seen if symptoms were present for at least 30 hours. In children and adults aged above 50 these perforation rates were seen after 10 to 20 hours. In many cases patient reports to surgeon with advanced disease. A crucial factor is the time elapsed from the onset of pain. If a given surgical practice has a perforation rate under 10% with a negative appendectomy of 30% then that center is performing well.

A practice with perforation rate of 30% and negative appendectomy rate of 5% only then that centre may not be aggressive enough in surgically managing patients with suspected appendicitis even though the normal appendectomy rate is viewed favourably in regard to quality assurance.

An aggressive surgical practice to patients with suspected appendicitis is often warranted.

The overall complication rate in patients suspected of having appendicitis improved when the rate of perforated appendicitis is lowered even if this meant raising the negative appendectomy rate.

It has been recently shown that patients with negative appendectomies have an increased inflammatory response in the appendix as well as in the peripheral blood. An increased inflammatory response has also been shown among patients who are prone to develop peritoneal adhesions. This suggest that an inflammatory response may be common etiological factor both for pain that lead to the negative exploration and to peritoneal adhesions The increased risk of bowel obstruction after negative appendectomy may therefore be attributed to patient related factors and not only to the surgical technique⁴

Do's

1. Clinical assessment by an experienced surgeon is the best way in diagnosing acute appendicitis.
2. In equivocal cases we can depend on the Ultrasound scan abdomen and other lab investigations.
3. In diagnosed case of appendicitis early surgical intervention is needed especially in case of children and old age patients because in these cases there is increased chance of early perforation and peritonitis.
4. Perfect haemostasis, minimal tissue handling anti grade appendectomy appendicular stump inversion etc., can reduce the chance of adhesion formation.
5. Good surgical techniques, minimal peritoneal injury, use of atraumatic instruments, starch free gloves, less reactive sutures etc., can also minimize adhesion formation.

DON'TS

1. Early surgical intervention in doubtful or equivocal cases of appendicitis especially in female patients leading to increased rate of negative appendectomy.
2. Unnecessary handling of intestines and other visceral organs leading to serosal and peritoneal injury.
3. Extensive dissection and exploration.
4. Tissue trauma, bacterial contamination and spillage of infected material into peritoneal cavity.
5. Blood clots and foreign bodies in peritoneal cavity.

CONCLUSION

1. In this study of 50 patients readmitted for post appendectomy abdominal Pain 35 i.e. 70% had adhesions.
2. Out of the 35 patients with adhesions, 20 had small bowel obstruction due to adhesions and bands.
3. In this study, 1/4th of the patients required surgical intervention.

4. Out of 20 patients with small bowel obstruction, 13 required surgery. Of these, adhesiolysis was done in 8, resection anastomosis in 2, Right hemicolectomy was done in 2, and hernia repair in 1.
5. In early appendectomy group (surgery within 48hrs.), adhesions responded to conservative treatment which shows adhesions were less aggressive in them.
6. In late appendectomy group (i.e. surgery after 48 hours) with perforated appendicitis, negative appendectomy group and extremes of age, aggressive adhesions occurred leading to surgical intervention.

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