

Intestinal obstruction from adhesions—how big is the problem?

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Apart from one post-mortem study, the incidence of adhesions following laparotomy has not been well documented.

1. In a prospective analysis of 210 patients undergoing a laparotomy, who had previously had one or more abdominal operations, we found that 93% had intra-abdominal adhesions that were a result of their previous surgery. This compared with 115 first-time laparotomies in which 10.4% had adhesions.

2. Over a 25-year period, 261 of 28 297 adult general surgical admissions were for intestinal obstruction from adhesions (0.9%). Of 4502 laparotomies, 148 were for adhesive obstruction (3.3%).

3. Over a 13-year period all laparotomies were followed up for an average of 14.5 months (range 0–91 months). From these 2708 laparotomies, 26 developed intestinal obstruction due to postoperative adhesions within 1 year of surgery (1%). Fourteen did so within 1 month of surgery (0.5%).

4. The majority of the operations producing intestinal obstruction were lower abdominal, principally involving the colon.

The volume of general surgical work from adhesions is large and the incidence of early intestinal obstruction is high.

The percentage of intestinal obstructions which are due to adhesions is well documented. The proportion of patients having abdominal surgery that develop intra-abdominal adhesions is unclear. Only one previous study, performed on autopsy material, has addressed this problem (1). The true proportion of patients that go on to develop intestinal obstruction from adhesions after their abdominal surgery has never been adequately assessed

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and may never be accurately known. It is well known that some procedures have a higher risk of postoperative adhesive obstruction (particularly incriminated are appendectomy and large bowel surgery (2,3) and that a large proportion of these obstructions occur within 1 month of the surgery. The timing of intestinal obstruction beyond this period has not previously been investigated.

In order to try and assess the incidence of postoperative adhesions, the proportions which produce obstruction and the magnitude of work thus generated, we attempted to answer the following questions:

- 1 What percentage of abdominal operations result in adhesions?
- 2 What is the workload produced by adhesions in terms of proportions of admissions and laparotomies for adhesive obstruction?
- 3 What is the time relationship between the laparotomy and the onset of obstruction?
- 3 Which operations are more likely to produce intestinal adhesive obstruction?

Method and results

All adult patients, over the age of 16 years, under the care of the Academic Surgical Unit of Westminster Hospital were studied. The term 'laparotomy' refers to a formal exposure of the peritoneal cavity through a midline, paramedian or Kocher's incision and does not include lesser incisions, ie for appendectomy.

Incidence of adhesions following surgery

Method

A series of 210 patients undergoing a laparotomy, who had previously had one or more abdominal operations,

Table I. Frequency of surgery and appearance of adhesions. Findings at 210 reoperations

Previous operations	n	Post-surgical adhesions	No adhesions	Non-surgical adhesions
1	150	137	11	2
2	36	35		1
3	19	18	1	
4	2	2		
6	1	1		
8	1	1		
9	1	1		
Total	210	195	12	3

were examined prospectively over the period from January 1984 to December 1987. At full laparotomy, a note was made of the presence of intra-abdominal adhesions, their site and likely cause. The nature of the previous surgery and the initial pathology were recorded. In addition, a consecutive series of 115 first-time laparotomies were also similarly examined over the first 8 months of the study as controls.

Results

Twelve of 115 patients undergoing first-time laparotomies were found to have adhesions (10.4%). Of these 12 patients, 11 were considered inflammatory; eight from their primary pathology, three from incidental pathology and one was considered to be congenital.

Of the 210 patients who had previously had surgery, 195 (93%) were found at laparotomy to have intra-abdominal adhesions that were attributable to their previous surgery (Table I). Twelve patients had no adhesions (11 with one previous procedure and one with three), two had adhesions due to their current disease alone and one had adhesions that were considered to be congenital. Seven of the 12 with no adhesions had undergone previous appendectomy and three had undergone gynaecological procedures through a Pfannenstiel incision (two low segment caesarean sections). The commonest sites for adhesions were from the omentum to the back of the wound. The distribution of adhesions is shown in Table II.

Table II. Distribution of adhesions at subsequent laparotomy. Findings at 210 reoperations

Adhesion site	Number of occasions
Omentum to scar	170
Site of surgery alone	57
Omentum to site of surgery	47
Small bowel to scar	42
Small bowel to site of surgery	33
Small bowel to small bowel	17
Other	31

Workload produced by adhesions

Method

All adult admissions to the surgical unit from January 1964 to December 1988 were reviewed for numbers of admissions with the diagnosis of intestinal obstruction from any cause and intestinal obstruction due to adhesions. The proportion of these patients that required surgery was recorded, as was the total number of admissions and the total number of laparotomies performed for any reason.

Results

Over the 25-year period 28 297 adult patients were admitted. The number of laparotomies performed was 4502. A diagnosis of large or small bowel obstruction from any cause accounted for 514 admissions (1.8% of admissions). Of these, 261 were due to adhesions (0.9% of all admissions, 51% of cases of obstruction).

A total of 148 admissions for adhesive obstruction required laparotomy and division of adhesions (3.3% of all laparotomies, 29% of all cases of obstruction), while 113 were treated conservatively. Of the remaining small and large bowel obstructions from other causes, 211 (83%) required surgery.

Timing of obstruction

Method

Since January 1976 all laparotomies performed on the surgical unit have been studied prospectively. An accurate record has been kept of information including the initial diagnosis, the operative procedure, postoperative complications and their timing.

From January 1976 to December 1988 2708 major laparotomies were performed. Follow-up has been for a mean period of 14.5 months (range 0–91 months) with 94% follow-up at 1 month and 76% at 1 year.

Results

Of the 2708 laparotomies, 86 were performed for intestinal obstruction from adhesions.

Adhesions were considered to be congenital in four (4.7%); inflammatory in two (2.3%); and postsurgical in 80 (93%). Thirty-one patients presented within 1 year of surgery (39%). The distribution of time following surgery is shown in Table III.

Among these 31 patients with adhesive obstruction developing within 1 year of the initial laparotomy, 26 were actually patients who had their initial laparotomy on the surgical unit (0.96% of all laparotomies). Of these 26, 14 developed obstruction within 1 month of their initial operation (0.52% of all laparotomies).

Table III. Time to obstruction from postoperative adhesions

Time from surgery	Number
<1 month	17 (21.25%)
1 month-1 year	14 (17.5%)
1-5 years	17 (21.25%)
5-10 years	5 (6.25%)
>10 years	17 (21.25%)
Unknown	10 (12.5%)
Total	80

Type of surgery producing obstruction

Method

From January 1976 to December 1988, all patients who were operated upon for adhesive obstruction were analysed. Hospital records were reviewed in each case.

Results

The type of surgery originally performed is shown in Table IV. A high proportion of these involved the left side of the colon or rectum (25%). Other common procedures were: appendicectomies (15%), gynaecological operations (14%) or total colectomies (9%). Sixty-one patients had operations involving the peritoneal cavity below the transverse mesocolon (76%). Eleven had surgery above the transverse mesocolon (14%), four of which had generalised peritonitis at operation.

Discussion

Weibel and Majno (1), in an autopsy study of 752 cadavers, found an incidence of adhesions of 67% in those that had undergone previous abdominal surgery.

Table IV. Type of previous surgery producing adhesive intestinal obstruction

Original surgery	Number
Appendicectomy	12
Rectal surgery	12
Left colon	8
Total colectomy	7
Gynaecological	11
Right colon	4
Cholecystectomy	4
Perforated duodenal ulcer	4
Unknown	8
Others	10
Total	80

This figure rose with the severity of the surgery and the number of previous operations. Of cadavers with no previous surgery, 28% were found to have intra-abdominal adhesions of either inflammatory or congenital origin. We found a much higher proportion of patients with postoperative intra-abdominal adhesions (93%) and less with inflammatory or congenital adhesions alone (10.4%).

The proportion of these patients that might progress to intestinal obstruction over the years is impossible to assess accurately, although it is well known that the proportion of all cases of small bowel intestinal obstruction due to adhesions may be as high as 74% (4).

We have demonstrated that, over a 25-year period, the proportion of general surgical, adult admissions due to adhesive obstruction was 0.9% and that 3.3% of all laparotomies were for adhesions causing obstruction. Bevan (5) has reported an approximate figure of 1.5% of all admissions being for intestinal obstruction from any cause, although the number due to adhesions is not stated. He also reported an increasing number of admissions from adhesive obstruction over a 15-year period.

Stewart *et al.* (6) found that postoperative intestinal obstruction occurred within 4 weeks in 0.69% of 8098 patients who had undergone abdominal surgery (0.63% from adhesions) but did not follow the patients beyond 1 month. In the present study, of 2708 adult laparotomies, the incidence of adhesive obstruction requiring surgery was 0.52% at 1 month which rose to 0.96% at 1 year.

We found that operations accounting for the majority of early postoperative adhesive obstructions were large bowel, rectal, appendiceal and gynaecological surgery, confirming the findings of others (2,3,6-9). The high number of obstructions after appendicectomy must reflect the fact that this is a commonly performed operation and not that appendicectomy is particularly prone to producing obstruction. Surgery below the transverse mesocolon accounts for the majority of operations subsequently producing adhesive obstruction. The likelihood of obstruction occurring following an elective upper abdominal operation is much less. This has also been suggested by Stewart *et al.* (6).

In our series of 80 patients with postoperative adhesive obstruction, 39% occurred within 1 year of abdominal surgery and 21% within 1 month, though 21% occurred more than 10 years after their preceding surgery.

Following division of adhesions, recurrence of intestinal obstruction may be as high as 32% (10). Despite the near certainty that almost all abdominal surgery produces adhesions, the present high, and increasing, incidence of postoperative adhesive obstruction and its high recurrence rate following lysis of the adhesion, there is currently no effective treatment of adhesions that prevents their recurrence. Recent work on the pathogenesis of adhesions has implicated reduced levels of plasminogen activator, within the damaged peritoneum, as the underlying defect producing adhesions (11,12). This has led to the successful experimental use of tissue plasminogen activator in our laboratory as an effective preventative of adhesion reformation (13).

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Notes on books

Lasers in Gastroenterology: International Experiences and Trends edited by J F Riemann and C Ell. 164 pages, illustrated. Georg Thieme Verlag, Stuttgart. 1989. DM128. ISBN 3 13 720501 8

Although first suggested by Einstein in 1917, it was not until 1960 that the first working laser was built. Since then a variety of different types have been devised and their clinical application has been increasing steadily. This well-illustrated handbook summarises the present use of lasers in the field of gastroenterology. Easy to read and up to date (many 1987 references and some 1988) this volume can be recommended to all those wishing to keep abreast of a rapidly advancing field.

Dermabrasion and Chemical Peel: A Guide for Facial Plastic Surgeons by E Gaylon McCollough and Philip R Langsdon. 115 pages, illustrated. Thieme Medical Publishers Inc., New York. 1988. DM88. ISBN 3 13 729001 5

Numerous before and after photographs illustrate this text on dermabrasion and chemexfoliation. The first of these techniques is used especially for acne scarring while the chemical technique (using a solution of 88% phenol with croton oil) is particularly indicated for wrinkled sun-damaged skin as well as freckles. The authors hope that 'the contents of this book shall provide the foundation for the surgeon-artist to practise his or her profession with greater insight and improved skills'!

The Medical Consultation Handbook by Bradley B Kayser. 260 pages, paperback. Yearbook Medical Publishers Inc., Chicago. 1989. £14.50. ISBN 0 8151 4985 9

A small pocketbook for house officers. There are four sections: preoperative medical evaluation; nutritional support; the surgical patient with neurological disease and the medical problems of pregnancy.

Neurosurgical and Medical Management of Pain: Trigeminal Neuralgia, Chronic Pain and Cancer Pain edited by Ronald Brisman. 205 pages, illustrated. Kluwer Academic Publishers, Boston. 1989. £53.25. ISBN 0 89838 405 2

Neurosurgical intervention is usually reserved for those patients who continue to have agonising pain in spite of extensive non-surgical management. This book details the use of neurosurgical techniques in trigeminal neuralgia, cancer, and chronic pain caused by non-malignant conditions. There is a good introductory chapter on the neuroanatomical, neurophysiological and neurochemical basis of pain.

Carcinogenesis and Dietary Fat edited by S Abraham. 492 pages, illustrated. Kluwer Academic Publishers, Boston. 1989. £77.00. ISBN 0 7923 0117 X.

Twenty-five chapters provide a critical review of the literature concerning the possible roles played by dietary fat in carcinogenesis. Each contributor addresses critical gaps in current knowledge and identifies the most promising areas of research in this field. A highly specialised volume of interest principally to research workers.