Intraabdominal and Postoperative Peritoneal Adhesions

Harold Ellis, CBE, FACS (Hon), FRCS
London, England

Until the introduction of anesthesia and then antisepsic surgery allowed laparotomy to become a comparatively common and comparatively safe procedure in the 1880s, intraabdominal adhesions were an uncommon phenomenon and of little, if any, interest to surgeons. You will not find mention of them in the standard surgical textbooks up to that time.

In contrast, adhesions from inflammatory disease within the peritoneal cavity were well recognized at autopsy. For example, Thomas Hodgkin, in 1836, commented on the matted bowel found at autopsy in patients with tuberculous peritonitis and also on the tendency of adhesions to occur in the lower abdomen in patients dying of pelvic sepsis.

With the advent of the era of abdominal surgery, deaths from postoperative adhesive obstruction began to be reported. The first I have come across was by Thomas Bryant, of Guy’s Hospital, London, in 1872; he described a fatal case of small bowel obstruction from a band formed after removal of an ovarian cyst. The first account of a laparotomy for adhesive obstruction I have traced was reported in the Lancet in 1883 by William Battle, then a surgical registrar at St Thomas’s Hospital, London. The patient, a 43-year-old woman, had bilateral ovarian tumors removed 4 years earlier.

She was admitted with intestinal obstruction, was found at laparotomy to have matted adhesions of terminal ileum to the region of the cecum, and had a terminal ileostomy performed. Sadly, she died 3 weeks later. Reading the careful notes, it appears likely that with modern intravenous nutrition, nasogastric suction, and antibiotic administration, she might well have recovered.

Up to the 1930s, strangulated hernias accounted for the majority of small bowel obstructions. In more modern times, as elective repair of hernias becomes standard treatment, and abdominal surgery so common, adhesive obstruction accounts for about three-quarters of all cases of small bowel occlusion. Interestingly, in the Third World, where abdominal surgery is fairly uncommon and patients usually do not report their groin hernias until they strangulate, the situation is reversed; strangulated hernias are common, and adhesive obstruction is rare.

Since the beginning of the 20th century, truly enormous attempts have been made to prevent the formation of postoperative adhesions. Today, there are thousands of references on both the clinical and laboratory aspects of this problem, which now represents a considerable burden on our health services.

Attempts to prevent postoperative adhesions can be classified into:

A. Prevention of fibrin deposition, using citrate, heparin (both topically and systemically), and dicumoral. Deaths from hemorrhage were reported in animals under laboratory conditions, and, more alarmingly, there were examples of bleeding and even deaths in patients given intraperitoneal heparin.

B. Removal of fibrin exudates between damaged surfaces. Attempts have been made to wash away or dilute the fibrin using saline, hypertonic dextrose, and other solutions, or to digest or remove it with pepsin, trypsin, streptokinase, and streptodornase. Tissue plasminogen activator has been shown to be highly effective in a rabbit model, but there have been no clinical reports of its use to date.

C. Separation of surfaces. A wide range of materials has been used to separate surgically traumatized viscera. Each, in the past, had its advocates, proceeding even to clinical use, but most have later been shown to be noneffective, or even to increase the problem. Materials used in the past included saline, Ringer’s solution, dextran, gelatine, olive oil, paraffin, silicones, plasma, lanoline, polyvinyl pyrrolidone, and an amazing variety of membranes—amnion, fish bladder, carp peritoneum, calf peritoneum, oiled silk, silver or gold foil, and free grafts of omentum. Of these barriers, only a membrane composed of hyaluronic acid and carboxymethylcellulose was shown to reduce adhesion formation in a clinical prospective randomized trial. More recently, a solu-
tion of icodextrin has reduced adhesion formation after laparoscopic gynecologic operations in a pilot study.8

D. Inhibition of fibroblastic proliferation. Attempts to prevent the conversion of fibrinous adhesions into established fibrous tissue have included studies of antihistamines and steroids given topically and systemically. The conflict between the need for the surgical wound to heal and the prevention of unwanted fibrous adhesions was shown by studies using fluorouracil in rats. With a high dosage of this drug, complete inhibition of adhesions to the crushed cecum could be demonstrated. The abdominal wound failed to heal, and gangrene occurred at the site of the cecal crush.

These two articles from the 1920s, which are the subject of this commentary, are quite typical of the comparatively early studies on adhesions. Deaver, in the 1923 article, reviews the concept that it is peritoneal inflammation and trauma that are the important etiologic factors in the formation of these structures. He wisely doubts the efficacy of the various membranes and solutions advocated at that time in the hope of separating effectively the traumatized bowel surfaces.

The Williamson and Mann article of 1922 is representative of the vast number of articles reporting experimental studies of adhesion prophylaxis classified previously. Using dogs, they applied a mixture of gelatin and gum acacia to their model of gauze abrasion of the liver. Although no figures were given, the authors claimed “the results on the whole have been satisfactory.”

In these days of statistical appraisal, prospective randomized double-blinded trials, anonymous reviewers, and so on, this is hardly the conclusion that would be allowed by the editors of today’s Journal of the American College of Surgeons.

REFERENCES