



## Review

## Abdominal adhesions: A practical review of an often overlooked entity

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## HIGHLIGHTS

- Abdominal adhesions commonly form after intra-abdominal surgery, radiation, and inflammatory processes.
- In a subset of patients, adhesions lead to problematic symptoms such as abdominal pain, bloating, and bowel obstruction.
- Symptomatic adhesions (i.e. adhesive disease) can be diagnostically elusive and thus under-recognized by physicians.
- Adhesive disease often requires multimodal evaluation; in select patients, operative intervention can be diagnostic and therapeutic.

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## ABSTRACT

Formation of intra-abdominal adhesions is a common consequence of abdomino-pelvic surgery, radiation therapy, and inflammatory processes. In a small but clinically significant proportion of patients, adhesive disease may develop, wherein adhesions lead to a variety of chronic symptoms such as abdominal distension, pain, nausea, and abnormal bowel movement pattern which can be daily, intermittent, or episodic. Due to the chronic and troublesome nature of these symptoms, adhesive disease may be life-altering in many patients, particularly when not recognized and appropriately addressed, as is the case not infrequently. In addition, there is a paucity of literature regarding the evaluation and management of patients with suspected abdominal adhesive disease. Therefore, in this concise review, we provide a clinically practical synopsis of the etiopathogenesis, symptoms, differential diagnosis, evaluation, and treatment of abdominal adhesive disease.

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## 1. Introduction

Abdominal adhesions are fibrous bands that span two or more intra-abdominal organs and/or the inner abdominal wall (i.e. peritoneal membrane) which typically form after abdominal surgery. Adhesions may also form secondary to inflammatory conditions of the abdomen in the absence of prior abdominal surgery or as a sequela of abdomino-pelvic radiation. Although the majority of patients with intra-abdominal adhesions remain asymptomatic, a clinically significant subset of patients will develop “adhesive disease”, a symptomatic state ranging from mild and/or vague to highly distressing and even life-threatening symptoms [1,2].

Considering the fact that adhesions have no characteristic laboratory features and are not readily visible by currently available imaging methods, many cases of adhesive disease will go undiagnosed for prolonged periods of time, causing medical providers to find themselves in a diagnostic and therapeutic quandary. Patients, consequently, after extensive non-diagnostic testing and empiric treatments, may not only experience protracted symptoms and adverse medical outcomes, but can also suffer from significant emotional distress or demoralization, which in turn may be misdiagnosed as depression, anxiety, or a functional bowel disorder.

In this focused clinical review, we discuss the etiopathogenesis, symptoms, differential diagnosis, evaluation, and multi-modal management of abdominal adhesions and adhesive disease.

## 2. Etiopathogenesis of adhesions

The mechanisms of adhesiogenesis are not well understood but are believed to involve mesothelial surface disruption with subsequent fibrinocoagulative and inflammatory signaling processes [3]. Etiologic causes of adhesions can generally be organized into the following categories (in addition to congenital adhesions, which are not discussed herein):

1. Post-surgical: Nearly 90% of abdominal adhesions form as a result of prior abdominal surgery, primarily laparotomy (i.e. open surgery) and to a much lesser extent laparoscopic surgery [4,5]. In one study, intra-abdominal adhesion formation was noted intraoperatively in 95% of patients who had previously undergone laparotomy [6]. The indications for the initial laparotomy in said study were broad, ranging from gastrointestinal (GI) tract malignancy, benign small bowel disease, complicated appendectomy, cholecystectomy, hysterectomy, or ectopic pregnancy. The extent of adhesions seemed to correlate with the severity/extent of the underlying initial process. Fortunately, the incidence of significant adhesions has decreased considerably in the era of laparoscopic surgery, with approximately only about 5% of such cases subsequently developing adhesive disease.
2. Post-inflammatory or infectious: Endometriosis and pelvic inflammatory disease are the most common etiologies of non-surgical adhesions in women. Other etiologies affecting either sex include diverticular disease (particularly of small bowel), Crohn's disease, and abdominal tuberculosis (in endemic areas).
3. Post-radiation: Abdominopelvic radiation used for treatment of a variety of malignancies, including gynecologic, prostatic, rectal, or lymphoproliferative diseases, can cause adhesions as a late sequela, the severity of which depends on the anatomic

extent of the area treated, the degree of dose fractionation, and the total dose of radiation [7]. Post-radiation adhesions can be particularly challenging to manage due to their extent and density and the compromised nature of the underlying tissues (e.g. chronically ischemic or friable).

## 3. Symptoms of abdominal adhesive disease

Given the firm and fibrotic nature of adhesive bands, they have the potential to interfere with the normal intestinal motility and transit processes, among other physiologic functions. It remains unknown what proportion of patients with abdominal adhesions become symptomatic (i.e. have adhesive disease, as opposed to solely having asymptomatic adhesions) and in what proportion of such patients symptoms are directly due to the adhesions. Symptoms attributable to adhesive disease are non-specific, and with the paucity of sensitive/accurate diagnostic tests, patients are often undiagnosed. Further complicating the symptomatology and evaluation of adhesive disease is that the location of associated abdominal pain might be referred and thus may or may not correlate with the anatomic area involved by adhesions.

In general, any of the following may be seen in association with/ due to intra-abdominal adhesions:

- Chronic (persistent or intermittent) bloating.
- Abdominal cramping and borborygmi.
- Altered bowel habits, including constipation or frequent loose stools (e.g. from development of small intestinal bacterial overgrowth).
- Nausea with or without early satiety.
- Bowel obstruction, which may be transient, partial, or complete (and may cause the aforementioned symptoms).
- Female infertility and dyspareunia.
- Rectal bleeding and dyschezia (i.e. painful defecation) during menses, which typically indicate colorectal involvement of endometriosis [8].

In addition, many patients, particularly if their symptoms are unpredictable, go undiagnosed, and/or without effective treatment, can develop adjustment disorder and demoralization, which may erroneously point toward functional bowel disorders such as irritable bowel syndrome.

## 4. Differential diagnosis

Given the nonspecific symptoms and clinical presentation of adhesive disease, as mentioned above, the differential diagnosis may become extensive. The diagnostic approach should be step-wise, methodical, and comprehensive, and clinical suspicion should be high in patients with known risk factors for adhesion formation. Considerations include the following:

- Lactose intolerance: Approximately 30–40% of the general population is lactose intolerant; therefore, it is reasonable to start with an empiric trial of lactose-free diet for 7–10 days among those whose primary symptoms are bloating or loose stools. This will help to determine what component of a

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