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Gastroenterological causes of pelvic pain

Abstract Chronic pelvic pain is a common condition, which accounts for up to 10% of gynecological consultations and for over a third of diagnostic laparoscopies. In addition to gynecological etiologies for the pelvic pain, the physician must also consider gastroenterological, urological, and neurological disease as a possible basis for the pain. This article discusses the major gastroenterological causes of pelvic pain.

Chronic pelvic pain is a common condition, experienced by around 14% of women at some time in their lives [62]. The irritable bowel syndrome (IBS) is the most common gastroenterological cause of chronic pelvic pain, with symptoms of IBS present in approximately 50% of women presenting to gynecological clinics with chronic pelvic pain [29, 49, 62, 63]. Other common gastroenterological causes of chronic pelvic pain include inflammatory bowel disease, intestinal endometriosis, abdominal hernias, diverticular disease, colorectal carcinoma, and chronic appendicitis. These and other less common gastroenterological causes of pelvic pain will be discussed in the following pages.

Irritable bowel syndrome

Symptoms of IBS, including abdominal pain and discomfort, bloating and disturbed bowel habits (diarrhea or constipation), are present in up to 22% of the population [16]. Women are nearly twice as likely to be troubled by IBS as males and nearly three times more likely than males to seek medical attention [17]. IBS tends to be more commonly reported in younger people.

IBS symptoms usually fluctuate over time. In two series, between 50 and 62% of people with symptoms of IBS reported having similar symptoms on a follow-up questionnaire survey 1 year later [1, 58]. IBS pain is typically described as a cramping pain in the lower abdomen or pelvis. Food, bowel movements, and stress are common relievers or exacerbators of IBS pain. IBS pain can be difficult to differentiate from other gynecological causes of chronic pelvic pain, since menses will exacerbate IBS pain in approximately 50% of IBS patients [41]. The mechanisms whereby menses affect IBS symptoms are not completely understood, but progesterone and prostaglandins appear to be major contributors. For example, it has been well documented that progesterone affects the gastrointestinal tract by reducing the lower esophageal sphincter pressure and by delaying gastric emptying and gastrointestinal transit. In addition, patients with IBS have been shown to have an exaggerated colonic response to the prostaglandins (PGE2 and F2 α) released during menstruation. Interestingly, emotional or psychological factors, which have commonly been implicated, do not appear to explain the relationship between IBS symptoms and menses [13].

Most patients with IBS have other gastrointestinal symptoms, which help distinguish IBS from other non-gastrointestinal causes of pelvic pain. These symptoms include incomplete rectal evacuation following bowel movements, mucus in the stool, bloating or distention of the abdomen, excessive flatulence and alteration in bowel habits (diarrhea, constipation, or alternating diarrhea and constipation).

The "Rome II criteria" are currently the standard for diagnosing IBS [15]. These criteria, which were established from a consensus meeting in Rome in late 1990, specify that during the preceding year, a patient should have had more than 12 weeks of abdominal discomfort or pain accompanied by at least two of the following three features: (1) pain or discomfort that is relieved

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following defecation; (2) onset of pain or discomfort that is associated with a change in stool frequency; (3) onset of pain or discomfort that is associated with a change in stool appearance. Supporting evidence for the diagnosis includes: (1) abnormal stool frequency (less than three bowel movements per week or greater than three bowel movements per week); (2) abnormal stool form; (3) abnormal stool passage (straining, urgency, or the feeling of incomplete evacuation); (4) passage of mucus; and, (5) bloating or feeling of abdominal distention. These supporting symptoms are not, however, necessary for making the diagnosis.

Since these symptoms are not specific for IBS, an evaluation for organic disease is required. The extent to which organic disease must be excluded is ultimately based on clinical judgment. The consensus today is that for most patients, a history with physical examination and very limited diagnostic tests are all that are required for an initial evaluation. For most patients over the age of 45 years or patients with warning signs of organic disease (such as rectal bleeding, weight loss, anemia or a family history of colorectal cancer) the initial evaluation should include a colonoscopy or a barium enema and flexible sigmoidoscopy. For patients under the age of 40 years without warning signs of organic disease, the initial evaluation should include a flexible sigmoidoscopy. Additionally, initial laboratory tests should probably include a complete blood count, thyroid stimulating hormone levels, and liver function tests. Patients with loose or frequent stools should also have their stool checked for ova and parasites. Other extensive laboratory, radiologic, or endoscopic procedures should be reserved for patients with refractory symptoms, or for patients in whom the diagnosis is not clear.

Inflammatory bowel disease (ulcerative colitis and Crohn's disease)

Patients with ulcerative colitis and Crohn's disease may present with lower abdominal or pelvic discomfort. It is difficult to estimate the true prevalence of inflammatory bowel disease in patients presenting with pelvic pain, as patients with accompanying gastroenterological symptoms are likely to be referred to gastroenterologists and will not be reflected in obstetrical series. In an obstetrical series of 88 patients presenting with chronic pelvic pain, only one was found to have Crohn's disease at laparoscopy [14]. Thus, pelvic pain as an isolated symptom is a relatively uncommon presentation of inflammatory bowel disease. In a study of 60 women with a diagnosis of IBS and 26 women with established inflammatory bowel disease, chronic pelvic pain was reported significantly more frequently in patients with the irritable bowel syndrome (35%) than in patients with inflammatory bowel disease (13.8%) [63].

Ulcerative colitis is likely to present with symptoms of diarrhea with urgency and tenusmus. The loose stools are accompanied by the passage of blood and mucus. Cramping lower abdominal discomfort, more prominent in the left iliac fossa, may be experienced. This is attributed to increased tension in the inflamed colonic wall during contractions. Around 10% of patients experiencing an acute flare of ulcerative colitis develop an asymmetric nonerosive arthropathy affecting large joints [8]. Arthropathy affecting the hip joint may cause groin discomfort. Ileo-anal pouch surgery following total colectomy may rarely ($< 5\%$ of cases) be complicated by poor pouch function with resultant pelvic pain [30]. Pouchitis occurs in 10–35% of patients following ileo-anal pouch surgery [34] and may result in symptoms of cramping abdominal discomfort accompanied by an increase in stool frequency, urgency, malaise, and fever.

Physical examination in patients with mild to moderate ulcerative colitis may reveal only mild tenderness over the left colon. Blood is usually evident on rectal-examination. Severe disease is accompanied by a systemic disturbance which may include fever and tachycardia. Stool studies should be carried out to rule out an infectious basis for the colitis. Flexible sigmoidoscopy or colonoscopy and biopsy best establish the diagnosis of ulcerative colitis.

Crohn's disease results in segmental transmural inflammation of the bowel wall. Pain is much more likely to be a presenting symptom with Crohn's disease than with ulcerative colitis. Abdominal pain may arise due to one of several processes: transmural bowel inflammation, bowel obstruction due to stricturing disease, or localized perforation with intrabdominal/pelvic abscess formation.

The ileo-cecal region of the bowel is most commonly involved in Crohn's disease and the associated pain is often localized to the right lower quadrant or suprapubic area. Small bowel obstruction may result in colicky periumbilical discomfort. Perianal Crohn's disease occurs in up to a third of patients with Crohn's disease and is associated with the development of anal fissures and fistulae to the perineum, vagina and bladder, all of which may cause lower abdominal or perianal discomfort. Crohn's proctitis may also result in rectal discomfort and tenesmus. Accompanying symptoms include diarrhea, rectal bleeding, low grade fevers and weight loss. Patients are also at risk of bone disease, including pelvic osteomyelitis as a result of fistulizing disease [19], and osteonecrosis affecting the head of the femur [20, 61], both of which may result in pelvic or groin discomfort. The diagnosis of Crohn's disease is best established by a combination of colonoscopy with mucosal biopsy and a barium small bowel follow through, which allows for both a histological diagnosis and charting of the extent of disease.

Diversion colitis

When the fecal stream is diverted by an ileostomy or colostomy, the defunctionalized portion of bowel may

develop chronic inflammation, a condition referred to as diversion colitis [22]. Inflammatory changes are usually confined to the rectum, although less commonly may involve the entire excluded segment. Whereas the majority of patients with biopsy proven diversion colitis remain asymptomatic [18, 22], a small number may present with symptoms of rectal pain, tenusmus, and passage of blood and mucus per rectum [21, 26, 38]. The ideal treatment is restoration of the fecal stream by surgical reversal of the excluded segment if possible. It should also be noted that 5-aminosalicylic acid (5-ASA) and short-chain fatty acid enemas may be helpful in treating this condition when surgical reversal is not an option [59].

Intestinal endometriosis

Endometriosis affects women in their reproductive years, with an estimated prevalence of 10% in the female population [45]. In teenagers experiencing chronic pelvic pain, the incidence of endometriosis is high, at 47–65% [11, 23, 50]. The intestine is involved in 5–37% of patients with endometriosis [3, 51], with bowel adhesions being more common than implants. In a series of 182 patients with endometriosis, sigmoid and small bowel implants were noted in 3.8 and 0.5% of patients, respectively, and sigmoid and small bowel adhesions in 12.1 and 2.2%, respectively [32]. Intestinal endometriosis has a predilection for the recto-sigmoid. In patients undergoing surgery for gastrointestinal endometriosis, the most common site of bowel involvement is the rectum/cul-de-sac (79–91%), followed by the sigmoid colon (31–47%), appendix (9–17%), small bowel (5–13%), and other colonic sites (2%) [4, 60].

Intestinal endometriosis is usually asymptomatic. However, patients may complain of pelvic or abdominal discomfort related to bowel obstruction. In patients undergoing bowel surgery for gastrointestinal endometriosis, the most frequent site of discomfort is pelvic pain, occurring in 69–85% of patients, followed by rectal (52–68%), abdominal (59%,) and back pain (21%) [4, 60]. Abdominal pain due to intestinal endometriosis may be noncyclical. Hematochezia, often cyclical, is seen in 21–33% of patients with bowel involvement [4, 12, 60]. Additional symptoms may include narrowing of stool caliber, diarrhea, and tenesmus. Around a third of patients with intestinal endometriosis also complain of dysmenorrhea and dyspareunia [60].

Complete obstruction of the bowel lumen due to endometrial deposits is very rare, occurring in less than 1% of cases, and adhesions are usually implicated as the cause of pelvic pain. However, this remains controversial. Keltz et al. found that 93% of women undergoing laparoscopy for chronic pelvic pain had colon-to-sidewall adhesions, compared with only 13% of asymptomatic patients undergoing laparoscopy for tubal ligation [35], and that 73% of the symptomatic women had visual evidence of endometriosis compared with only 7% of the asymptomatic controls. Right-sided paracolic adhesions were both more common than left-sided adhesions, and paracolic adhesions were the most common type of intra-abdominal adhesion. The dependent position of the lateral gutters may make them susceptible to deposition and implantation of peritoneal endometriosis. However, Rapkin et al. in a retrospective study, found a similar prevalence of pelvic adhesions in patients with chronic pain and in asymptomatic controls undergoing laparoscopy for infertility [53]. Peters et al. randomized patients with chronic pelvic pain and known pelvic adhesions to either laparotomy with lysis of adhesions or to no surgery. At 9–12 months' follow-up, there was no significant difference between the two groups with regard to symptoms of pelvic pain. Symptomatic benefit from lysis of adhesions was noted only in a subgroup of patients with dense vascularized adhesions involving the bowel [48].

The diagnosis of intestinal endometriosis is based on the history and supported by the finding of tenderness and nodularity in the cul-de-sac, uterosacral ligaments, and adnexa, and adherence of the rectal wall to the cul-de-sac. Endometriosis rarely invades the bowel mucosa, and the only findings on colonoscopy may be mucosal distortion with flattening, puckering, and loss of mobility. Laparoscopy confirms involvement of the bowel.

Abdominal hernias

Groin hernias are estimated to occur in 0.25% of women. Indirect inguinal hernias are the most common type in women, accounting for approximately 70% of groin hernias, followed by femoral hernias, which account for around 30%. Direct inguinal hernias account for only 1–2% of groin hernias in women. Most uncomplicated groin hernias are asymptomatic, or at most cause a mild discomfort, which gradually increases with prolonged upright posture. Incarcerated hernias may produce constant discomfort, and strangulated hernias produce severe pain accompanied by symptoms of bowel ischemia and obstruction. Larger hernias are easily diagnosed clinically, and ultrasound or computerized tomography are useful in the detection of smaller hernias.

Obturator [5, 27, 47], sciatic [39], and Spigelian [40] hernias may also rarely cause chronic intermittent symptoms of pelvic and lower abdominal pain. In a series of 141 patients with chronic pelvic pain, internal hernias seen at laparoscopy were felt to be the cause of pain in two patients (1.6%) [9]. A further series studying patient assisted laparoscopy found hernias in 6% of patients with symptoms of chronic pelvic pain [14]. A very low overall negative finding rate of $< 3\%$ was seen with this patient-assisted procedure, compared to the negative rate of around 35% seen with standard

laparoscopy under general anesthesia. Miklos et al. described their experience with 20 patients with sciatic hernia, presenting with pelvic pain over a 4-year period. The hernias were more often right-sided (14 cases) than left-sided (5 cases), with only one bilateral case. The hernias contained the ipsilateral ovary in all cases with or without the fallopian tube. Following laparoscopic treatment, all patients reported symptomatic relief [39]. Hernias should therefore be carefully looked for in patients complaining of chronic pelvic pain, and surgical repair of all hernia defects should be carried out [10].

Enteroceles arise due to pelvic floor weakness and comprise a herniation of the peritoneal sac between the vagina and the rectum, often containing small bowel or the sigmoid colon. They may result in obstructive defecation and may be associated with symptoms of pelvic discomfort. Diagnosis is established by evacuation proctography, with or without simultaneous peritoneography [28, 55]. A study examined the efficacy of obliteration of the pelvic inlet with a nonabsorbable Mersilene mesh in 20 women with symptomatic enterocele. At a median follow-up of 25 months, none of the patients complained of pelvic discomfort [25].

Diverticular disease

Diverticular disease is a common condition in developed countries, affecting up to 50% of elderly adults [46]. The sigmoid and the descending colon are most commonly affected. Most patients with diverticulosis remain asymptomatic. A small number may present with a variety of symptoms including chronic intermittent lower abdominal discomfort, a change in stool caliber, or alterations in stool consistency. Rectal bleeding may occur in up to 30% of affected patients, with massive bleeding in around 5%, and diverticulitis occurs in up to 25% of patients with diverticular disease. In symptomatic patients, it is important to rule out colorectal cancer, as the presenting symptoms are similar. This is best done by colonoscopy, as barium studies are inaccurate in the presence of severe diverticular disease [6, 7]. In particular, inverted diverticulae may cause confusion with polyps, and areas of stricturing resulting from attacks of diverticulitis may be confused with stenosing colonic tumors.

Colorectal carcinoma

Colorectal carcinoma is the fourth most common cancer diagnosed in the USA today and the second commonest cause of cancer related death. Around 130,000 new cases are diagnosed each year in the USA, and an estimated 57,000 Americans die each year from this tumor. Risk factors for colorectal carcinoma include increasing age, a history of prior adenomas or colorectal cancer, inflammatory bowel disease, a family history of colorectal carcinoma, and the familial syndromes including familial adenomatous polyposis, Gardner's syndrome, Turcot's syndrome, and hereditary nonpolyposis colon cancer.

Several kinds of abdominal and pelvic pain may arise as a consequence of colorectal tumors. Obstructing left colonic tumors may produce colicky abdominal pain, sometimes brought on by meals. Rectal tumors may, in addition, produce symptoms of rectal discomfort and tenesmus. Advanced rectal cancers may invade local structures, including the bladder and vagina to produce fistulae, and may also involve surrounding nerves resulting in pelvic, perineal, and sacral pain. In addition to symptoms of pain or discomfort, the diagnosis should be suspected in patients older than 40 years presenting with symptoms of a change in bowel habit or a change in stool caliber, hematochezia, iron deficiency anemia, or hemeoccult positive stool. Right colonic tumors in particular may present mainly with symptoms related to anemia, as obstructive symptoms are unusual due to the relatively fluid nature of stool in the proximal colon. However, small bowel obstruction may rarely occur as a consequence of cecal tumors in the vicinity of the ileocecal valve. Abdominal examination may reveal a vaguely palpable abdominal mass. Rectal tumors may be detected on rectal examination. Stool should be tested for hemeoccult positivity. The diagnosis of colorectal cancer is best established at colonoscopy, which is more sensitive than a barium enema [54].

Chronic appendicitis

Recurrent appendicitis and chronic appendicitis (symptoms for >3 weeks) are controversial but probably authentic diagnoses. These conditions are rare and account for only a small number of appendectomies. Lee et al. reviewed 1,869 appendectomies done over a 21-year period and found only 11 patients who had complained of recurrent right lower quadrant pain, giving an incidence of 0.6% of appendectomies. Each of these patients had an abnormal appendix at surgery, and 10 of 11 patients had no recurrence of pain following surgery, supporting a diagnosis of recurrent appendicitis [37].

A study prospectively evaluated the benefit of laparoscopic appendectomy in 483 women with chronic pelvic pain, of whom 103 patients had chronic right lower quadrant pain. An appendectomy was performed if the appendix appeared abnormal during laparoscopy. Visualized abnormalities in the appendix included cecal adhesions, endometriosis, and appendicitis. Sixty two of 103 patients (60%) with right lower quadrant pain required appendectomy compared with only 38 of 380 patients (10%) with chronic pelvic pain in areas other than the right lower quadrant. Histological abnormalities were confirmed in only 40% of cases overall and in 48% of cases with right lower quadrant pain. However, 97% of patients with right lower quadrant pain reported complete and immediate relief of symptoms following appendectomy [2].

Rao et al. studied the findings on computerized tomography of the abdomen in 18 cases of recurrent or chronic appendicitis. Findings were similar to those seen in acute appendicitis and included pericecal stranding, appendiceal dilatation >6 mm, apical thickening, associated adenopathy, fecoloths, abscess/phlegmon, and periappendicael fluid [52].

Appendiceal colic

This is a controversial condition, defined as partial luminal obstruction of the appendix without inflammation, resulting in intermittent symptoms of right lower quadrant pain with local tenderness, but with no other peritoneal signs. In a recent study, 26 children determined as having this condition underwent elective appendectomy. The diagnosis was based on a history of recurrent right lower quadrant pain and on contrast studies showing irregular filling, partial filling, or nonfilling of the appendix and/or delayed emptying of the appendix at 72 h. Twenty three of 26 children (88.5%) experienced immediate pain relief and the remaining three children had pain relief within 4 months of surgery [24].

Ischemic bowel

Chronic mesenteric ischemia usually causes symptoms in the distribution of the superior mesenteric artery. The pain of chronic mesenteric ischemia is therefore usually periumbilical or upper abdominal and often precipitated by eating. Ischemia of the colon (ischemic colitis) caused by small vessel disease may result in lower abdominal pain, but is usually an acute process. Cocaine users may, however, develop chronic intermittent lower abdominal pain with or without rectal bleeding due to colonic ischemia related to drug use with vasoconstriction [43]. The diagnosis can be made based on the symptoms, a history of cocaine use, and colonoscopic findings suggestive of ischemia. In a small study on seven patients with cocaine-induced colonic ischemia, colonoscopic findings were limited to the left colon and included a hemorrhagic edematous mucosa, ulcerations, and pseudopolyposis. Rectal involvement, which is unusual in other forms of colonic ischemia, was common in cocaine users and was seen in five of the seven patients [43].

Infectious enterocolitis

Gastrointestinal tuberculosis

Gastrointestinal tuberculosis is a rare disease in developed countries, but should be considered in immigrants from countries with a high prevalence of tuberculosis. The most frequent location of gastrointestinal tuberculosis is in the ileocaecal region [56], where it may result in stenotic bowel [42], mesenteric lymphadenitis [31], or bowel perforation [33]. The usual presentation is with chronic right lower quadrant pain, low-grade fevers, and weight loss. Obstructive symptoms may develop as a consequence of stenotic lesions or intussusception. Physical examination may reveal anemia and a tender mass may be palpable in the right lower quadrant. Colonoscopy may reveal nodular mucosa with areas of ulceration [56, 57], and biopsy with culture may allow the diagnosis to be established. However, the condition is often confused preoperatively with ileocecal Crohn's disease or with colon carcinoma.

Severe constipation associated with pelvic hiatal hernia

Pelvic hiatal hernia is the herniation of bowel through the hiatus of the pelvic diaphragm. Diagnosis is usually established on pelvic videofluoroscopy. In a recent study of 196 patients with severe constipation undergoing major colonic surgery for a pelvic hiatal hernia (44%), colonic inertia (27%), or for both conditions (29%), a high number (69%) had preoperative symptoms of pelvic pain [36]. Associated symptoms included needing to strain excessively at stool (90%), incomplete rectal emptying (85%), painful bowel movements (74%), and incontinence of stool (38%).

Solitary rectal ulcer syndrome

This condition usually affects young women and is thought to result from excessive straining at defecation, resulting in prolapse of and trauma to the anterior rectal mucosa. Patients present with complaints of constipation with excessive straining, anorectal, or pelvic pain [44], and the passage of blood and mucus with defecation. The anterior rectal ulcer is seen on lower gastrointestinal endoscopy, and the diagnosis confirmed on biopsy, which shows characteristic histological changes, including hypertrophy and disorganization of the muscle fibers of the muscularis mucosa, fibrosis of the lamina propria, and mucosal distortion.

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