Sigmoid Volvulus – A Radiological Interpretation

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Citation

Abstract
A volvulus is an abnormal twisting of the bowel on its mesenteric axis greater than 180 degrees [1], which produces an obstruction of the intestinal lumen and mesenteric vessels. Only a satisfactorily long mesenteric axis, as in the case of sigmoid colon, allows this torsion. The predisposing factors for the sigmoid volvulus are indeed the length of the sigmoid colon and the colon distension due to chronic constipation. The trigger factor causing the twisting of the sigmoid colon, maximally distended by the faecal impaction in constipated patients, is a quick emptying of the terminal faecal column portion in the sigma - rectum[2]. The diagnosis of acute sigmoid volvulus is established by clinical and radiological findings. In the majority of patients, a thorough physical examination and abdominal radiographs are adequate to achieve the diagnosis. Typical symptoms include sudden abdominal pain and distension followed by constipation. The most common signs are abdominal tenderness and asymmetrical abdominal distention. Other findings include abnormal bowel sounds, abdominal tympany, a palpable abdominal mass, empty rectum, and dehydration[3]. Plain radiographs are diagnostic in 57% - 90% of patients[4, 5]. The classical sign of acute sigmoid volvulus is the coffee bean sign. Abdominal CT usually reveals a dilated colon with an air/fluid level and the “whirl sign”, which represents twisted colon and mesentery[6]. Nonoperatedetorsion is advocated as the primary treatment choice in uncomplicated acute sigmoid volvulus. Although rectal tubes, barium enemas or rigid sigmoidoscopy have been widely used, flexible sigmoidoscopy is now the preferred nonoperative procedure. Nonoperative treatment is successful in 70% - 91% of cases, with reported complication rates of 2% - 4.7% in geriatric patients[7, 8].

1. Introduction

Disease that was well recognized from ancient days; the name “Volvulus” originates from the Latin (volvere: to twist). Sigmoid volvulus is an acute surgical emergency and the earliest description of this condition dates back to 1500 BC in the Ebers Papyrus which is one of the two oldest preserved medical documents anywhere. The disease is
frequently reported in the “volvulus belt” which includes countries in the Middle East, Africa, the Indian subcontinent, Turkey and South America where it accounts for almost half of all large bowel obstructions. It is the third leading cause of large bowel obstruction in North America and is frequently recognized as a cause of acute abdomen in the elderly and institutionalized patients in the USA and UK. [9][10]. The sigmoid colon is the most frequently reported site of intestinal tract volvulation. [11–14] The symptom triad of constipation, severe abdominal pain, and a distended abdomen is common in patients with sigmoid volvulus. Sigmoid volvulus is responsible for 5% to 7% of all intestinal obstructions and is the third leading cause of large bowel obstruction. [15] In the United States, sigmoid volvulus is classically described as an illness in elderly persons, persons with psychiatric disorders, or persons residing in nursing homes or mental institutions. [16] However, some reports suggest that sigmoid volvulus occurs in younger age groups more frequently than has been reported. [17–20] This report reviews the case of a 46-year-old previously healthy man with sigmoid volvulus. Sigmoid volvulus is a common presentation of bowel obstruction in the elderly age group, thought to arise due to redundancy of the Sigmoid colon [21]. Few cases occurring during pregnancy also have been reported, where enlarging gravid uterus has been implicated in pathophysiology [22]. However sigmoid volvulus is a very rare cause of intestinal obstruction in children. There are only very few reported cases to date [23–32]. We report a case of sigmoid volvulus causing in an 11 year old Sri Lankan child, presenting with intestinal obstruction.

2. Incidence

The sigmoid volvulus incidence is constantly reducing. At the beginning of the XX century, in the Guibé’s record of occurrences[33], volvulus represented 16, 9% of intestinal occlusions. Nowadays its incidence has considerably decreased and sigmoid volvulus is a rare event. Particularly in North America and Europe it represents 3, 7 - 6% of all intestinal occlusions and it usually occurs in elderly patients with a greater incidence in the 8th decade[34]. Conversely in other countries this pathology still shows a higher incidence: 24% in East India[35], 40% in North India [36], 32% in Iran[37], 31% in Zimbabwe [38], 54% in Ethiopia[39], 33% in Sudan[10] and 99% in Nigeria[41]. Although in western countries intestinal obstruction caused by sigmoid volvulus is rare, its mortality remains significant in patients with a late diagnosis[42]. The aim of this work is to assess which are the results of different surgical timings and procedures performed in the different clinical presentations of this disease.

3. Epidemiology

The worldwide incidence of sigmoid volvulus is unknown. In the United States patients with sigmoid volvulus are typically older than age 50 years. These patients are often elderly, have neurologic or psychiatric conditions, or are residents of nursing homes or mental health care facilities. However, there are reports of younger individuals presenting with a medical history of intermittent abdominal pain as a sign of sigmoid volvulus. Internationally, the pediatric age group is the second most affected population in areas of roundworm infestation, such as Africa, Southeast Asia, and the South Pacific. In a review by Ballantyne, [43] sigmoid volvulus was more common in men (64%) and in African Americans (67%). Women are thought to have a lower incidence because of a wider pelvis. Sigmoid volvulus causes 5% to 7% of all intestinal bowel obstructions, with a mortality rate as high as 20% to 25% depending on the time interval from symptom onset to treatment.

4. Etiology

In the United States, a long, redundant sigmoid colon—commonly seen in patients with illnesses such as Parkinson’s disease, multiple sclerosis, spinal cord injuries, and psychiatric disorders—is the major cause of sigmoid volvulus. Inhibition of colonic motility by psychotropic medications as well as the possible inherent colonic dysmotility properties of the primary disease leads to sigmoid elongation. Chronic constipation, most often resulting from the low physical activity levels seen in residents of nursing care facilities, is also a cause of sigmoid volvulus secondary to sigmoid enlargement. Another important etiologic factor is the repetitive use of laxatives, cathartic agents, and enemas. The etiology of sigmoid volvulus in younger patients has been thought to be a congenital megasigmoid with additional stimuli, such as purgation, diet, fecal loading, active peristalsis, or pregnancy. Roundworm infestation is prevalent in more than 1 million persons worldwide and causes sigmoid enlargement secondary to constipation.

5. Radiological Diagnosis

The diagnosis of sigmoid volvulus is made by physical examination and radiographic studies. Abdominal radiographs demonstrate a markedly distended sigmoid colon with a convex superior margin projecting into the right upper quadrant of the abdomen. This section of sigmoid colon is often devoid of haustral markings (Figure). A “coffee bean” or “omega loop” sign has been described on abdominal radiograph. These terms refer to the 2 large compartments of distended sigmoid colon with central double walls of colon and a single outer wall, which assume the shape of a coffee bean or omega loop. Computed tomography scan has been used to rule out other etiologies of obstruction and colonic ischemia in patients with sigmoid volvulus. Contrast enema can be used as a diagnostic study as well as a therapeutic radiographic study that can reduce the sigmoid volvulus and provide immediate relief of the patient’s symptoms. On radiography, a “bird’s beak” sign can be demonstrated at the
torsion point of the sigmoid. A limited enema using water soluble contrast material can be performed in patients for whom perforation is suspected. Contrast enema successfully reduces 5% of cases of sigmoid volvulus.[44] Although the patient experiences dramatic relief of symptoms, contrast enema is not definitive treatment. Recurrence rates of sigmoid volvulus after contrast enema are 80% to 90%, and sigmoid resection is recommended as definitive treatment. Although air enemas have been described in the reduction of intestinal intussusception, no data are available to support their use in sigmoid volvulus. Sigmoidoscopy with insertion of a rectal tube beyond the obstruction point is a safe and fast method for diagnosis that allows thorough assessment of the bowel mucosa and that has therapeutic value as well. Sigmoidoscopy for reduction of sigmoid volvulus was first described by Bruusgaard.[45] It can be performed in the operating room by the surgeon. Like contrast enema, sigmoidoscopy with rectal tube placement is an acute management strategy.

18 year old girl came with the history of:

a) Constipation for one year.

b) Intermittent back pain for last two months which changed to continuous pain for last few days.

Distinct midline crease corresponding to mesenteric root

Figure 1. Radiograph Abdomen A/P View.
Figure 2. CTSCANORAM.

Scanogram reveals grossly dilated sigmoid colon with 'Coffee bean' appearance and apex at level of D9 - D10 vertebrae with narrowed tapering at the pelvic inlet.

Figure 3. ON RECTAL CONTRAST ADMINISTRATION.
Acute sigmoid volvulus is the third most common cause of large bowel obstruction[46]. It has a wide geographic variation and it differs significantly between high - incidence countries and low - incidence countries[16]. This variation may be associated with differences in anatomy[47]. Acute sigmoid volvulus usually occurs in adult men. The mean age was found to be between 56 and 77 years and nearly one - third of all colonic emergencies in elderly patients are due to sigmoid volvulus [48]. In our patient group, age ranged from 21 to 93 years with a mean of 63.1 ± 22.9 years which showed that the Chinese population with acute sigmoid volvulus also included many younger patients. The presence of a redundant and mobile sigmoid colon, with a narrow base at the mesenteric root, is one of the major predisposing factors for sigmoid volvulus. Other predisposing factors, such as a high - fiber diet, constipation, previous abdominal surgery, pregnancy, diabetes, or neurological and psychiatric diseases such as dementia or schizophrenia have been described in the literature[49]. Sigmoid volvulus can be divided in 2 clinical types with different onset and natural history, the acute fulminating type (obstructed patients) and the subacute progressive one (subocclusive patients). The first kind is characterized by a sudden onset with abdominal pain, often localized in the umbilical region, early vomiting, abdominal tenderness, constipation and marked physical prostration. Gangrene usually develops early and perforation and shock may appear quickly. Whereas the subacute progressive form is characterized by an insidious onset and progression and it frequently occurs in older patients. It often shows an unspecific clinical presentation characterized by widespread cramp - like abdominal pain, sometimes localized in the left abdominal quadrants. Fever and vomiting are rare at the beginning. The ischemia is often due to an abnormal and prolonged distension of the twisted loop rather than to strangulation and for this reason ischemic necrosis can appear in a later stage[46].

7. Prognosis

The prognosis of patients affected by sigmoid volvulus tightly depends on the disease stage, surgical timing and comorbidities. In fact the highest mortality rate is observed in the obstructed patients group, in those patients with clinical signs and symptoms of peritonitis and ileus who underwent Hartmann’s procedure (57%). Mortality rate also results high in those patients belonging to the subocclusive patients group with late diagnosis and necessarily treated with Hartmann’s (50%). Conversely, mortality reduces up to 16% in the patients affected by subocclusion with an early diagnosis achieved through CT scan the prognosis is worse for the patients with advanced stages of disease and late diagnosis, as they are usually older, uncollaborative, bedbound at admission and affected by several comorbidities (>) 2). In opposition prognosis is more favourable in younger patients affected by minor comorbidities. The abdominal X - ray may show unspecific signs of sigmoid volvulus, but it is not able to offer an etiologic diagnosis. Indeed in 30 - 40% of the cases the abdominal X - ray is not diagnostic for sigmoid volvulus[47] because the transverse colon or small bowel distension can superimpose upon the sigmoid loops. Furthermore are dundant transverse colon or an obstructed small bowel loop may mimic a sigmoid volvulus[48, 49]. Conversely CT scan allows to achieve a diagnosis even in the indeterminate cases [50 - 51] being particularly useful in the patients affected by intestinal subocclusion with ambiguous and insidious clinical onset and progression, and allowing an earlier diagnosis with a lower mortality. The main limitation of this series is due to the fact that we analyzed patients with sigmoid volvulus treated with emergency surgery, while we excluded the majority of them being managed successfully with medical therapy; we also included patients in an advanced disease stage (ischemia/peritonitis). Therefore the advanced disease stage, the treatment performed in emergency and the elderly age of our population with a poor functional status could justify the high mortality rate that was detected.

8. Conclusion

Sigmoid volvulus is the most common form of volvulus of the gastrointestinal tract, and this condition is responsible for 8% of all intestinal obstructions. Sigmoid volvulus is particularly common in elderly persons. Patients present with abdominal pain, distention, and absolute constipation. Predisposing factors to sigmoid volvulus include chronic constipation, megacolon, and an excessively mobile colon. Plain abdominal radiograph findings are usually diagnostic. Decompression may be achieved with the introduction of a stiff tube per the rectum, aided by endoscopy or fluoroscopy. Early radiographic recognition is important to prevent the mortality related to sigmoid volvulus. Sigmoid volvulus is a surgical emergency that commonly occurs in patients older than age 50 years but can occur in younger age - groups. An accurate patient history and physical examination followed by promptresus citation is essential. Detorsion of the bowel and assessment of the bowel mucosa must be performed. Arectal tube is placed to maintain the reduction in the preoperative evaluation and stabilization period. A sigmoidcolectomy is then performed. Findings of ischemic colonic mucosa mandate immediate operative intervention.
The mortality of patients with sigmoid volvulus treated surgically is closely related to the disease stage, a prompt surgical timing, the patient functional status and his collaboration with clinicians in order to define a correct diagnosis and treatment. For this reason mortality is higher in both obstructed patients with generalized peritonitis and patients affected by subocclusion with late diagnosis and undergoing surgery in advanced stages; in both cases an emergency Hartmann’s procedure (57% and 50% mortality rate respectively) is to be considered.

References


