



“Synchronous sigmoid and transverse colon volvulus --- A systematic review and scientific analysis”

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ABSTRACT

Background: Volvulus is a rotation or twisting of part of alimentary tract often around their vascular pedicle. Colonic volvulus is third leading cause of colonic obstruction worldwide. Sigmoid colon is primary site of colonic volvulus but synchronous sigmoid and transverse colon volvulus is exceedingly rare. **Methods:** A systematic review of 12 cases received from various search engines, published between 2000 to 2022 are included. Age, gender, aetiology, symptoms, investigation modalities, surgical approach, intraoperative findings and post-operative events are analysed scientifically. **Results:** Mean age group of all patients are older except two cases of early age group. Aetiological factors are mainly physiological followed by anatomical factors. Majority of cases present early with abdominal obstruction and distension before developing features of peritonitis. In maximum number of cases left and transverse colectomy or extended left hemicolectomy have been performed. Primary anastomosis has been done in majority cases. In post-operative period, a lot of cases documented for surgical site infection. **Conclusion:** Incidence of synchronous sigmoid and transverse colon is extremely rare. Pre-operative diagnosis is difficult even if CT scan shows in some cases “double whirl” sign. There are no guidelines for management of synchronous volvulus and a tailored approach should be used in such cases.

Keywords: “volvulus”, “Sigmoid colon volvulus”, “Transverse colon volvulus”, “Synchronous volvulus”

Introduction: -

Volvulus is a rotation or twisting of part of alimentary tract often around their vascular pedicle. Colonic volvulus is defined as a torsion of a part of colon causing large bowel obstruction which may lead to ischemia and then necrosis. Colonic volvulus is 3rd leading cause of colonic obstruction worldwide after tumour obstruction and complicated sigmoid diverticulitis [1]. But it is the leading cause of large gut obstruction, in Sub-Saharan Africa with a prevalence of up to 69% [2]. Colonic volvulus is very common in Africa, South America, Russia, the Middle East and Eastern Europe determining the geographic region known as “Volvulus Belt” [1,2].

Sigmoid colon is primary site of volvulus in 60-75% followed by the cecum in 25-40% of cases [2], transverse colon only represents 4%. Simultaneous volvuli are very uncommon situations. It leads to life threatening emergency when diagnosis and treatment are not established early.

The synchronous occurrence of a sigmoid colon and transverse colon volvulus is exceptional. Double location of twisting or rotation makes it major surgical emergency with a high risk of gangrene and septic shock. Due to lack of number of this clinical entity, literature concerning its description is sparse and the treatment options are poorly established.

Our objective was to evaluate the safety and efficacy of early interventional approach in the management of synchronous sigmoid and transverse colon volvulus by determining demographical data and other associated conditions and rate of post-operative complications and outcomes.

Methods: -

We did a systematic review to determine the outcomes and associated conditions of patients in the management of synchronous sigmoid and transverse colon volvulus.

Search Strategy => We looked for published study about synchronous sigmoid and transverse colon volvulus. The preferred reporting items for systematic reviews and Meta-analysis (PRISMA) guidelines was followed.

The following electronic database were checked: PubMed, Embase, Web of Science and Google Scholar.

The period reviewed: 2000 to 2022.

The search process took into account the following keyword: “Synchronous”, “Sigmoid volvulus”, “Transverse Colon Volvulus”.

The reference section of included studies and systematic reviews in the same field were checked for additional relevant studies.

Study Selection => The inclusion criteria were: Case reports published regarding synchronous sigmoid and transverse colon volvulus.

Original articles.

Studies including the following variables: Age, sex, etiological factors, clinical symptoms or presentation, Investigation modalities, Extent of resection, Choice of stoma, post-operative events and intraoperative findings. English and French languages.

All publication levels (in progress, published, in press or unpublished).

We excluded letters, reviews, abstracts only and duplicated studies.

Quality Assessment => We used the modified New Castle-Ottawa-Scale (NOS) to assess the quality of studies.

Using the selection and outcome criteria:

- A score of 6 was taken as good quality.
- A score of 4/5 was taken as moderate quality.
- A score of ≤ 3 was taken as low quality.

Bias Assessment => The Cochrane tool for Risk of Bias in Non-randomized studies of interventions (ROBINS-I) was used to assess the risk of bias.

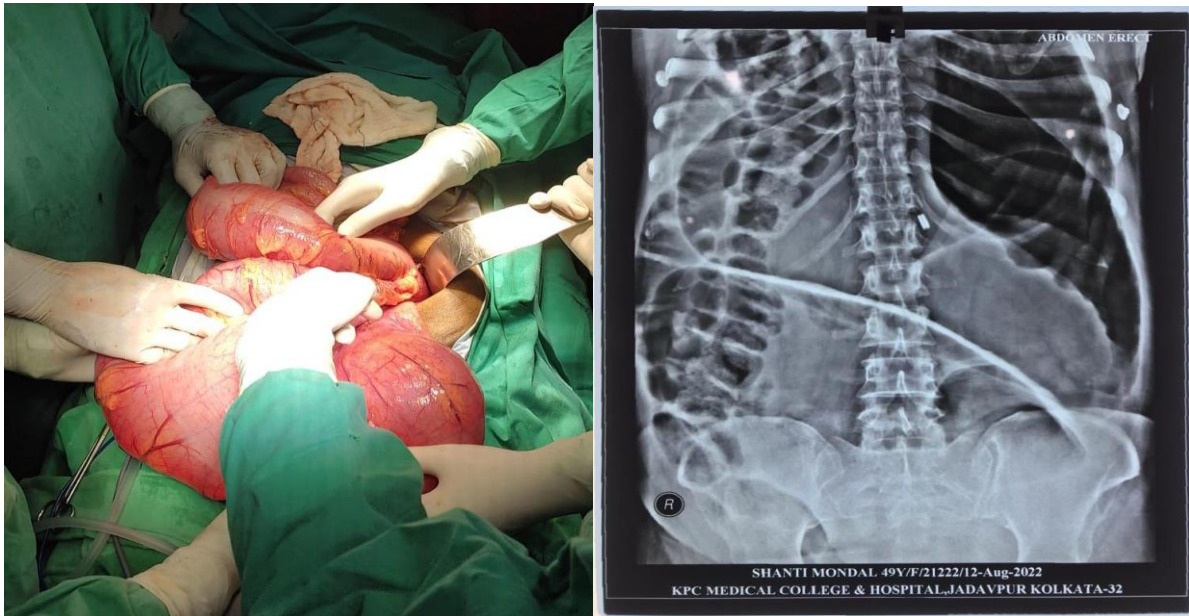
- Low risk of bias (the study is comparable to a well-performed randomized trial with regard to this domain).
- Moderate risk of bias (the study is sound for a non-randomized study with regard to this domain but cannot be considered comparable to a well-performed randomized trial).
- Serious risk of bias (the study has some important problems in this domain).
- Critical risk of bias (the study is too problematic in this domain to provide any useful evidence on the effects of intervention); and No information on which to base a judgement about risk of bias for this domain.

Data Extraction => The variables extracted from the studies were: type of study, the total number of cases, demographic variables, indications, surgical technique, post-operative infection, morbidity and mortality.

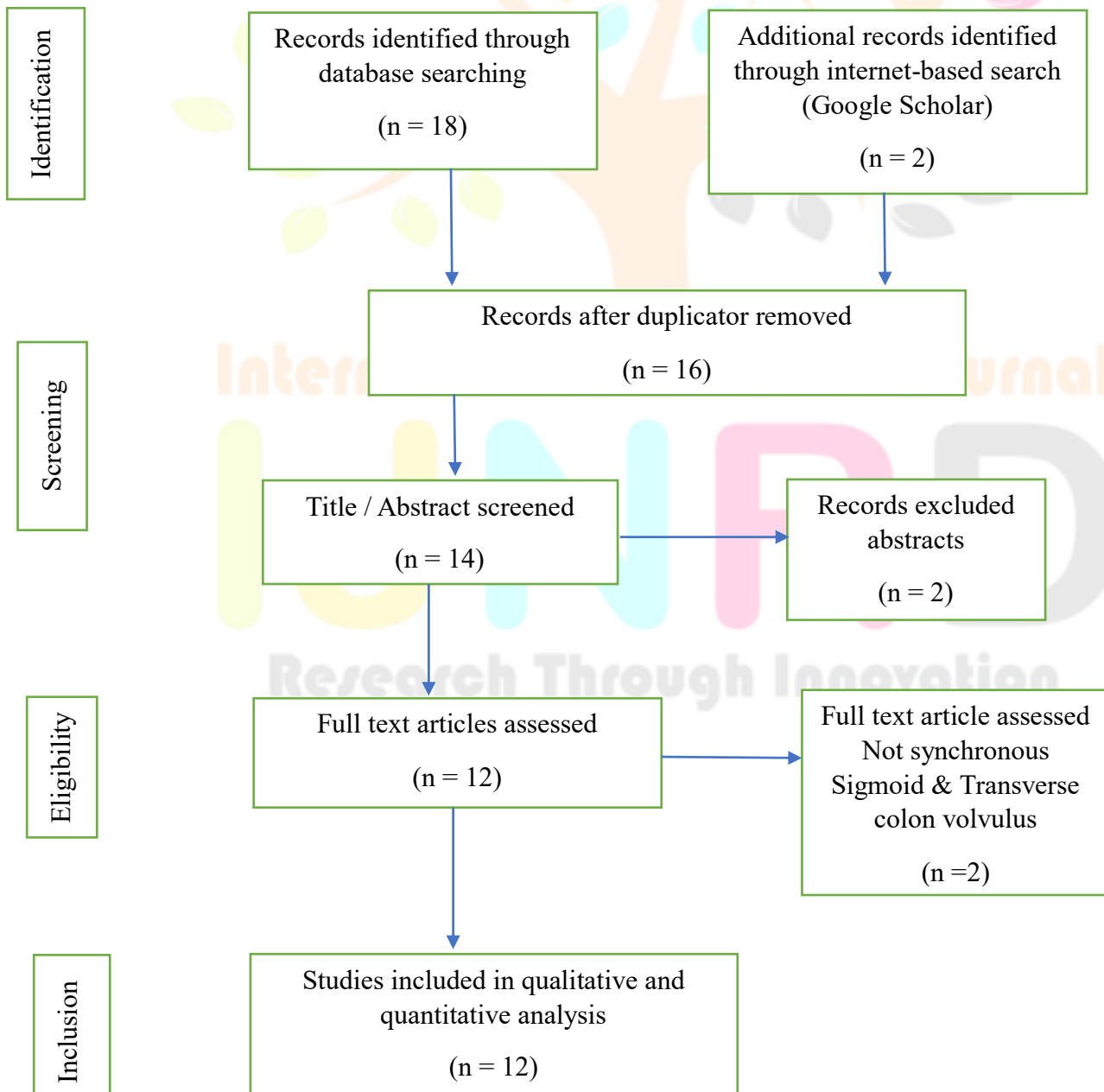
Statistical Methods => Stata software was used. For qualitative variables, number with their percentage were described. For quantitative variables, mean and standard deviation were used. Heterogeneity between studies was tested by I^2 test. A random-effects model was when $I^2 > 50\%$; and a fixed effects model when $I^2 \leq 50\%$.

Results: -

We reviewed 18 articles through databases searching (PubMed, Embase, Web Science) and 2 articles through Google Scholar. Among 20 articles, there were 4 duplicates which were removed. 16 articles remaining and 2 articles are removed as we excluded “only abstracts”. Full text articles assessed of 14 and out of those 2 articles are removed as those were not of synchronous sigmoid and transverse colon volvulus. We finalised 12 articles for qualitative and quantitative analysis.



The PRISMA flowchart illustrating the search process and study selection is given at Fig.1.



After having demographic analysis (**Table.1**) of Age of patients mean age of the patients 60 years, except two cases of early age (23yr., 26 yr.). Though Colonic volvulus is relatively male predominance [3], as per my review no sex predilection in case of synchronous sigmoid and transverse colon volvulus. Etiological factors are mainly physiological (chronic constipation in 16.67% of cases, History of overuse of laxatives in 8.33% case, but both in 41.67% of cases). Anatomical factors like megacolon or Chiladiti syndrome (25.00%). Congenital factors like long mesocolon or unfixed left colon in 8.33% of cases. Majority of cases present early with pain abdomen and distension (66.67%) before developing of features of peritonitis. Features of peritonitis (increased temperature, tachycardia, tachypnoea) was present in 4 cases (33.33%).

Synchronous volvulus diagnosis is very difficult through radiological investigations. Radiography only can diagnose distended colon; as in synchronous volvulus coffee bean/ northern exposure/ inverted U-shaped sign is not found. At CT scan two “whirl sign” suggestive of synchronous volvulus was found in only 1 (16.67%) case. As per published literatures left and transverse colectomy or extended left hemicolectomy (**Table. 2**) were done in majority of cases (33.33%) followed by subtotal colectomy (25.00%). In maximum cases primary anastomosis were choice (50.00%); only in 3 cases colostomy was done (25.00%). As per intraoperative findings gangrenous changes were in 5 cases (41.67%), no gangrenous changes in rotated part of colon were in 6 cases (50.00%) and no fixation of left colon was in 1 case (8.33%). After analysing post-operative outcomes 5 cases (41.67%) had wound site (laparotomy wound) infection. In 3 cases (25.00%) abdominal drain was kept for long time, in 1 case (8.33%) re-exploration was done, entero-cutaneous fistula was found in 1 case (8.33%).

Discussion: -

Colonic volvulus accounts for 3-5% of acute bowel obstruction and third leading cause of colonic obstruction worldwide after tumour obstruction and complicated sigmoid diverticulitis. It is very common in Sub-Saharan Africa where it is the leading cause of colon obstruction.

The most reported contributing factors are abnormal mobility of colonic segments, dolichocolon, narrow mesocolon, chronic constipation. These factors may be congenital in young or acquired patients (especially in elderly).

The clinical symptoms and signs have no specificity that could lead to the suspicion of a double colonic volvulus. Diagnosis may be late at the stage of ischemia or intestinal necrosis in the presence of signs of peritoneal irritation. For most of the cases reported in the literature, morphological examinations performed in emergencies did not allow to suspect the occurrence of two volvuli, mainly intraoperatively discovered.

Emergency surgery is usually done in majority of cases but elective laparoscopic surgery performed after successful sigmoidoscopic decompression was safe.

According to large-scale study conducted in France on only sigmoid volvulus, the percentage of patients experiencing morbidity was higher, the length of hospital stay was also longer.

According to Ifversen & Kjaer [4], there is improved long term survival with surgical management relative to conservative management due to high recurrence rates. Colonic resection or percutaneous endoscopic colostomy (PEC) can be performed as a surgical treatment. Frank et al. [5] concluded that PEC may be an alternative management option for recurrent sigmoid volvulus in high-risk patients. But no such study regarding synchronous volvulus.

Volvulus mainly occurs at advance age group; as per our analysis mean age is 60 years (except 2 cases). Indeed, advance age is a factor of exposure to constipation and intestinal hypomotility, which favour the onset of volvulus. In colonic volvulus, a relative male predominance is described [3], but in my review no gender predilection.

Anatomical factors described in literature are those associated with abnormal motility of the colon. These are mainly dolichocolon, whether or not associated with megacolon or Chiladiti syndrome [3]. In 3 patients there was megacolon and in one case unfixed left colon [6-9].

Particularly in one case report, simultaneous volvulus was associated with ulcerative colitis [6]. This association with chronic inflammatory disease could be explained by the fact that chronic inflammation promotes fixation, twisting and dilation of the intestine.

Physiological factors are represented by chronic constipation and/ or overuse of laxatives leading to motility disturbances which can promote volvulus. In our review 8 out of 12 patients presented with any of those habits. Clinically symptoms of bowel obstruction were found in all patients with no particular pattern suggesting double volvulus. In fact, imaging remains essential, but the used modalities depend on surgical teams. In resources limited context, plain abdominal skiagram is helpful and as per our review done in all cases. Indeed, the classic image of the coffee bean or northern exposure or invested U-shaped sign is not found if there is a double volvulus [10]. CT scan has better sensitivity and specificity in the diagnosis; but only in 2 cases (16.67%) “double whirl sign” was observed, remaining 4 cases (33.33%) where CT scan was done, they can't predict double volvulus. This explains why preoperative diagnosis remains difficult and the simultaneous volvulus is often discovered during surgery.

Initial non-operative management with endoscopic derotation is the gold standard for sigmoid volvulus if there is no sign of necrosis or perforation. This treatment is secondarily associated with a colectomy preferably with immediate anastomosis. Therefore, treatment for simultaneous volvulus is mainly surgical. As per our review, in all patients no endoscopic derotation was attempted. But it should be noted that the unavailability of flexible sigmoidoscope/ colonoscope in some developing countries explains why surgery is preferred. The literature review explained that all the patients had a colonic resection. The choice between primary and delayed anastomosis varies according to the teams. In our review 11 cases had delayed anastomosis. This can be explained by the fact that with the emergency context and high probability of ischemia delayed anastomosis seems safer by reducing risk of anastomotic leakage.

Despite the rarity of this situation and the lack of randomized studies, delayed anastomosis seems to be the best option.

Conclusion: -

Incidence of synchronous sigmoid and transverse colon volvulus is extremely rare. Pre-operative diagnosis is difficult even if CT scan shows in some cases “double whirl sign”. There are no guidelines in the treatment of synchronous volvulus and a tailored approach should be followed in each case. If no gangrenous changes and no features of peritonitis the derotation, resection of rotated segment and primary anastomosis seems to be best option.

Declarations: -

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Ethical approval:

The ethical committee of the hospital gave the agreement to report this case.

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Table.1: Patients demographical data and other associated conditions

| | Number of patients (%) |
|---|--|
| Age: | |
| Mean | 60 |
| Median | 64 (23-83) |
| Gender: | |
| Male | 6 (50%) |
| Female | 6 (50%) |
| Aetiology: | |
| Physiological factors | <ul style="list-style-type: none"> Chronic constipation → 2 (16.67%) Overuse of laxatives (Ulcerative colitis) → 1 (8.33%) Both of above → 5 (41.67%) |
| Anatomical factors | 3 (25.00%) |
| Congenital factors | 1 (8.33%) |
| Clinical Symptoms: | |
| Pain abdomen with distension | 8 (66.67%) |
| Feature of Peritonitis (increased temperature, tachycardia, tachypnoea) | 4 (33.33%) |
| Investigation Modality: | |
| Plain Radiography / Skiagram of abdomen | 12 (100%) |
| Radiography / skiagram and CT scan | <ul style="list-style-type: none"> Not suggested as synchronous → 4 (33.33%) Suggested as synchronous → 2 (16.67%) |

Table.2: Treatment approach and post-op outcomes

| | Number of Patients (%) |
|--|-------------------------------|
| Extent of resection: | |
| Left Hemicolectomy | 6 (50.00%) |
| Subtotal Colectomy | 3 (25.00%) |
| Total Colectomy | 2 (16.67%) |
| No resection (Only fixation) | 1 (8.33%) |
| Choice of stoma: | |
| Ileostomy | 4 (33.33%) |
| Double barrel colostomy | 6 (50.00%) |
| Coecostomy | 1 (8.33%) |
| Primary anastomosis | 1 (8.33%) |
| Intra-operative findings: | |
| Gangrenous change | 5 (41.67%) |
| No gangrene | 6 (50.00%) |
| Unfixed left colon | 1 (8.33%) |
| Post-operative events: | |
| Wound site infection (laparotomy incision) | 5 (41.67%) |
| Long time drain placement | 3 (25.00%) |
| Re-exploration | 1 (8.33%) |
| Enterocutaneous fistula | 1 (8.33%) |
| Uneventful | 2 (16.67%) |

