

# Clinical Profile and Management of Patients with Superior Mesenteric Vein Thrombosis- A Descriptive Study from Southern India

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## ABSTRACT

**Introduction:** Abdominal pain is the most common presenting complaint in any Emergency Department. Superior Mesenteric Vein Thrombosis (SMVT) is a very rare condition, a surgical emergency seen in the elderly population with a high mortality rate.

**Aim:** To assess the clinical profile, risk factors, radiological findings, management and outcome of patients presenting with SMVT.

**Materials and Methods:** A retrospective descriptive study was conducted in the Department of General Surgery, Father Muller Medical College, Mangaluru, Karnataka, India, from January 2018 to December 2022. Hospital data and case files were analysed and parameters such as age group, sex distribution, presenting features, management and outcomes were recorded. Statistical analysis of the data was done using Excel 2021 (Microsoft 365), and the data was described in numbers and percentages.

**Results:** A total of 10 patients were included, with a predominance of male patients, of which 6 (60%) were males and 4 (40%) were

females. Eight patients had associated co-morbidities. Among the 10 patients, 4 (40%) were diagnosed with malignancies (three pancreatic, one liver secondary), 2 (20%) patients were on oral contraceptive pills. Two (20%) patients developed SMVT after intra-abdominal surgery following trauma, two had a history of Distal Venous Thrombosis (DVT) and pre-existing portal hypertension were identified as causative factors. The majority, 6 (60%) of patients, presented within 48 hours of the onset of pain and vomiting. Computed Tomography (CT) angiography was the diagnostic test used in all patients (100%). Anticoagulation was initiated in all patients, and three patients underwent surgery for complications associated with the condition. Out of the 10 patients, 3 (30%) died during treatment, while 7 out of 10 (70%) had a good recovery. Within one year of follow-up, four patients out of the seven deceased.

**Conclusion:** Acute mesenteric venous thrombosis is observed in the elderly population with multiple co-morbidities. Early presentation to the hospital with appropriate clinical and radiological investigations helps in reducing mortality.

**Keywords:** Anticoagulation, Bowel infarction, Distal venous thrombosis, Portal hypertension

## INTRODUCTION

Superior Mesenteric Vein Thrombosis (SMVT) is a rare condition, a surgical emergency seen in the elderly population with a high mortality rate of 20-30% [1]. The superior mesenteric venous drainage consists of venae rectae forming a venous arcade that drains the small bowel and proximal colon through the ileocolic, middle colic and right colic veins to form the superior mesenteric vein. The superior mesenteric vein and the splenic vein join and continue to the liver as the portal vein [2].

The most common causes are prothrombotic states due to heritable or acquired disorders of coagulation or cancer, intra-abdominal inflammatory conditions, the postoperative state, cirrhosis and portal hypertension [3]. Oral contraceptive use accounts for 9-18% of the episodes of mesenteric venous thrombosis in young women [3,4].

Abdominal pain is the main characteristic symptom of arterial or venous thrombosis that cannot be explained by physical examination findings. Suggesting the origin as the small intestine, acute or sub-acute mesenteric venous thrombosis presents with mild colicky abdominal pain [5]. Haematemesis, haematochezia, or melaena occurs in about 15% of patients, but occult blood will be detectable in the stool in nearly 50% of patients [3]. Fever, guarding and rebound tenderness develop later and indicate progression to bowel infarction; peritonitis develops in one-third to two-thirds of patients with acute mesenteric venous thrombosis [3].

Transabdominal colour doppler Ultrasonography (USG) may demonstrate thrombus in the mesenteric veins, but CT is the test of choice for suspected cases of mesenteric venous thrombosis,

as the sensitivity rates are more than 90% [3]. A CT scan presents early with central lucency as a characteristic finding of an acute thrombus, along with other findings like a sharply defined vein wall with a rim of increased density and enlargement of the superior mesenteric vein. Late findings include pneumatosis intestinalis and portal vein gas [3].

Patients should be screened for deficiencies of protein C, protein S, factor V Leiden and paroxysmal nocturnal haemoglobinuria to check for hereditary or acquired thrombophilia once mesenteric venous thrombosis has been confirmed. If a myeloproliferative condition is suspected, then a bone marrow examination will be useful [6].

The treatment of mesenteric venous thrombosis involves anticoagulation alone or in combination with surgery. In patients with acute or subacute mesenteric venous thrombosis, treatment with heparin should be started immediately. Supportive measures include nasogastric suction, fluid resuscitation and bowel rest (with no food by mouth). Oral anticoagulation with warfarin should be started, once there is evidence of the absence of ongoing ischaemia. In the absence of an ongoing thrombotic disorder, the duration of anticoagulation may be limited to six months to one year [6]. The present study was conducted with the aim of assessing the clinical profile, risk factors, radiological findings, management and outcome of patients presenting with superior mesenteric vein occlusion.

## MATERIALS AND METHODS

The present retrospective descriptive study was conducted in the Department of General Surgery, Father Muller Medical College Hospital, Mangaluru, India. Records of patients diagnosed with

SMVT from January 2018 to December 2022 were obtained and analysed. Data analysis was done from February 2023 to July 2023. Institutional Ethical Committee clearance was obtained (FMIEC/CCM/0072024).

**Inclusion criteria:** Patients diagnosed with SMVT with complete medical records, aged 18-90 years, were included in the study.

**Exclusion criteria:** Patients with incomplete medical records, without CT abdomen or angiography, those who did not initiate treatment, and those discharged against medical advice were excluded from the study.

### Study Procedure

Demographic data like age and sex, presence of co-morbidities like diabetes mellitus, hypertension, seizure disorders, psychiatric conditions, and associated risk factors such as malignancy, hypercoagulable status, previous surgery, abdominal trauma, and infection/inflammatory conditions were assessed. Type of clinical presentation-acute (<48 hours), sub-acute (1-7 days), chronic (>15 days), Investigation modalities-abdominal CT, CT angiography, treatment provided such as anticoagulation or surgery, outcomes-survived or deceased, and one-year follow-up presentation were also assessed.

### STATISTICAL ANALYSIS

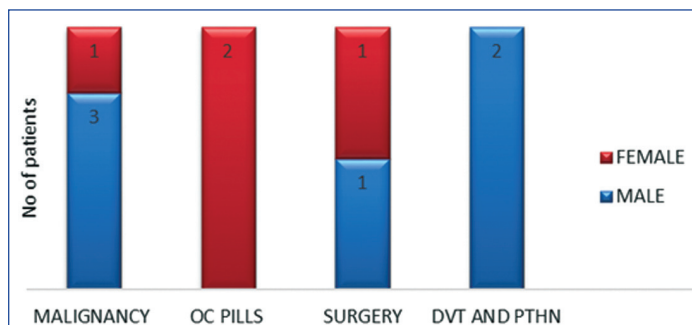
The statistical analysis of the data was conducted using Excel 2021 (Microsoft 365). The data description was presented in the form of numbers and percentages.

### RESULTS

After analysing the medical records, 10 patients were included in the study, comprising 6 (60%) males and 4 (40%) females. The age group ranged from 40-85 years [Table/Fig-1]. Eight out of the 10 patients had multiple co-morbidities and were on medications for these conditions, while two patients had no co-morbidities. Out of the 10 patients, 4 (40%) were diagnosed with malignancy (three pancreatic, one with liver metastasis), and 2 (20%) patients were using oral contraceptive pills. Two (20%) patients developed SMVT following intra-abdominal surgery due to trauma, two had a history of DVT and pre-existing portal hypertension [Table/Fig-2].

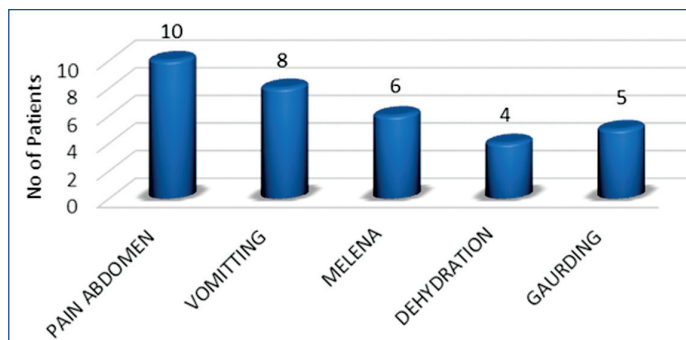
Age (years)	Male, n (%)	Female, n (%)
40-60	1 (10%)	2 (20%)
61-80	4 (40%)	1 (10%)
81 and above	1 (10%)	1 (10%)

[Table/Fig-1]: Age-wise distribution of the patients.



[Table/Fig-2]: Risk factors for SMVT.

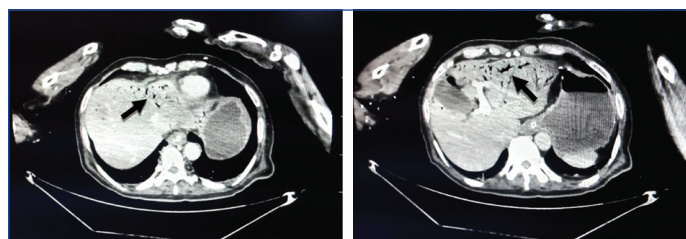
All 10 patients presented to the Emergency Department with abdominal pain lasting for varying durations: ≤48 hours-6 (60%) patients, ≤2 weeks-2 (20%) patients, >2 weeks-2 (20%) patients. Upon arrival, four out of the 10 patients were drowsy and dehydrated, while 5 patients exhibited guarding and localised rigidity on examination [Table/Fig-3].



[Table/Fig-3]: Distribution of participants according to clinical features.

All 10 patients underwent an emergency erect X-ray of the abdomen and ultrasound of the abdomen and pelvis as initial assessments for abdominal pain. In the erect X-ray of the abdomen, 5/10 (50%) of patients showed bowel dilatation, and one (10%) patient had air under the diaphragm. Among the USG findings of the abdomen in 10 patients, 1 (10%) case revealed liver metastases, 2 (20%) cases showed pancreatic tumours, and the rest showed normal results.

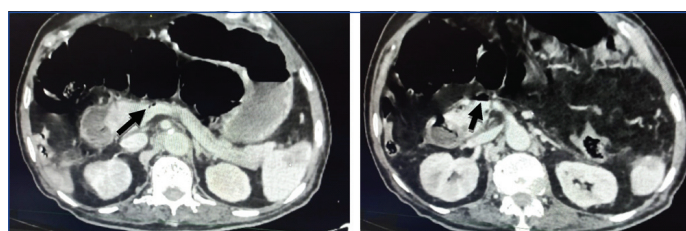
The CT abdomen with contrast was performed in all cases, accurately diagnosing SMVT in every patient [Table/Fig-4-7]. However, additional features of bowel ischaemia were observed in 4/10 (40%) patients, 1 (10%) patient had gangrene and perforation, and 2 (20%) patients had both SMVT and portal vein thrombosis. CT angiography also demonstrated reformation with collaterals in 3/10 (30%) patients.



[Table/Fig-4]: Intrahepatic superior mesenteric vein branches, section of CECT abdomen\*.

[Table/Fig-5]: Intrahepatic portal vein branches section of CECT abdomen\*.

(Images from left to right)  
(\*Arrow mark indicating the air within)



[Table/Fig-6]: Portal vein thrombosis on CECT abdomen\*.

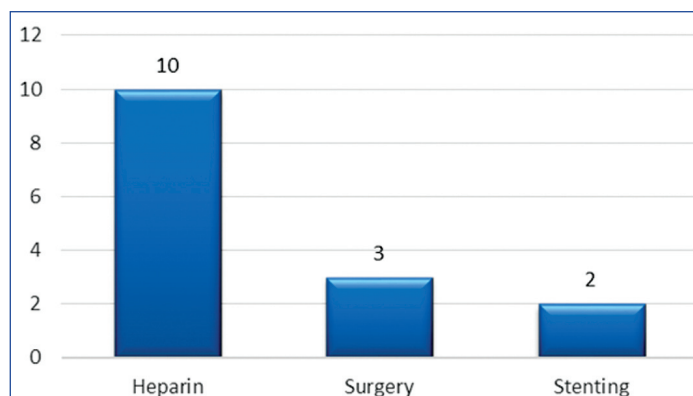
[Table/Fig-7]: Superior Mesenteric Vein Thrombosis (SMVT) on CECT abdomen\*.

(Images from left to right)  
(\*Arrow mark indicating thrombosis)

All 10 patients received anticoagulation with Low Molecular Weight Heparin (LMWH) immediately upon diagnosis confirmation. Additionally, 3/10 (30%) patients underwent surgical intervention for bowel ischaemia, involving midline laparotomy, resection of gangrenous bowel loops, and side-to-side anastomosis using GI linear cutter staplers (Healthium Medtech, India), with fascia closure using PDSynth and skin stapling with Trupler staplers. Two patients underwent stenting [Table/Fig-8]. Three (30%) patients died during treatment, while 7/10 (70%) patients experienced a good recovery. Over the one-year follow-up period, four out of the seven surviving patients passed away.

### DISCUSSION

The superior mesenteric vein functions to drain most of the organs within the abdominal cavity. Embryologically, it originates from the vitelline vein. Anatomically, it is positioned laterally to the superior mesenteric artery and superiorly connects with the splenic vein



[Table/Fig-8]: Distribution of participants according to management performed.

to form the portal vein [7]. Superior mesenteric vein occlusion contributes to 5-15% of all mesenteric ischaemia cases globally [8]. SMVT is reported in approximately one in 5,000-15,000 inpatient admissions worldwide and one in 1,000 Emergency Department admissions presenting with acute abdominal pain [9]. CT imaging is able to identify around 90% of mesenteric venous thrombosis cases [9].

Generally, mesenteric venous thrombosis is more prevalent in males in the age group of 40-60 years [9]. In the present study, there were a total of 10 patients with a higher incidence of SMVT observed in males compared to females.

The SMVT poses challenges in diagnosis due to its non specific history and clinical presentation, diverse underlying conditions and associated risk factors. Common risk factors include malignancies (of gastrointestinal and pancreatic origin), inflammatory conditions (pancreatitis, peritonitis and diverticulitis), blunt abdominal trauma and prior abdominal surgeries [8]. Malignancy emerged as a significant factor in the occurrence of SMVT in the current study, followed by abdominal trauma related to surgery or other inflammatory conditions. Prothrombotic and primary hypercoagulable states are major contributors to secondary mesenteric venous thrombosis [10]. Additionally, genetic abnormalities also contribute to venous thrombosis and primary hypercoagulable conditions, including defects in antithrombotic proteins (antithrombin III, protein C, protein S) and increased prothrombotic protein activity (e.g., G20210A prothrombin gene mutation) [10].

Oral contraceptive usage accounts for 9-18% of SMVT cases in young women [11]. In a retrospective analysis, four out of 12 patients with no identifiable hypercoagulable state were found to be using oral contraceptives [11]. Abdominal pain, especially pain that is disproportionate to the physical findings, is a major presenting symptom in almost 90-100% of cases of SMVT, often accompanied by symptoms like nausea and vomiting [12]. The mean duration for patients to seek medical attention varied between 2-3 days in over 80% of cases [13]. In this study, the majority of patients presented with abdominal pain within the first 48 hours.

On radiological investigation, an erect X-ray of the abdomen may reveal indirect signs such as small bowel enlargement and air-fluid levels in approximately 50-75% of cases [14]. The present study also observed a similar clinical presentation on an erect X-ray of the abdomen. Ultrasound with Doppler study is used to assess flow in the mesenteric and portal venous systems, providing diagnostic information with a lower sensitivity rate (73-80%) due to variations in interpretation [15].

Abdominal CT is the investigation of choice when SMVT is suspected, as it has a high sensitivity rate of 90-100% for establishing the diagnosis [16]. SMVT typically appears as a radiolucent area within the territory of the superior mesenteric vein on CT scans. Additional signs on CT that suggest the presence of SMVT include bowel wall thickening, pneumatosis intestinalis, gas in the portal vein and evidence of collateral circulation in chronic cases [17].

Early and timely diagnosis, prior to the onset and progression of intestinal ischaemia, along with timely initiation of anticoagulation therapy, have been shown to reduce mortality rates in patients with superior mesenteric thrombosis [2,3,15,18].

Initiating anticoagulation therapy early in the disease course, even intraoperatively, can improve outcomes and reduce the risk of recurrence. Maintaining an activated partial-thromboplastin time of more than twice the normal level with an initial intravenous bolus of 5000 IU heparin followed by continuous infusion is recommended. Despite the potential risk of bleeding, the benefits of preventing bowel infarction outweigh the risks, supporting the initiation of anticoagulation therapy [19]. In the present study, all patients received anticoagulation therapy, which contributed to improved outcomes and prevented mortality.

Oral anticoagulation should be continued for a period of 12-18 months and regularly reassessed. Supportive measures such as nasogastric suction, fluid resuscitation, and bowel rest (with no oral intake) are recommended [20]. Some studies have shown promising results with thrombolytic therapy in patients who are haemodynamically stable and have no contraindications for the therapy [21,22]. In the present study, two patients underwent thrombolytic therapy and experienced favourable outcomes as a result.

Surgery should be limited to patients presenting with peritonitis or perforation. The objective of surgical management should be to preserve, as much bowel as, possible. For patients with reversible underlying causes, it is recommended to continue anticoagulation therapy for a period of at least six months to one year. Individuals with inherited thrombotic disorders or those in whom a specific cause cannot be determined should receive lifelong anticoagulation [22,23,24]. In the current study, surgery was done only in three patients to prevent intra-abdominal complications.

### Limitation(s)

The retrospective nature of the study is an inherent limitation. Another limitation was the small sample size.

### CONCLUSION(S)

The SMVT is a rare and challenging condition to diagnose, with a high mortality risk due to intestinal ischaemia. A thorough clinical examination, a high level of suspicion and adequate knowledge about the diagnosis are essential for accurate diagnosis. Contrast-enhanced CT is the investigation of choice for early and accurate diagnosis. Early treatment with anticoagulation and, if necessary, surgery is crucial to reduce the high mortality associated with this condition.

### REFERENCES

- [1] Clavien PA, Dürig M, Harder F. Venous mesenteric infarction: A particular entity. *Brit J Surg.* 1988;75(3):252-55.
- [2] Mock JN, Orsay EM. Primary mesenteric venous thrombosis: An unusual cause of abdominal pain in a young, healthy woman. *Ann Emerg Med.* 1994;23(2):352-55.
- [3] Acosta S, Salim S. Management of acute mesenteric venous thrombosis: A systematic review of contemporary studies. *Scand J Surg.* 2021;110(2):123-29.
- [4] Kumar S, Sarr MG, Kamath PS. Mesenteric venous thrombosis. *New Eng J Med.* 2001;345(23):1683-88.
- [5] Ellert W, Hecht B, Zuiderveld L. Acute mesenteric venous thrombosis with a vaginal contraceptive ring. *West J Emerg Med.* 2014;15(4):395.
- [6] Choudhary AM, Grayer D, Nelson A, Roberts I. Mesenteric venous thrombosis. A diagnosis not to be missed! *J Clin Gastroenterol.* 2000;31(2):179-82.
- [7] Broussard A, Wehrle CJ, Samra NS. Anatomy, Abdomen and Pelvis: Superior Mesenteric Vein. [Updated 2023]. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2024. Available from: <https://www.ncbi.nlm.nih.gov/books/NBK545162/>
- [8] Sulger E, Dhaliwal HS, Goyal A, Gonzalez L. Mesenteric venous thrombosis. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2024 Jan-. 2022 Jul 18.
- [9] Singal AK, Kamath PS, Tefferi A. Mesenteric venous thrombosis. *Mayo Clin Proc.* 2013;88(3):285-94.
- [10] Bhattarai AM, Bhattarai AM, Karki A, Baral S, Poudel S, Adhikari S. Superior mesenteric venous thrombosis in a 47-years-old male with protein S deficiency: A case report. *Ann Med Surg (Lond).* 2022;77:103719.



- [11] Harward TR, Green D, Bergan JJ, Rizzo RJ, Yao JS. Mesenteric venous thrombosis. *J Vasc Surg.* 1989;9(2):328-33.
- [12] Kumar S, Kamath PS. Acute superior mesenteric venous thrombosis: One disease or two? *Am J Gastroenterol.* 2003;98(6):1299-304.
- [13] Rhee RY, Gliviczki P, Mendonca CT. Mesenteric venous thrombosis: Still a lethal disease in the 1990s. *J Vasc Surg.* 1994;20(5):688-97.
- [14] Grendell JH, Ockner RK. Mesenteric venous thrombosis. *Gastroenterology.* 1982;82(2):358-72.
- [15] Zhang J, Duan ZQ, Song QB, Luo YW, Xin SJ, Zhang Q. Acute mesenteric venous thrombosis: A better outcome achieved through improved imaging techniques and a changed policy of clinical management. *Eur J Vasc Endovasc Surg.* 2004;28(3):329-34.
- [16] Rosen A, Korobkin M, Silverman PM, Dunnick NR, Kelvin FM. Mesenteric venous thrombosis: CT identification. *AJR Am J Roentgenol.* 1984;143(1):83-86.
- [17] Matos C, Gansbeck V, Zalcman M, Ansay J, Delcour C, Engelholm L, et al. Mesenteric venous thrombosis: Early CT and US diagnosis and conservative management. *Gastrointest Radiol.* 1986;11:322-25.
- [18] Abdu R, Zakhour BJ, Dallis DJ. Mesenteric venous thrombosis--1911 to 1984. *Surgery.* 1987;101(4):383-88.
- [19] Muñoz S, Cubo P, González-Castillo J, Nuevo JA, Garcia-Lamberechts EJ, Sanz A. Superior mesenteric venous thrombosis: A retrospective study of thirteen cases. *Rev Esp Enferm Dig.* 2004;96(6):385-94.
- [20] Kozuch PL, Brandt LJ. Review article: Diagnosis and management of mesenteric ischaemia with an emphasis on pharmacotherapy. *Aliment Pharmacol Ther.* 2005;21(3):201-15.
- [21] Poplausky MR, Kaufman JA, Geller SC, Waltman AC. Mesenteric venous thrombosis treated with urokinase via the superior mesenteric artery. *Gastroenterology.* 1996;110(5):1633-35.
- [22] Yankes JR, Uglieta JP, Grant J, Braun SD. Percutaneous transhepatic recanalization and thrombolysis of the superior mesenteric vein. *AJR Am J Roentgenol.* 1991;151(2):289-90.
- [23] Morasch MD, Ebaugh JL, Chiou AC, Matsumura JS, Pearce WH, Yao JS. Mesenteric venous thrombosis: A changing clinical entity. *J Vasc Surg.* 2001;34(4):680-84.
- [24] Kaplan JL, Weintraub SL, Hunt JP, Gonzalez A, Lopera J, Brazzini A. Treatment of superior mesenteric and portal vein thrombosis with direct thrombolytic infusion via an operatively placed mesenteric catheter. *Am Surg.* 2004;70(7):600-04.

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