



Mesenteric Fibromatosis - Three Cases Report and Literature Review

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Abstract

Mesenteric Fibromatosis (MF) is a rare fibroid tumor in the abdomen that often has no symptoms. It is frequently misdiagnosed as tumor recurrence or lymph node metastasis, making diagnosis and treatment challenging. Surgical excision is the preferred treatment, but medical therapy may be considered in certain cases. Despite limited research on this condition, we present three cases of MF in male patients who underwent colectomy. They had "para-anastomotic soft tissue density nodules with increased metabolism" on PET-CT scans, but were asymptomatic. Two patients had successful surgical treatment and were diagnosed with fibromatosis. The third patient was monitored and remained asymptomatic. The objective of this article is to offer up-to-date insights on mesenteric fibromatosis, share our experience with these three cases, and conduct a comprehensive review of existing literature to minimize misdiagnosis, and establish suitable treatment plans.

Keywords: Fibromatosis; Mesentery; Mesenteric tumor; Mesenteric fibromatosis; β -Catenin

Introduction

MF is a rare but locally aggressive benign tumor that originates from mesenteric fibroblasts and fibrous tissue. It can infiltrate surrounding structures and cause severe visceral involvement [1]. The incidence of this disease is very low, accounting for only 0.03% of all tumors and less than 3% of all soft tissue tumors [2]. The exact cause of fibromatosis is still unclear, although studies suggest that it may be related to trauma, surgery, hormones, and genetics. Therefore, the purpose of this paper is to enhance our understanding of MF by presenting our experience in diagnosing and treating three cases, as well as reviewing the existing literature.

Fibromas, also called fibromatous fibrosis or invasive fibromatosis, are characterized by the growth of fibroblasts derived from mesenchymal tissue. Although they do not have the potential to metastasize, they are locally aggressive. The incidence of fibromas is rare, with approximately 5 to 6 newly diagnosed cases per million person-years reported in 2013 [3]. Fibromas are most commonly diagnosed in individuals between the ages of 30 and 40, with a slightly higher occurrence in women [4,5]. Fibromas is more prevalent in women who use oral contraceptives, are pregnant or have recently given birth, have a history of trauma or surgery, or have inherited disorders like Familial Adenomatous Polyposis (FAP) and Gardner syndrome [6,7]. Although mortality is uncommon, a single-center cohort study found that patients FAP and intra-abdominal desmoid tumors had an overall mortality rate of up to 76% [8]. Fibromas have the potential to develop in various deep soft tissues of the body, such as the abdominal wall, abdominal cavity, mesentery, gastrointestinal tract, extremities, chest wall, breast, and head and neck [7]. Surgical tumor resection has remained the primary treatment modality for many years, frequently complemented by the incorporation of systemic therapy or radiotherapy [9]. Nevertheless, given the gradual progression and possibility of spontaneous regression, the treatment approach has shifted towards active monitoring following the initial diagnosis [10,11]. Early intervention may be necessary for mesenteric fibromatosis due to its heightened risk of recurrence. Additionally, symptomatic and progressive tumors require medical or surgical intervention [11].

Case Series

Case 1

In March 2019, a 59-year-old male patient presented with colon cancer and received treatment

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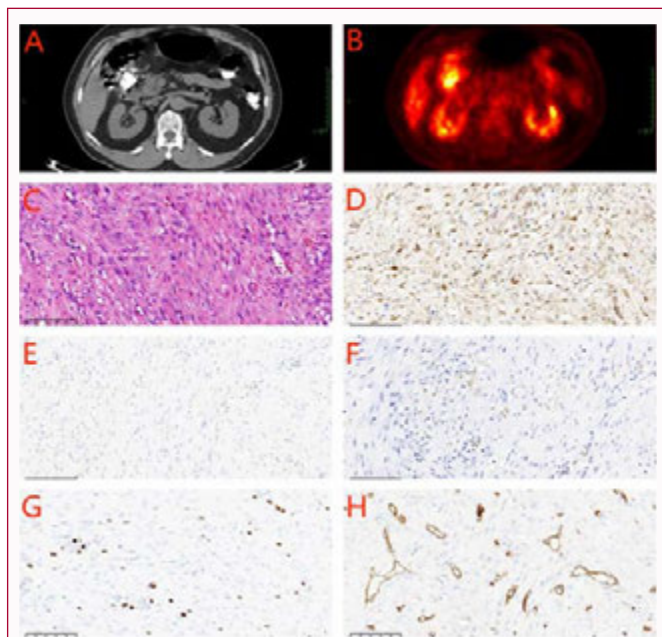


Figure 1: A) Computed Tomography (CT) scan taken in March 2022, showed a soft tissue density nodule adjacent to the anastomotic site, measuring approximately 16.0 mm × 10.0 mm. B) Positron Emission Tomography (PET)-CT scan showed that the nodule was located in the mesentery, with increased metabolic activity and a maximum SUV of 4.9. C) Microscopic examination (x200) revealed that the masses consisted of well-differentiated fibroblasts and that the ileum muscularis had been invaded by the homogeneous proliferation of mesenchymal cells. D-H) Immunohistochemistry results revealed β -catenin (partial nuclear+), STAT6 (-), SMA (focal+), Ki-67 (approximately 5%), and CD34(-), respectively.

at the National Cancer Center/Cancer Hospital, Chinese Academy of Medical Sciences, Peking Union Medical College. Abdominal-pelvic CT scan did not reveal any lymph node or distant organ metastasis. The patient had a history of alcohol consumption for over 30 years and a family history of malignancy, with his father passing away from colorectal cancer. Preoperative auxiliary examinations, including chest X-ray, electrocardiogram, and blood tests, did not show any significant surgical contraindications. Therefore, the patient underwent successful laparoscopic right hemicolectomy. The postoperative pathology revealed colonic adenocarcinoma with villous growth, moderate differentiation, focal necrosis, and mucin secretion. No lymph node metastasis was detected (0/22), resulting in a pathological stage of pT3N0M0 stage IIA. After discharge, the patient was scheduled for follow-up every three months. During a colonoscopy on February 28th, 2022, no abnormalities were observed at the anastomotic site, but a tubular adenoma was found in the colon. Subsequently, a PET-CT scan on March 17th, 2022, showed a "soft tissue density nodule adjacent to the anastomotic site, measuring approximately 16.0 mm × 10.0 mm, with increased metabolism and a maximum SUV of 4.9, indicating caution for malignancy (Figure 1A, 1B)." However, tumor markers (CEA, CA242, CA199, CA724) were within the normal range. As a result, the patient sought medical attention, despite being asymptomatic and showing no significant abnormalities on abdominal examination.

After a Multidisciplinary Team (MDT) discussion, it was determined that excisional biopsy surgery was the most appropriate treatment option. Consequently, on March 29th, 2022, the patient underwent laparoscopic exploration, partial colectomy, ileectomy, and re-anastomosis. The postoperative pathology revealed fibrous

proliferative tumor-like lesions with glassy change and hemorrhage in the submucosa to subserosa of the colon (Figure 1C). Occasional nuclear division (0-1/2 square millimeters) was observed. Based on morphology and immunohistochemical results, the findings were consistent with fibromatosis, and no cancer was detected. Additionally, three reactive lymph nodes were found in the adipose tissue, with no evidence of metastatic cancer. Immunohistochemistry results showed β -Catenin (partial nuclear+) (Figure 1D), STAT6 (-) (Figure 1E), Bcl-2 (1+), SMA (focal+) (Figure 1F), Ki-67 (approximately 5%) (Figure 1G), and CD34 (-) (Figure 1H). The patient had a successful postoperative recovery, and no recurrence has been observed during follow-up.

Case 2

A 56-year-old male patient underwent laparoscopic radical right hemicolectomy at a local hospital in May 2020. The postoperative pathology revealed a low-grade mucinous tumor of the appendix with mild to moderate epithelial cell dysplasia. The appendix wall showed degenerative fibrosis, with mucin protruding into the serosal adipose tissue to form a mucin pool. The mucin involvement was limited to the root of the appendix and did not affect the mucosa of the cecum. No lymph node metastasis was observed. The patient received three sessions of hyperthermic intraperitoneal chemotherapy after the surgery. Regular follow-up examinations were conducted. On April 4th, 2023, a CT scan showed a soft tissue shadow below the anastomotic site, without excluding the possibility of metastasis (Figure 2A). Subsequently, the patient sought medical attention at the National Cancer Center/Cancer Hospital, Chinese Academy of Medical Sciences, Peking Union Medical College. The patient was asymptomatic, and no significant abnormalities were found on abdominal examination. The patient had a family history of malignancy, with his father having had lung cancer. Tumor markers

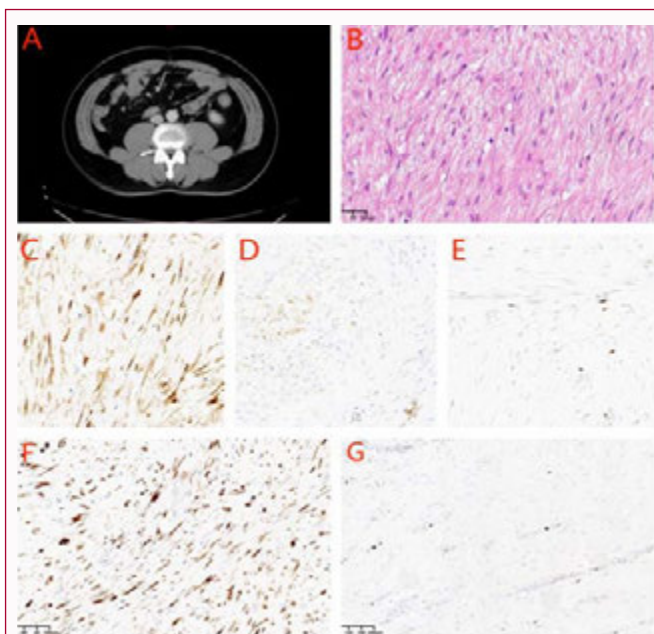


Figure 2: A) CT scan taken in April 2023, showed a soft tissue density nodule adjacent to the anastomotic site, measuring approximately 27.0 mm × 25.0 mm. B) Microscopic examination (x200) revealed that the masses consisted of well-differentiated fibroblasts and that the ileum muscularis had been invaded by the homogeneous proliferation of mesenchymal cells. C-G) Immunohistochemistry results revealed β -catenin (nuclear+), SMA (1+), ALK (partial+), Desmin (1+), and Ki-67 (1%), respectively.

(CEA, CA125, CA199, CA724) were within the normal range. After an MDT discussion, it was determined that excisional biopsy surgery was the best treatment option. Therefore, on April 10th, 2023, the patient underwent exploratory laparotomy, resection of the original anastomotic site, and partial mesenteric resection. The postoperative pathology revealed a spindle cell desmoid tumor, which was consistent with fibromatosis based on immunohistochemical results (Figure 2B). The tumor presented as two lesions, with a maximum diameter of 35.0 mm to 40.0 mm, located within the pericolic adipose tissue, locally involving the muscularis propria and submucosa of the ileum. No tumor was found at the resection margins of the ileum, colon, or mesentery. No metastatic tumors were observed in the lymph nodes (0/44). Immunohistochemistry results showed β -Catenin (nuclear+) (Figure 2C), AE1/AE3 (-), SMA (1+) (Figure 2D), ALK (-) (Figure 2E), BCL-2 (1+), CD34 (vascular+), CD68 (-), CD99 (2+), Desmin (1+) (Figure 2F), EMA (-), Ki-67 (+1%) (Figure 2G), Vimentin (3+). The patient had a successful postoperative recovery, and no recurrence has been detected during follow-up.

Case 3

A 54-year-old male patient underwent radical surgery for sigmoid colon cancer at the National Cancer Center/Cancer Hospital, Chinese Academy of Medical Sciences, Peking Union Medical College on December 18th, 2017. The postoperative pathology revealed a discoid elevation of a high to moderately differentiated adenocarcinoma in the sigmoid colon. The tumor invaded the muscular layer and reached the subserosal adipose tissue, with no lymph node metastasis detected (0/14). The postoperative pathological staging was pT3N0M0, stage IIA. Following discharge, the patient was instructed to have follow-up visits every three months. On December 27th, 2019, an endoscopic ultrasound showed a hypoechoic area near the anastomotic site (28.7 mm \times 15.5 mm), with uneven echo and unclear boundaries, suggesting a possible malignancy due to its close and indistinct relationship with the intestinal wall. On January 7th, 2020, a CT scan showed postoperative changes in the sigmoid colon, with unobstructed anastomosis and mild local uptake enhancement (Figure 3A). On January 14th, 2020, ultrasound-guided fine needle aspiration biopsy revealed mucin and a few glandular epithelial cells, with no significant atypia observed. The patient was asymptomatic, and no significant abnormalities were found on abdominal examination. There was no family history of tumors. Regular follow-up visits were continued. On July 7th, 2021, an enhanced CT scan showed a low-density nodular shadow near the anastomotic site, measuring approximately 24.0 mm \times 18.0 mm (Figure 2B), similar to previous findings. On February 17th, 2023, an enhanced CT scan showed a low-density nodular shadow near the anastomotic site, measuring approximately 18.0 mm (Figure 2D), similar to previous findings. Tumor markers (CEA, CA199, CA724, CA242) were within the normal range. The patient underwent regular follow-up, and multiple imaging examinations showed no significant changes in the size of the lesion. After a Multidisciplinary Team (MDT) discussion, it was considered that mesenteric fibromatosis could be a possibility. However, as the lesion had shown no significant changes in nearly four years and the patient had no discomfort, both the options of excisional biopsy surgery or observation were deemed acceptable. The patient refused surgery and chose to continue with observation. No recurrence has been detected during follow-up.

Discussion

MF, also known as ligamentous fibromatosis, invasive

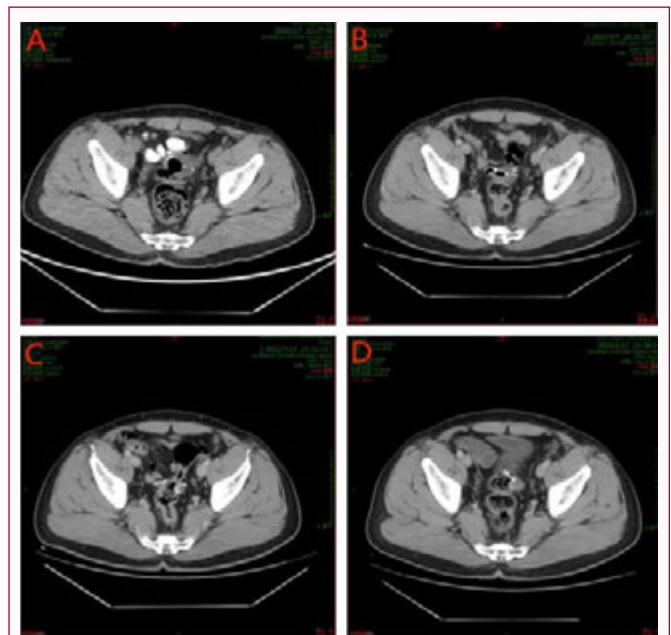


Figure 3: A) CT scan taken in January 2020, showed a low density nodule adjacent to the anastomotic site, measuring approximately 35.0 mm \times 14.0 mm. B) CT scan taken in July 2021, showed a low density nodule adjacent to the anastomotic site, measuring approximately 24.0 mm \times 18.0 mm. C) CT scan taken in July 2022, showed a low density nodule adjacent to the anastomotic site, measuring approximately 24.0 mm \times 18.0 mm. D) CT scan taken in July 2022, showed a low density nodule adjacent to the anastomotic site, measuring approximately 24.0 mm \times 18.0 mm.

fibromatosis, and desmoid tumor, is a rare locally invasive tumor that originates from mesenteric fibroblasts and fibrous tissue. It grows infiltratively, does not metastasize to distant sites, is prone to recurrence, and often leads to misdiagnosis due to insufficient understanding [1,12].

These tumors usually present as painless masses with no obvious symptoms, but local infiltration and destructive growth can cause fatal visceral involvement. The pathogenesis of MF is unknown, but most cases are sporadic and associated with a history of surgery, Gardner's syndrome (colorectal adenomatosis), and high levels of estrogen [13].

Some cases of invasive fibromatosis with variable clinical history may remain stable for a long time, and some may grow aggressively around the organ. Other cases of MF may even disappear spontaneously [14]. Although MF is less prone to distant metastases, it is prone to recurrence after surgery, with local recurrence rates as high as 17.6% to 30.7% [15-18]. Primary MF is a rare but common comorbid disorder in FAP patients. The incidence of MF in patients with FAP ranges from 10% to 30%, which is 1,000 times higher than in the general population [9,19].

MF can be easily mistaken for other primary gastrointestinal tumors, particularly those of mesenchymal origin. Therefore, in cases of mesenchymal tumors clearly originating from the intestinal wall and infiltrating the mesentery, the diagnosis of MF should be considered [20].

Mesenteric fibromatosis and Gastrointestinal Stromal Tumors (GIST) are similar in clinical presentation, imaging, and histopathology, but the principles of treatment differ, so diagnostic identification is particularly important. Pathologically, MF is characterized by poorly demarcated lesions with infiltrating edges

composed of spindle or stellate cells. These cells are separated by abundant collagen and prominent thin-walled blood vessels, arranged in a parallel fashion. The amount of collagen and the keloid-like appearance are typically greater than in GIST. The cells of MF have a fine, tapered eosinophilic cytoplasm and an elongated, delicate nucleus. The cells exhibit slender, tapering eosinophilic cytoplasm and elongated, delicate nuclei with typically fewer than three mitoses per 50 high power fields. There is an absence of atypical mitosis and cytologic atypia. The finger-like lesions extend into the mesenteric fat and intestinal wall, irregularly infiltrating the muscularis propria. Inflammatory cells and mucus-like features may also be observed [12].

Immunohistochemistry can further assist in the diagnosis. Positive staining for nuclear β -catenin, Desmin, and Smooth Muscle Actin (SMA) is typically seen in MF. Negative staining for CD-117, DOG-1, CD-34, and ALK-1 helps differentiate it from GIST and Inflammatory Myofibroblastoma (IMFT) [21].

Mesenteric fibromatosis exhibits similar morphological and biological characteristics to fibromas in the abdominal wall or extra-abdominal sites, but they differ in overall appearance and clinical presentation. A study comparing 56 cases of mesenteric fibromatosis with non-mesenteric fibromatosis and retroperitoneal fibrosis found that the mutation rate of mesenteric dermatomes (51/56, 91.1%) in the third exon of the β -catenin gene (CTNNB1) was significantly higher than that of non-mesenteric tumors (20/28; 71.4%; $p=0.027$) [22]. This mutation serves as a characteristic pathological diagnostic marker for invasive fibromatosis.

Currently, there is no clear treatment guideline for MF, and treatment methods include surgical resection, molecular targeted therapy, hormone therapy, cytotoxic therapy, and radiotherapy. Surgical resection is the preferred treatment method [12,23].

In a retrospective analysis of 11 patients who underwent surgery for primary MF, Yalav et al. found that during an average postoperative follow-up of (43.4 ± 28.4) months, only 1 patient (9.1%) experienced relapse and required reoperation. One patient (9.1%) died within 30 days after surgery due to anastomotic leakage and sepsis, and another patient (9.1%) died from other causes 1 year after surgery. The study demonstrates that surgical resection is the mainstay of treatment for MF, radiographic methods aid in diagnosis and surgical planning, and immunohistochemical features confirm the diagnosis and differentiate it from other similar tumors [24].

Giant MF is a rare condition that is typically treated with surgical excision, and a definitive diagnosis is made based on immunohistochemistry [25]. Severe MF can lead to obstruction of the intestines or ureters. There has been a case report of MF involving both the colon and ureters, resulting in colonic obstruction and ureteral hydronephrosis. Preoperative imaging should consider the possibility of celiac malignancy, and postoperative immunohistochemical staining that is positive for β -catenin can help distinguish MF from abdominal malignancy. After surgical resection, the patient's clinical condition typically improves [26].

Additionally, because some tumors can grow aggressively and invade surrounding tissues such as the intestinal wall and skeletal muscle, there is a risk of postoperative recurrence. Hormone therapy is also becoming increasingly important in the treatment of MF. A study at Heinrich Heine University treated 25 patients with derumfibromas (17 FAP-related patients and 8 sporadic dermatomes)

using a combination of tamoxifen and sulindac. Out of the 13 patients with unoperated FAP-related tumors, 10 achieved partial or complete response, indicating that conservative treatment with hormone therapy can be effective [27].

In this study, three patients had a history of surgery for abdominal malignant tumors. Upon review, para-anastomotic mesenteric nodules were found, and PET/CT scans showed mild metabolic activity. However, PET-CT scans cannot yet differentiate between MF and the recurrence or metastasis of malignant tumors. The preoperative diagnosis suggested possible anastomotic tumor recurrence or lymph node metastasis. Two patients underwent surgical treatment, and postoperative immunohistochemistry confirmed the presence of β -catenin, consistent with the diagnosis of MF. In case 2, two tumors were found during the surgery, and they were closely adhered to the mesenteric vascular branches. In order to completely remove the tumors, it was necessary to resect a portion of the small intestine, which posed a risk of causing short bowel syndrome. One patient opted for a watch-and-wait approach. Additional research is required to establish the timing for implementing a watch-and-wait approach, the monitoring methods during the observation period, and the intervals for monitoring to prevent missing the optimal treatment window. All three patients have been regularly monitored and are currently in good overall condition.

Conclusion

MF is a locally aggressive condition that often follows abdominal surgery. It has a high recurrence rate and can be misdiagnosed as tumor recurrence or lymph node metastasis. Imaging and immunohistochemistry are helpful in diagnosis. Extensive surgical excision is the main treatment, considering anatomical location and organ preservation. During abdominal surgery, efforts should be made to minimize muscle fiber damage, bleeding, and hematoma formation to prevent the development of MF. For small, asymptomatic tumors, monitoring or drug therapy may be considered, but caution is needed. Regular follow-up tests are crucial for evaluating treatment efficacy.

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