MAK HILL Publications Research Journal of Medical Sciences

Case Study
doi: 10.59218/makrjms.2024.5.469.474

OPEN ACCESS

Key Words
Enterocutaneous fistula (ECF), umbilical hernia, polypropylene mesh repair, risk factors

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Received: 10 January 2023
Accepted: 28 February 2024
Published: 5 March 2024

Citation: Amitabh Goel, Vandana Bansal, Narendra Haryani, Dolly Mehta, Sana Afrin, Saranshi Shrivastava and Rahul Patidar, 2024. Enterocutaneous Fistula following Mesh Fixation in the Repair of Umbilical Hernia: A Case Series. Res. J. Med. Sci., 18: 469-474, doi: 10.59218/makrjms.2024.5.469.474

Enterocutaneous Fistula following Mesh Fixation in the Repair of Umbilical Hernia: A Case Series

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ABSTRACT
Enterocutaneous fistula (ECF) is a rare but potentially serious complication following hernia repair, particularly when polypropylene mesh fixation is involved[1]. Cases presentation: We present five cases (three females and two males) belonging to the geriatric age group (60-75 years) of enterocutaneous fistula following umbilical hernia repair with polypropylene mesh fixation.

INTRODUCTION

Enterocutaneous fistula (ECF) is a rare but potentially serious complication following hernia repair, particularly when mesh fixation is involved[1]. An enterocutaneous fistula (ECF) is defined as development of an abnormal communication between the gastrointestinal tract and the skin. This causes the contents of the stomach or intestine to leak through the skin. ECF represents 88.2% of all fistulae and is the most comman type of small bowel fistula[2,3]. The most common symptoms include recurrent abdominal pain and tenderness, discharge from the umbilical region, fever, malaise and weakness[4]. Patients with predisposing factors such as type-2 diabetes mellitus (T2DM), hyperlipidemia, hypertension and obesity are at increased risk for developing complications[5]. Management is influenced by etiology and specifics of the ECF and patient-related factors. In this case series we present five cases of ECF following umbilical hernia repair with polypropylene mesh fixation.

Case 1: We hereby describe a case of a 70-year-old female who came to Vishesh Jupiter Hospital, Indore in January, 2024 with complaint of pain in abdomen and discharge from peri-umbilical region since five days. The patient was a known case of hypertension and type-2 diabetes mellitus since twenty five years. She had undergone an elective primary umbilical hernia repair with placement of polypropylene onlay mesh twenty five years back. The family history was insignificant.

The patient was then admitted for further investigation and management. She underwent routine investigations along with Ultrasonography (USG) abdomen, Contrast Enhanced Computed Tomography (CECT) Scan and Computed Tomography (CT) Sinogram. The USG report was suggestive of gall bladder calculus and hernial mesh with granulation and sinus tract over anterior abdominal wall.

After injecting positive contrast to the discharging sinus in CT Sinogram, evidence of a linear tract, approximately 2.5-3.0 cm in length was seen extending from skin and deep intra peritoneum communicating with the underlying adherent middistal jejunal loop with resultant luminal contrast opacification of the jejunal-enterocutaneous fistula (Fig. 1).

The further plan of treatment was to manage the patient surgically by Exploratory Laparotomy and she stood the procedure well.

The resected specimen (Fig. 2) was sent for biopsy after surgery. The features were consistent with inflamed fistulous tract with faecolith and giant cell reaction.

The post-operative recovery was uneventful. Patient was managed with Intravenous antibiotics, analgesics, antacids and other supportive treatment.

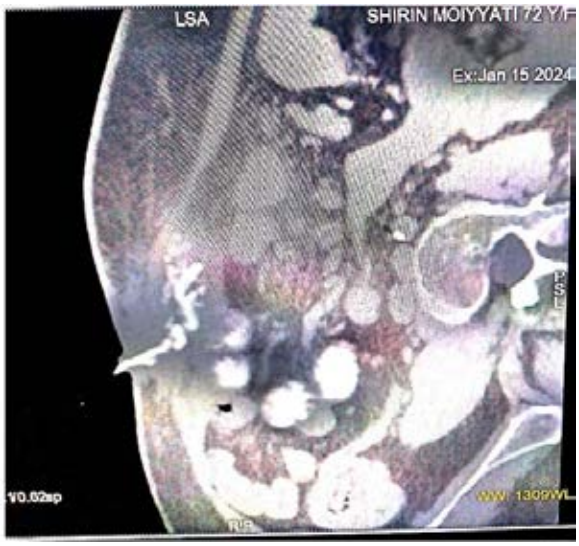

Fig. 1: CT Sinogram showing a linear enterocutaneous tract

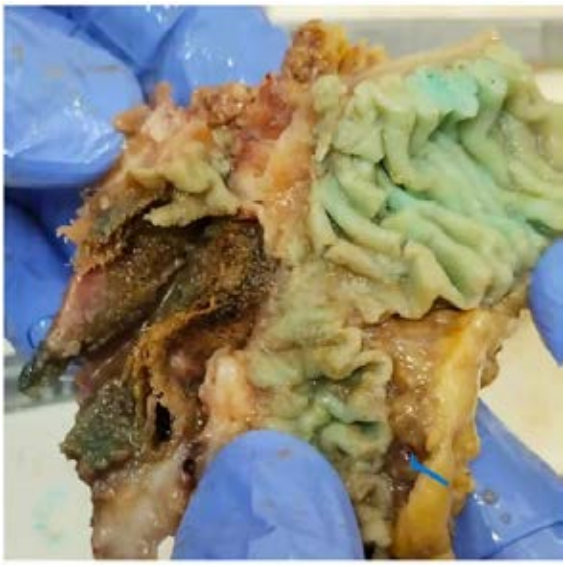

Fig. 2: Gauze piece with marked small bowel opening

She was discharged on oral medications after 6 days. She was advised to take preventive care measures like avoiding lifting of heavy weights and consumption of heavy fatty meals; and was told to report back immediately if she experienced severe pain or fever. The patient now visits the surgeon for routine follow-up in completely fine state with no new complaints.

Case 2: A 60-year-old male presented to Vishesh Jupiter Hospital, Indore in November 2023, with complaint of abdominal pain and purulent discharge from previous umbilical hernia incision site. He underwent open hernia repair with polypropylene onlay mesh placement 15 years back. He had a past

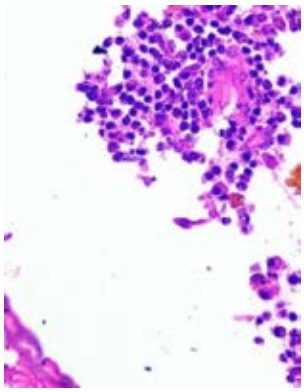

Fig. 3: Vegetative cells at 9 o'clock position with giant cell (serosal surface of the resected small bowel)

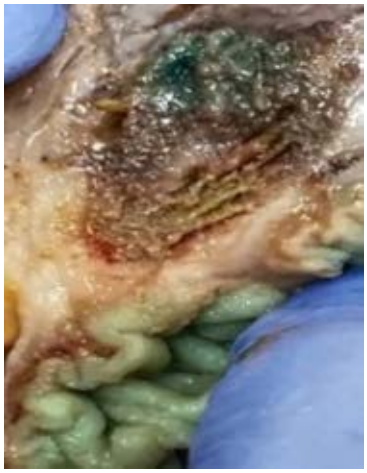

Fig. 4: Gross image with skin at the top and small bowel at the bottom

medical history significant for hypertension and hyperlipidemia but was otherwise healthy. Physical examination revealed erythema and tenderness around the umbilical hernia incision site with a small amount of purulent discharge. Laboratory investigations were significant for leukocytosis with a left shift. The USG report was suggestive of surgical mesh and hypoechoeic tract extending from abdominal cavity to the skin surface at umbilicus.

CT Sinogram was suggestive of a linear tract, approximately 2.0-3.0 cm in length extending from skin to the underlying adherent middistal ileal loop with resultant luminal contrast opacification of the Ileal-enterocutaneous fistula.

After discussion of treatment options, exploratory laparatomy was planned. The procedure was performed under general anesthesia. The mesh was removed and the bowel defect was closed primarily with interrupted sutures. A thorough irrigation of the abdominal cavity was performed and a drain was left in place. The patient tolerated the procedure well and post operative period was uneventful. The resected specimen was sent for biopsy after surgery. The features were consistent with inflamed fistulous tract and giant cell reaction (Fig. 3).

The patient was discharged home on post operative day seven and followed up in the outpatient clinic. At one month follow up the patient had completely healed from the surgical intervention.

Case 3: A 65-year-old obese female [Body Mass Index (BMI): 35 kg m^{-2}] presented to the surgery department of Vishesh Jupiter Hospital Indore, in August, 2021. She had complaints of abdominal pain, fever and foul smelling discharge from the umbilicus. The patient reported a history of umbilical hernia repair with polypropylene inlay mesh fixation performed ten years ago at an outside institution. She had no significant past medical history other than obesity and denied any recent trauma or significant weight loss.

On physical examination, the patient was febrile with tenderness and erythema around the umbilicus. There was purulent discharge noted from the umbilical wound. Laboratory investigations were significant for leukocytosis with a left shift.

A computed tomography (CT) scan of the abdomen and pelvis with oral contrast was obtained, revealing evidence of a small bowel perforation with extraluminal contrast extravasation at the site of the umbilical hernia repair mesh. A diagnosis of enterocutaneous fistula secondary to mesh erosion was made and the patient was scheduled for surgical exploration.

Intraoperatively, extensive adhesions were noted around the umbilical region. Mesh erosion into the small bowel was confirmed, with evidence of localized peritonitis. The eroded mesh was carefully dissected away from the bowel, revealing a 3 cm defect in the small bowel wall. The mesh was removed and the bowel defect was closed primarily with interrupted sutures. A thorough irrigation of the abdominal cavity was performed and a drain was left in place.The resected specimen (Fig. 4) was sent for biopsy after surgery.

The patient's postoperative course was uneventful and she was discharged home on postoperative day five. She was followed up in the outpatient clinic regularly and at six-month follow-up, she had no evidence of recurrence of the umbilical hernia or development of any further complications.

Case 4: A 68-year-old male, chronic smoker, presented to the surgery department of Vishesh Jupiter Hospital Indore, in January 2024, with complaints of abdominal pain and tenderness, fever and purulent discharge from the umbilicus. The patient reported a history of umbilical hernia repair performed 20 years ago, with polypropylene onlay mesh placement. He had a BMI of 30 kg m^{-2} and a medical history significant for type-2 diabetes mellitus and hypertension.

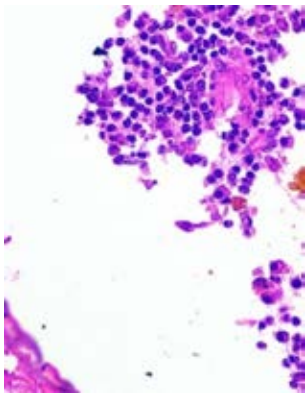

Fig. 5: Giant cell at the skin end with faecolith in the cytoplasm

Fig. 6: CT Sinogram showing enterocutaneous fistula tract

On physical examination, the patient was febrile with tenderness and erythema around the umbilicus. Laboratory investigations revealed leukocytosis and elevated inflammatory markers. Ultrasound of the abdomen showed evidence of a fistulous tract extending from the umbilicus to the abdominal cavity. CECT confirmed the presence of an enterocutaneous fistula with extraluminal contrast extravasation at the site of mesh fixation.

Surgical exploration was performed, revealing mesh erosion into the jejunum. Histopathological examination of the resected specimen showed fragments of polypropylene mesh surrounded by inflammatory infiltrates and fibrous tissue. Additionally, examination revealed the presence of fecal discharge and a fecolith within the specimen, indicating bowel involvement (Fig. 5). The patient's postoperative course was uneventful. And there were no complications in further follow up visits.

Case 5: A 75-year-old female presented to the surgery department Vishesh Jupiter Hospital Indore, in January, 2022. She complained of malaise, abdominal tenderness and feculent discharge from the umbilicus. The patient had a history of umbilical hernia repair performed several years ago, with polypropylene inlay mesh placement. She had a medical history significant for hypertension, hyperlipidemia and type-2 diabetes mellitus.

On physical examination, the patient was found to have tenderness, erythema and skin excoriation around the umbilicus. Laboratory investigations revealed leukocytosis and elevated inflammatory markers. Ultrasound of the abdomen showed evidence of a fistulous tract extending from the umbilicus to the abdominal cavity. CECT confirmed the presence of an enterocutaneous fistula communicating with the jejunum.

CT sinogram was performed, involving the instillation of contrast material into the external opening of the fistula, followed by imaging to delineate the course of the tract. The sinogram confirmed the communication of the fistulous tract with the jejunum, providing precise localization of the defect (Fig. 6).

The further plan of treatment was to manage the patient surgically by Exploratory Laparotomy. Mesh removal and primary repair of the bowel defect were performed. The patient stood the procedure well.

Intraoperative findings were confirmed by histopathological examination of the resected specimen, which showed foreign body giant cell reaction surrounding the vegetative cells along with fibrosis in dermis and subcutaneous fat. Mucosa showed presence of mixed inflamatory cell infiltrates at serosal surface.

The post-operative recovery was uneventful. Patient was managed with Intravenous antibiotics, analgesics, antacids and other supportive treatment.

She was discharged on oral medications after 6 days. The patient now visits the surgeon for routine follow-up in completely fine state with no new complaints.

DISCUSSION

Enterocutaneous fistula following umbilical hernia repair is a rare but potentially serious complication, particularly when mesh fixation is involved. The etiology of ECF in this setting is thought to be related to mesh erosion into adjacent bowel loops, leading to perforation and subsequent fistula formation. Risk factors for this complication include poor surgical technique, inadequate mesh fixation and patient factors such as obesity, any non-communicable diseases and smoking[6,7].

In the present case series we described 5 cases of enterocutaneous fistula who presented to the surgery

department following umbilical hernia repair with onlay/inlay polypropylene mesh fixation several years ago. All patients belonged to geriatric age group. History of presence of non-communicable disease was a significant finding in all cases.

Alshamali *et al*.[5] described a similar case of an obese female, belonging to geriatric age group and with significant risk factors including hypertension, type-2 diabetes and chronic renal insufficiency. She had undergone umbilical hernia repair with polypropylene onlay mesh repair[5].

Gravina *et al*.[8] also described a similar case of a obese, diabetic, asthmatic and hypertensive female of geriatric age group who underwent ventral hernia repair with polypropylene mesh placement.

On the contrary, Bostanci *et al*.[7] reported a 35 year old mentally retarded male patient who underwent open umbilical hernia repair with dual mesh. The patient did have diabetes which was a significant finding similar to our cases[7].

Albino *et al*.[9] discussed that onlay and inlay mesh placement exhibited the highest recurrence rate of hernia, which was evident in our cases, while sublay and underlay positions demonstrated lower recurrence rate.

Holihan *et al*.[10] also discussed that sublay position yielded superior outcomes compare to onlay inlay and underlay repairs.

Gravina et al.[8] and Thirumalagiri *et al*.[11] also discussed that placement of polypropylene mesh predisposed the patients to a lifelong risk for ECF development which was also observed in our case series.

Thorough preoperative evaluation and careful surgical planning are essential to optimize patient outcomes. Laboratory investigations revealed leukocytosis with left shift and raised inflamatory markers in majority of our cases.

Cowan *et al*.[12] discussed that USG, CT scan and fistulography are three imaging methods employed to characterize a fistula; of which CT scan with oral contrast is regarded as the most effective radiological test because it can delineate the tract, detect abdominal leakage, identify intra-abdominal abscesses, assess for distal obstruction and detect foreign bodies. While fistulography is utilized less frequently, it can serve as a valuable alternative when CT or Ultrasound is not accessible or when their results are inconclusive. Exploratory laparotomy was the preferred surgery in our case series.

As per Ghimire[13], management of ECF secondary to mesh fixation involves surgical exploration with removal of the eroded mesh and primary closure of any associated bowel defect. Similarly Alshamali *et al*.[5], Bostanci *et al*.[7] and Gravina *et al*.[8] performed exploratory laparotomy in their cases.

Tuma *et al*.[4] stated that histopathological examination of ECF postoperatively shows acute-on-chronic inflammatory reaction. Similar findings consisting of inflamed fistulous tract with faecolith and giant cell reaction were observed in our cases.

CONCLUSION

ECF following umbilical hernia repair with polypropylene mesh is a challenging complication, particularly in patients with multiple comorbidities. Thorough preoperative evaluation, including diagnostic imaging, is essential for accurate diagnosis and surgical planning. This case highlights the complexity of managing ECF in patients with multiple comorbidities and underscores the importance of a multidisciplinary approach to optimize patient outcomes.

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