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## International Journal of Surgery Case Reports

journal homepage: [www.casereports.com](http://www.casereports.com)

## Intestinal stenosis of Garré: A rare cause of small bowel obstruction in the virgin abdomen



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## ARTICLE INFO

## Article history:

Received 9 May 2016

Received in revised form 10 June 2016

Accepted 11 June 2016

Available online 24 June 2016

## Keywords:

Case report

Literature review

Virgin abdomen

Intestinal obstruction

Intestinal stricture

Hernia repair

## ABSTRACT

**INTRODUCTION:** Small bowel obstruction (SBO) in the virgin abdomen usually requires operative intervention. Intestinal stenosis of Garré is a rare and frequently missed cause of SBO following hernia repair. **METHODS:** We describe a case of intestinal stenosis of Garré and provide a comprehensive review of the literature. Statistical analysis was performed using IBM SPSS Statistics V.22 software and included descriptive analysis.

**RESULTS:** Most males developed a delayed stricture following an inguinal hernia repair (93.3%). 84.6% of females, on the other hand, developed intestinal stenosis following repair of a femoral hernia. 87.5% of strictures developed on the right side. The timing of development of a bowel obstruction is very variable and ranges from 5 days to 22 years. 22 patients (68.8%), however, presented with an obstruction within 5 months of hernia repair.

**CONCLUSIONS:** Intestinal stenosis of Garré is an under-reported cause of delayed stricture formation. It is most common following right inguinal hernia repair in men and right femoral hernia repair in women.

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## 1. Introduction

The management of small bowel obstruction remains a common challenge for surgeons. Recent years have witnessed a shift towards the non-operative management of patients with previous abdominal surgery in whom adhesions are considered the main cause of obstruction [1]. Many surgeons will observe adhesive partial small bowel obstruction for 24–48 h with fluid resuscitation and nasogastric decompression [2]. Surgery is reserved for complete obstruction, signs of impending ischemia, clinical deterioration or lack of improvement.

Without previous abdominal surgery, the so-called virgin abdomen is a reason to proceed directly to the operating room in most centers [3]. These patients are less likely to have adhesions and a search for a more sinister underlying cause prompts operative intervention [3]. As such, obtaining an accurate history is of paramount importance for successful management. A history of a previous groin hernia repair may not be given enough attention as these procedures are usually performed electively and without violating the peritoneal cavity. Strangulated hernias, however, necessitate opening the hernia sac and assessing bowel viability prior to repair. A primary or mesh repair is performed if the bowel is viable without resection. However, what happens to the chronically incarcerated loop of bowel that was reduced?

In 1788, Richter called attention to the possibility of delayed symptoms after successful management of a strangulated hernia [4]. In 1866, Guignard established that a small bowel stricture can develop following successful reduction of a strangulated hernia [5]. In 1892, Garré of Germany reviewed previous literature and coined the term “intestinal stenosis”. This condition has therefore been referred to subsequently as the “benign stenosis of Garré”. He proposed that venous stasis and hemorrhage in the incarcerated intestinal wall leads to ischemia, fibrosis and finally tubular stenosis resulting in delayed small bowel obstruction. A literature review performed by Cherney in 1958 identified a total of 83 cases of intestinal stenosis following strangulation [6]. Since then, very few authors have described this condition and many graduating surgical residents are unaware of its importance.

We present a case of “intestinal stenosis of Garré” and a more recent and comprehensive literature review in an attempt to highlight its importance as a cause of bowel obstruction in a virgin abdomen. Written consent was obtained and documented as per our institution’s guidelines.

## 2. Case report

The patient is a 68 year old man who presented to the emergency room with a 1 day history of nausea, vomiting, colicky abdominal pain and obstipation. He had a history of emphysema and an inguinal hernia repair with mesh for a chronically incarcerated right inguinal hernia, two years prior to presentation. His vital signs were stable with no fever or tachycardia. His abdomen was distended

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and tympanitic with mild right lower quadrant tenderness on deep palpation. He had a small fat-containing reducible left inguinal hernia. White Blood Cell count was  $12.8 \times 10^9/L$ , Hemoglobin was 18.1 g/dl and Blood Urea nitrogen and Creatinine were 22.2 mg/dl and 1.1 mg/dl respectively. An upright chest X-ray did not show free air under the diaphragm. A computed tomography scan (CT scan) of the abdomen demonstrated marked dilatation of small bowel up to a focal transition point in the distal ileum, associated with a small amount of free fluid in the pelvis (Fig. 1).

Intravenous fluids were started and a nasogastric tube was inserted. An EKG and Type and Screen were performed and the patient was consented for an exploratory laparotomy with possible bowel resection.

The patient was taken to the operating room and placed in a supine position. General anesthesia was induced; a Foley catheter placed and Cefoxitin along with subcutaneous heparin were administered. On entering the abdomen, we identified dilated loops of intestine and some free fluid which was suctioned. We proceeded to run the bowel from the ligament of Treitz towards the ileocecal junction. We identified a stricture 30 cm proximal to the ileocecal junction. The stricture had pale/white serosa with circumferential narrowing and decompressed distal ileum (Fig. 2). The involved segment was resected and a stapled side-to-side, functional end-to-end anastomosis was fashioned. Omentum was used to cover the anastomosis. The patient was extubated and sent to the intensive care unit due to respiratory distress in the recovery unit. He was transferred to the floor the next day. His post-operative course was complicated by urinary retention and transient atrial fibrillation. He was discharged on post-operative day 7.

The pathology demonstrated a small bowel stricture with ischemic changes, mucosal ulceration and increased inflammatory cells.

### 3. Discussion

Although some studies have shown that adhesions are still the most common cause of SBO in a virgin abdomen and a 12–24 h trial of non-operative management is warranted [1,7], this is not the case when the patient presents with a complete obstruction and tenderness [8]. The role of CT scans in diagnosing and categorizing the degree of small bowel obstruction is well-established [9–11]. CT scans have a sensitivity of 78%–100% for detecting complete, high-grade bowel obstruction and 63%–100% for detecting strangulation [11]. Our patient had signs of a high-grade SBO including a focal transition point and free fluid.

Patients presenting with an SBO and a virgin abdomen are at higher risk for non-adhesive obstruction [3,12]. Common causes of SBO in a virgin abdomen include: hernia, neoplasm, inflammatory bowel disease, congenital bands, volvulus, gallstone ileus and intussusception [1]. Intestinal stenosis of Garré is a frequently forgotten, yet important cause of SBO in patients with a history of an incarcerated or strangulated hernia repair. These patients undergo elective repair of a chronically incarcerated hernia or an emergent repair of a strangulated hernia. At surgery, the bowel is evaluated and deemed viable, reduced, and the hernia is repaired. Due to venous congestion, with or without arterial ischemia, the involved segment of bowel becomes fibrotic eventually leading to a stricture. Experiments on rabbits have shown that ischemia maintained for several hours produced frank gangrene of the intestine; if circulation was restored before the expiration of the critical time interval, some rabbits developed mucosal ulceration and eventual stricture [6,13]. Factors that increase the likelihood of stricture formation include: duration of strangulation, tightness of the neck of the constricting sac and resiliency of the vascular tree [14].



**Fig. 1.** CT scans of the case demonstrating a stricture and a high grade bowel obstruction.

Reports of strictures following strangulated hernia repair are few, presented in different languages, and the data is frequently incomplete. We understand that this condition is frequently under-reported: either it is not published or the association between the hernia repair and the development of a stricture is not made. A detailed search of relevant publications was conducted using

**Table 1**

Literature review: Strictures developing following the repair of incarcerated inguinal hernias.

Article	Year of Publication	# of patients	Description
Intestinal stenosis of Garre: an old problem revisited <i>Marrelli D et al.</i>	2015	1	70 year old F presenting with SBO 20 days following strangulated femoral hernia repair
Atypical small bowel obstruction following repair of inguinal hernia: a case of intestinal stenosis of Garre <i>Weledji EP et al.</i>	2013	1	30 year old M presenting with SBO 21 days following left inguinal hernia repair
Ileal stricture following strangulated inguinal hernia <i>Dakubo JC et al.</i>	2007	4	1. 65 year old M presenting with SBO 2 years following right inguinal hernia repair 2. 55 year old M presenting with SBO 15 years following right inguinal hernia repair 3. 37 year old M presenting with SBO 22 years following right inguinal hernia repair 4. 55 year old M presenting with SBO 5 weeks following right inguinal hernia repair
Fibrous stricture of the small intestine following strangulated inguinal hernia: report of two cases <i>Ahmed A et al.</i>	2006	2	1. 56 year old M presenting with SBO 4 months following right inguinal hernia repair 2. 17 year old M presenting with SBO 9 months following right inguinal hernia repair
Ischemic strictures of the small intestine in Nigeria  <i>Subbuswamy SG et al.</i>	1977	4	1. 15 year old M presenting with SBO 1 month following hernia repair 2. 58 year old M presenting with SBO 2 months following hernia repair 3. 48 year old M presenting with SBO 3 months following hernia repair 4. 38 year old M presenting with SBO 3 weeks following hernia repair
Intestinal stenosis following strangulated hernia <i>Cherney LS et al.</i>	1958	1	All strictures occurred 30 cm from the ileocecal junction 67 year old F presenting with SBO 3 weeks following right femoral hernia repair
Benign stricture of the intestine <i>Teskey L et al.</i>	1955	2	1. 62 year old F presenting with SBO 5 months following right femoral hernia repair 2. 53 year old F presenting with SBO 3 months following right femoral hernia repair
Intestinal obstruction from fibrous stricture: following strangulated hernia <i>Konstam P et al.</i>	1948	2	1. 69 year old M presenting with SBO 1 month following right inguinal hernia repair 2. 60 year old M presenting with SBO 1 month following right femoral hernia
Fibrous stricture of the small intestine following strangulated hernia <i>Hugh C. Barry</i>	1942	3	1. 32 year old M presenting with SBO 4 months following right inguinal hernia repair 2. 78 year old M presenting with SBO 5 weeks following right inguinal hernia repair 3. 59 year old F presenting with SBO 3 months following right femoral hernia repair
Stenosis of the intestine after strangulated hernia with fatal complication following intestinal intubation <i>Warren KW et al.</i>	1948	2	1. 52 year old F presenting with SBO 3 years following right femoral hernia repair 2. 66 year old F presenting with SBO 8 months following right inguinal hernia repair
A case of intestinal stenosis following strangulation with a pathological description <i>Tanner et al.</i>	1943	1	61 year old M presenting with SBO 7 months following left inguinal hernia repair
Stricture of small bowel following strangulated hernia <i>Raw SC</i>	1943	3	1. 62 year old F presenting with SBO 3 months following right femoral hernia repair 2. 70 year old F presenting with SBO 7 months following right femoral hernia 3. 36 year old M presenting with SBO 5 days following right inguinal hernia repair
Late intestinal stenosis following strangulated hernia <i>Ginzburg et al.</i>	1928	5	1. 60 year old F presenting with SBO 2 weeks following femoral hernia repair 2. 50 year old female presenting with an SBO 5 months following femoral hernia repair 3. 45 year old male presenting with an SBO 2.5 months following inguinal hernia repair 4. 45 year old female presenting with an SBO 4 years following left inguinal hernia repair 5. 66 year old F presenting with an SBO 2 months following right femoral hernia repair



Fig. 2. Actual stricture/intestinal stenosis that was resected in the operating room.

**Table 2**  
Analysis of the literature review.

Sex	n			%	
Male	18			56.3	
Female	14			43.7	
Total	32			100	
Type of hernia	Inguinal			Femoral	
Total	16 (57.1%)			12 (42.9%)	
	Male	Female		Male	
n (%)	14 (87.5%)	2 (12.5%)		1 (8.4%)	
	Right	Left	Right	Left	Right
n (%)	11 (84.6%)	2 (15.4%)	1 (50%)	1 (50%)	0 (0%)
					8 (100%)
					0 (0%)

PubMed and MEDLINE between 1900 and 2016. Keywords used included: Intestinal stenosis, intestinal stricture and intestinal stenosis or stricture following hernia repair. We only included cases of “intestinal stenosis of Garré” following groin hernia repairs. Articles with missing or incomplete data and duplicate results were excluded. Studies published in languages other than English were translated. Our literature review includes 32 patients. Prior literature reviews included more cases; however, the age, location and laterality of hernias were not included in many patients [6]. Table 1 is a comprehensive literature review over the last century.

Table 2 summarizes our findings. Our analysis demonstrates that this complication occurs almost equally among genders: 18 patients (56.3%) were male and 14 (43.7%) were female. Intestinal stenosis of Garré was more frequently reported to follow inguinal hernia repair than femoral hernia repair (57.1% vs. 42.9%). Most males developed a delayed stricture following an inguinal hernia repair (93.3%). 84.6% of females, on the other hand, developed intestinal stenosis following repair of a femoral hernia. These differences in presentation have been noted in the literature and are due to the following [6]: femoral hernias are four to five times more common in females. Femoral hernias also pass through the tight femoral canal and are more likely to strangulate [15]. Occasionally, only part of the bowel circumference will be involved leading to incarceration/strangulation without obstruction (Richter’s hernia) [16]. Partial involvement of the bowel wall and over a small segment can be more easily reduced and less likely to require resection, allowing for the development of a delayed ischemic stricture.

87.5% of strictures developed on the right side. The terminal ileum is the narrowest part of the small bowel and is the segment where a stricture would result in the biggest impact. It is tethered to the cecum and its retroperitoneal attachments on the right side

of the abdomen. It is understandable that a right groin hernia is more likely to contain a loop of distal ileum, which in turn, is more likely to develop an obstruction should a stricture develop. Previous authors have reported similar findings and described how these strictures commonly occur within 30 cm of the ileocecal valve [17].

The timing of development of a bowel obstruction is very variable and ranges from 5 days to 22 years. 22 patients (68.8%), however, presented with an obstruction within 5 months of hernia repair.

**4. Conclusions**

Intestinal stenosis of Garré is an under-reported and frequently forgotten cause of delayed stricture formation and small bowel obstruction. It is most common following right inguinal hernia repair in men and right femoral hernia repair in women. The timing of presentation is variable but is usually within the first few months of repair. Surgical and emergency medicine residents should keep it in their differential diagnosis when a patient presents with a small bowel obstruction and a virgin abdomen.

**Conflict of interest**

None of the authors have any conflicts of interest to disclose.

**Funding**

No sources of funding available.

**Ethical approval**

Ethical approval has been given.

**Consent**

Written consent in accordance with the ethics committee has been obtained.

**Author contribution**

Hishaam Ismael: study concept and writing the paper.

Yury Ragoza: data collection.

Steven Cox: data interpretation and paper review.

**Guarantor**

Hishaam Ismael MD.

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