Review

Gastric Outlet Obstruction from Stomach-Containing Groin Hernias: A Systematic Review of The Literature

Juan G Favela , Madison B Argo , Jared McAllister , Caitlyn L Waldrop , Sergio Huerta *

Posted Date: 27 November 2023

doi: 10.20944/preprints202311.1665.v1

Keywords: Femoral Hernia; Amyand hernia; Hernia of Littre; Sliding Hernia, Gastric volvulus

Review

Gastric Outlet Obstruction from Stomach-Containing Groin Hernias: A Systematic Review of The Literature

Juan G Favela [1], Madison B Argo [1], Jared McAllister [2], Caitlyn L Waldrop [2] and Sergio Huerta [2,*]

[1] Department of Surgery, University of Wisconsin Hospital and Clinics, Madison, Wisconsin
[2] Department of Surgery, VA North Texas Health Care System, Dallas, Texas
* Correspondence: sergio.huerta@utsouthwestern.edu

Abstract: Most abdominopelvic structures can find their way to a groin hernia. However, location, and relative fixation are important for migration. Gastric outlet obstruction (GOO) from a stomach-containing groin hernia (SCOGH) is exceedingly rare. In the current report, we present a 77-year-old man who presented with GOO from SCOGH to our facility. We performed a review of the literature following the Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA) of patient presenting with SCOGH since it was first reported in 1802. Ninety-one cases of SCOGH were identified (85 inguinal and 6 femoral) over the last two centuries (1802-2023). GOO from SCOGH occurred in 48% of patients in one review and 18% in our world literature review, but initial presentation ranged from completely asymptomatic to peritonitis. Management varied from entirely conservative treatment to elective hernia repair to emergent laparotomy. Only one case of laparoscopic management was documented. Twenty-one deaths from SCOGH were reported, with most occurring in early manuscripts (1802-1896 [n=9] and 1910-1997 [n=10]). In the recent medical era, outcomes for patients with this rare clinical presentation are satisfactory and treatment ranging from conservative, non-operative management to surgical repair should be tailored towards patients' clinical presentation.

Keywords: femoral hernia; Amyand hernia; hernia of littre; sliding hernia; gastric volvulus

1. Introduction

With more than 20 million groin hernia repairs performed every year worldwide, this represents one of the most common operations performed by general surgeons globally [1]. It is not uncommon to find abdominopelvic organs within the groin hernia sac. Proximity, chronicity, and gravity make some organs more likely to be found within the femoral or inguinal hernia sac compared to others. A chronic indirect inguinal hernia might lead to adherence of the posterior wall of the hernia sac to an intraabdominal viscus, making that wall indistinguishable from the hernia sac. This type of hernia is called a sliding hernia [2]. Most commonly, omentum, small bowel, sigmoid colon on the left, ileocecal contents on the right, or bladder are found in sliding hernias [2,3].

Less commonly, a Meckel's diverticulum (a hernia of Littre) [4], the inflamed appendix (an Amyand hernia) [5], or ovaries with fallopian tubes [6] can be found within the hernia sac. Other eponyms in groin hernias include a two loop incarceration of the small bowel creating a "W" configuration, termed a Maydl's hernia [7], and an inflamed appendix within the femoral canal, called a de Garengeot hernia [8].

Exceedingly rare contents of the hernia sac include the ureter [9], transverse colon [10], the pancreas [11], and the gallbladder [12]. The spleen [13] and the uterus [14] have also been documented in inguinal hernias in newborns with congenital disorders. The stomach is also uncommonly found in groin hernias.

Given the relative fixation and lack of proximity of the stomach to the groin, it is extremely rare to find it within the groin hernial contents. Thus, stomach-containing groin hernias (SCOGH) have uncommonly been reported in the literature with less than one hundred cases since it was initially

 doi:10.20944/preprints202311.1665.v1

documented 1802 [15]. The clinical presentation of patients with SCOGH is highly variable but commonly includes gastric outlet obstruction (GOO).

In the present report, we reviewed the literature of patients with SCOGH and present a case recently encountered in our practice. Pathophysiology, a brief history, and outcomes related to this rare entity are discussed.

2. Materials and Methods

We review a case report of a patient who presented with a SCOGH at our institution. The medical records were reviewed for this patient in the computer patient record system. Informed consent was obtained from the patient for the publication of this report. This work has been reported in line with the SCARE criteria and following the Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA) guidelines [16]. SH, JF, and MA reviewed all the papers and selected all manuscripts required for inclusion. The initial literature review was performed in March of 2023. Various combinations of keywords including “hernia”, “inguinal hernia”, “sliding hernia”, “femoral hernia”, “groin”, and “stomach” were used for our searches. No time restriction (beyond that of the existing databases) or language restriction was imposed. Databases including PubMed, MEDLINE (via PubMed), and Embase were initially queried. Subsequently, Cochrane Library, Google, Google Scholar, and ResearchGate were utilized to search and acquire reports that were new and/or unavailable from the previous databases. Further manuscripts were identified by close examination of the references of the index papers and main reviews on this subject [17–19]. These manuscripts were included in our review if they were appropriate references and did not duplicate our original findings of patients with SCOGH reviewed elsewhere.

The PRISMA flow chart depicts the screening process (Figure 1). All the abstracts were analyzed within an EndNote group to eliminate irrelevant and duplicated studies. Google translate was utilized to translate articles in other languages. Full text for a handful of articles was unavailable for a variety of reasons. These include lack of electronic copies, restrictions by foreign countries, incomplete scanning, and older manuscript dates.

Preprints (www.preprints.org) | NOT PEER-REVIEWED | Posted: 27 November 2023 doi:10.20944/preprints202311.1665.v1

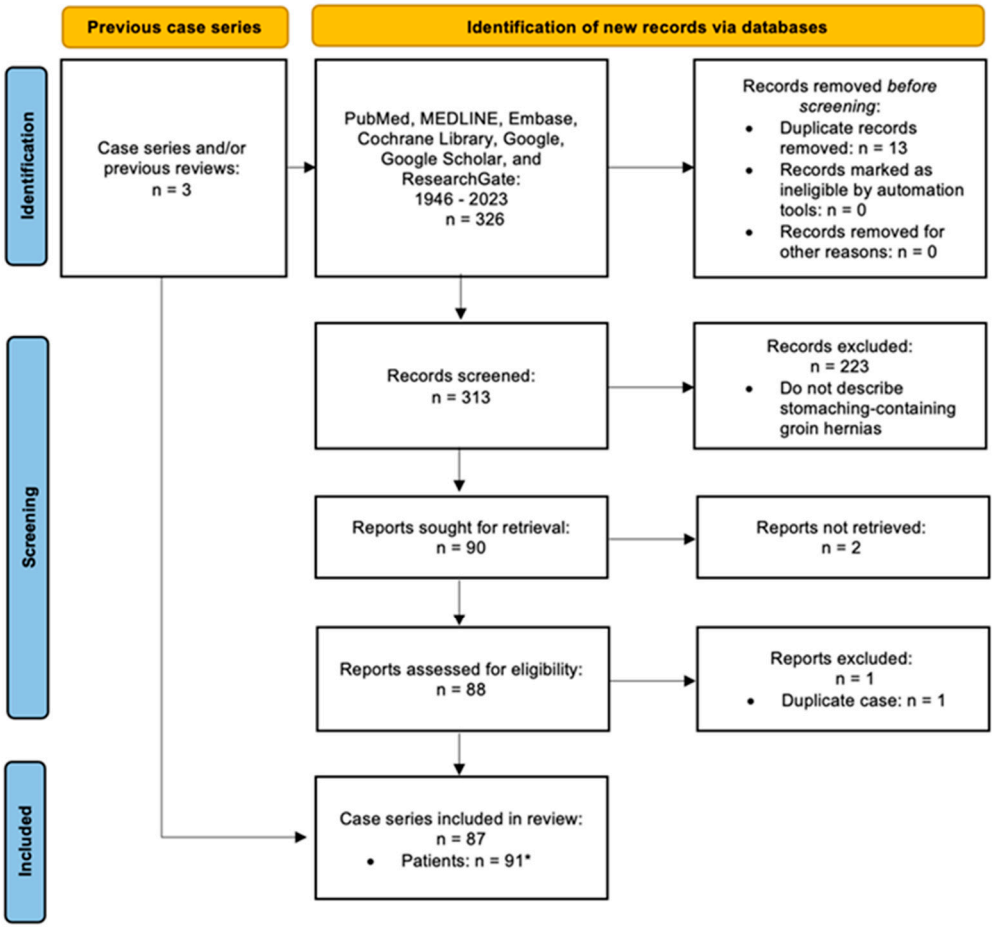

Figure 1. PRISMA flow-chart describing the process of our literature search. *Total number of patients includes our present case.

3. Results

3.1. Case Report

A 77-year-old man with chronic obstructive pulmonary disease (COPD; on 4L of home oxygen), hypertension, and class III chronic kidney disease presented to the Emergency Department (ED) at our institution in February of 2023 with an incarcerated left inguinal hernia. He had a one-day history of abdominal pain, nausea, and vomiting. He reported presence of the hernia for over 10 years. His last bowel movement had been the night prior to presentation to the ED. On physical examination, he was tachycardic to 100 beats per minute and normotensive with a blood pressure of 110/70 mmHg. His abdomen was soft and mildly tender to deep palpation. He had a left inguinal bulge that was tender to palpation and irreducible. He had no leukocytosis, and his serum lactic acid level was within normal limits. Due to the patient's presentation and symptomatology, a nasogastric tube (NGT) was placed in the emergency department for decompression. A subsequent Kidney-Ureter-Bladder X-ray demonstrated the tip of the NGT within the left groin. Computed tomography confirmed GOO from an incarcerated stomach within the left groin hernia. There was no radiographic evidence of bowel ischemia or compromise (Figure 2).

Preprints (www.preprints.org) | NOT PEER-REVIEWED | Posted: 27 November 2023 doi:10.20944/preprints202311.1665.v1

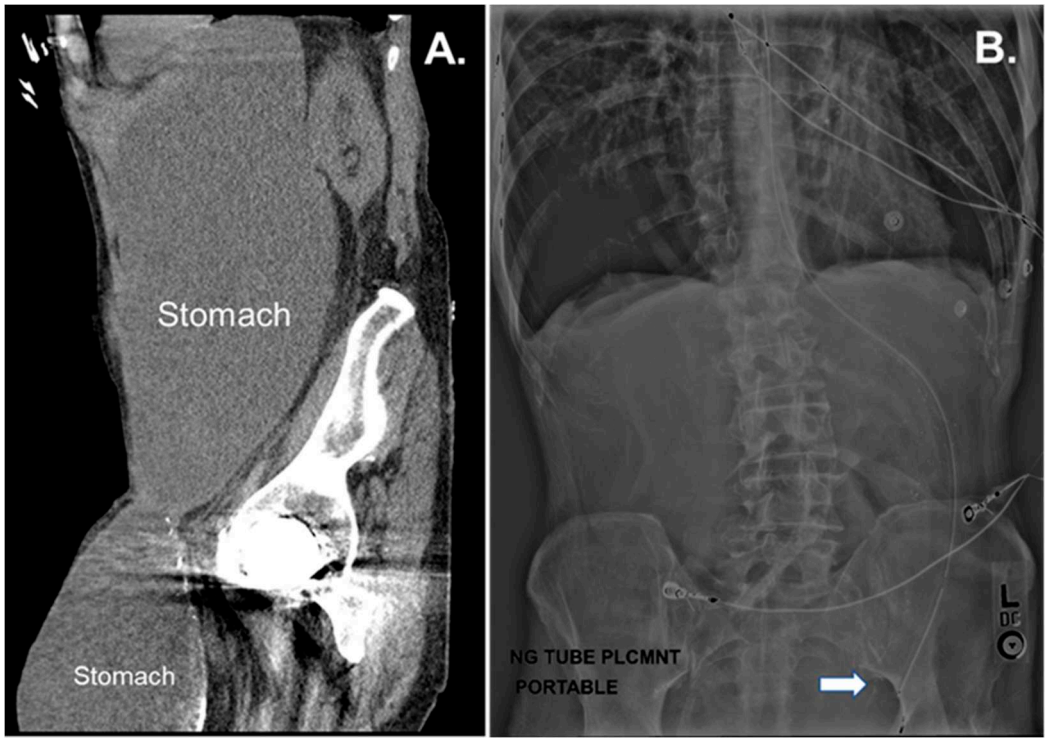

Figure 2. A, Sagittal computed tomography image of the abdomen depicting the stomach extending into the left groin causing gastric outlet obstruction. B, Coronal radiograph of the abdomen depicting the tip of the nasogastric tube in the left groin (arrow).

Intravenous fluid (IVF) administration and NGT decompression were immediately started. His tachycardia promptly resolved after initiating IVF. Serial abdominal examinations were performed and after a few hours of NGT decompression his left inguinal hernia was able to be reduced. Because he was not interested in surgical intervention, he was started on oral feeds a day later and once he was tolerating his diet well, he was discharged home from the hospital. He was doing well at a six-week follow up visit in clinic and still not interested in elective surgical repair of his hernia.

3.2. Review of the Literature

A systematic review of the literature revealed 90 cases of SCOGH, with the present report adding an additional case to the world literature. Other than English, the Spanish and French literature were the most reported languages identifying this clinical entity. Most reports include single cases with a literature review at the time of the publication. Several documents indicated the existence of only 60 cases prior to 1980 [19–21].

The first comprehensive review of SCOGH was published by Davey and Strange in 1954.[18] This manuscript accounted for 34 inguinal and 3 femoral hernias and was inclusive of the prior 150 years and up to the date of publication [18]. A second review in 1960 added only 6 further cases of inguinal hernias with stomach contents to the literature [19].

The most recent review includes 21 cases from 1942 to 2020 of patients who presented with SCOGH [17]. Within this review, there were 10 patients who presented with GOO. This manuscript focused on the management of this condition with emphasis on patients presenting acutely because of perforation. This review was of the English literature only and was limited to reports digitally available. All patients with gastric perforation required laparotomy with one exception, which was addressed laparoscopically [17] .

Our analysis identified 90 unique patients with SCOGH encompassing a period of over two centuries (1802 to 2022). In addition, we include a patient who presented to our institution in February of 2023 with GOO from SCOGH. Thus, a total of 92 patients (86 inguinal and 6 femoral)

 doi:10.20944/preprints202311.1665.v1

are included in the present review (Table 1). If available, patient characteristics and clinical presentation for each case are included in Tables 2 and 3, inguinal and femoral cases, respectively. Online Resource 1 includes the respective references.

Table 1. Characteristics of patients presenting with stomach-containing groin hernias (n=92).

Characteristics	Inguinal (n=86)	Femoral (n=6)
Age [Years (SD)*]	74.2 (13.0)	62.0 (11.5)
Sex [male (%)]	95.2	33.3
Laterality [Left (%)]	78.0	100.0

* Standard Deviation.

Table 2. Characteristics and clinical presentation for the 86 patients with stomach-containing inguinal hernias, ordered by chronological occurrence.

n	Reference, Year [a]	Age	Sex	Laterality	Clinical Presentation
1	Lallement, 1802	64	Male	NR	Abdominal pain/discomfort and vomiting
2	Yvan, 1830	NR	Male	NR	Vomiting
3	Febre, 1832	73	Male	Right	No symptoms
4	Fogt, 1884	60	Male	Left	Vomiting
5	Schmidt, 1885	65	Male	Left	Hematemesis and inguinal pain
6	Chiari, 1888	74	Male	Right	No symptoms
7	Lewin, 1893	53	Male	Left	Emesis and pain
8	Chevereau, 1894	77	Male	Left	Emesis and pain
9	Souligoux, 1896	NR	Male	Left	NR
10	Brunner, 1897	28	Male	NR	NR
11	Hilgeneriner, 1910	52	Female	Left	Pain and vomiting
12	Chambard, 1912	62	Male	Left	Vomiting, pain and an incarcerated hernia
13	Rieder, 1915	62	Male	Left	Hematemesis and melena
14	Ahrens, 1920	40	Male	Right	Pain
15	Maag, 1920	81	Male	Left	No symptoms
16	Stokes, 1922	42	Male	Right	Vomiting and an incarcerated hernia
17	Elischer, 1923	53	Male	Left	Nausea and an incarcerated hernia
18	Elischer, 1923	70	Male	Left	Incarcerated hernia
19	Dressen, 1925	62	Male	Left	Vomiting, pain, and inguinal symptoms when eating
20	de Vernejoul, 1925	57	Female	Left	NR
21	Sicot, 1927	59	Male	Left	Pain, vomiting, and dyspepsia
22	Lipkin, 1928	60	Male	Left	Incarcerated hernia
23	Siegmund, 1929	NR	Male	Right	NR
24	Novaro, 1930	53	Male	Right	Vomiting, pain, and an irreducible hernia
25	Rodzevich, 1935	54	Male	Left	Vomiting and abdominal pain
26	Oakley, 1937	81	Male	Right	Abdominal and groin pain
27	Herrmann, 1937	80	Male	Left	Vomiting
28	Lemaitre, 1937	51	Male	Left	Dyspepsia
29	Lust, 1937	62	Male	Left	NR
30	Alexsandrovskiv, 1940	73	Male	Left	Incarcerated hernia
31	Feldman, 1943	66	Male	Right	No symptoms
32	Hartley, 1945	67	Male	Left	Dyspepsia
33	Simmons, 1949	66	Male	Left	Nausea, vomiting, and abdominal pain
34	Lewis, 1950	69	Male	Right	Occasional vomiting
35	Anger, 1952	74	Male	Left	Vague symptoms
36	Bernard, 1953	NR	NR	NR	NR
37	Meinterz, 1953	NR	NR	NR	NR
38	Davey, 1954	61	Male	Left	Vomiting with markedly distended and tense abdomen

Preprints (www.preprints.org) | NOT PEER-REVIEWED | Posted: 27 November 2023 doi:10.20944/preprints202311.1665.v1

39	Legrand, 1955	NR	NR	NR	NR
40	D'Eshougues, 1956	NR	NR	NR	NR
41	Allende, 1956	NR	NR	NR	NR
42	Kislenskii, 1959	NR	NR	Left	NR
43	Hagarty, 1959	NR	NR	NR	NR
44	Ship, 1960	83	Male	Left	Persistent nausea and vomiting
45	Herrera, 1960	NR	NR	NR	NR
46	Jackson, 1964	NR	NR	NR	Strangulation and perforation of the stomach in the inguinal canal
47	Falugiani, 1968[b]	NR	NR	NR	NR
48	Gue, 1970	NR	NR	NR	NR
49	Soudek, 1975	NR	NR	NR	NR
50	Padmanabhan, 1976	65	Male	Left	NR
51	Nagendran, 1977	NR	NR	NR	NR
52	Rozencwajg, 1981	NR	NR	NR	NR
53	Udwadia, 1984	NR	NR	NR	Hematemesis
54	Quaranta, 1984	NR	NR	NR	NR
55	Resente,1986	NR	NR	NR	NR
56	Naraynsingh, 1987	62	Male	Left	Recurrent bouts of vomiting, recurrent GOO
57	Levy, 1987	49	Male	Left	Abdominal pain, nausea, and weight loss
58	Loizate, 1988	NR	NR	NR	Upper gastrointestinal tract hemorrhage
59	Broquet, 1992	64	Female	Bilateral	Perforation of gastric ulcer within the hernia sac
60	Diaz, 1997	NR	NR	NR	NR
61	Diaz, 1997	NR	NR	NR	NR
62	Walgenbach, 2001	72	Male	Left	A 6-hour history of abdominal distension and pain
63	Birnbaum, 2011	86	Male	Right	Nausea and vomiting
64	Dogar, 2011	65	Male	Left	Irreducible groin bulge, abdominal pain, distention, darkish red vomitus, and obstipation
65	Kerschaever, 2012	79	Male	Left	Anorexia, vomiting, and abdominal distension
66	Ogul, 2013	56	Male	Left	Recurrent vomiting and bilateral incarcerated groin bulges
67	Ferdinand, 2013	73	Male	Right	Iron deficiency anemia and gastric volvulus
68	Fazekas, 2014	85	Male	Left	Three-day history of gastrointestinal obstructive symptoms
69	Creedon, 2014	87	Male	Left	Colicky abdominal pain for 48 hours and vomiting
70	Patel, 2014	85	Male	Left	3-day history of profuse vomiting and abdominal pain
71	Lajevardi, 2015	83	Male	Left	Four-day history of vomiting and constipation
72	Fitz, 2016	46	Male	Bilateral	Severe abdominal pain after dinner brought in by ambulance to the emergency department
73	Mora-Guzman, 2016	79	Male	Right	Abdominal pain and vomiting
74	Perez-Pueyo, 2016	61	Male	Left	Gastric necrosis secondary to an incarcerated inguinal hernia
75	Nugud, 2017	67	Male	Left	Bilious vomiting with abdominal pain
76	Sayad, 2019	50	Male	NR	Severe abdominal pain
77	Junge, 2019	75	Male	Left	Abdominal pain and nausea
78	Mehta, 2019	75	Male	Left	5-day history of hematemesis
79	Heylen, 2020	74	Male	Left	Dark vomitus and generalized abdominal tenderness

Preprints (www.preprints.org) | NOT PEER-REVIEWED | Posted: 27 November 2023 doi:10.20944/preprints202311.1665.v1

80	Patel, 2021[b]	84	Male	NR	Nausea, vomiting, constipation, GOO, and eventual peritonitis
81	Vinod, 2021	49	Male	Left	Acute abdominal pain with nausea and dysuria
82	Alexandre, 2022	71	Male	Left	Nausea, vomiting, constipation, and GOO
83	Grantham, 2022	81	Male	Lett	Coffee ground emesis
84	Abbakar, 2022	84	Male	Right	Double GOO. One-day history of severe abdominal pain and dark brown vomiting
85	Huerta, 2023[b]	77	Male	Left	Abdominal pain, nausea, vomiting, and GOO

GOO = gastric outlet obstruction; NR = not recorded; [a]Full reference details included in Online Resource 1; [b]From posters, abstracts, presentations, and/or present case.

Table 3. Characteristics and clinical presentation for the 6 patients with stomach-containing femoral hernias, ordered by chronological occurrence.

Reference, Year[a]	Age	Sex	Laterality	Clinical Presentation
Keller, 1885	47	Female	Left	3-day history of abdominal pain and vomiting
Spiegel, 1920	55	Female	Left	Gastric strangulation
Cave, 1948	56	Female	Left	Dyspepsia
Davey, 1954	68	Male	Left	No symptoms
Cade, 1984	79	Female	Left	Abdominal pain, emesis, and hematemesis
Natsis, 2008	67	Male	Left	Findings at autopsy

[a]Full reference details included in Online Resource 1.

3.2.1. Patient Demographics

The mean age for the entire cohort was 69.6 ± 12.9 years-old (range 28 to 87 years-old) (Table 1). Most patients were men overall, but female gender was more common in femoral hernias with SCOGH (66.7%). For 73 cases, laterality was included in the reports and 97.5% occurred on the left. Two cases reported bilateral hernias. Six patients had femoral hernias.

3.2.2. Complications

The mean duration for history of a hernia was 23.1 ± 10.8 years (range 10 to 50 years). Gastrointestinal symptoms related to obstruction (nausea, emesis, abdominal pain) were the most commonly reported symptoms (47.8%). GOO was reported in 17, absent in 14, and not reported in 61 patients. Five cases explicitly reported no symptoms. Gastric rupture was emphasized for some reports and in manuscript review [17,22]. Other complications included aspiration pneumonia directly attributed to this entity [23]. Gastric volvulus in a patient with SCOGH was reported in one manuscript [24].

3.2.3. Mortality

Death directly attributed to SCOGH was reported in 21 cases (22.8%). However, most mortalities occurred in early publications (1802-1896 [n=9] and 1910-1997 [n=10]). Only two mortalities occurred in the recent era (2019 and 2021), but these patients were 75 and 84-years old, respectively. Only one death was identified from a femoral hernia containing stomach in a 47-year-old woman, which was reported in 1885 [25].

3.2.4. Management

Nine inguinal and one femoral hernia containing stomach were reported at autopsy, but these were all early reports (1802 to 1896). Elischer successfully operated emergently on two patients with

 doi:10.20944/preprints202311.1665.v1

SCOGH in 1923 [26]. The first hernia repaired in the elective setting was reported by de Vernejoul and de Luna in 1925 [27].

Heylen's manuscript addressed the management of this condition with emphasis on patients presenting acutely because of gastric perforation. All patients with gastric perforation required laparotomy with one exception, which was addressed laparoscopically [17].

Conservative management was explicitly undertaken in 12 patients with SCOGH. The reasons for this approach were cited as high-risk operative candidates. Nasogastric decompression was initially undertaken in patients who presented with emesis or acute incarceration. This was also the management for the patient that presented to our institution.

4. Discussion

The stomach is a fixed structure in the upper abdomen. The gastrophrenic, gastrosplenic, hepatogastric, and hepatoduodenal ligaments provide fixation to the stomach superiorly [28]. This arrangement combined with distance, makes the stomach an unusual visitor to the groin. The groin finds a visiting stomach in the following fashion. First, the inferior fixation of the stomach to the greater omentum and the gastrocolic ligament is more tenuous compared to the superior fixation. Initial migration of the omentum to the groin hernia sac (which is common) with continuous traction and chronicity may eventually lead the stomach to travel within the groin hernia sac [29]. This downward movement of the stomach is termed gastroptosis [30]. Chronicity is thus the second element that makes this migration possible. This is further evidenced by our review, which found that the reported average of time for symptoms of a stomach containing groin hernia was 23.1 ± 10.8 years (range 10 to 50 years).

Multiple mechanisms for the descent of the stomach into the groin have been proposed as early as 1912 by Chambard,[29] 1927 by Sicot,[31] and 1930 by Novaro [32]. Three mechanisms remain constant in the literature: (1) downward pulling of the omentum into the inguinal hernia sac, (2) chronicity, and (3) short stature of patients. Downward deviation of the diaphragm as a result of chronic COPD might also be a contributing factor (as in our patient) [20]. Giant inguinoscrotal hernias, defined by the extension of the hernia down to midthigh while the patient is standing, has also been documented as a risk factor [33].

The likelihood of these three mechanisms occurring in groin hernias simultaneously is so infrequent that in over more than two centuries less than 100 stomach-containing groin hernias have been reported in the literature. The first case of a hernia sac containing stomach appeared in the literature in 1802, and it was diagnosed at autopsy. The patient had been suffering from symptoms of this hernia for 32 years until his demise at age 64 [15]. It took 152 years for the first comprehensive and intriguing review to appear in the literature by Davey and Strange in 1954 [18]. This review included 34 inguinal and 3 femoral hernias. Our review adds 51 inguinal (including one of our own) and 3 femoral hernias to the world literature.

The first eight reports of SCOGH were documented at autopsy (n=8 from 1802 to 1896) [15]. The first case of a femoral hernia containing stomach was documented by Keller in 1885 [25]. The first laparotomy performed identifying SCOGH occurred in 1897 [34]. The first radiographic evidence of SCOGH was first published in the literature in 1915 [34]. Successful outcomes for an emergent operation from SCOGH were initially described by Elischer in 1923 [26]. The first woman with SCOGH was reported in 1925 [18,27]. The first case of SCOGH repaired in the elective setting is credited to de Vernejoul and de Luna in 1925 [27].

Laterality and sex are important for migration of the stomach into the groin. Our analysis identified left laterality for 78% and 100% of the cases and male sex for 95% and 33% of the cases for inguinal and femoral hernias in patients with SCOGH, respectively.

Clinical presentation for SCOGH ranged from entirely asymptomatic to an acute abdomen. Overall, the most common complaint was related to obstructive symptoms, occurring in nearly half of the cases in our analysis. GOO from SCOGH occurred in 18.5% of cases. There was also a wide spectrum of management in patients with SCOGH from entirely conservative (n=11; 12%), to elective operative intervention, to emergent operative management. Management varied from a groin

approach with or without laparotomy for elective cases to laparotomy with or without a groin incision in emergent cases. One report documented an exclusively laparoscopic hernia repair [17]. Haylen's manuscript provides an excellent review of the surgical approach depending on clinical presentation [17].

While mortality has been reported in patients with SCOGH, these deaths occurred in earlier reports. For recent reports, mortality is uncommon and most patients did well regardless of management strategy (conservative, non-operative management [as in our case] to elective operations,[27] or urgent operations[17,26]).

5. Conclusions

Our review shows that almost any abdominopelvic organ, even the naturally superiorly located stomach, can migrate to the groin, enter the groin hernia sac, and present as an asymptomatic or symptomatic hernia. The stomach is rarely found in groin hernias owing to its fixation to the upper abdomen; however, omental downward displacement combined with chronicity are common mechanisms leading to SCOGH. Commonly, patients present with symptoms related to GOO, though some patients may remain asymptomatic entirely. Conservative management is permissible depending on clinical presentation, patient preferences, and operative risk. For SCOGH presenting with symptoms of GOO, immediate NGT decompression is encouraged and may allow for reduction of an initially incarcerated SCOGH and ultimately permit conservative management. Modern diagnostic tools and contemporary management strategies allow for early identification and improved outcomes for patients with SCOGH.

6. Patents

Informed consent was obtained by the patient for publication of this manuscript and is available upon request.

Supplementary Materials: The following supporting information can be downloaded at the website of this paper posted on Preprints.org.

Author Contributions: "Conceptualization, S.H., J.F. and M.A.; methodology, M.A, and J.F.; software, M.A., and J.F.; validation, KW., J.F. and M.A.; formal analysis, M.A, J.F., S.H, C.W., J.M., and S.H,; investigation, J.F., M.A., S.H., J.M., and C.W.; resources, J.F., M.A., S.H., J.M.; data curation, J.F., M.A., S.H., J.M.; writing—original draft preparation, J.F., M.A., S.H., J.M.; writing—review and editing, J.F., M.A., S.H., J.M.; visualization, J.F., M.A., S.H., J.M.; supervision, S.H.; project administration, S.H.; funding acquisition, S.H. All authors have read and agreed to the published version of the manuscript." Please turn to the CRediT taxonomy for the term explanation. Authorship must be limited to those who have contributed substantially to the work reported.

Funding: Please add: "This research received no external funding".

Institutional Review Board Statement: All procedures performed in the studies involving human participates were in accordance with the ethical standards of the institution and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. Appropriate Institutional Board Review approval was not required for this systematic review. .

Informed Consent Statement: Informed consent was obtained by the patient for publication of this manuscript and is available upon request.

Conflicts of Interest: The authors declare no conflict of interest.

References

1. Huerta S, Patel PM, Mokdad AA, Chang J. Predictors of inguinodynia, recurrence, and metachronous hernias after inguinal herniorrhaphy in veteran patients. *Am J Surg* 2016;212(3):391-8. doi: 10.1016/j.amjsurg.2016.01.036 [published Online First: 20160506]
2. Ponka JL, Brush BE. Sliding inguinal hernia in patients over 70 years of age. *Journal of the American Geriatrics Society* 1978;26(2):68-73.
3. Huerta S, Fairbanks T, Cinat M. Incarcerated vesicoinguinal hernia presenting with gross hematuria. *J Am Coll Surg* 2005;201(6):992-3. doi: 10.1016/j.jamcollsurg.2005.04.037 [published Online First: 20050923]
4. Dunn TM, Markgraf WH. Littre hernia—incarcerated meckel's diverticulum. *The American Journal of Surgery* 1962;103(1):144-45.

5. Michalinos A, Moris D, Vernadakis S. Amyand's hernia: A review. *The American Journal of Surgery* 2014;207(6):989-95.
6. Goyal S, Shrivastva M, Verma R, Goyal S. "Uncommon contents of inguinal hernial sac": A surgical dilemma. *Indian Journal of Surgery* 2015;77:305-09.
7. Ganesaratnam M. Maydl's hernia: Report of a series of seven cases and review of the literature. *British journal of surgery* 1985;72(9):737-38.
8. Taveras LR, Huerta S. A case report of a de garengeot hernia in a nonagenarian veteran. *Int J Surg Case Rep* 2017;41:301-03. doi: 10.1016/j.ijscr.2017.10.049 [published Online First: 20171103]
9. Sidiqi MM, Menezes G. Asymptomatic herniation of ureter in the routine inguinal hernia: A dangerous trap for general surgeons. *Int J Surg Case Rep* 2018;49:244-46. doi: 10.1016/j.ijscr.2018.07.013 [published Online First: 20180720]
10. Aldhafar A, Mohammed A, Alwabari M, Aldhafar R. A strangulated right inguinal hernia containing the transverse colon: An unusual case report. *Asian Journal of Case Reports in Surgery* 2020;5(4):10-13.
11. Fitz E, Chihara R, Stanton-Maxey KJ. Gastric perforation associated with bilateral inguinal hernias. *J Am Coll Surg* 2016;222(2):e12-3. doi: 10.1016/j.jamcollsurg.2015.11.029
12. Tajti J, Jr., Pieler J, Abraham S, Simonka Z, Paszt A, Lazar G. Incarcerated gallbladder in inguinal hernia: A case report and literature review. *BMC Gastroenterol* 2020;20(1):425. doi: 10.1186/s12876-020-01569-5 [published Online First: 20201214]
13. Chen G, Wang X, Zhao Y, Zhu L, Tang D. Splenogonadal fusion: A case report and review of the literature. *BMC Urol* 2021;21(1):16. doi: 10.1186/s12894-021-00781-z [published Online First: 20210203]
14. Arredondo Montero J, Guillen Redondo P, Antona G, Bronte Anaut M. Newborn inguinal hernia containing uterus, ovary and fallopian tube. *An Pediatr (Engl Ed)* 2023;98(3):232-33. doi: 10.1016/j.anpede.2023.02.003 [published Online First: 20230220]
15. Lallement L. *J Med Chir Pharm* 1802;1:329.
16. McInnes MD, Moher D, Thombs BD, McGrath TA, Bossuyt PM, Clifford T, Cohen JF, Deeks JJ, Gatsonis C, Hooft L. Preferred reporting items for a systematic review and meta-analysis of diagnostic test accuracy studies: The prisma-dta statement. *Jama* 2018;319(4):388-96.
17. Heylen J, Campioni-Norman D, Lowcock D, Varatharajan L, Kostalas M, Irukulla M, Ratnasingham K. Inguinoscrotal hernias containing stomach: Risk of emergency presentation. *Ann R Coll Surg Engl* 2021;103(10):713-17. doi: 10.1308/rcsann.2021.0040 [published Online First: 20210825]
18. Davey W, Strange S. The stomach as a content of inguinal and femoral herniae. *British Journal of Surgery* 1954;41(170):651-58.
19. Ship AG, Glick AH, Goldenson AB. Incarceration of the stomach in an inguinal hernia: Report of a case. *New England Journal of Medicine* 1960;262(2):78-80.
20. Diaz Oller J, Medina Dominguez MT, Arcos Navarro A, Alia Diaz JJ, Asanza Llorente JA, Numancia Andreu MB, Nevado Infante A, Martos Torres J, Moya Vazquez RJ. [stomach in inguinal-scrotal hernia]. *Rev Esp Enferm Dig* 1997;89(4):325-8.
21. Ogul H, Yuce I, Eren S, Kantarci M. Bilateral inguinal hernia with uncommon content. *Can J Gastroenterol* 2013;27(1):14. doi: 10.1155/2013/873702
22. Heylen J, Campioni-Norman D. Bilateral inguinoscrotal hernia with gastric contents and subsequent perforation: Lessons in operative management. *International Journal of Surgery Case Reports* 2020;77:853-56.
23. Fazekas B, Frecker P, Francis L, Patel K. Aspiration pneumonia as a complication of a rare type of hernia. *Int J Surg Case Rep* 2014;5(12):1061-3. doi: 10.1016/j.ijscr.2014.10.070 [published Online First: 20141101]
24. Ferdinand E, Amir R, Manjunath S. Serendipity of giant proportions. *Clin Gastroenterol Hepatol* 2013;11(10):A25-6. doi: 10.1016/j.cgh.2013.01.009 [published Online First: 20130129]
25. Keller O. Schenkelhernie mit magen als inhalt. *Inag Diss, Bern* 1885
26. Elisscher EV. *Ibid* 1923;50:1814.
27. de Vernejoul, de Luna D. Sociétés de province: Société de chirurgie de marseille: Volumineuse hernie inguinale renfermant l'estomac et les annexes gauches. *Pr Med* 1925;33:208.
28. Grantham TA, Ramachandran R, Parvataneni S, Gaduputi V. Stomach within a large inguinal hernia. *Cureus* 2022;14(5):e24783. doi: 10.7759/cureus.24783 [published Online First: 20220506]
29. Chambard ME. La hernie inguinale de l'estomac. *Rev, de gynec e d'obst* 1912;19:61–79.
30. Natsis K, Apostolidis S, Papadopoulou A, Vlasis K, Totlis T, Skandalakis P. Gastric femoral hernia in a male cadaver with gastroptosis: Case report and review of the literature. *Hernia* 2008;12:205-08.
31. Sicot R. Contribu a l'etude des hernies inguinales de l'etomc. *These de Paris* 1927
32. Novaro N. *Arch Ital Chir* 1920;27:483.
33. Lajevardi SS, Gundara JS, Collins SA, Samra JS. Acute gastric rupture in a giant inguinoscrotal hernia. *J Gastrointest Surg* 2015;19(12):2283-5. doi: 10.1007/s11605-015-2916-y [published Online First: 20150820]
34. Brunner F. Kleinere mittheilungen: Ein fall von hernia ventriculi inguinalis incarcerata. *Zentralbl f Chir* 1897;24:919-21.

 doi:10.20944/preprints202311.1665.v1