






# Acute splenic pedicle torsion involving pancreatic tail: case report and computed tomography diagnostic role

Valeria Molinelli<sup>1</sup> , Marco Calvi<sup>2\*</sup> , Giada Zorzetto<sup>2</sup>, Matteo Annoni<sup>3</sup> , Massimo Venturini<sup>2</sup> , Eugenio Annibale Genovese<sup>2</sup> 

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## ABSTRACT

**Background:** Wandering spleen is an unusual condition characterized by hypermobility of the spleen. Excessive mobility can cause torsion of the vascular pedicle with subsequent complications such as ischemia and necrosis. Clinical manifestations can vary from asymptomatic to abdominal emergency and treatment is often surgical.

**Case Presentation:** We presented a case report of splenic torsion in a 24-year-old woman with complaints of upper abdominal pain associated with mild left hypochondrial tenderness. Laboratory testing and ultrasound were completely negative making the diagnosis difficult. A computed tomography (CT) scan was carried out due to worsening symptoms and it demonstrated a splenic torsion with involvement of the distal part of the pancreatic tail. Surgery was performed by laparoscopic splenectomy. No signs of pancreatitis were found.

**Conclusion:** Splenic torsion is a rare but important differential diagnosis in patients with an acute abdomen and CT is often necessary to achieve the correct diagnosis and exclude possible complications.

**Keywords:** Wandering, torsion, pancreas, spleen, acute abdomen.

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Correspondence to: Marco Calvi

\*Department of Diagnostic and Interventional Radiology, University of Insubria, Varese, Italy.

Email: [dr.marco.calvi@icloud.com](mailto:dr.marco.calvi@icloud.com)

Full list of author information is available at the end of the article.

## Background

Wandering spleen is an unusual condition characterized by hypermobility of the spleen. Excessive mobility can cause torsion of the vascular pedicle with subsequent complications such as ischemia and necrosis. Clinical manifestations can vary from asymptomatic to abdominal emergency and treatment is often surgical.

## Case Presentation

A 24-year-old woman presented to the emergency department at 5.10 in the morning with complaints of severe deep abdominal pain increasing in intensity upon admission with associated symptoms such as vomiting and agitation.

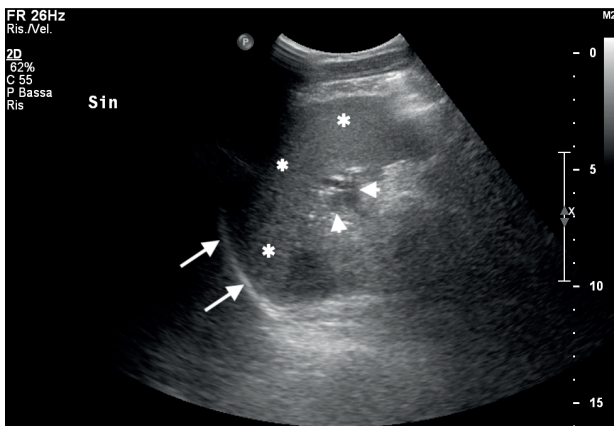
She reported suffering from similar episodes of intermittent mild pain in the 2 weeks before admission. She had no prior medical history and no addiction, neither to drugs nor to alcohol assumption. No allergies were found.

On general examination, the patient was afebrile (36.5°C), pulse rate of 100 bpm, and blood pressure of 130/70 mmHg. No pathologic variation in skin color or superficial masses was noted. Systemic examination was unremarkable except for mild tenderness in the left hypochondrium at deep palpation. The abdominal examination did not find any palpable masses or guarding.

Laboratory parameters showed hemoglobin 12.5 g/dl (n.v. 12.0–16.5), white blood cells 9.54  $10^9/l$  (n.v. 4.30–11.00), platelet count 209  $10^9/l$  (n.v. 150–450), C-serum reactive protein 3.6 mg/l (n.v. 0.0–5.0), serum tot. alpha-amilase 115 U/l (n.v. 31–107), serum AST 24 U/l (n.v. 11–34), serum ALT 13 U/l (n.v. 8–41), and serum tot. bilirubin 0.55 mg/dl (n.v. 0.10–1.20). Urea and electrolytes were normal. A complete abdominal ultrasound examination was carried out without revealing any relevant issue. In particular, no abnormalities were found in the left upper quadrant showing a normally located spleen (Figure 1). A surgical evaluation was required and progressive clinical deterioration and guarding onset demanded further diagnostic workup.

A computed tomography (CT) scan (GE Medical Systems - Revolution EVO) of the abdomen with an endovenous contrast agent (Ioxolo 350 mgI/ml) was carried out.

As shown in Figures 2–4, the CT findings of spleen morphology, size, and location were normal and consistent with those of the ultrasound evaluation. The splenic pedicle was abnormal with a twisting aspect involving the distal part of the pancreatic tail with associated, mild, regional venous dilatation. There was no evidence of arterial obstruction.



**Figure 1.** The spleen (asterisks) is located in its regular position in the upper left quadrant; the diaphragm is clearly evident (arrows). Splenic pedicle did not present any evident abnormality (arrowheads).

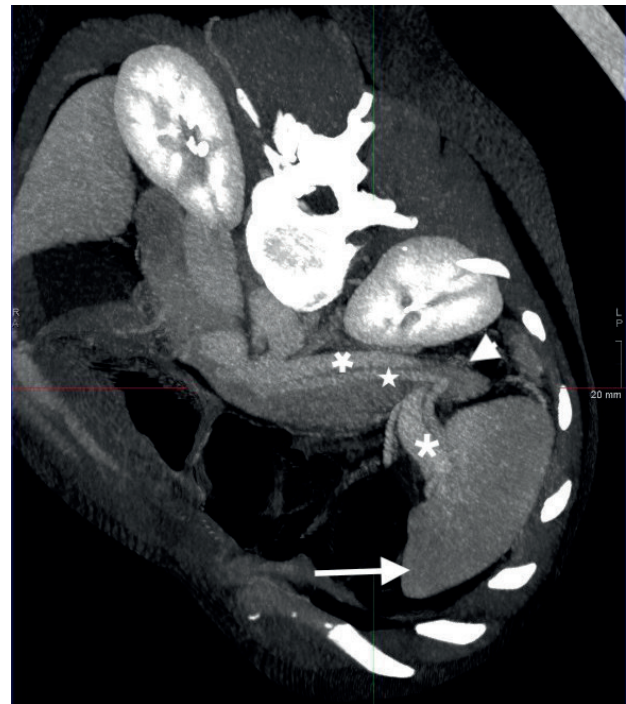


**Figure 2.** The MIP reformatted image obtained in portovenous phase (90°), demonstrates a normally located spleen (arrow) and clearly shows a "whirl" image at the splenic pedicle involving the pancreatic tail (arrowheads) with opacification of the proximal splenic vein (black asterisk).

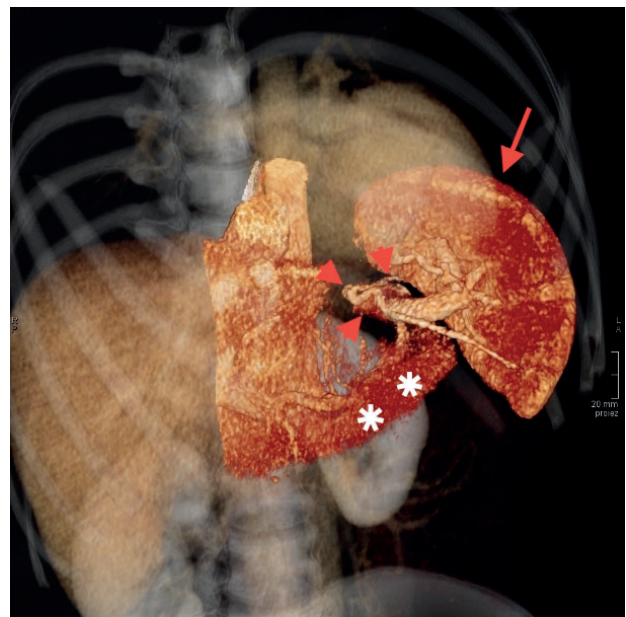
Regional fat stranding and free intra-abdominal fluid along the paracolic space were present with thickening of the omental fascia. The diagnosis of complete splenic torsion was suggested and the patient was scheduled for immediate laparoscopic treatment under general anesthesia.

The operative findings showed a congested but not infarcted spleen overlying the stomach (Figure 5) located in its normal hypochondrial position. The spleen was twisted 360° counterclockwise (Figure 5) and splenic ligamentous attachments (gastrosplenic, splenophrenic, splenocolic, and phrenicocolic) were completely absent. No adhesions between the spleen and other abdominal viscera were found. Splenectomy was carried out (Figure 6).

The patient had regular postoperative management with gradually decreasing abdominal pain. Laboratory parameters remained normal even after surgery. Antibiotic, analgesic, and support therapies were administered together with vaccination against capsulated bacteria. The patient was discharged in good clinical conditions on the 3rd postoperative day. The immediate follow-up was uneventful.



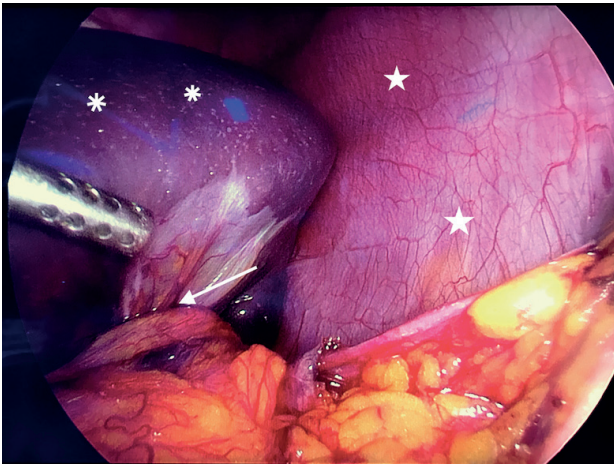
**Figure 3.** The thick reformatted oblique MIP image clearly shows a twisted splenic pedicle involving the pancreatic tail (arrowhead) with opacification of the proximal and distal splenic vein (asterisks), and regular opacification of the splenic artery (star). The spleen is normally located (arrow).



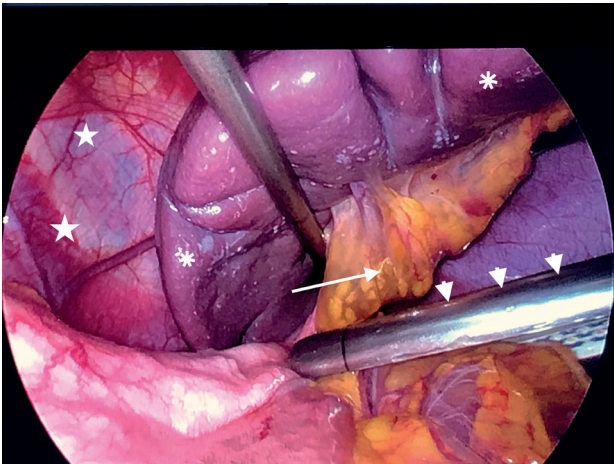
**Figure 4.** In the 3D virtual reality (VR) image reconstruction, the twisted splenic pedicle (arrowheads) with pancreatic tail involvement is clearly represented (asterisks). The spleen is normally located (arrow).

## Discussion

The first case of splenic wandering was described in 1667 by the Dutch physician Von Horne and was noted during an autopsy [1]. However, one of the first case reports of a wandering spleen in a child was published in 1854 by the Polish physician Józef Dietl who also considered the



**Figure 5.** At the endoscopic evaluation, the spleen (asterisks) appeared congested without necrotic areas. 360° counterclockwise pedicle torsion was confirmed (arrow). The examination also confirmed the absence of spleno-diaphragmatic ligaments (stars).



**Figure 6.** After complete detorsion, the spleen (asterisks) was completely mobilized cutting its residual attachments to the lateral abdominal wall (stars) and video laparoscopic splenectomy was performed cutting the splenic pedicle (arrow) with an Echelon J&J stapler (arrowheads).

relaxation, extension, or hypoplasia of splenic ligaments as the major cause to the spleen wander [2].

The spleen stems from the splanchnic mesoderm as single or multiple outbreaks of embryonic mesenchyme that later merges into the dorsal mesogastrium during the fifth week of pregnancy. The rotation of the stomach displaces the spleen from the middle line toward the left side of the abdominal cavity and the dorsal mesogastrium separates giving rise to the peritoneal ligaments. These ligaments fix it to the primitive abdominal cavity and keep it in its usual position [3]. The gastrosplenic, splenorenal, and splenocolic ligaments are usually present, except for the wandering spleen, while the splenomenthal and splenophrenic ligaments are inconstant. Without fixed ligamentous attachments, a normal spleen can change its position within the abdomen [4].

In some cases, this clinical condition may also be associated with splenomegaly, such as occurring in malaria, lymphoma, chronic myeloid leukemia, lymphosarcoma, infectious mononucleosis, and Gaucher's disease [5].

In pediatric patients, there may be other associated congenital diseases, including prune belly syndrome, renal agenesis, gastric volvulus, diaphragmatic eventration, and congenital diaphragmatic hernia [6].

The incidence is unknown, but it accounts for 0.2%-0.3% of splenectomies. The wandering spleen has two peaks of incidence in childhood and in the third decade of life [7]. It is seven times more common in females than males above the age of 10 and 2.5 times more common in males than females below the age of 1. In adulthood, most of the affected females are multiparous as hormonal changes and abdominal laxity seems to be a predisposing condition.

Clinical manifestations vary from asymptomatic to the abdominal emergency. Patients may complain of a pelvic mass or intermittent colicky abdominal pain (presumably caused by intermittent torsion-detorsion or kinking of relevant vasculature). Patients aged less than 12 months most commonly present with an abdominal mass [6].

Other non-specific symptoms include nausea, emesis, and mild crampy abdominal pain. The patient may become severely symptomatic when torsion of the pedicle results in spleen ischemia, infarction, or rupture [8]. Other complications include bowel obstruction, gastric volvulus, and gastric and duodenal compression [9,10].

Recurrent acute pancreatitis is a rare presentation and complication of wandering spleen, where the tail of the pancreas is twisted along with the splenic vascular pedicle at the splenic hilum, causing pancreatic inflammation [10,11].

Our case is peculiar because of the great discrepancy between the patient symptoms and the clinical, laboratory, and echographic findings which resulted to be completely normal, except for mild tenderness in the upper-left abdominal quadrant. Ultrasonography (US), with or without Doppler, could be a very useful initial tool for revealing the absence of the spleen in the left upper quadrant and an abdominal mass with US features of a spleen. If, as in our case, US is negative or equivocal, CT must be used as a fundamental investigative tool [1,2,11].

The use of CT in the pediatric population must be appropriately tailored to obtain diagnostic imaging using the lowest possible radiation dose. The features of spleen torsion on contrast-enhanced CT are virtually pathognomonic, enabling, as in our case, prompt diagnosis and treatment.

Computed tomographic signs of acute splenic torsion include decreased enhancement, either diffuse or heterogeneous, and the "whirl" sign with thickened and coiled vascular pedicle (both signs were present in our case). Signs of subacute or recurrent torsion are splenomegaly,

**Table 1.** Summary of the articles mentioning wandering spleen torsion with pancreatic tail involvement [10,12–15].

Author	Year of publication	Patient's age at presentation/ sex	Clinical presentation	Spleen position and dimension	Pancreatic tail involvement	Outcome
Colombo F	2020	18 years, female.	Recurrent pain, known history of wandering spleen.	Pelvic spleen; splenomegaly was present.	Involved with ectopic position, no signs of infarction.	Splenectomy with pancreatic tail preservation. Normal recovery.
Michaels L	1954	43 years, female.	Fever in presence of a sacral pressure wound (postencephalitic parkinsonism).	(Autoptic evidence) Normal position and dimension, pedicle twisted twice.	Infarcted pancreatic tail.	Exitus.
Dirican A	2009	30 and 19 years, both female.	Acute abdominal pain and vomiting.	1 <sup>st</sup> : normal location, splenomegaly. 2 <sup>nd</sup> : pelvic location, normal dimension.	Only the first one had pancreatic tail involvement; necrosis was present.	1 <sup>st</sup> : splenectomy and distal pancreatectomy. 2 <sup>nd</sup> : splenectomy. Normal recovery.
Gilman RS	2003	24 years, female.	Signs and symptoms of acute pancreatitis (pregnant patient).	Enlarged spleen with caudal displacement.	No mention of pancreatic necrosis.	Splenectomy due to splenic vein hypertension and gastric varices bleeding. Normal recovery.
Parker LA	1984	28 years, female.	Nausea, vomiting, central abdominal palpable mass.	Displaced spleen, normal dimension.	Pancreatic tail infarction	Splenectomy and distal pancreatectomy. Normal recovery.

due to a venous impaired outflow, and hyperdense splenic pedicle on the unenhanced scan (suggesting thrombus in the torted pedicle). A sign of chronic torsion and ischemia is rim sign or pseudocapsule sign [12].

Between 1903 and 2020, 304 cases of wandering spleen were described (the research was made entering the keyword combination: “wandering spleen” on the PubMed platform).

Most of the reported cases describe abnormally long pedicles twisted multiple times with the spleen located in ectopic locations [4]. Our case was different due to the substantially normal length of the splenic vascular pedicle with the spleen located in its usual position making the diagnosis of “wandering spleen” challenging.

Involvement of the distal part of the pancreatic tail is also uncommon with only five cases reported [5] in the literature (Table 1). Three out of the five cases described a twisted pancreatic tail with concomitant signs of acute pancreatitis. In our case, there were no CT or laboratory findings of concurrent acute pancreatitis, probably due to incomplete venous outflow occlusion.

In our case, before CT evaluation, an alternative diagnosis such as acute renal obstruction due to urolithiasis, extrauterine pregnancy, early bowel obstruction, bowel invagination, or abdominal malignant mass was advised. Fortunately, the correct diagnosis led to immediate treatment and the young patient was discharged in good clinical conditions.

Concerning the treatment, if the spleen is viable, open or laparoscopic splenopexy is preferred, especially in very

young patients, while splenectomy is a better choice if the spleen is necrotic or there is a concern of torsion recurrence. In our case, splenectomy was carried out to avoid the risk of recurrence.

## Conclusion

Upper left quadrant pain in female patients, when traumatic anamnesis is excluded, can be caused by intestinal, renal, pancreatic, or gynecological issues. When clinical examination, laboratory findings, and preliminary US evaluation are inconclusive, CT is an essential diagnostic tool to achieve the correct diagnosis and to proceed with the correct treatment. Spleen torsion is a rare pathological condition and CT proved to be an indispensable diagnostic tool.

## List of Abbreviations

CT Computerized tomography  
US Ultrasonography

## Conflict of interest

The authors declare that there is no conflict of interest regarding the publication of this article.

## Funding

None.

## Consent for publication

Written consent was obtained from the patient.

## Ethical approval

Ethical approval is not required at our institution to publish an anonymous case report.

### Author details

Valeria Molinelli<sup>1</sup>, Marco Calvi<sup>2</sup>, Giada Zorzetto<sup>2</sup>, Matteo Annoni<sup>3</sup>, Massimo Venturini<sup>2</sup>, Eugenio Annibale Genovese<sup>2</sup>

1. Department of Diagnostic and Interventional Radiology, ASST-Settelaghi, Ospedale di Circolo e Fondazione Macchi, Varese 21100, Italy
2. Department of Diagnostic and Interventional Radiology, University of Insubria, Varese, 21100, Italy
3. Department of Endocrine and Metabolic Surgery, ASST-Settelaghi, Ospedale di Circolo e Fondazione Macchi, Varese, 21100, Italy

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### Summary of the case

1	<b>Etiology</b>	Unknown
2	<b>Incidence</b>	Incidence is unknown, but it accounts for 0.2-0.3% of splenectomies.
3	<b>Gender Ratio</b>	Before 1st year of life: M>F (2.5:1); after: F>M (7:1).
4	<b>Age Predilection</b>	Childhood and third decade of life
5	<b>Risk Factors</b>	Female sex, splenomegaly, multiple pregnancies, congenital abnormalities.
6	<b>Treatment</b>	Splenopexy, splenectomy.
7	<b>Prognosis</b>	Good if promptly recognized and treated.
8	<b>Findings on imaging</b>	Decreased enhancement, either diffuse or heterogeneous, “whirl” sign with thickened and coiled vascular pedicle.