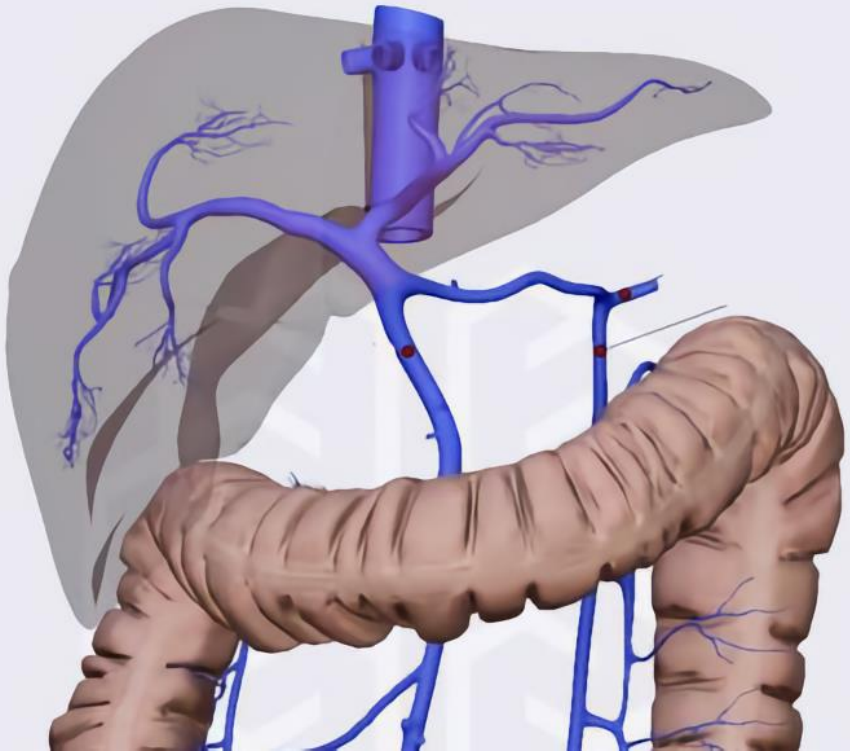

APPROACH TO PORTAL VEIN THROMBOSIS (PVT)

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ANATOMY & DEFINITIONS

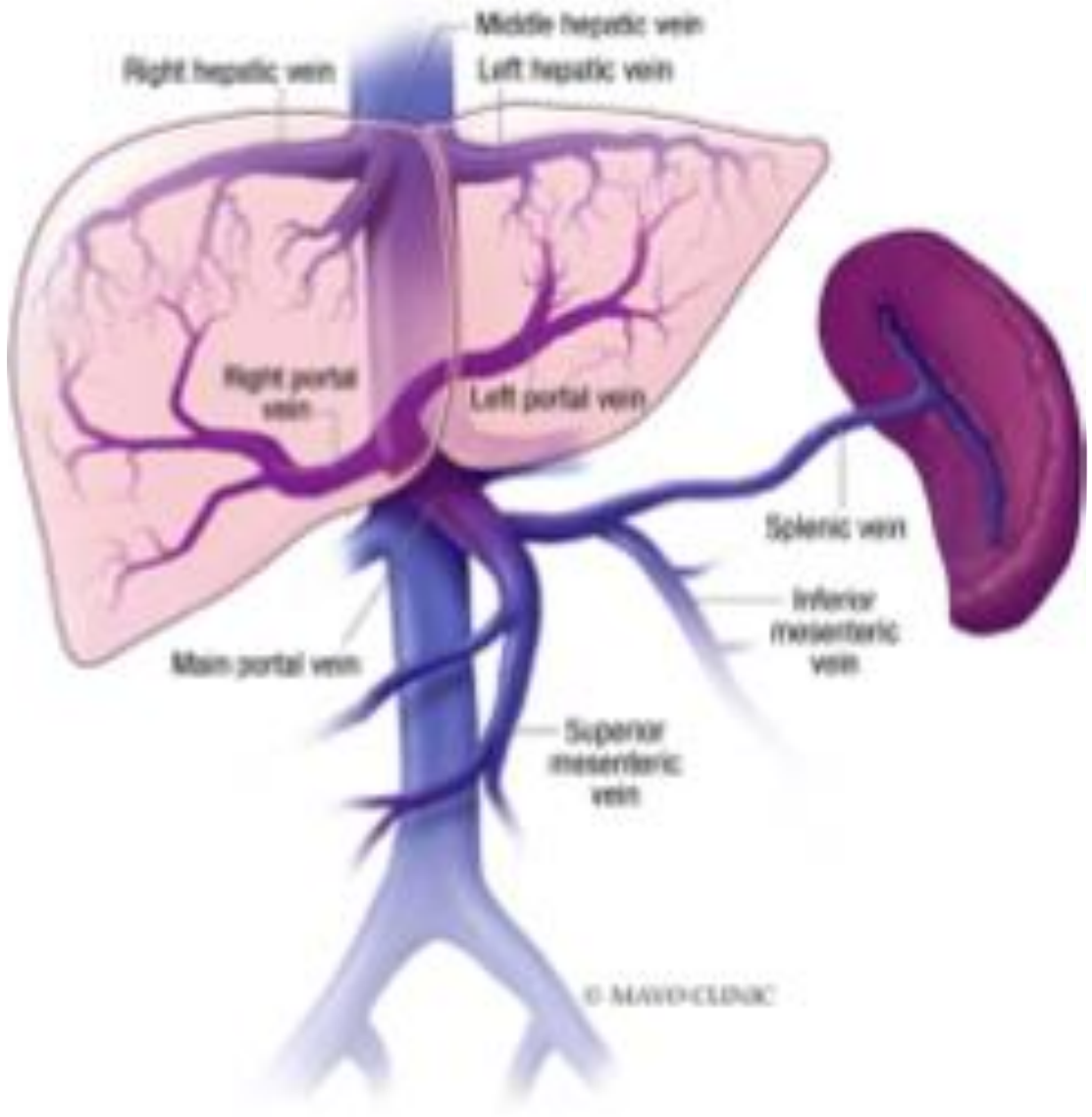
Portal vein = SMV + splenic vein

Thrombosis may involve:

- Main portal vein
- Intrahepatic branches
- Extension to SMV / splenic vein

Key distinction:

- Acute vs chronic
- Partial vs complete
- Bland vs tumor thrombus
- With vs without Cavernous transformation



ETIOLOGY & RISK STRATIFICATION
(NON-CIRRHOTIC VS CIRRHOTIC VS MALIGNANT)

1) Non-cirrhotic, non-malignant PVT (NCPVT)

- Typical triggers (think “local + systemic”)
- Local: intra-abdominal inflammation (pancreatitis/IBD/diverticulitis), intra-abdominal infection, abdominal trauma, recent abdominal surgery (incl. laparoscopic)
- Systemic: inherited/acquired thrombophilia; myeloproliferative neoplasm (MPN) (often occult)

Recommendation: Detailed thrombophilia workup + JAK2 testing to evaluate MPN (ACG 2025, AASLD 2020)

ETIOLOGY & RISK STRATIFICATION
(NON-CIRRHOTIC VS CIRRHOTIC VS MALIGNANT)

3) Malignant PVT (tumor thrombus)

- "First exclude tumor thrombus before applying benign PVT anticoag pathways."
- Most commonly HCC-related portal vein tumor thrombus; management is oncologic (locoregional/systemic) rather than routine AC.

tumor thrombus due to HCC is suggested by arterialization of the thrombus on contrast imaging; CT/MRI helps distinguish and map extent

ETIOLOGY & RISK STRATIFICATION
(NON-CIRRHOTIC VS CIRRHOTIC VS MALIGNANT)

Summary

If non-cirrhotic → search systemic thrombophilia/MPN; if cirrhotic → focus on portal HTN phenotype + selective thrombophilia; if malignant → treat as tumor biology and don't auto-anticoagulate.

CLINICAL PRESENTATION

Many PVTs are asymptomatic; when symptomatic, abdominal pain is common.

Red flags for ischemia: pain out of proportion, sepsis, rising lactate, concerning CT bowel findings.

ACG: explicitly flags “pain disproportionate to exam” and systemic signs (fever, leukocytosis, lactate) as ischemia cues.

AGA: ties ischemia to urgent anticoagulation and multidisciplinary care.

Rutherford: emphasizes repeated clinical exams + labs and close CT review for bowel wall edema/dilatation/mesenteric edema as prognostic indicators for resection risk.

DIAGNOSTIC IMAGING ALGORITHM

Preferred sequence

1. Doppler ultrasound as initial test
2. Contrast CT/MRI to confirm extent, evaluate mesenteric involvement, and exclude malignant/tumor thrombus

TREATMENT STEP 1

1) First: confirm phenotype and exclude "look-alikes"

A. Exclude malignant portal vein obstruction (tumor thrombus)

- Use contrast CT/MRI to evaluate for malignancy and document degree of lumen occlusion, extent, and chronicity.
- If malignant thrombus is likely, the management is primarily oncologic/portal HTN-directed, and benign PVT anticoagulation algorithms may not apply.

B. Assess for intestinal ischemia (this is the "hard stop")

- If there is concern for intestinal ischemia: urgent multidisciplinary management + immediate anticoagulation, with surgery if infarction.

TREATMENT STEP 2

2) Imaging and staging (guidelines largely aligned)

Initial test: Doppler ultrasound, then confirm/stage with CT or MRI.

Stage using:

- Recent (<6 months) vs chronic (>6 months)
- <50% vs >50% occlusion of main portal vein / mesenteric veins (practical threshold used for treatment decisions)
- SMV involvement (higher risk; lower threshold for treatment/escalation)

TREATMENT STEP 3

3) Decide whether this is cirrhotic vs non-cirrhotic PVT

A. Non-cirrhotic, non-malignant PVT (NCPVT)

- ACG: anticoagulation is recommended for all non-cirrhotic acute symptomatic portal or mesenteric vein thrombosis (strong recommendation).
- Thrombophilia evaluation is recommended when no obvious provoking factor; JAK2 testing for occult MPN is specifically emphasized.

B. Cirrhotic PVT

- Evidence is weaker; decisions are based on expected benefit (prevent extension, preserve transplant options, avoid worsening portal HTN) vs bleeding risk.

TREATMENT STEP 4

4) Anticoagulation: who gets treated vs observed

B. Non-cirrhotic acute symptomatic PVT/MVT

Treat with anticoagulation (ACG strong recommendation).

If chronic: anticoagulate selectively (thrombophilia, progression into mesenteric veins, or current/previous bowel ischemia).

TREATMENT STEP 5

5) Agent selection and duration

Initiation: UFH or LMWH are both acceptable as initial therapy (conditional) (ACG).

Maintenance: VKA, LMWH, and DOACs are all reasonable; individualize based on patient preference and Child-Turcotte-Pugh class (AGA 2025).

Duration: at least 6 months if reversible etiology/no thrombophilia; indefinite if thrombophilia (ACG).

- Thrombosis Canada: reversible risk factor generally 3 months; unprovoked/ongoing risk factor 3–6 months, consider long-term with periodic reassessment.
- Rutherford/ESVS (for mesenteric venous thrombosis): 6 months for transient risk; lifelong for thrombophilia/idiopathic due to fatal recurrence risk.

TREATMENT STEP 6

6) When to escalate beyond anticoagulation

Most PVT is managed medically, but the moment bowel viability is threatened, this becomes a surgical disease.

1. Screen for bowel ischemia/necrosis (clinical + CT): Clinical red flags (evolving): fever, rebound tenderness/peritonitis, leukocytosis, rising lactate, increasing abdominal pain (especially out of proportion). CT role: characterize signs of intestinal ischemia and disease extent.
2. Decide pathway: No peritonitis / stable + no necrosis on CT → anticoagulation-first + close monitoring. Peritonitis or clinical deterioration (even if CT is not definitive) → urgent operative evaluation (laparoscopy or laparotomy depending on expertise, bowel distension, adhesions, physiology).
3. Intraoperative decision: Resect if: frank transmural necrosis, uncertain viability, or severe ischemic lesions. Consider damage-control and second-look when viability is borderline (aim: avoid unnecessary bowel loss).

ENDOVASCULAR THERAPY

When to consider Endovascular escalation

1. Intestinal ischemia persists despite anticoagulation (pain out of proportion, rising lactate, worsening CT signs). Thrombolysis only in **highly selected cases**; prioritize multidisciplinary decision-making.
2. Progression / non-response on anticoagulation with threatened bowel. For acute MVT/PVT, a small subset deteriorates during medical therapy; those are typical endovascular candidates in experienced centers.
3. Portal hypertension complications where TIPS would be indicated anyway (especially in cirrhosis): refractory ascites/hydrothorax, variceal bleeding. Prefer PVR-TIPS/TIPS in selected patients, particularly if this can improve transplant feasibility.
4. Transplant candidates with chronic PVT that threatens physiologic portal anastomosis. Consider portal vein recanalization (PVR) followed by TIPS as part of a transplant pathway.

ENDOVASCULAR THERAPY

Choice of endovascular modality

1. Acute clot (best within ~1 week): mechanical thrombectomy is most effective in acute thrombus; consider adjunct local thrombolysis for residual clot.
2. Access routes (expert centers): transjugular (often with TIPS), transhepatic, transsplenic (high technical success reported for PVR in chronic PVT in transplant candidates).
3. Avoid “routine lysis”: indirect SMA thrombolysis is less effective and associated with higher bleeding exposure (longer infusion/higher dose).

ENDOVASCULAR THERAPY: GUIDELINES

A. Thrombolysis (chemical ± mechanical): Who actually qualifies?

AASLD 2020: Local or systemic thrombolysis only in very selected recent PVT when intestinal ischemia persists despite anticoagulation.

EASL 2025: Anticoagulation is first line; endovascular thrombolysis ± TIPS may be required if ischemia signs do not reverse, but recanalization rates similar to anticoagulation alone with more frequent/severe adverse effects → implies restrictive use.

ACG 2020: In acute mesenteric vein thrombosis, consider thrombolysis if progressive thrombosis despite anticoagulation with risk of intestinal ischemia; evidence mainly observational with bleeding risk.

Rutherford: No comparative trials vs anticoagulation; most succeed medically, but small proportion (~5%) deteriorate → some centers escalate to endovascular therapy. Direct local thrombolysis (transjugular/transhepatic) for residual clot/flow restoration; assess contraindications.

ENDOVASCULAR THERAPY: GUIDELINES

A. Thrombolysis (chemical ± mechanical): Who actually qualifies?

AGA 2025: Consider catheter-based thrombectomy ± thrombolysis (expert center) if all apply:

1. Cirrhosis + nonmalignant PVT
2. Evidence of intestinal ischemia (clinical + imaging)
3. No clinical improvement after prompt therapeutic anticoagulation
4. Managed by a multidisciplinary team with ability to convert to surgery if needed

INDICATIONS FOR SURGERY: RUTHERFORD

Operate for:

1. Peritonitis
2. Severe GI bleeding
3. Small bowel perforation
4. Intestinal stricture (late complication, often with chronic diarrhea)

If deterioration or peritonitis develops → laparotomy indicated (laparoscopy can be preferred to assess viability in experienced hands).

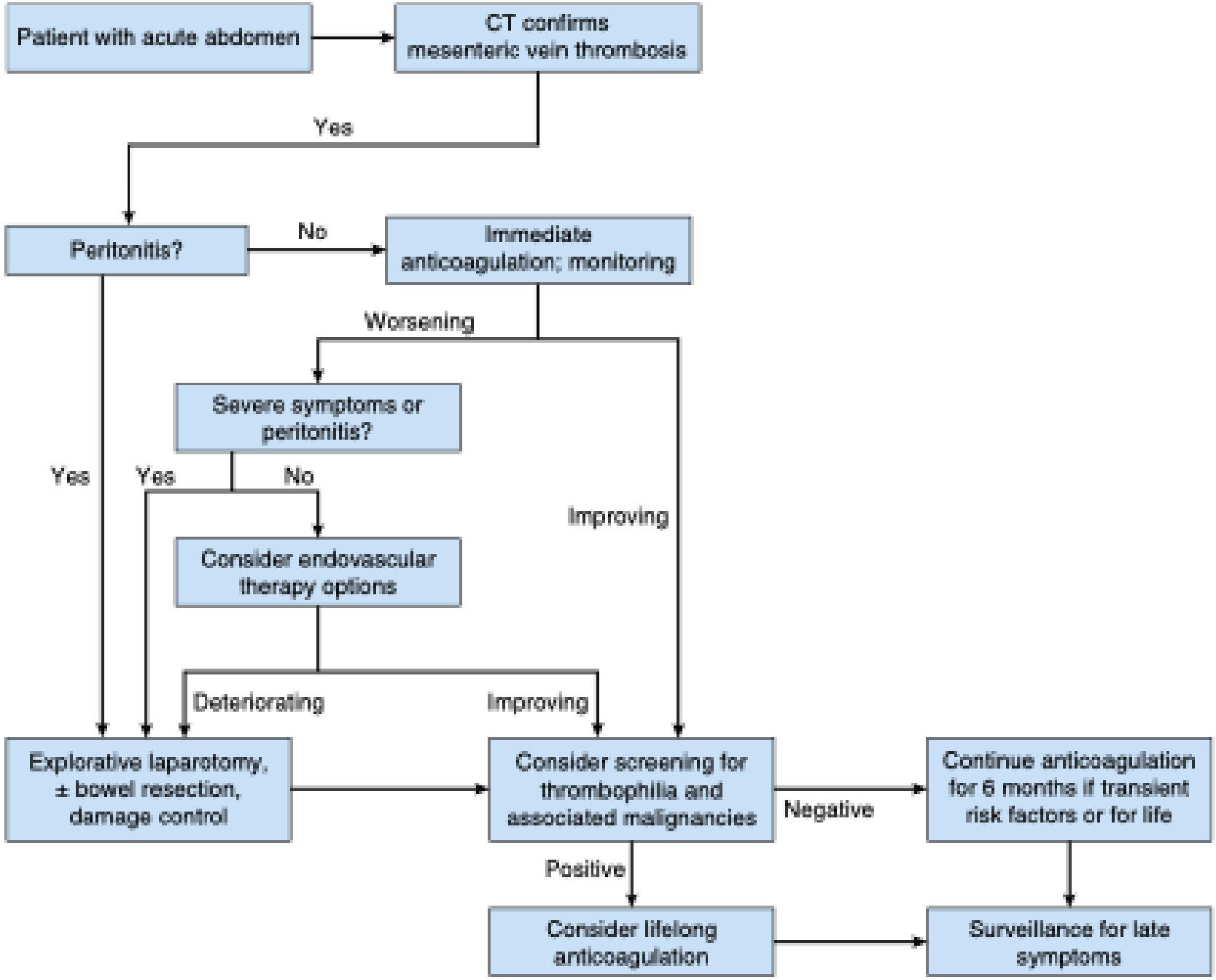
Bowel resection criteria: frank transmural necrosis, uncertain bowel viability, or severe ischemic lesions.

Second-look strategy (24–36 h) is emphasized to salvage bowel and limit resection when viability is uncertain.

Selected "hybrid" options are described after resection (e.g., balloon thrombectomy) in difficult ongoing thrombosis associated with bowel infarction.

RUTHERFORD, 10TH EDITION

CHAPTER 137 ALGORITHM



INDICATIONS FOR SURGERY: ACG GUIDELINE

ACG 2020 Clinical Guideline:

- Clear operative trigger: suspected or confirmed intestinal infarction or gangrene → surgical resection.
- Practical operative pearl: determine bowel viability intraoperatively to optimize resection extent and reduce short bowel syndrome risk.

ACG vs Rutherford

ACG anchors the indication to infarction/gangrene and explicitly emphasizes bowel-viability-based extent of resection.

Rutherford lists a broader set of surgical indications, including severe GI bleeding, perforation, and late stricture, and gives second-look/damage-control tactics in more operational detail.

INDICATIONS FOR SURGERY: AGA GUIDELINE

AGA 2025:

- States the primary goals of anticoagulation include preventing bowel necrosis requiring bowel resection and achieving portal venous recanalization.
- Notes that anticoagulation may not always reverse intestinal ischemia, and escalation to other strategies (chemical/mechanical thrombolysis ± TIPS) may be required.

INDICATIONS FOR SURGERY: GUIDELINES

ACG Clinical Guideline:

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SUMMARY

Operate (or urgently scope viability) when ANY of the following are present:

1) Peritonitis / clinical deterioration in suspected portomesenteric thrombosis.
2) Suspected or confirmed intestinal infarction/gangrene → resection.
3) Complications requiring operative management: perforation; severe GI bleeding (selected cases); late stricture/obstruction.
4) Uncertain viability → consider damage-control + planned second-look (24–36 h) to preserve bowel length.

REFERENCES

1. Sidawy AN, Perler BA, editors. Rutherford's vascular surgery and endovascular therapy. 10th ed. Philadelphia (PA): Elsevier; 2022.
2. Simonetto DA, Singal AK, Garcia-Tsao G, Caldwell SH, Ahn J, Kamath PS. ACG Clinical Guideline: Disorders of the hepatic and mesenteric circulation. Am J Gastroenterol. 2020 Jan;115(1):18-40. doi:10.14309/ajg.0000000000000486.
3. American College of Gastroenterology. New ACG clinical guideline: disorders of hepatic and mesenteric circulation [press release]. 2020 Jan 6.
4. Northup PG, Garcia-Pagan JC, Garcia-Tsao G, Intagliata NM, Superina RA, Roberts LN, et al. Vascular liver disorders, portal vein thrombosis, and procedural bleeding in patients with liver disease: 2020 practice guidance by the American Association for the Study of Liver Diseases. Hepatology. 2021 Jan;73(1):366-413. doi:10.1002/hep.31646.
5. Davis JPE, Lim JK, Francis FF, Ahn J. AGA Clinical Practice Update on management of portal vein thrombosis in patients with cirrhosis: expert review. Gastroenterology. 2025 Feb;168(2):396-404.e1. doi:10.1053/j.gastro.2024.10.038.
6. European Association for the Study of the Liver. EASL Clinical Practice Guidelines on vascular diseases of the liver. J Hepatol. 2025 Nov 12;S0168-8278(25)02406-7. doi:10.1016/j.jhep.2025.08.001. Online ahead of print.
7. European Association for the Study of the Liver. EASL Clinical Practice Guidelines for the management of patients with decompensated cirrhosis. J Hepatol. 2018 Aug;69(2):406-460. doi:10.1016/j.jhep.2018.03.024.
8. Prakash S, Bies J, Hassan M, Mares A, Didia SC. Portal vein thrombosis in cirrhosis: a literature review. Front Med (Lausanne). 2023 Apr 26;10:1134801. doi:10.3389/fmed.2023.1134801.
9. Thrombosis Canada. Portal vein thrombosis (PVT) [Internet]. Clinical Guide. Updated 2024 Sep 10 [cited 2025 Dec 25]. Available from: Thrombosis Canada Clinical Guides.

Thank You!