The Complex Liver Transplant Procedure

Charles M. Miller
Professor of Surgery
Director of Liver Transplantation
Cleveland Clinic

What makes certain cases very difficult?

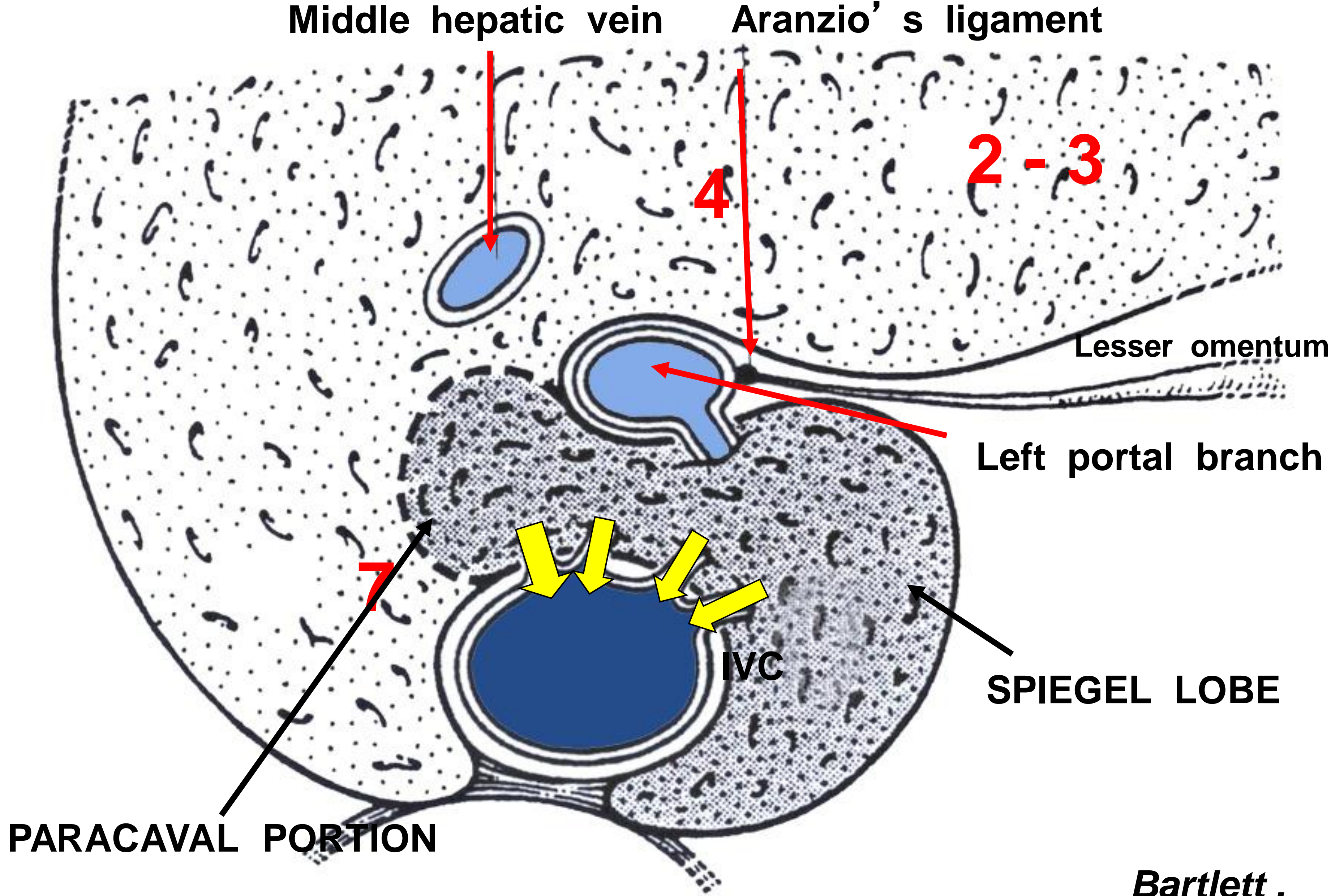
- Multiple previous hepato-biliary surgeries
- Multiple previous transplants especially with partial grafts
- Porto-mesenteric thrombosis
- Severe coagulopathy
- Previous Radiation Therapy
- Combinations of above

Technical Principles for Complicated Liver Transplants

- Good pre-operative planning using tri-phasic CT's or MRI's
- Approach it like an aortic aneurysm; control the inflow and outflow early
  - To get hilar control find the caudate; will lead you behind the hilum and anterior to the cava. This facilitates vascular control
  - Cava above and below.
  - It is easier to get good cuffs once the liver is out.
- Assure yourself good portal inflow and venous outflow; everything else will follow
- Systemic bypass can be helpful.

Cleveland Clinic

Caudate lobe : hepatic venous drainage



Technical Tips and Tricks

- Plan extensively and create a set of options depending on what you find
- General "Nickenpush" – differential tensile strength of tissue
- Get in the right plane and try to stay close to the liver.
- Do what's easy and everything else becomes easy
- Use of sealing devices to help intermittent hemostasis
- Stay calm!

Cleveland Clinic

Three Cases

1. Extensive PVT with spleno-renal shunt

1. Re-transplant of left lateral segment graft with PVT and extra-luminal TIPS

2. Primary Transplant 30 years s/p right nephrectomy, right hepatectomy andRUQ radiotherapy resulting in secondary sclerosing cholangitis, duodenal stricture and PVT

LIVER TRANSPLANTATION 16:999-1005, 2010

ORIGINAL ARTICLE

Portal Vein Thrombosis and Liver Transplant Survival Benefit

Michael J. Englesbe,[1] Douglas E. Schaubel,[2,3] Shijie Cai,[4] Mary K. Guidinger,[5] and Robert M. Merion[1,3,5]

Departments of [1]Surgery, and [2]Biostatistics, University of Michigan, Ann Arbor, MI; [3]Scientific Registry of Transplant Recipients, Ann Arbor, MI; [4]Kidney Epidemiology and Cost Center, University of Michigan, Ann Arbor, MI; and [5]Arbor Research Collaborative for Health, Ann Arbor, MI

Cleveland Clinic

PVT and LT survival benefit

No PVT — PVT

Smoothed Benefit HR
HR TX / HR WL

Benefit threshold for
PVT = MELD 13

Benefit threshold for
No PVT = MELD 11

No benefit from transplant

Benefit from transplant

MELD

- Shift in the benefit curve.
- "The threshold for transplant benefit among patients without PVT was MELD score >11 compared to MELD score >13 for patients with PVT."

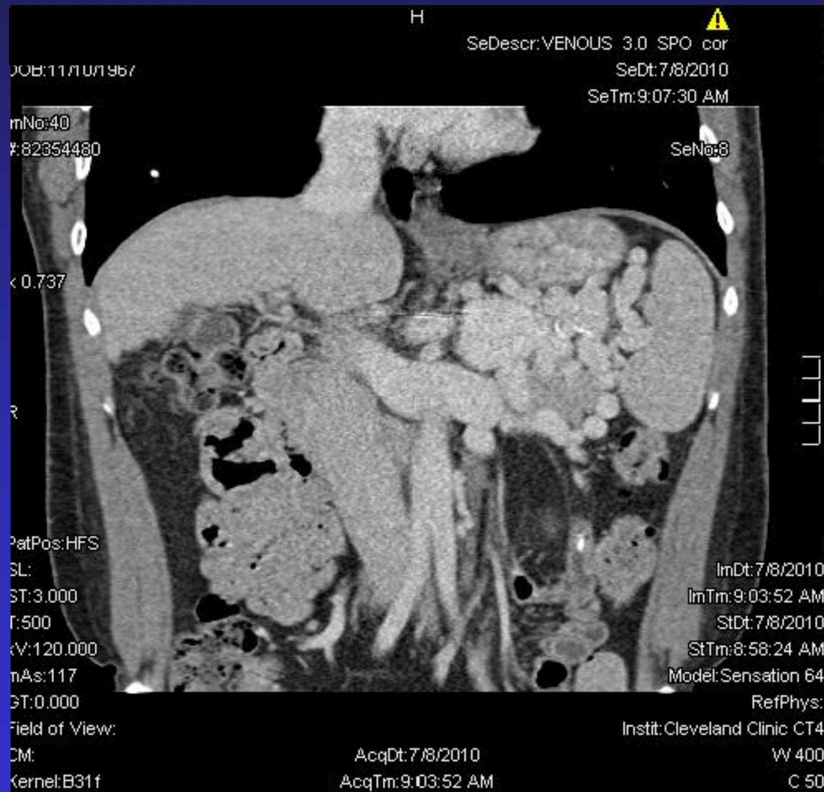
Patients with MELD >13 benefit from LT

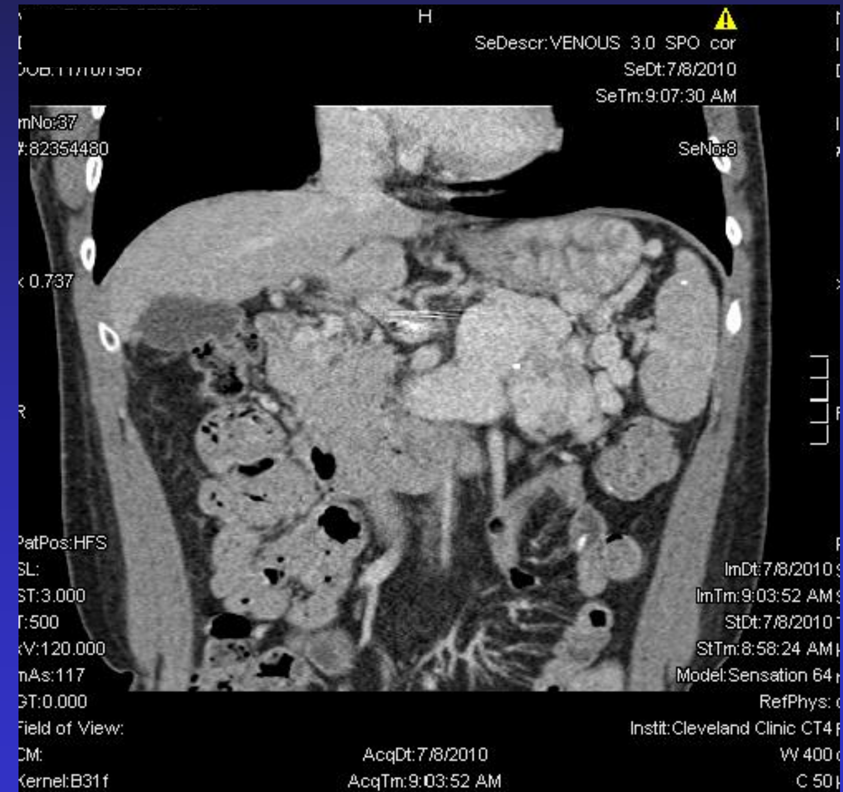
Extensive PVT not amenable to primary PV reconstruction

- Reno-portal anastomosis
- TIPS +/- anticoagulation followed by LT
- The unusual collateral!

Cleveland Clinic

Large Spontaneous Splenorenal Shunt with Chronic PV Thrombosis



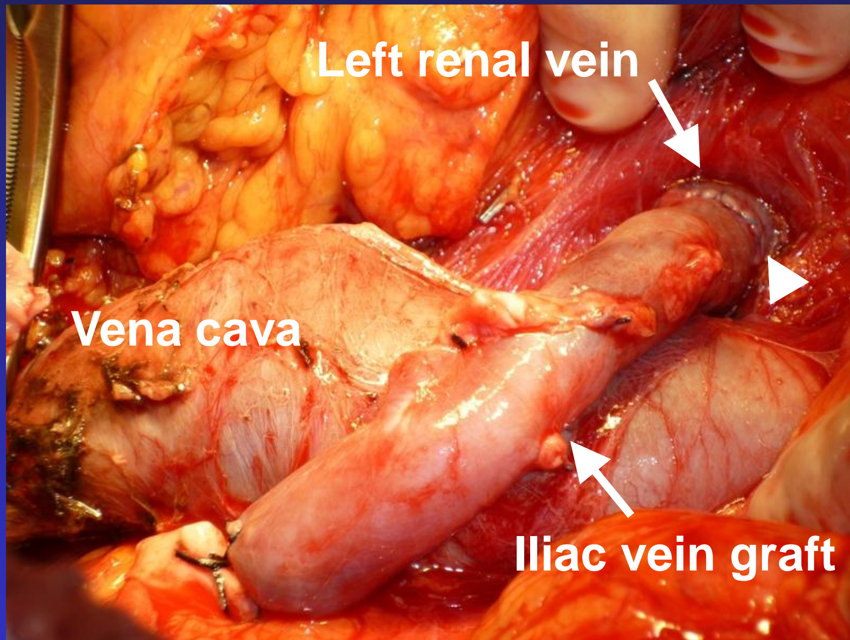


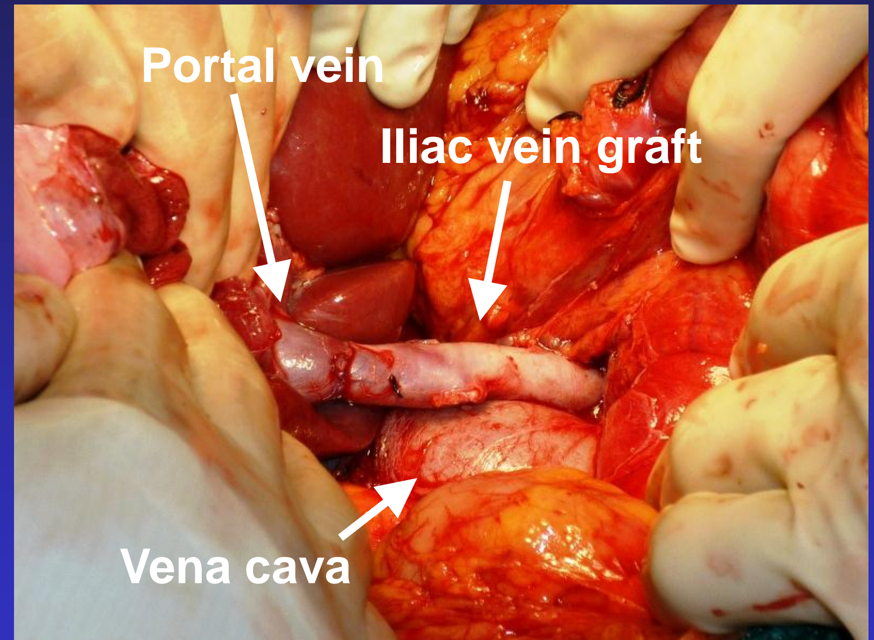
Cleveland Clinic

Video
- Reno-portal Anastomosis -

Shunt
Left Renal Vein

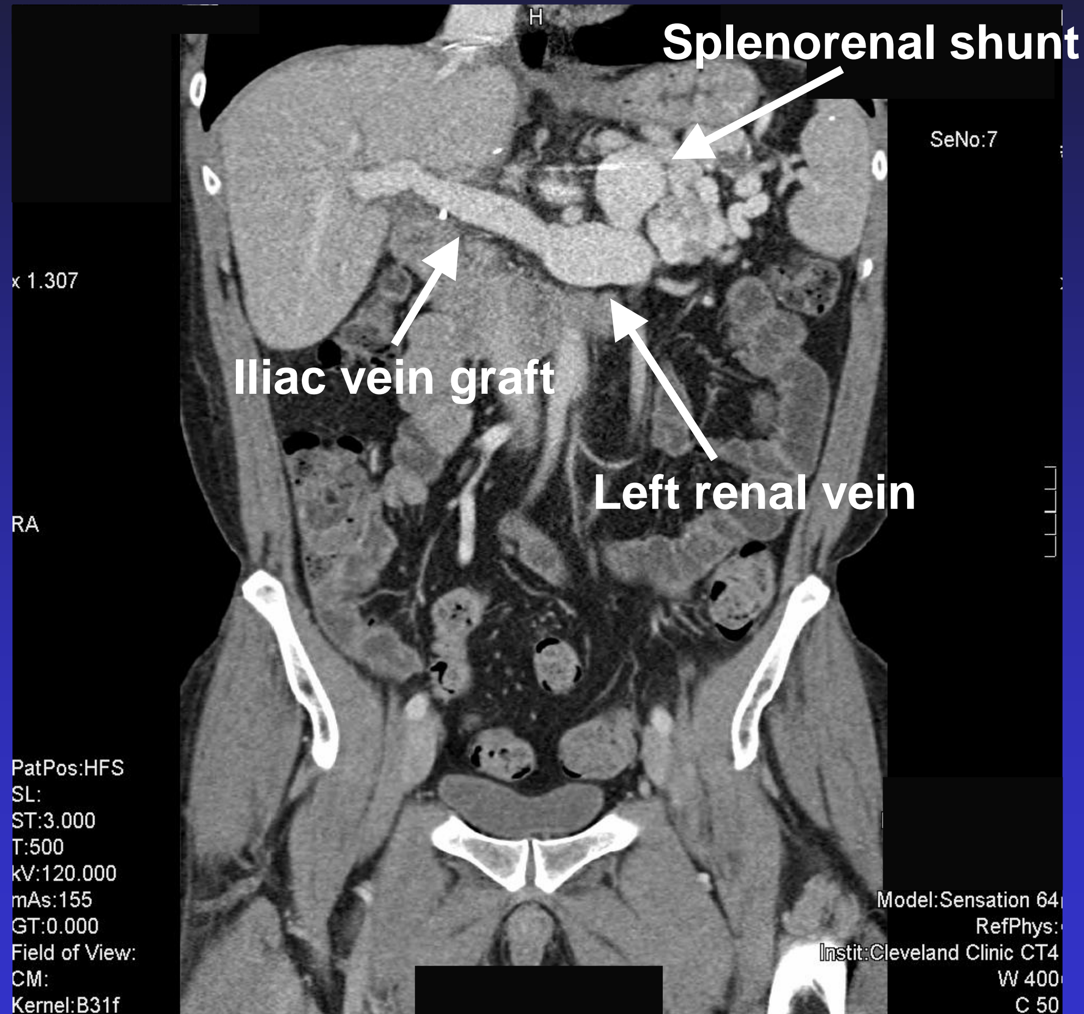
Reno-portal Anastomosis





Cleveland Clinic

Post-transplant CT

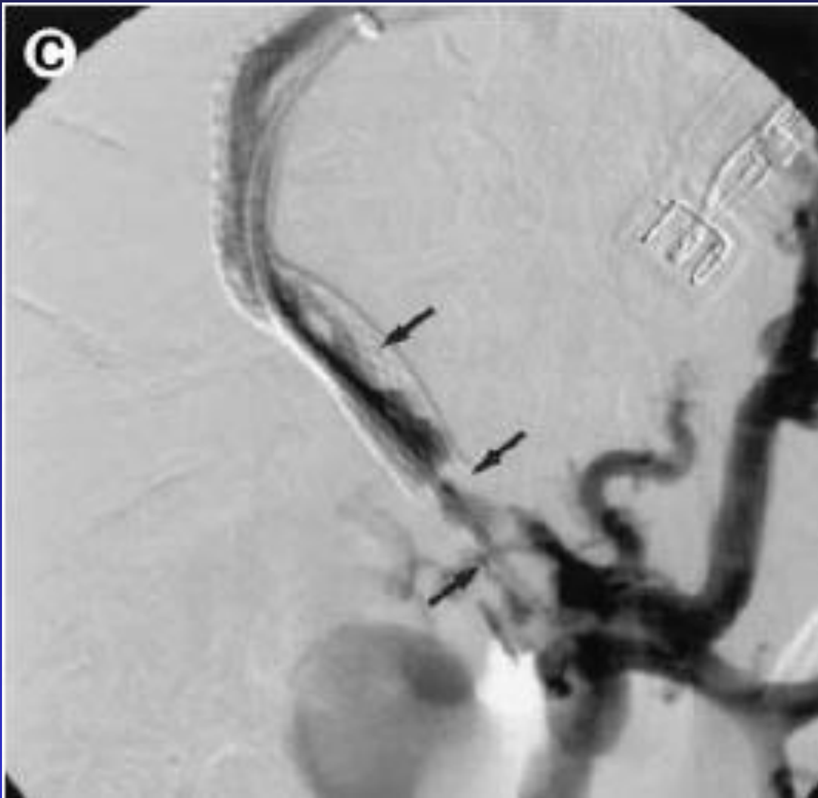


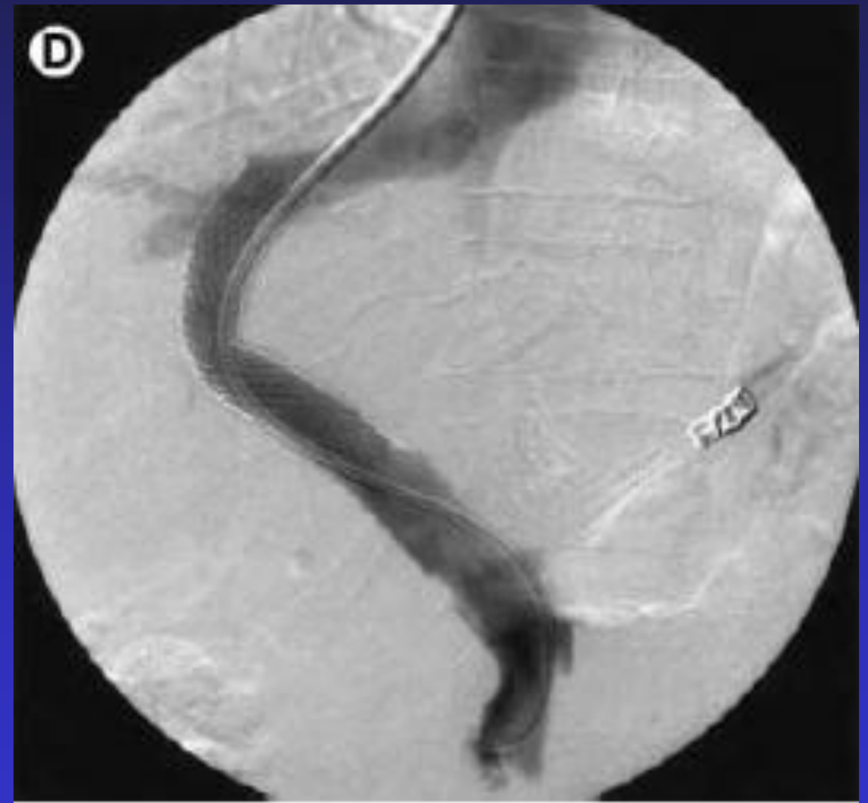
Cleveland Clinic

Extensive PVT not amenable to primary PV reconstruction

- Reno-portal anastomosis
- TIPS +/- anticoagulation followed by LT
- Multi-visceral transplantation

TIPS for Patients with Cavernous Transformation





Cleveland Clinic

LIVER TRANSPLANTATION 12:1544-1551, 2006

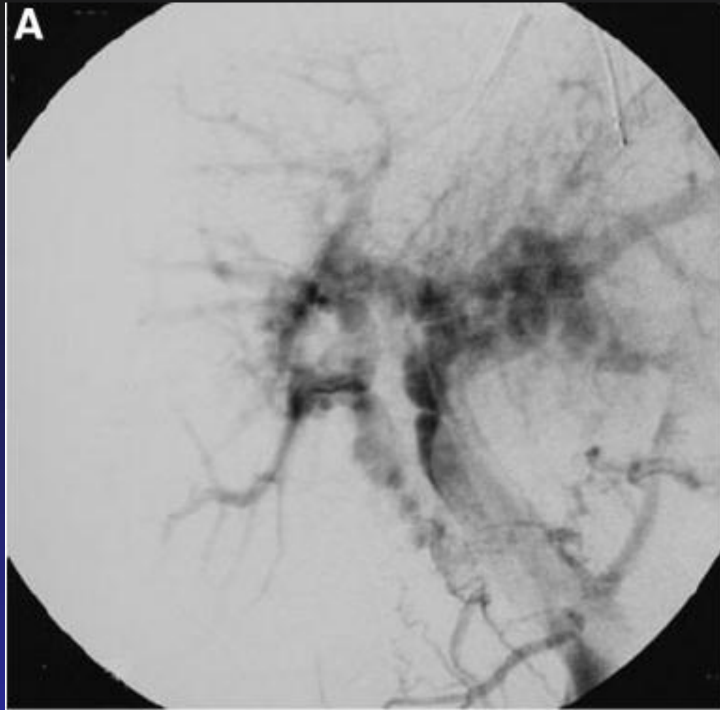
SHORT REPORT

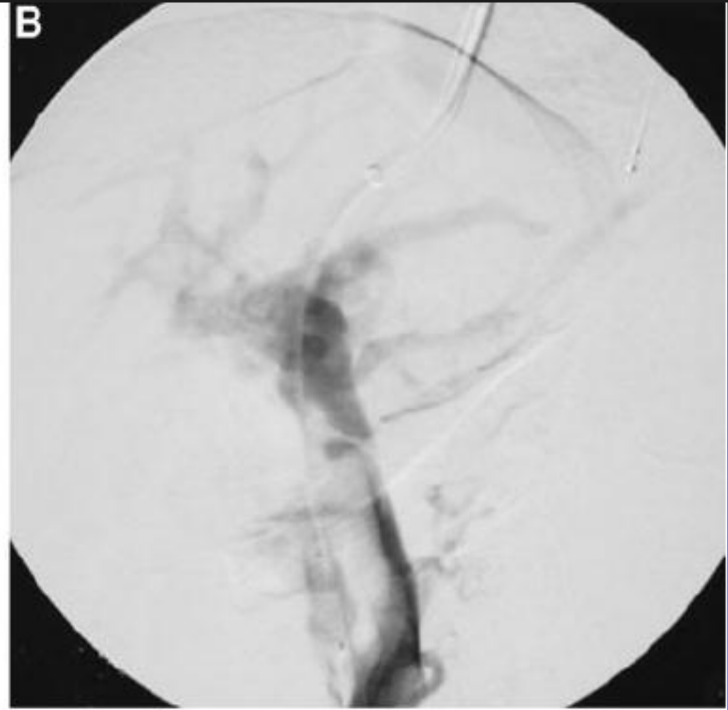
The Role of TIPS for Portal Vein Patency in Liver Transplant Patients With Portal Vein Thrombosis

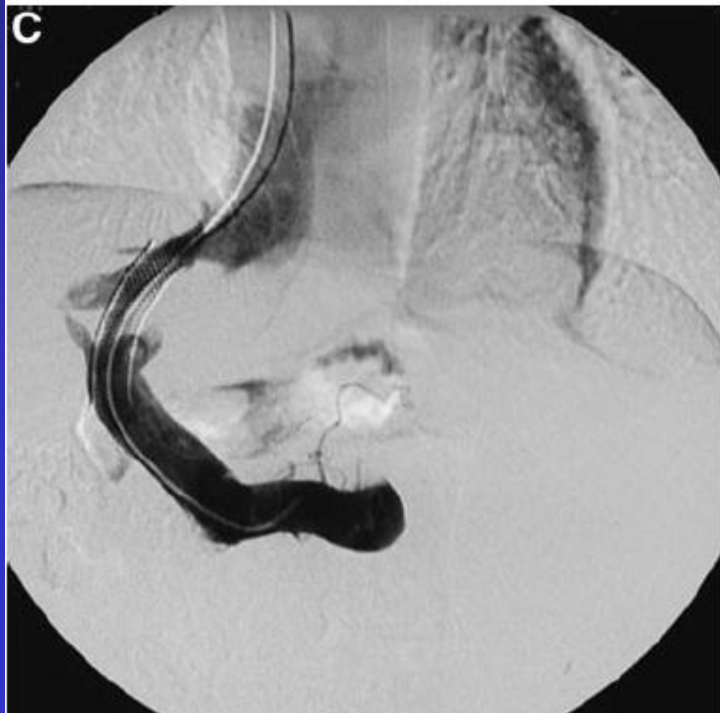
Jason Bauer,[1] Stephen Johnson,[1] Janette Durham,[1] Michael Ludkowski,[1] James Trotter,[2] Thomas Bak,[3] and Michael Wachs[3]
[1]Department of Radiology, Division of Interventional Radiology, [2]Department of Internal Medicine, Division of Hepatology, and [3]Department of Surgery, Division of Liver Transplant, University of Colorado Health Sciences Center, Denver, CO

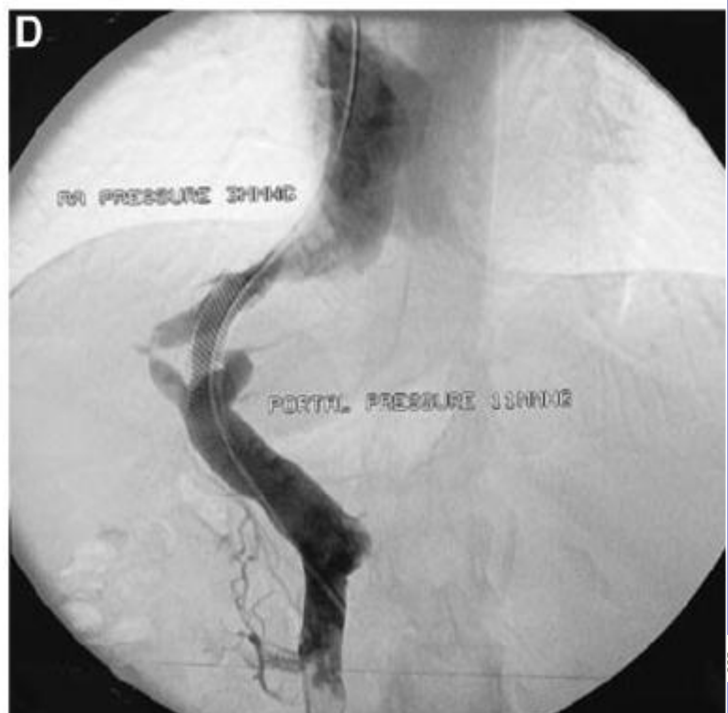
- Utilize TIPS to treat PVT and prevent progression of clot in order to maintain candidacy for liver transplant.

Cleveland Clinic









and Clinic

Results- TIPS before LT

- In 9 patients with PVT, TIPS was successfully placed.
- 4 of 9 patients (44%) had cavernous transformation.
- 8 of 9 patients (89%) had improvement in PVT at follow-up.
- One patient failed therapy and re-thrombosed.
- 2 patients (22%) were successfully transplanted.

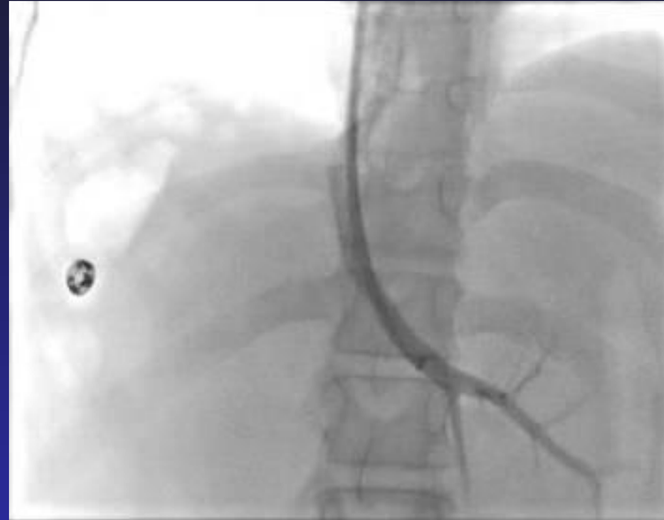
TIPS is safe and effective in patients with PVT requiring LT. Patients can be successfully transplanted with optimal surgical anatomy

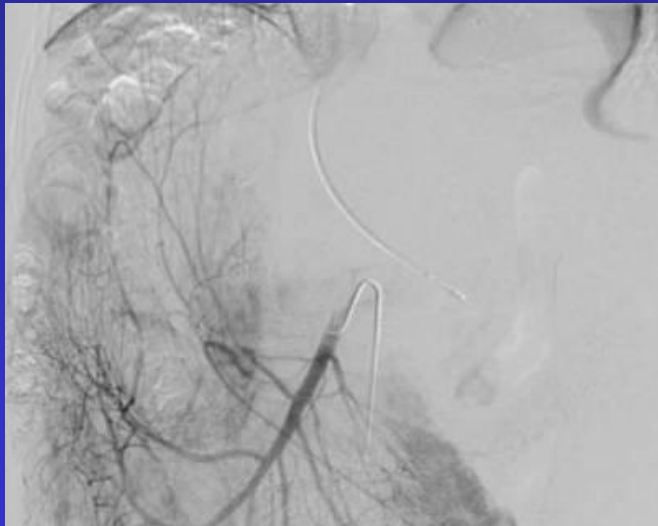
Cleveland Clinic

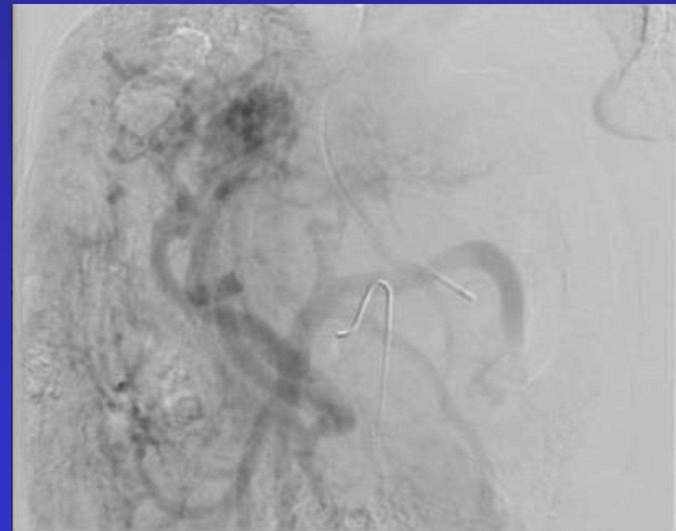
Case presentation

- 10 yo girl, s/p LDLT for BA using left lateral segment at 15 months old
- Liver failure sec to chronic rejection, portal HTN and GI bleeding.
- PV cavernous transformation.
- TIPS was requested.

HV venogram + SMA angiogram

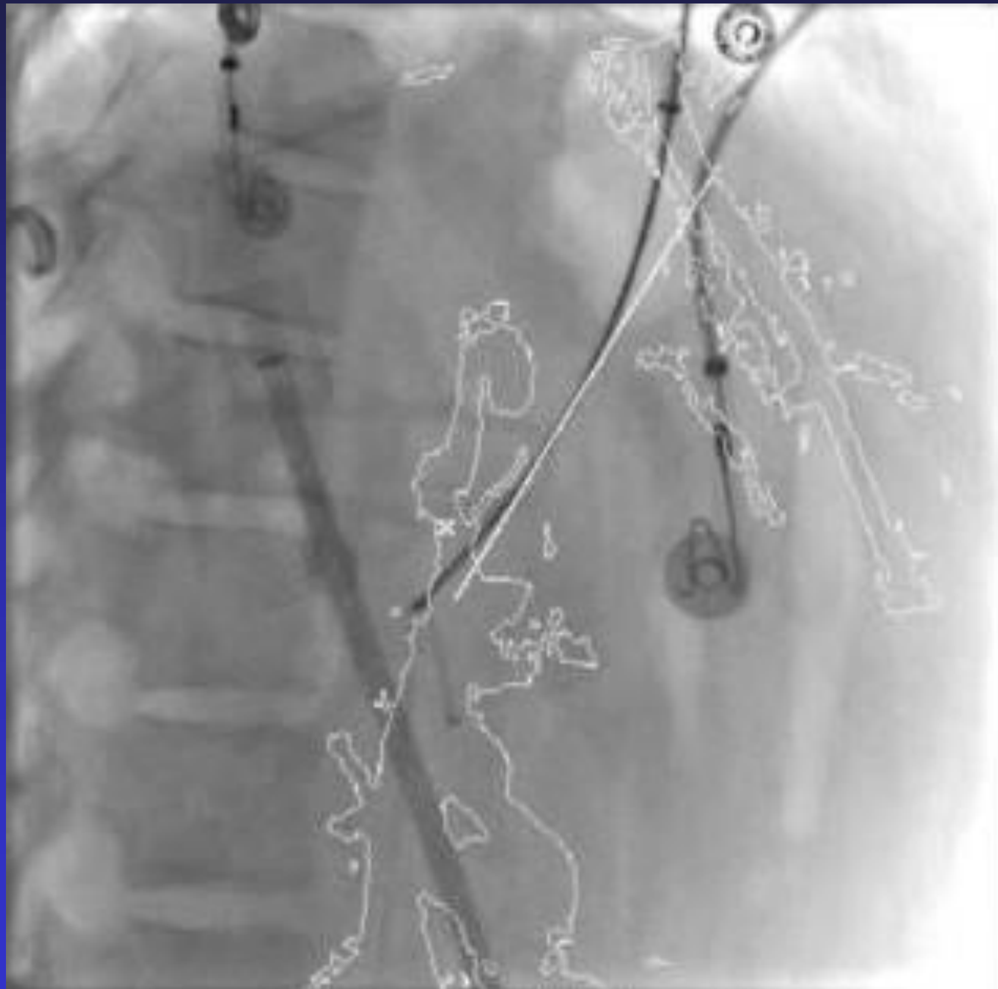






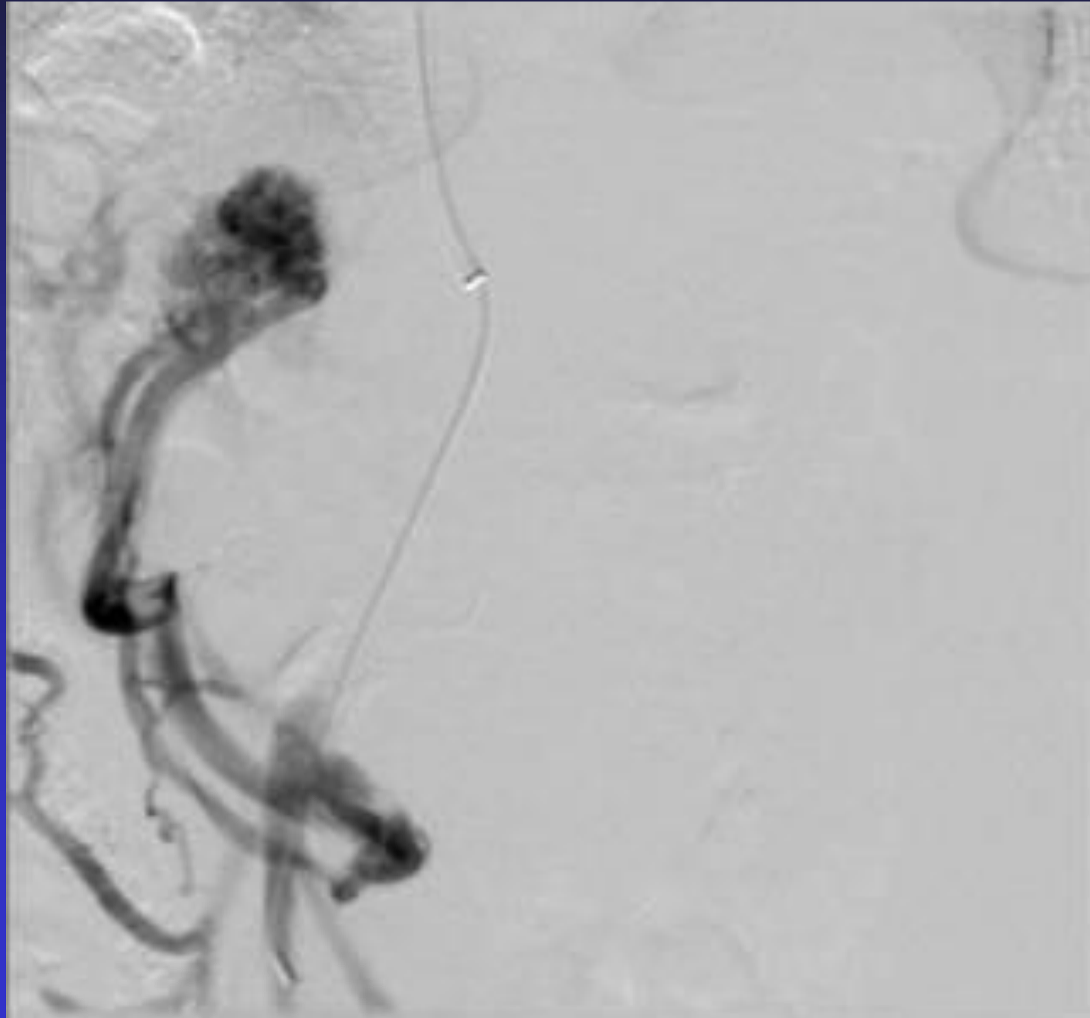
Cleveland Clinic

Simulation



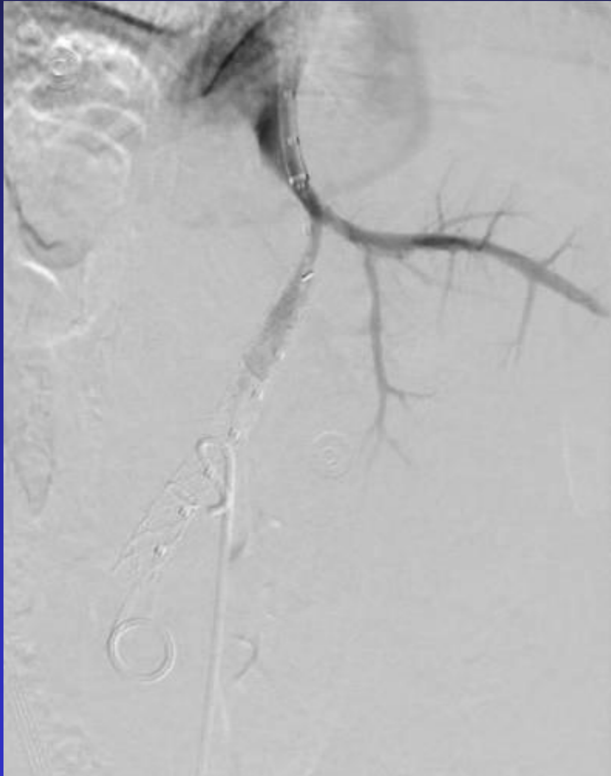
Cleveland Clinic

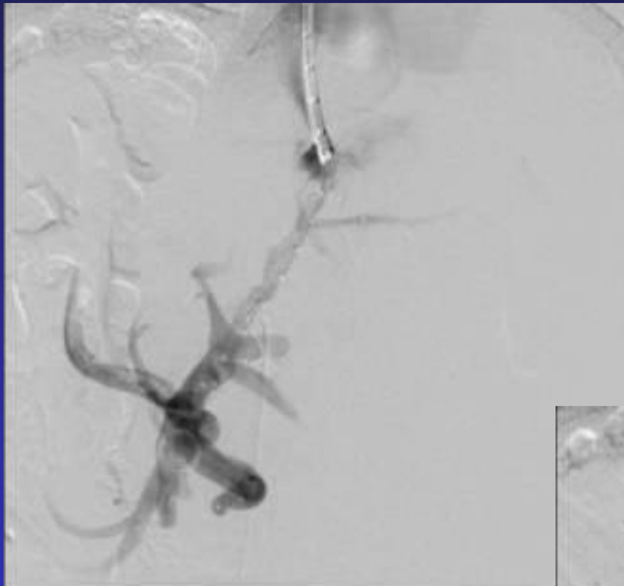
TIPS canulation

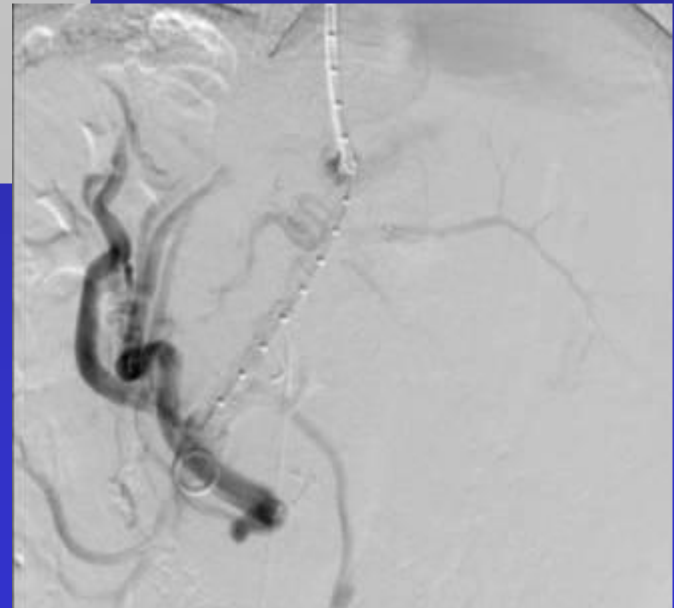


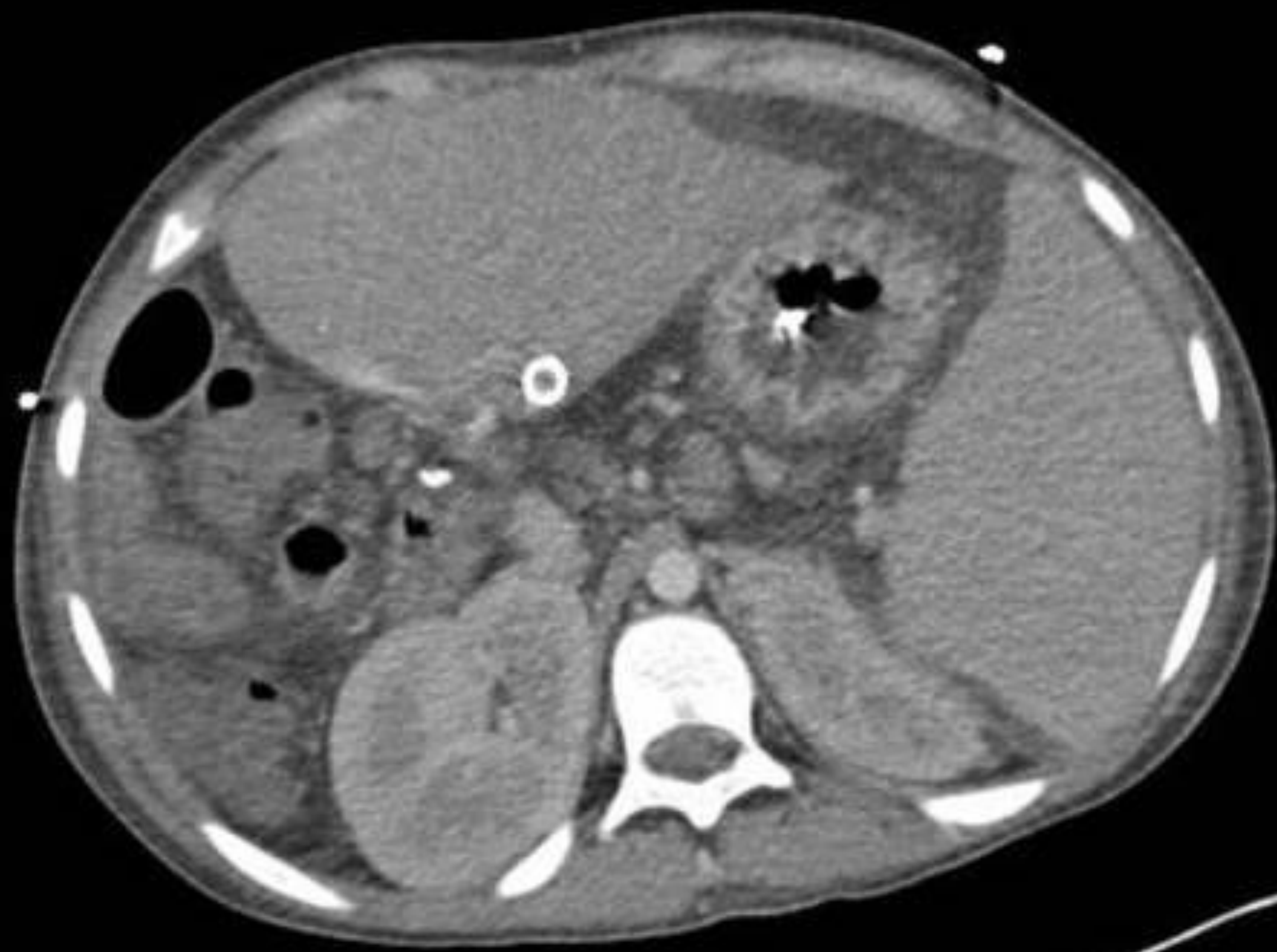
Cleveland Clinic

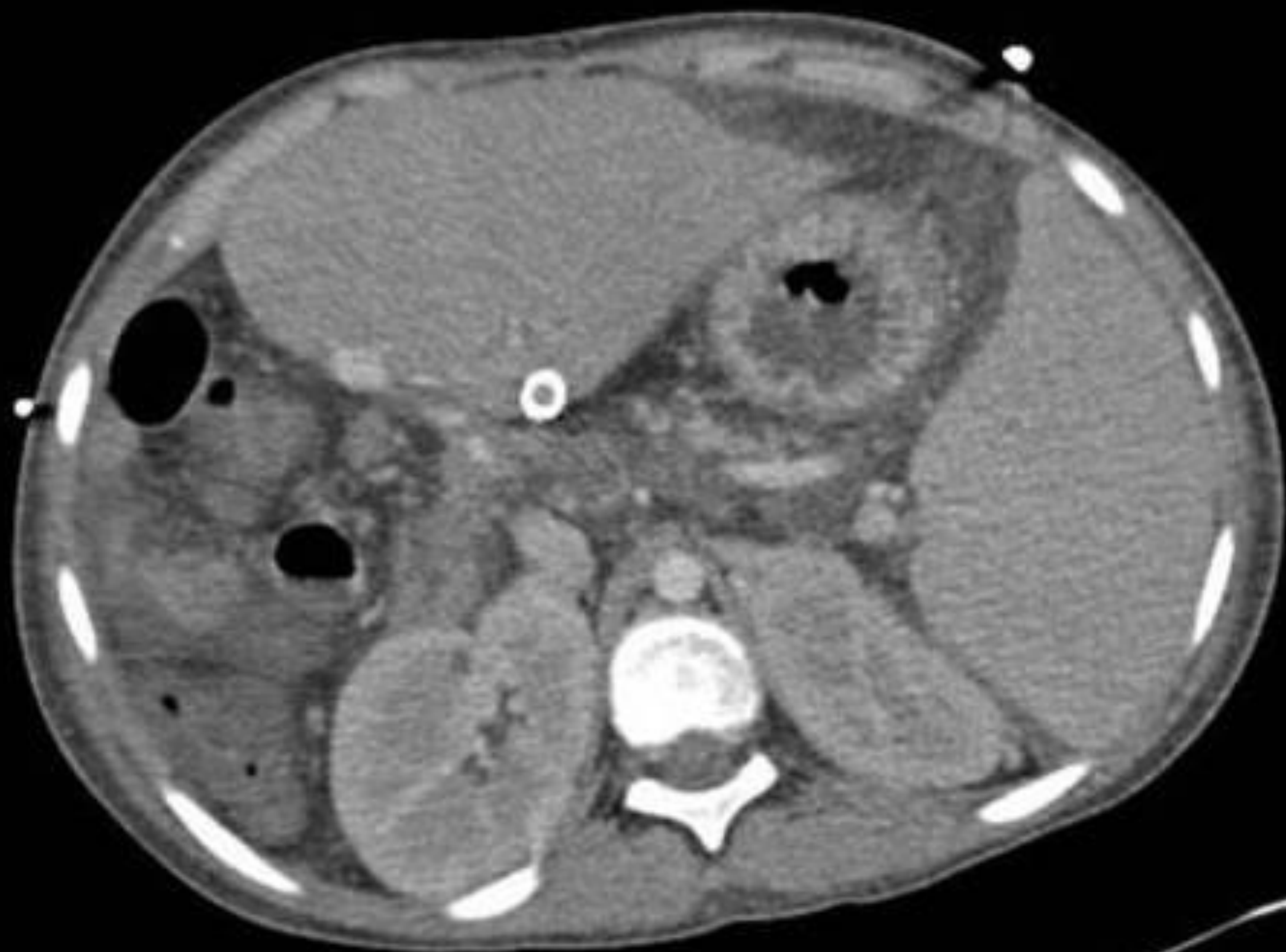
TIPS placement

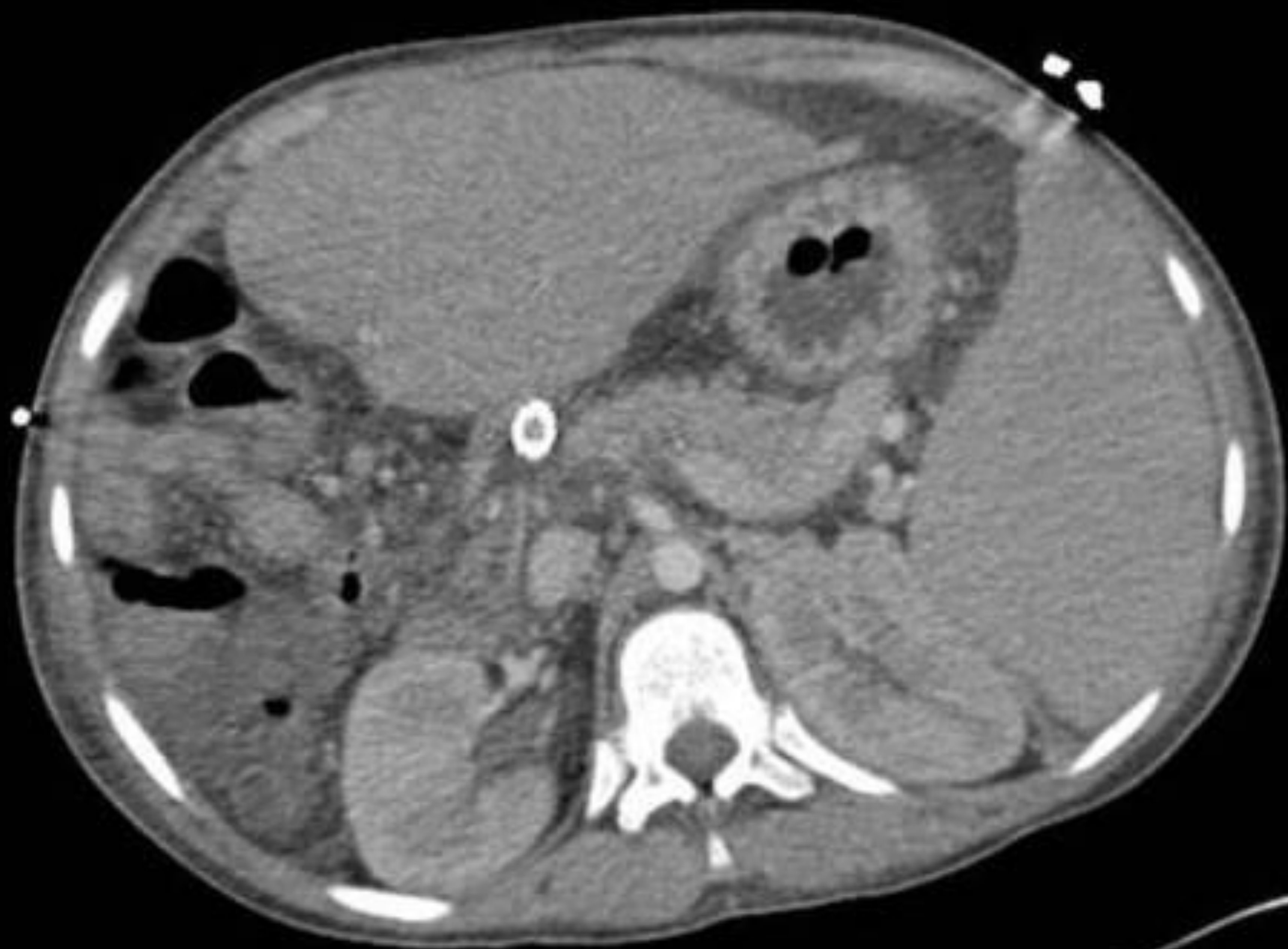


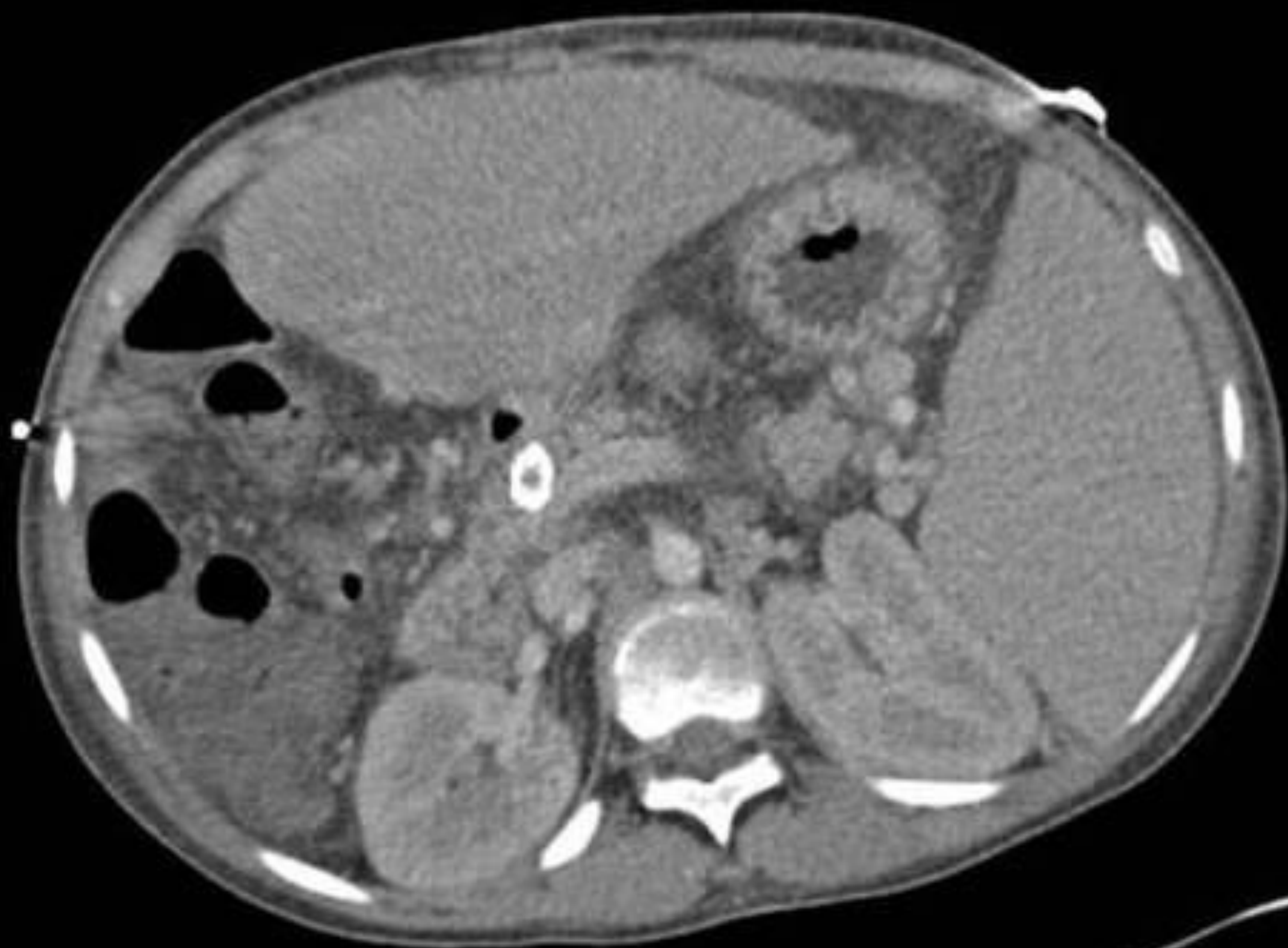


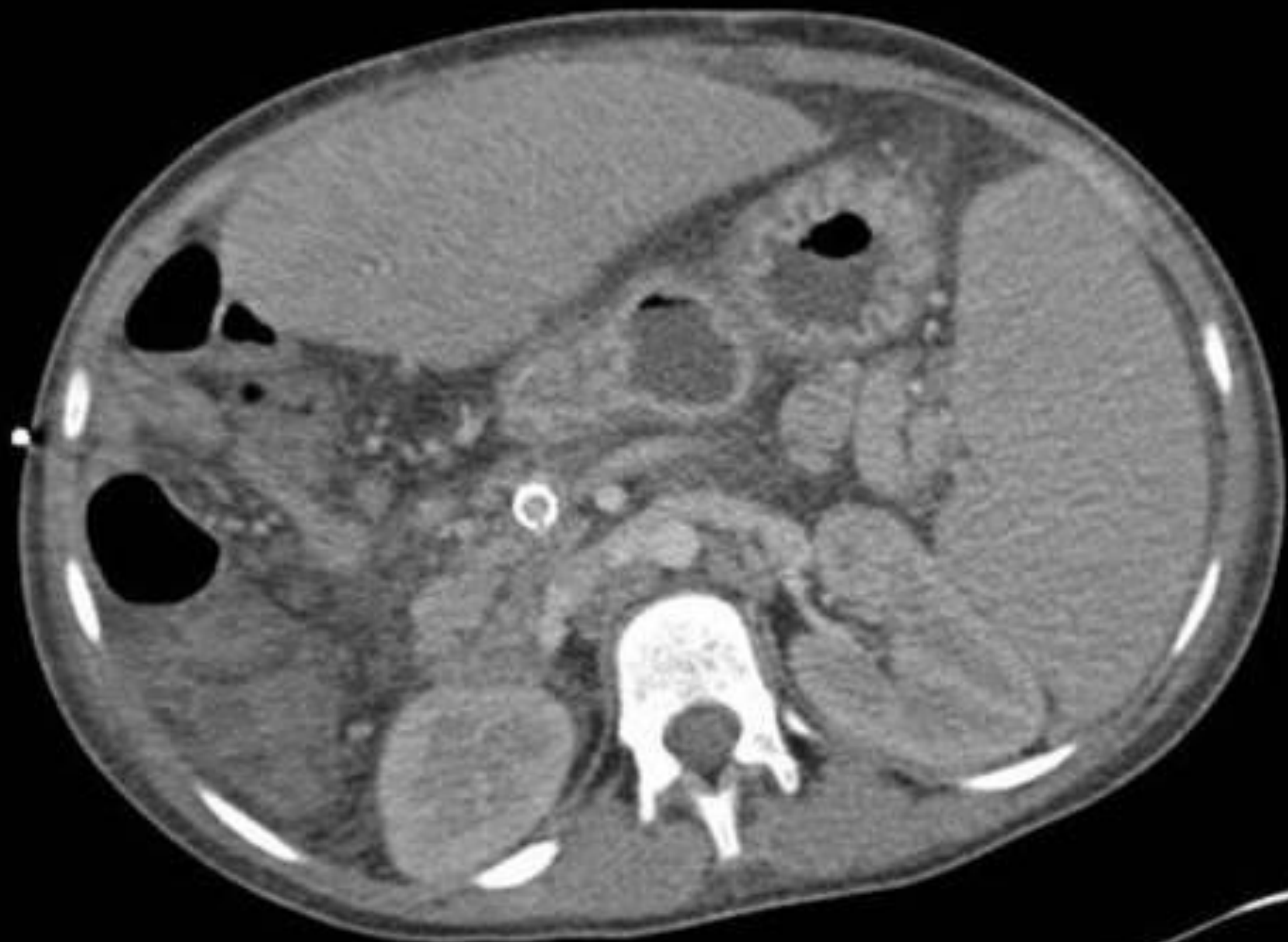


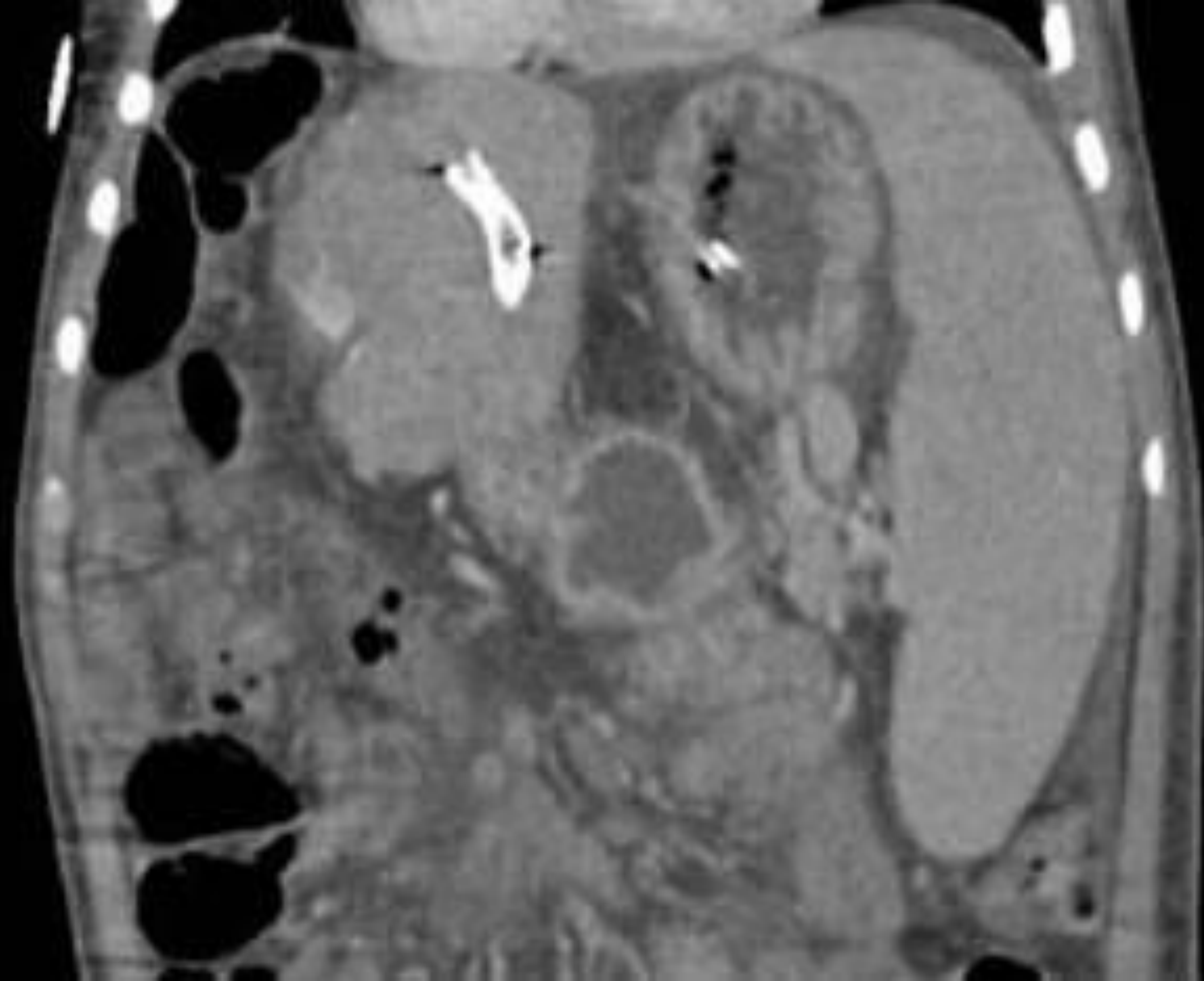


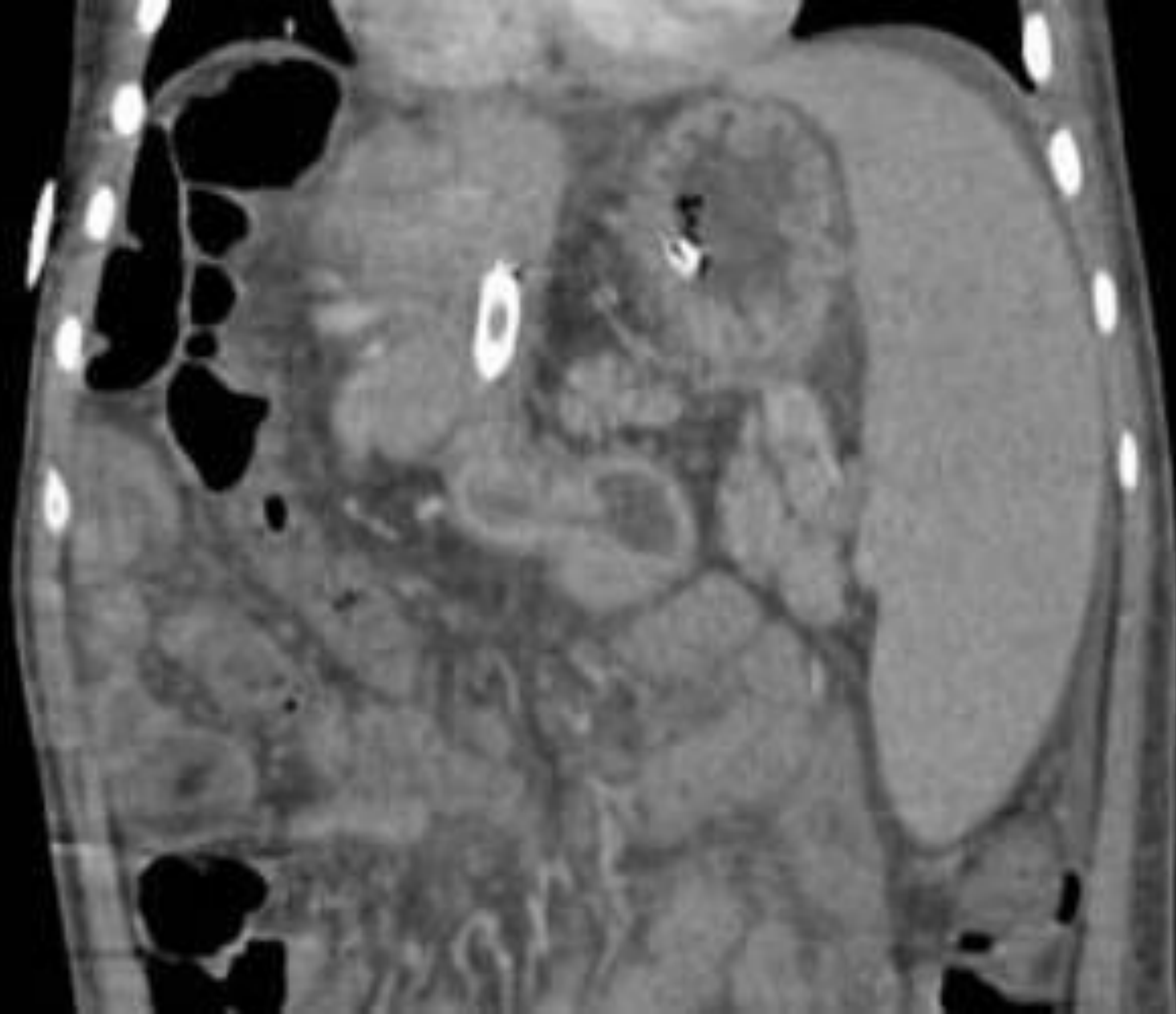


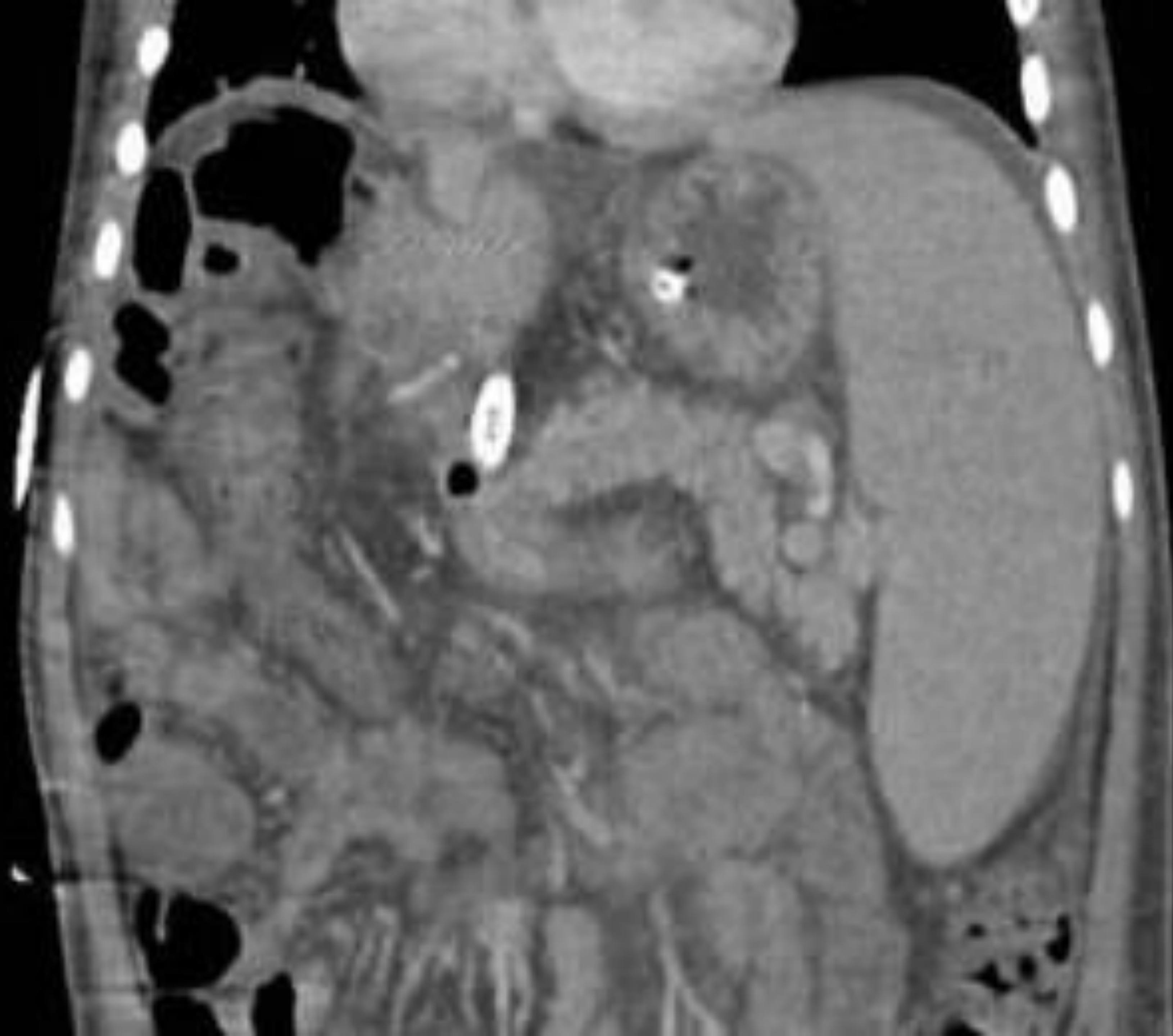


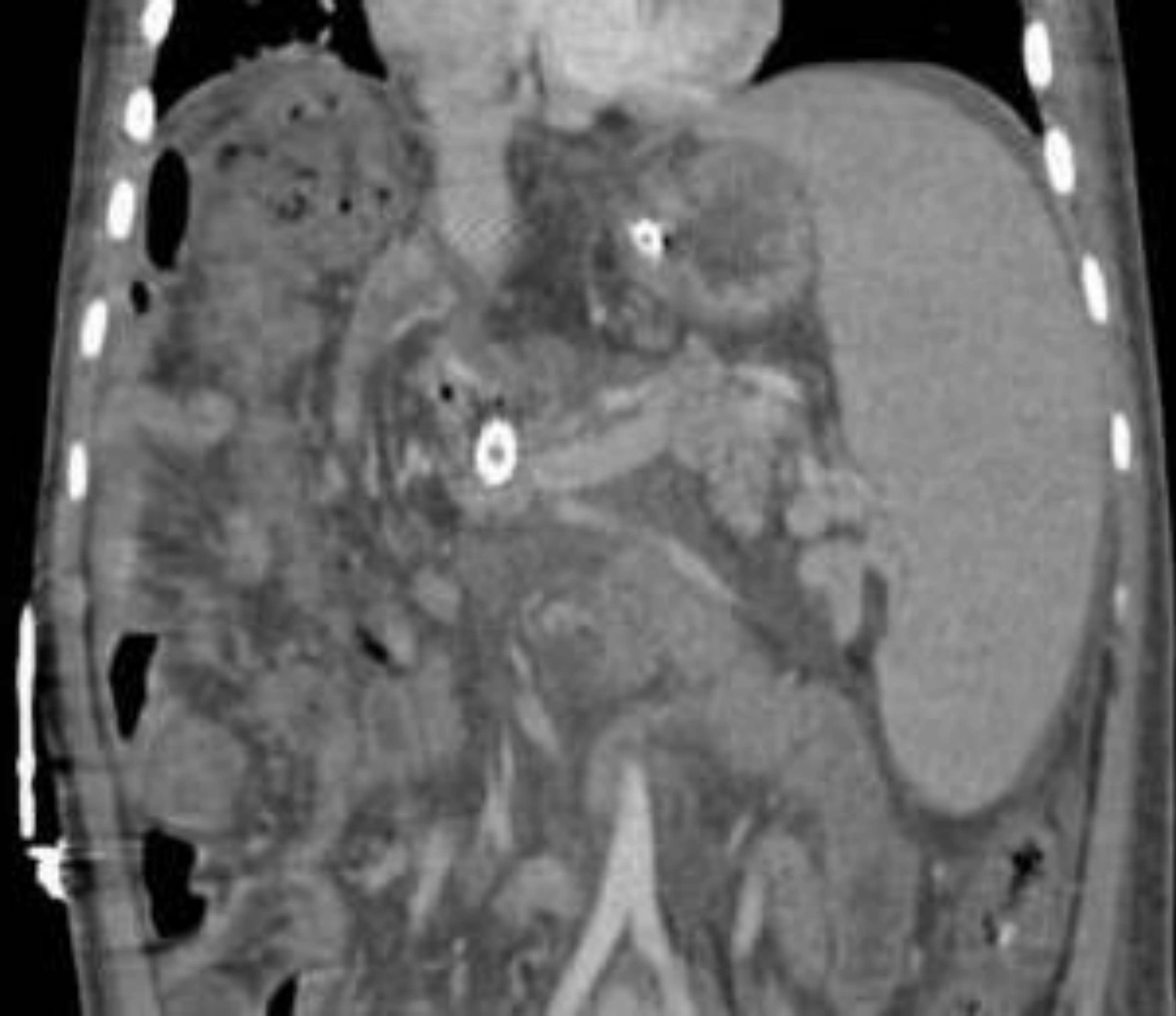


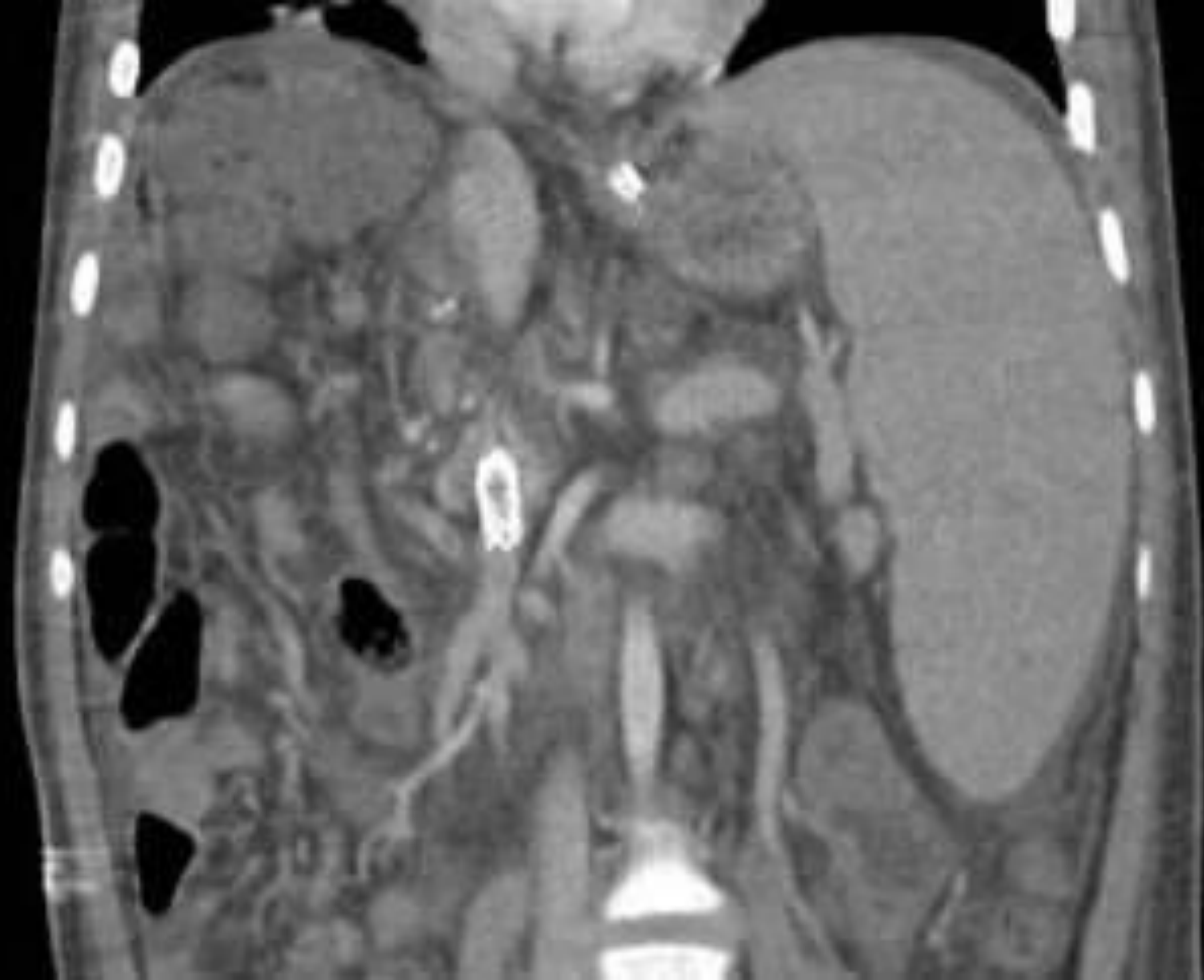








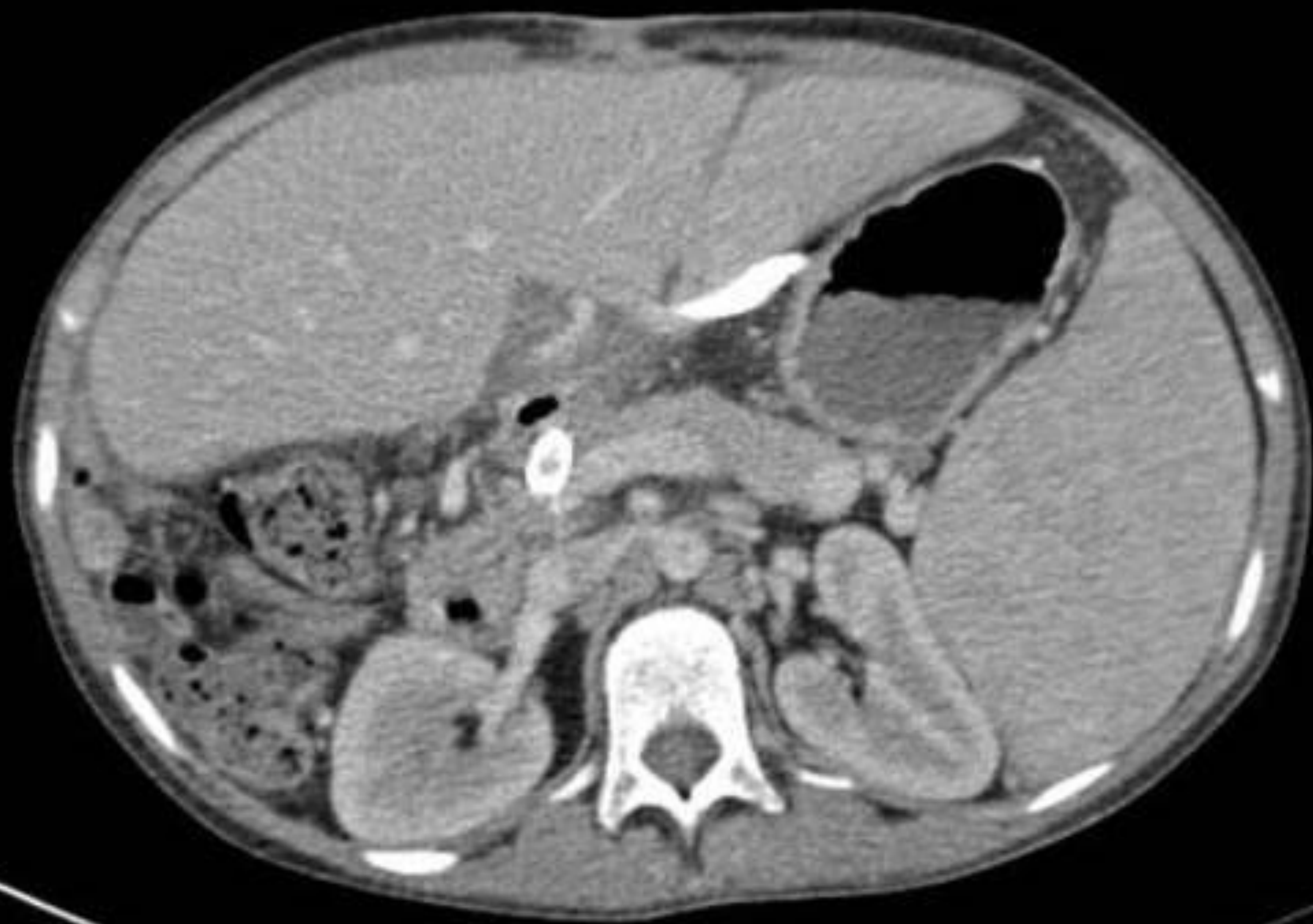


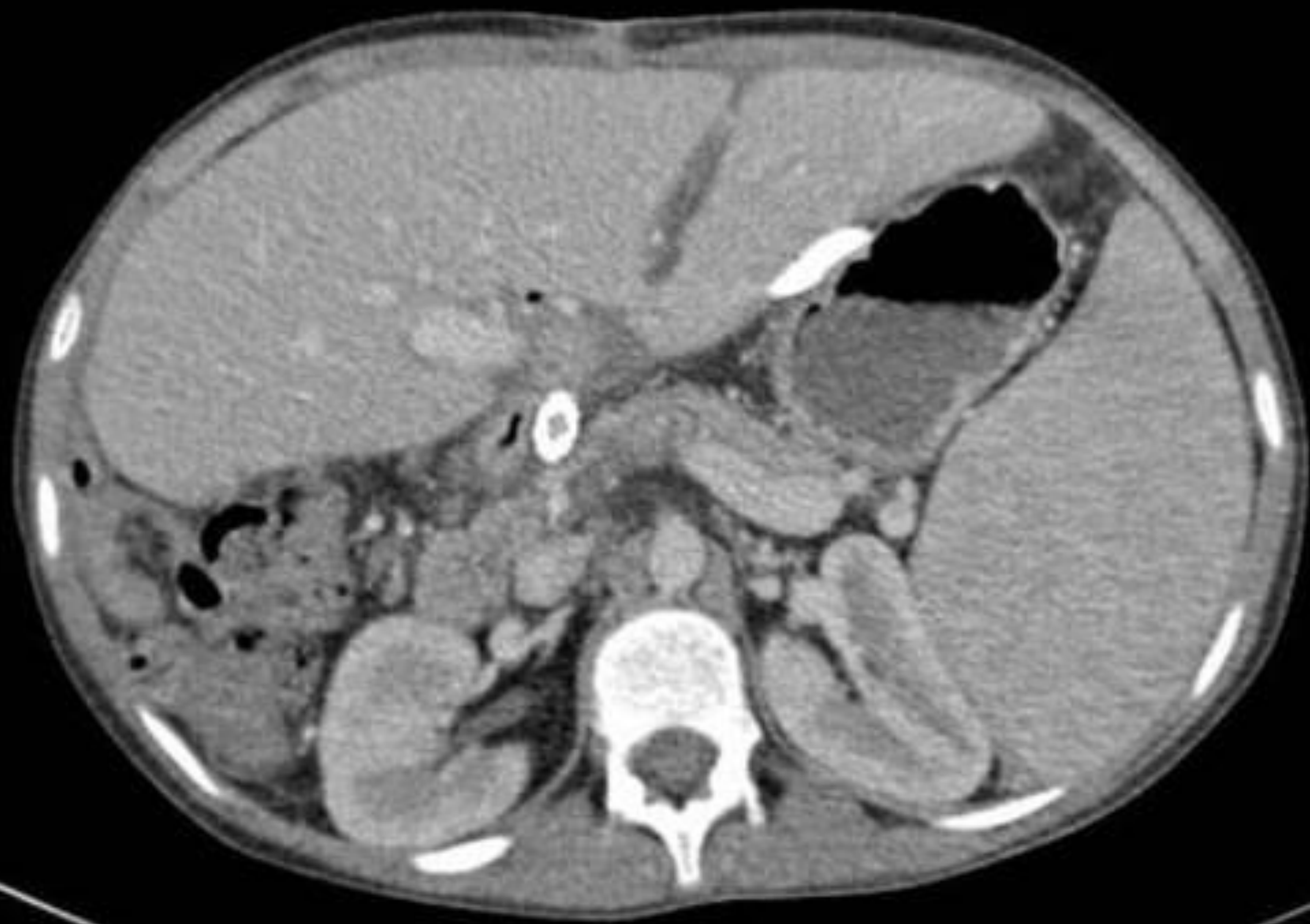


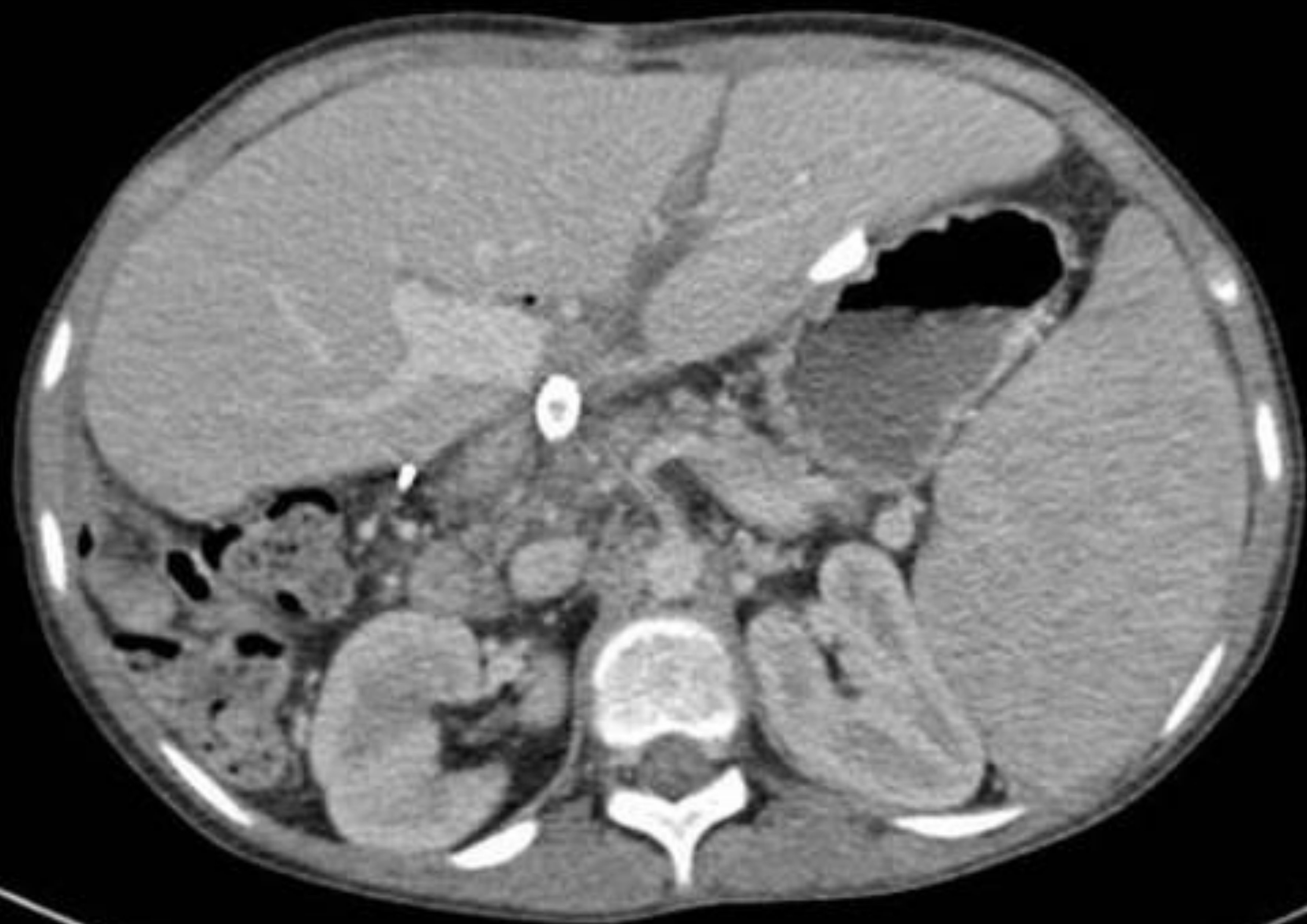
Re-Liver Transplantation

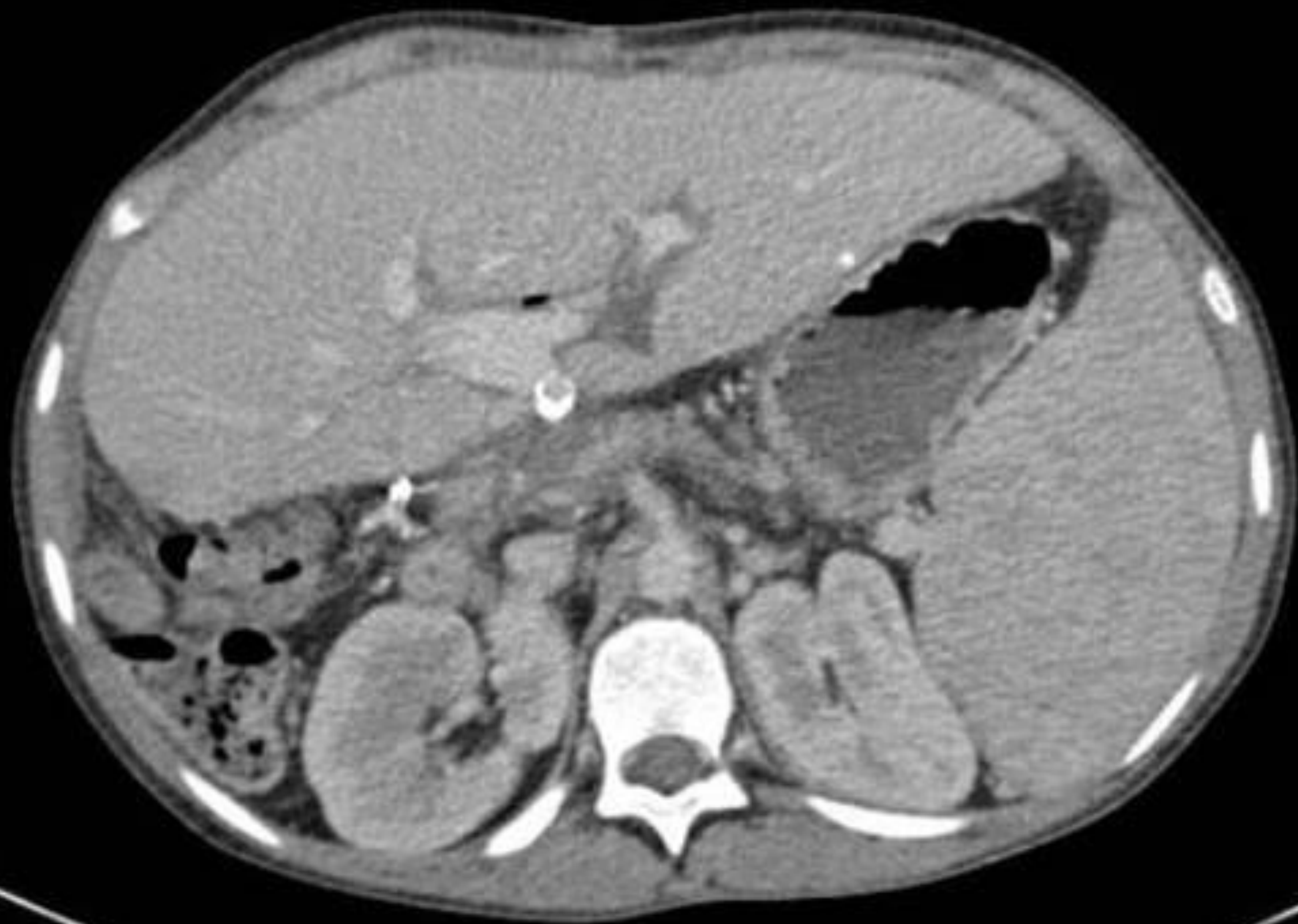
- TIPS (stent graft) could not be removed.
- Jump graft and reno-portal anastomosis were not option.
- Transected PV with TIPS in place.
- Reconstructed PV directly to the end of the TIPS

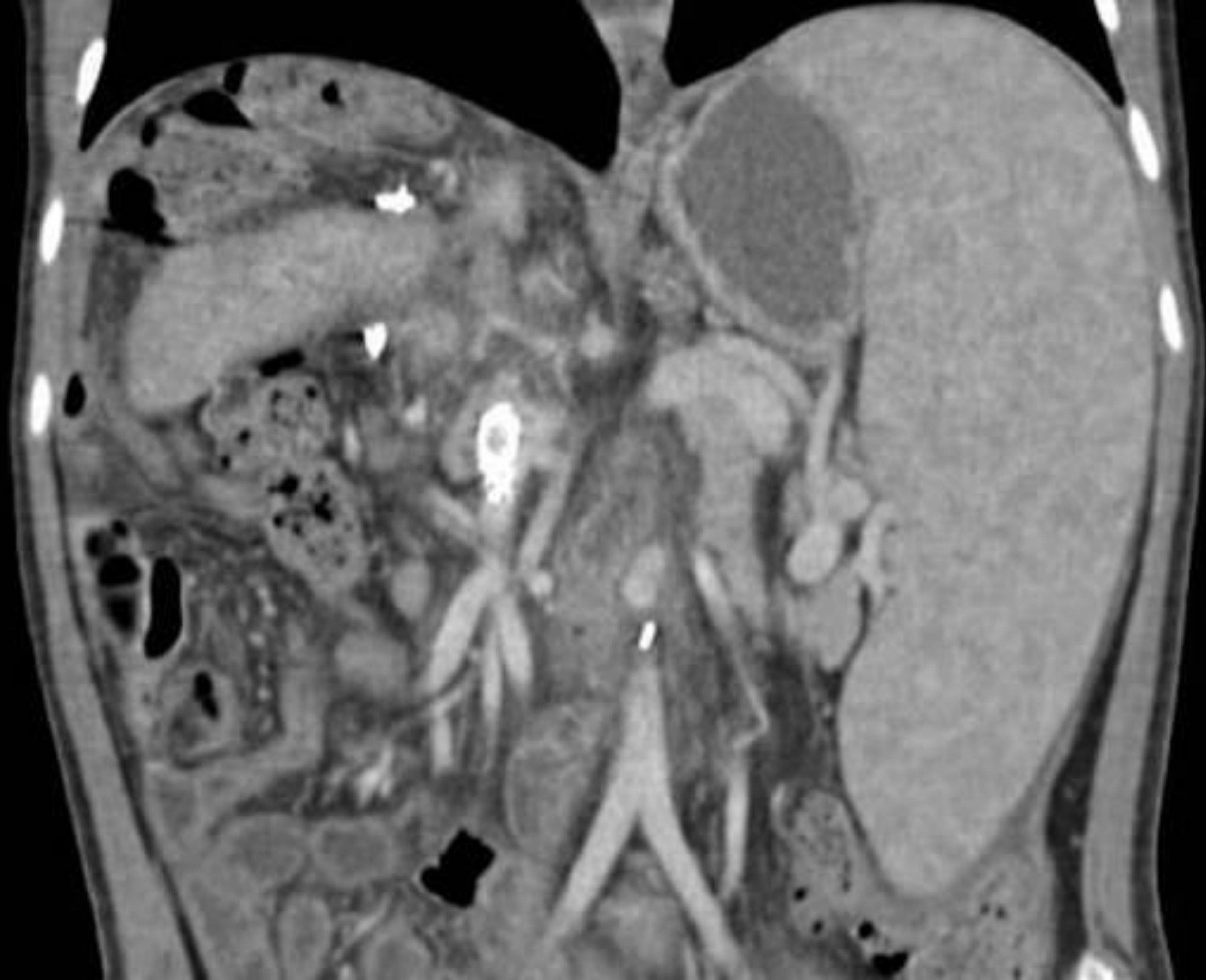
Cleveland Clinic

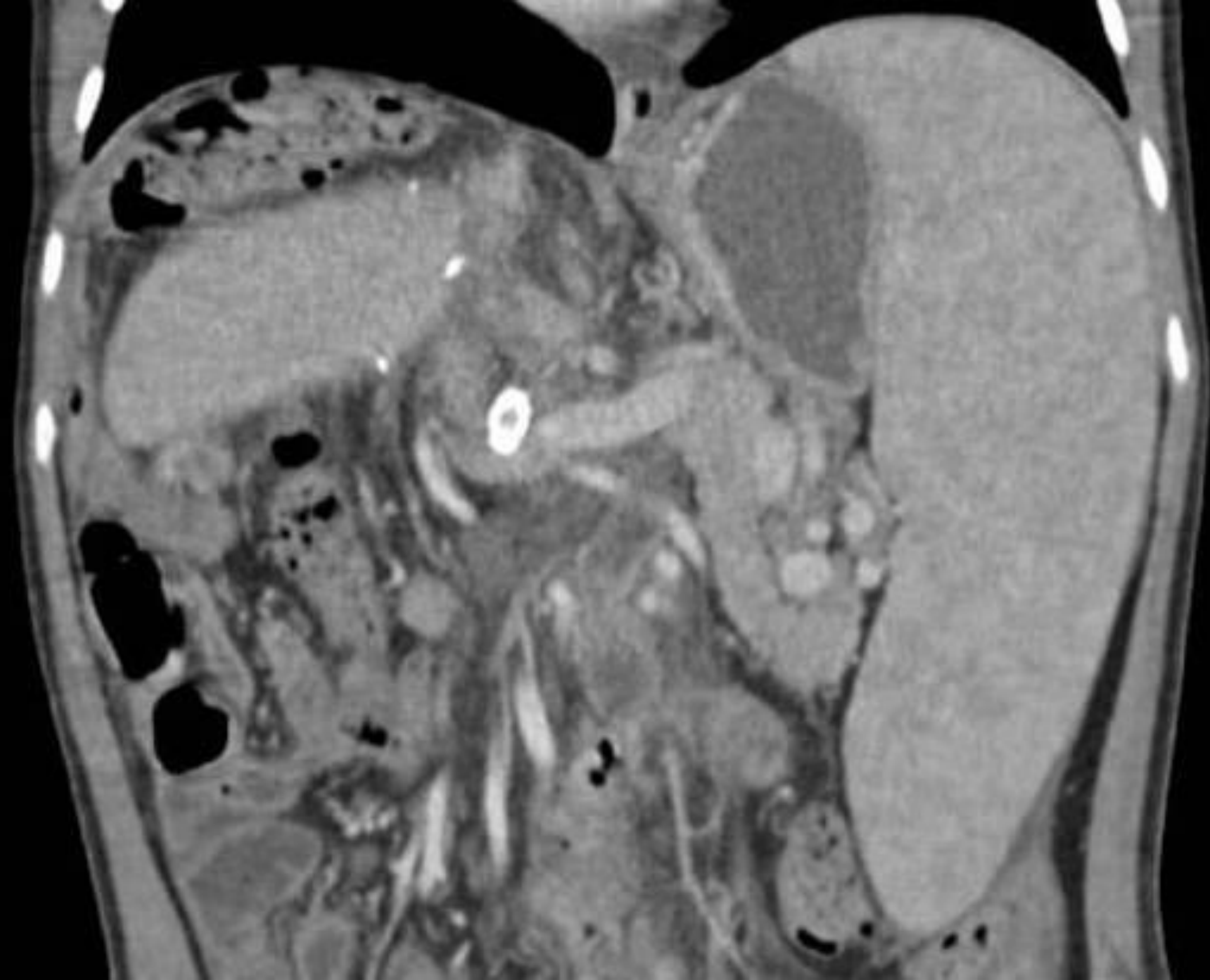


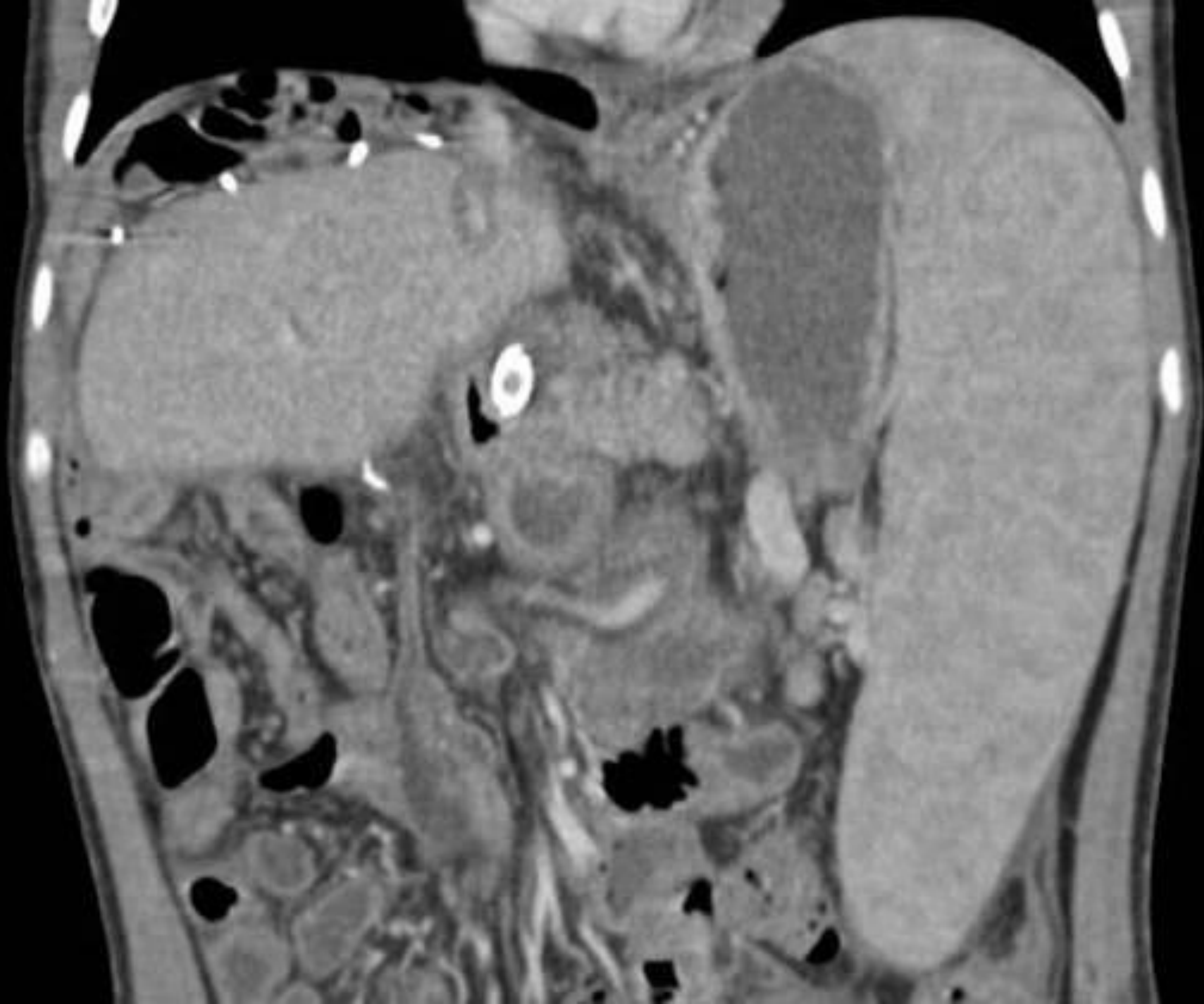


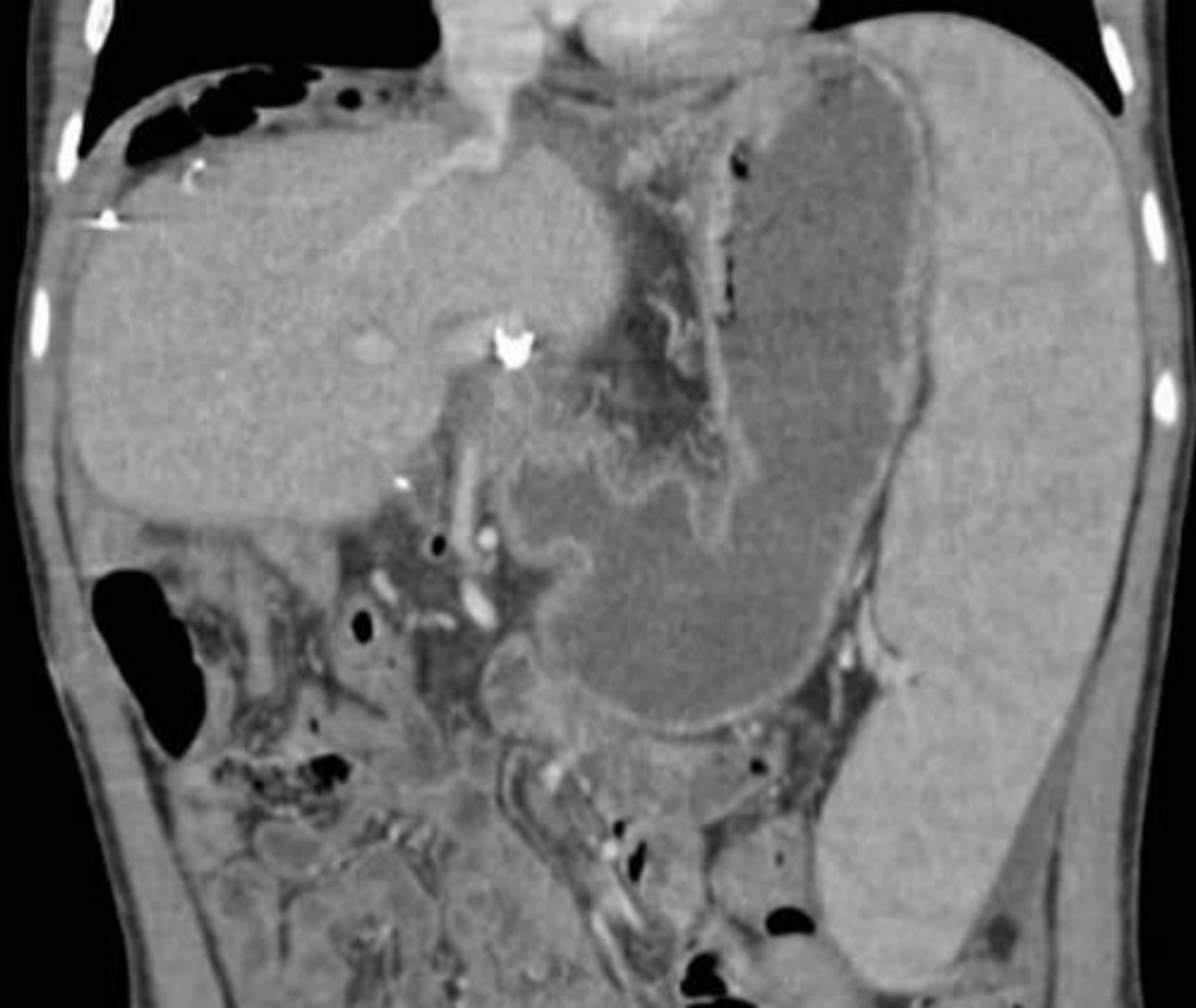


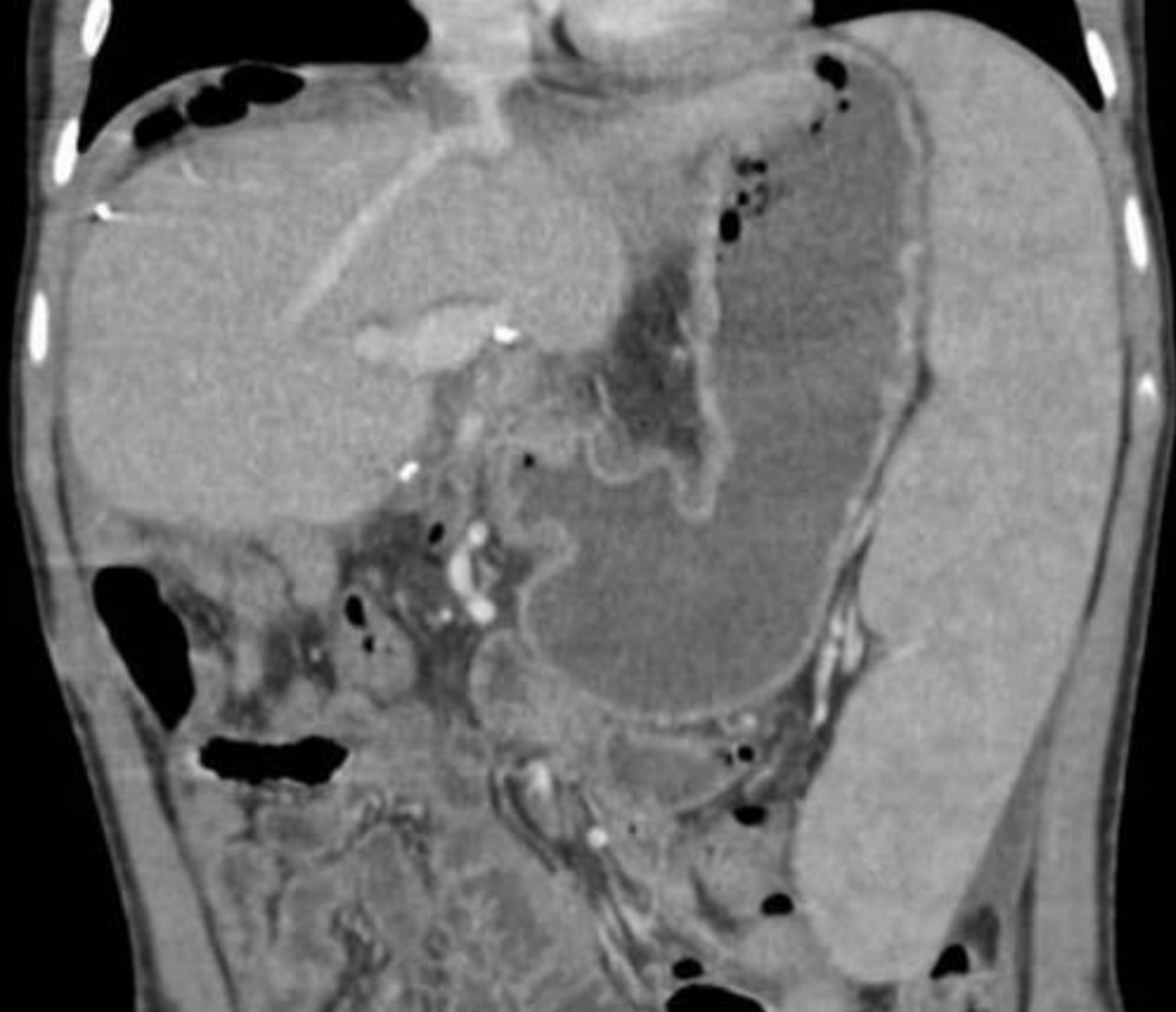


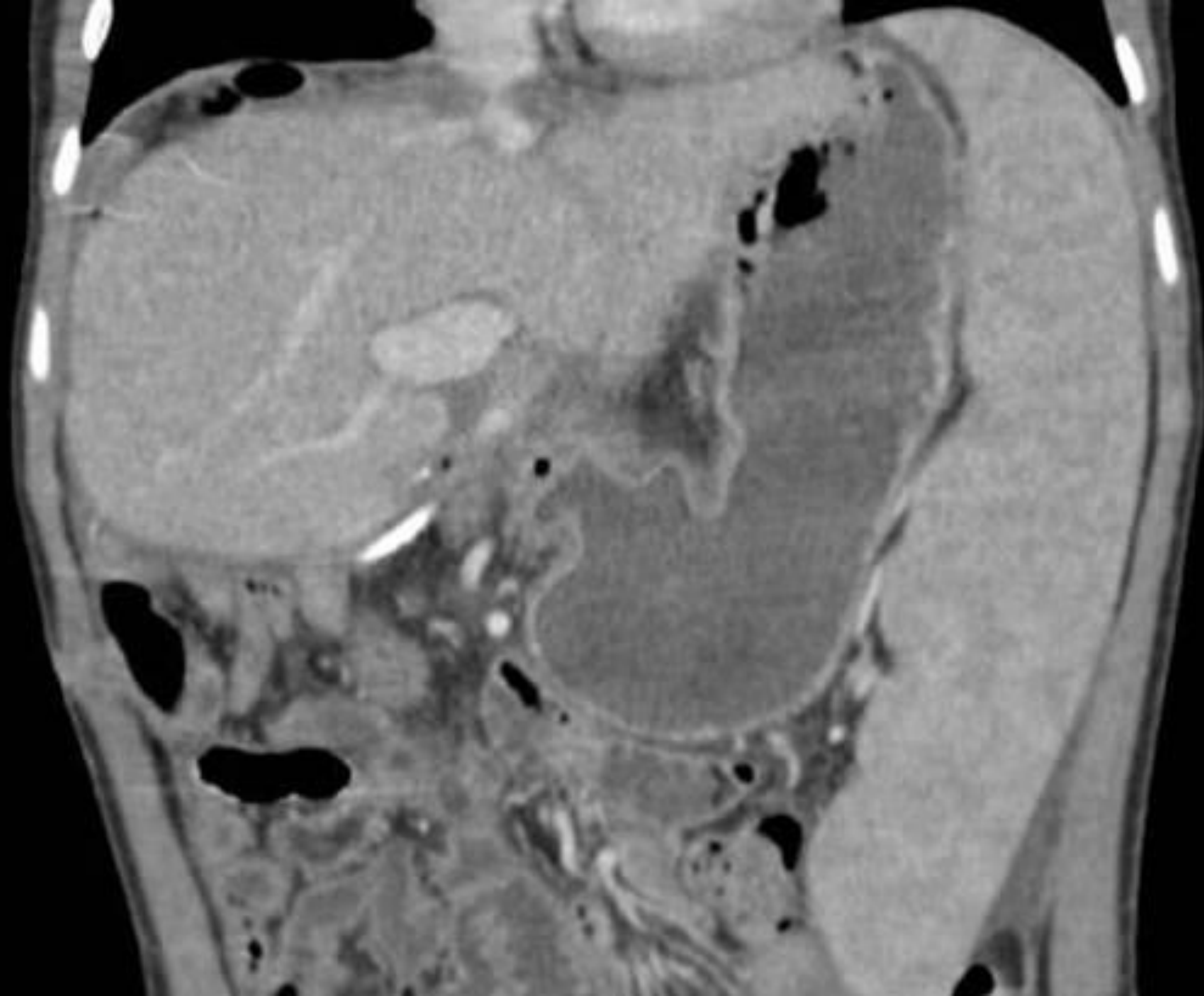






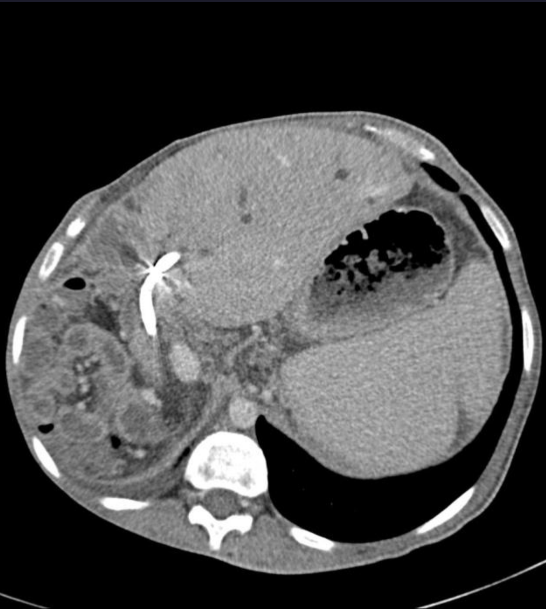
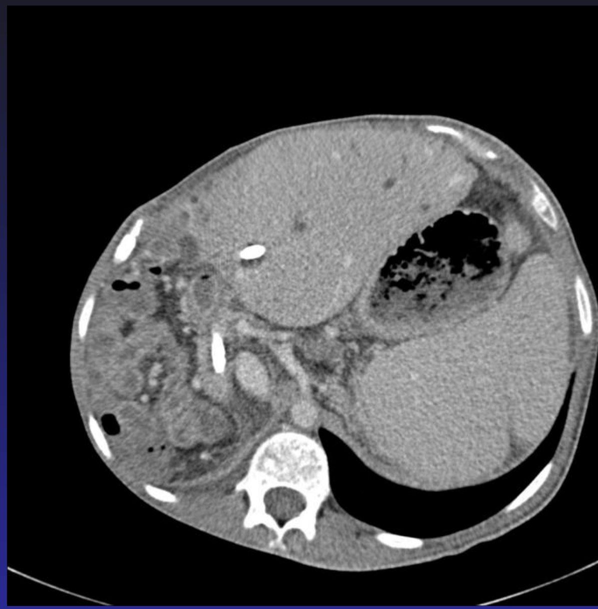
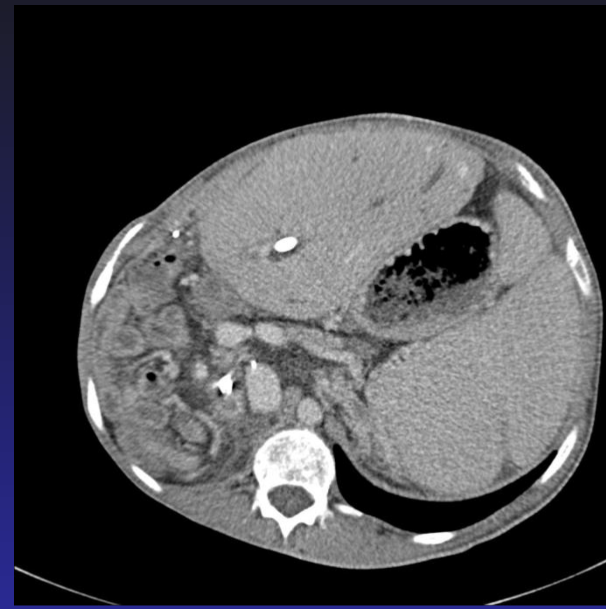
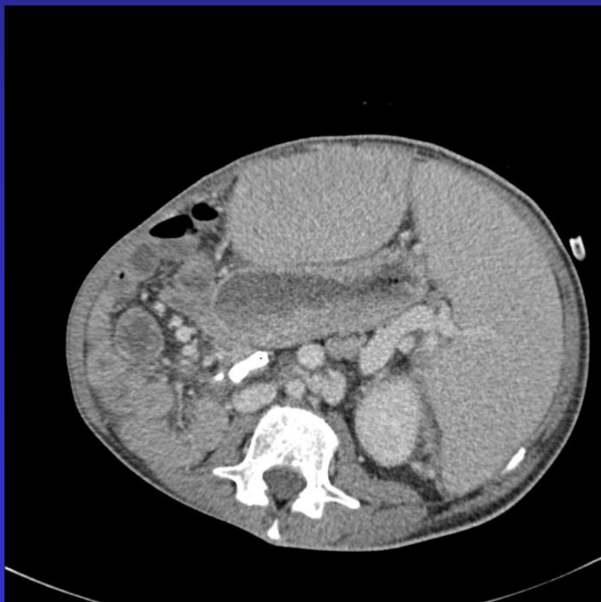
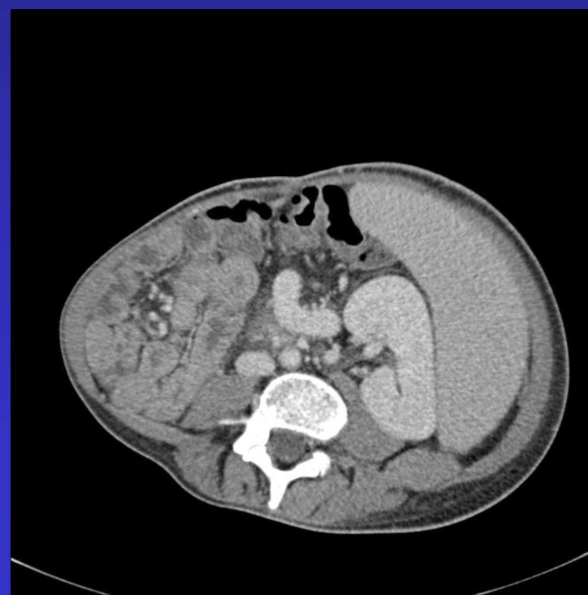




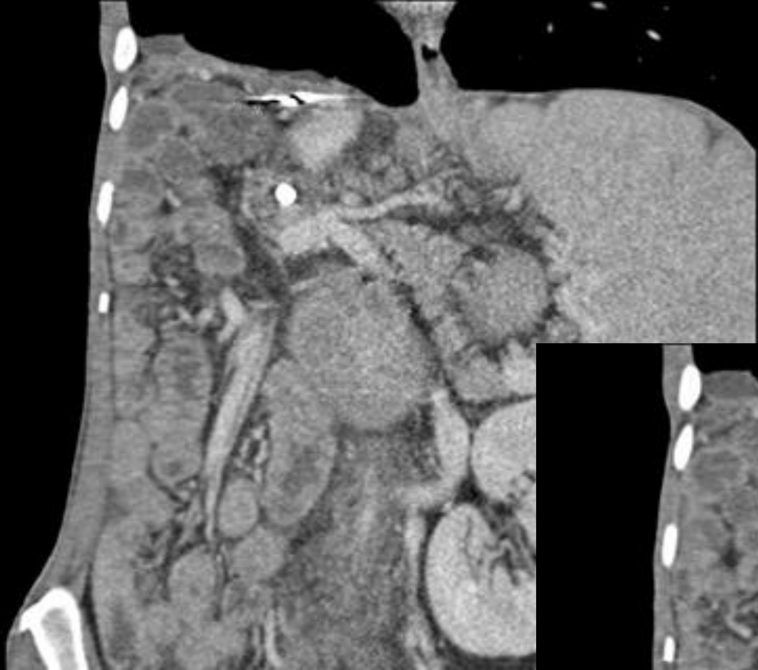


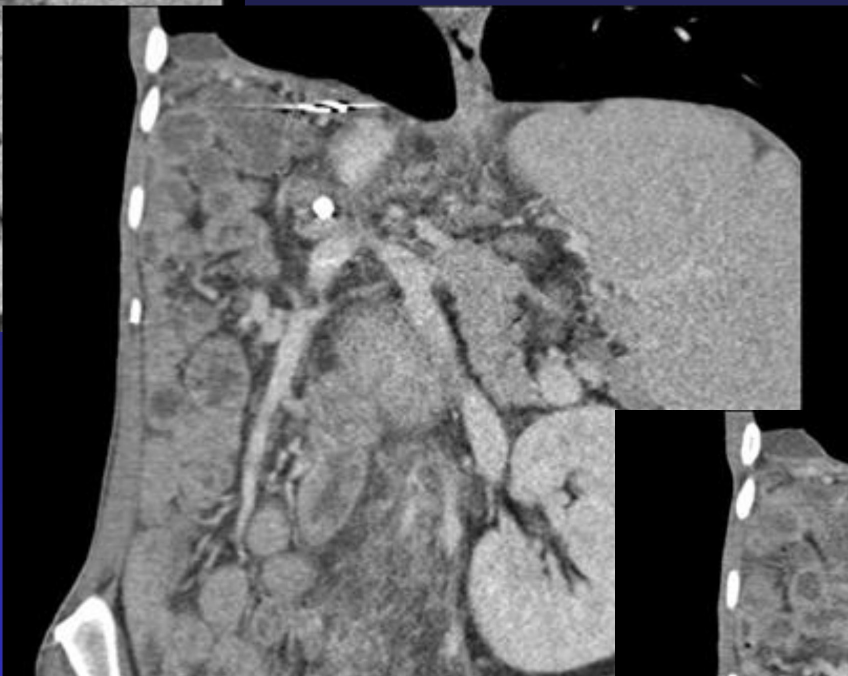
Case presentation

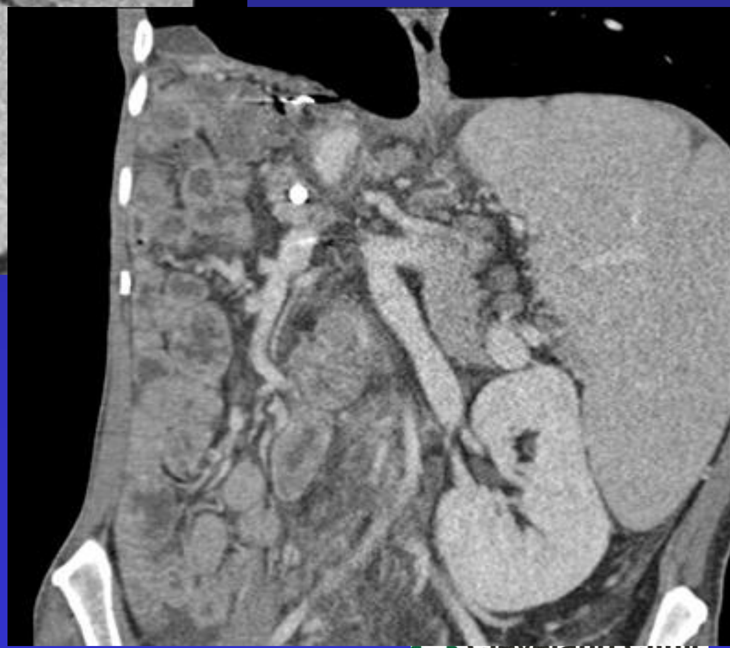
- 36 yo male, h/o Wilm's tumor, s/p right nephrectomy + right hepatectomy, XRT resulting in biliary and duodenal stricture
- Long standing PTC
- 2ndary biliary cirrhosis
- PVT
- Recent gastrojejunostomy for duodenal stricture
- 2 Liver abscesses recently drained
- 175 cm, 51kg

Cleveland Clinic





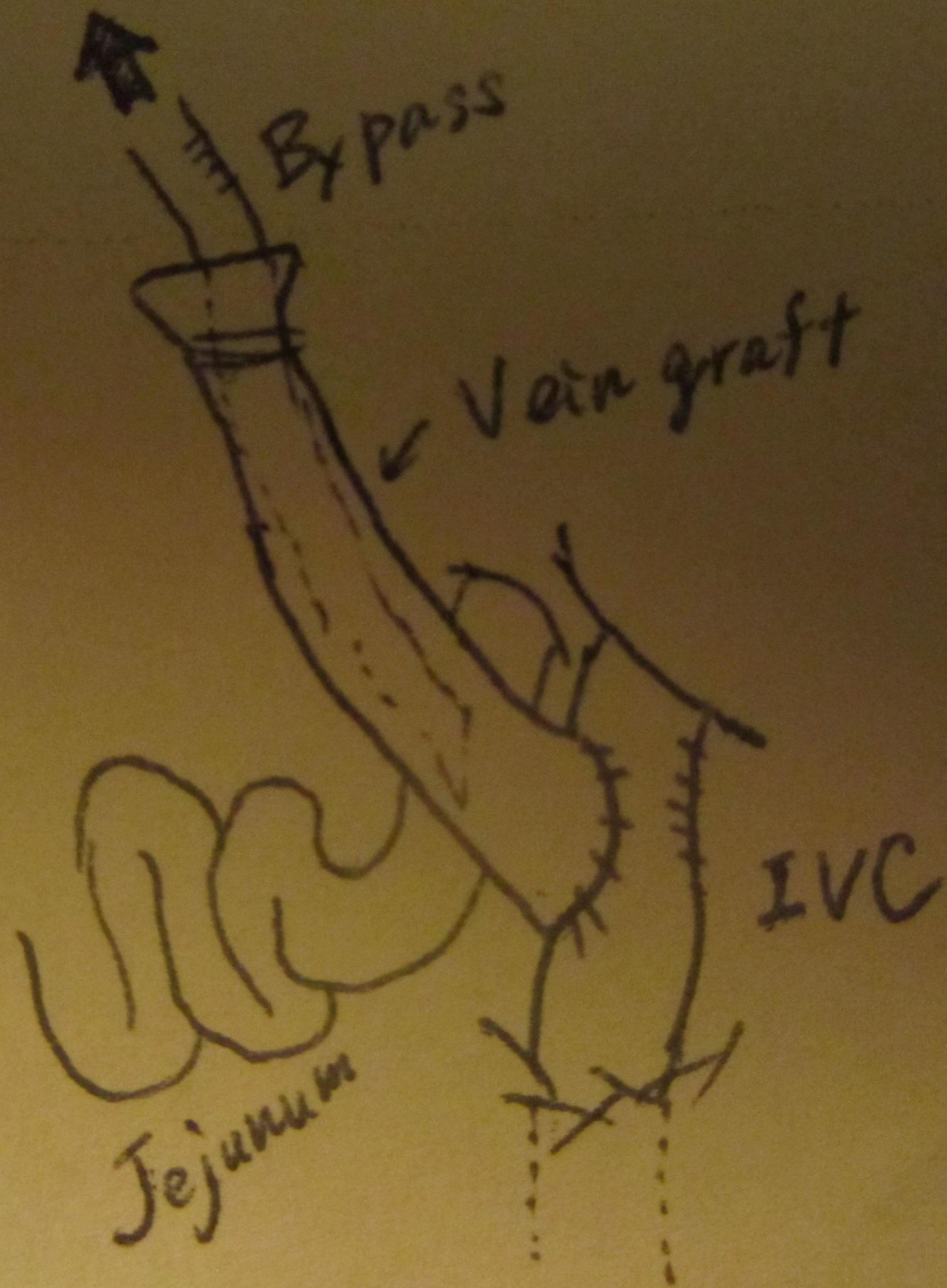


PTCD
G-J stomy

The Transplant

- Isolate IMV and put vein graft in end-to-side
- Venoveno bypass to decompress portal pressure
- Mass clamp and transected hilum
- Right colon and diaphragm severely adheised to liver hilum-> removed
- Pericardium opened to access suprahepatic IVC
- Piggyback
- Choledocho-enterostomy for biliary reconstruction

Cleveland Clinic


Bypass
Vein graft
IVC
Jejunum

The Transplant

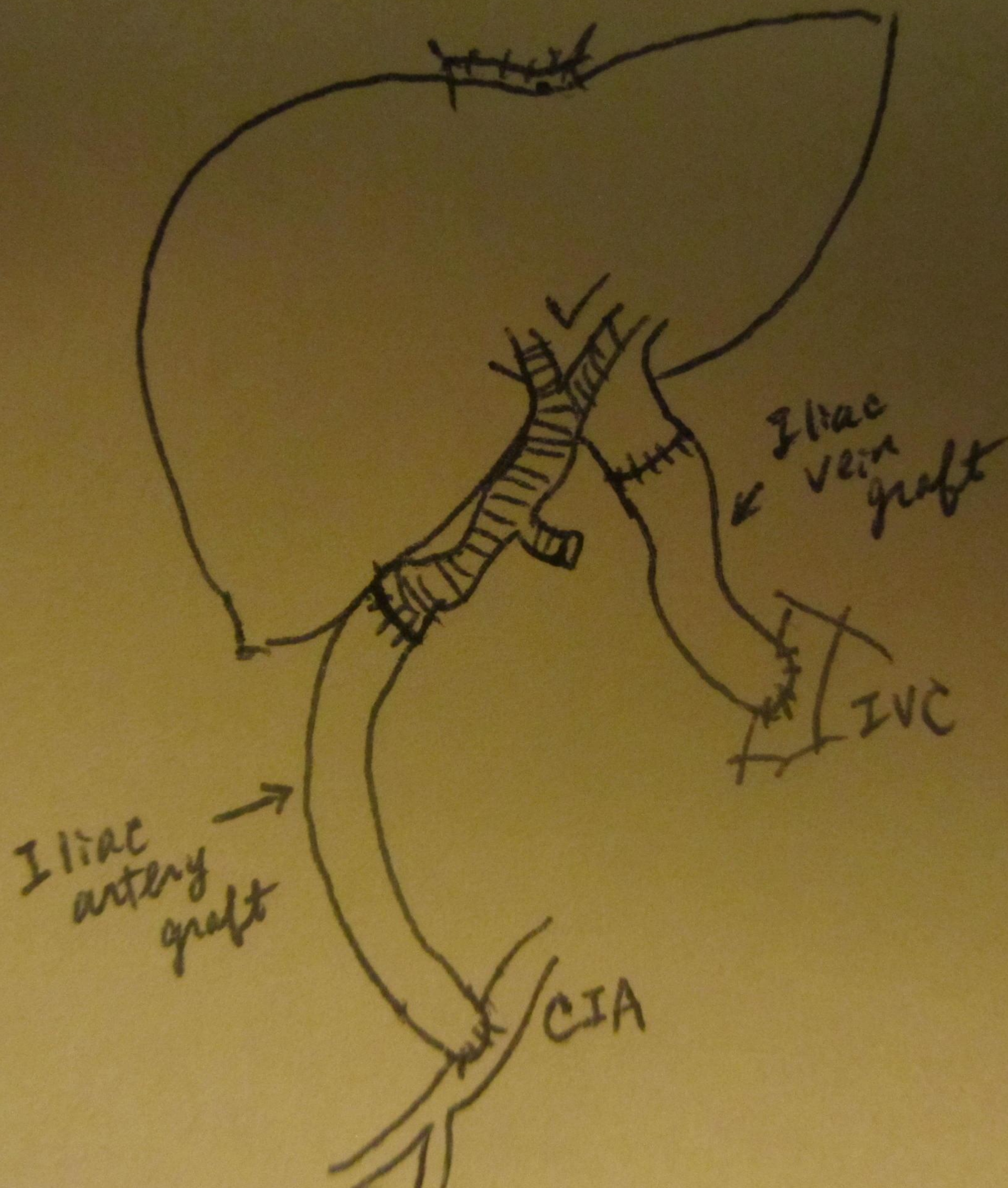
- Isolate IMV and put vein graft in end-to-side
- Venoveno bypass to decompress portal pressure
- Mass clamp and transected hilum
- Right colon and diaphragm severely adheised to liver hilum-> removed
- Pericardium opened to access suprahepatic IVC
- Piggyback with addition lower cavo-cavostomy
- IMV to portal vein graft
- Right iliac artery to hepatic artery graft
- Choledocho-enterostomy for biliary reconstruction

Cleveland Clinic

The Transplant

- Isolate IMV and put vein graft in end-to-side
- Venoveno bypass to decompress portal pressure
- Mass clamp and transected hilum
- Right colon and diaphragm severely adheised to liver hilum-> removed
- Pericardium opened to access suprahepatic IVC
- Piggyback with addition lower cavo-cavostomy
- IMV to portal vein graft
- Right iliac artery to hepatic artery graft
- Choledocho-enterostomy for biliary reconstruction

Cleveland Clinic



Iliac vein graft
IVC
Iliac artery graft
CIA

The Transplant

- Isolate IMV and put vein graft in end-to-side
- Venoveno bypass to decompress portal pressure
- Mass clamp and transected hilum
- Right colon and diaphragm severely adheised to liver hilum-> removed
- Pericardium opened to access suprahepatic IVC
- Piggyback with addition lower cavo-cavostomy
- IMV to portal vein graft
- Right iliac artery to hepatic artery graft
- Choledocho-enterostomy for biliary reconstruction

Cleveland Clinic

Summary

Sometimes it is impossible to anticipate the worst that can happen…..

So to get through the "impossible" situation……..

Summary

Prepare, Practice and Stay Calm

Cleveland Clinic