Abdominal Point of Care Ultrasound

Christopher Choi, MD
Assistant Professor
Department of Anesthesiology & Pain Management

UT Southwestern
Medical Center

Learning objectives

- Gastric examination
- Free fluid examination
- Renal examination

Gastric ultrasound

- Peri-operative indications:
  - Lack of adherence to fasting instructions:
  - Unreliable/unclear fasting history
  - Potential delay in gastric emptying

PERIOPERATIVE MEDICINE: CLINICAL SCIENCE

Intra- and Interrater Reliability of Ultrasound Assessment of Gastric Volume

Kruisselbrink, Richelle M.D., F.R.C.P.C.; Arzola, Cristian M.D., F.R.C.P.C.; Endersby, Ryan M.D., F.R.C.P.C.; Tse, Cyrus B.Sc.; Chan, Vincent M.D., F.R.C.P.C., F.R.C.A.; Perlas, Anahi M.D., F.R.C.P.C.

Author Information

Anesthesiology 121(1):p 46-51, July 2014. | *DOI:* 10.1097/ALN.0000000

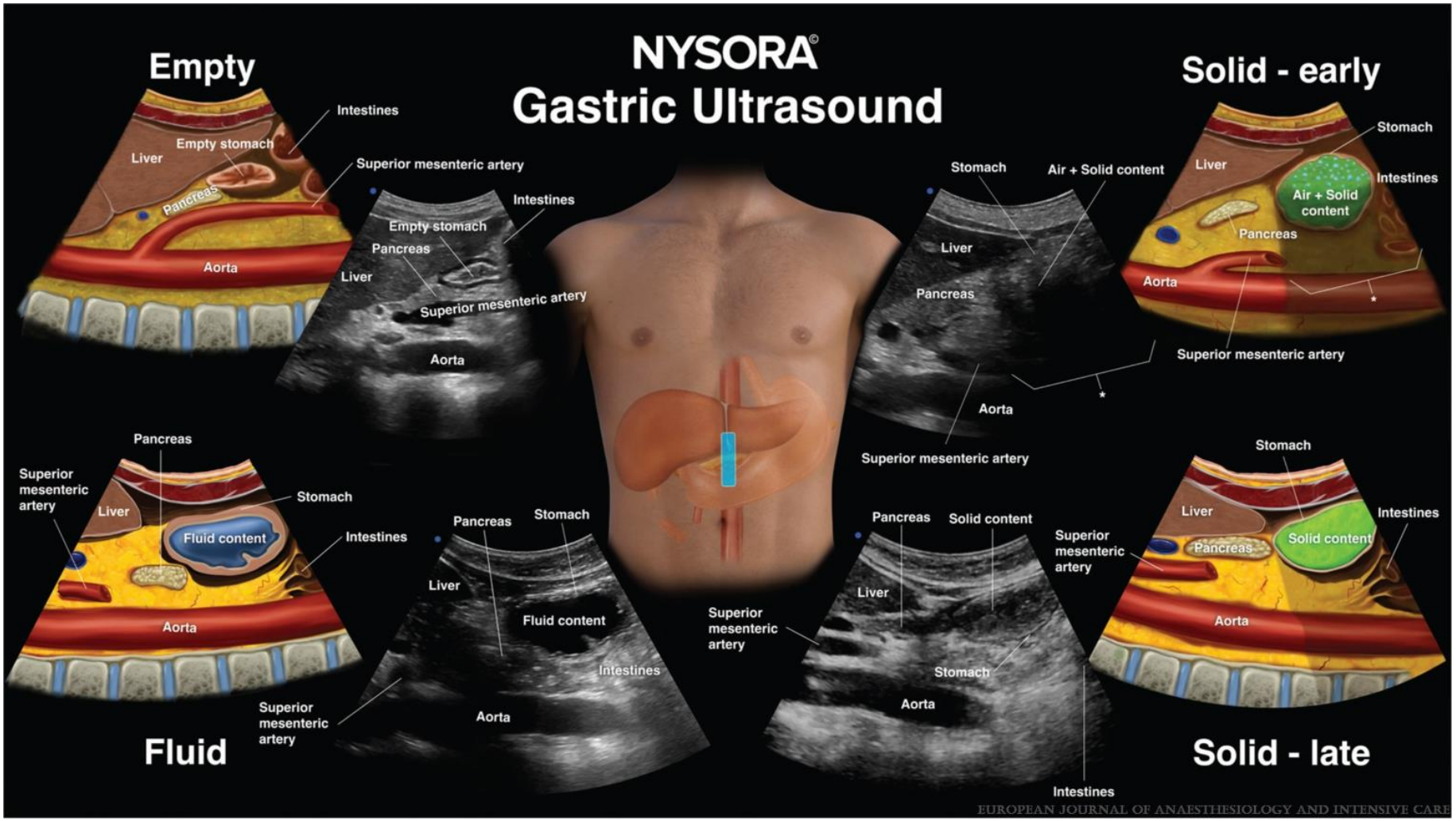
Home > Canadian Journal of Anesthesia/Journal canadien d'anesthésie > Article

Anesthesiologists' learning curves for bedside qualitative ultrasound assessment of gastric content: a cohort study

Les courbes d'apprentissage des anesthésiologistes pour l'évaluation du contenu gastrique par échographie qualitative au chevet: une étude de cohorte

Reports of Original Investigations | Published: 24 May 2013

Volume 60, pages 771–779, (2013) Cite this article


NYSORA©
Gastric Ultrasound
Empty
Intestines
Empty stomach
Liver
Superior mesenteric artery
Pancreas
Aorta
Intestines
Empty stomach
Pancreas
Liver
Superior mesenteric artery
Aorta
Stomach
Air + Solid content
Liver
Pancreas
Aorta
Superior mesenteric artery
Solid - early
Stomach
Liver
Intestines
Air + Solid content
Pancreas
Aorta
Superior mesenteric artery
Pancreas
Superior mesenteric artery
Stomach
Liver
Fluid content
Intestines
Aorta
Fluid
Pancreas
Stomach
Liver
Fluid content
Intestines
Aorta
Superior mesenteric artery
Pancreas
Solid content
Liver
Superior mesenteric artery
Stomach
Aorta
Intestines
Stomach
Liver
Intestines
Pancreas
Solid content
Aorta
Solid - late
EUROPEAN JOURNAL OF ANAESTHESIOLOGY AND INTENSIVE CARE

Interpretation

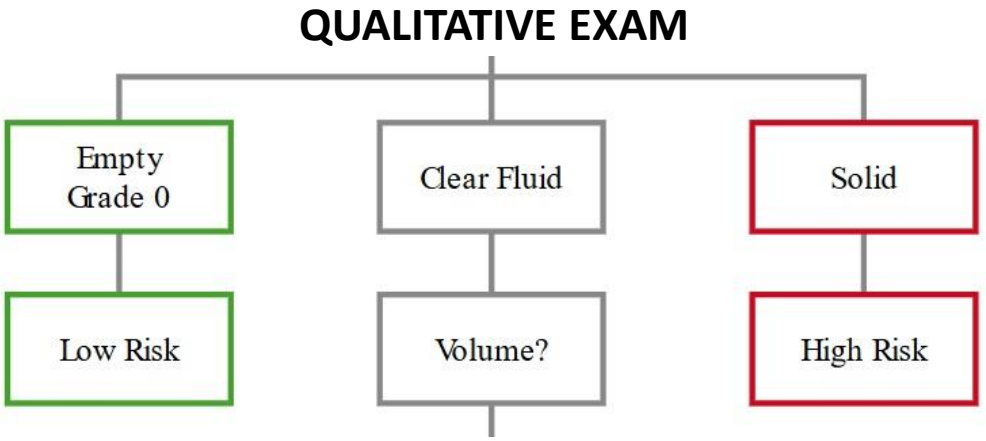
- Free tracing or formula [CSA = (AP × CC) x π/4]

Right lat CSA (cm²)	Age(y) 20	30	40	50	60	70	80
2	31	18	5	0	0	0	0
3	45	32	20	7	0	0	0
4	60	47	34	21	9	0	0
5	74	62	49	36	23	10	0
6	89	76	63	51	38	25	12
7	103	91	78	65	52	40	27
8	118	105	93	80	67	54	41
9	133	120	107	94	82	69	56
10	147	135	122	109	96	83	71
11	162	149	136	123	111	98	85
12	177	164	151	138	125	113	100
13	191	178	165	153	140	127	114
14	206	193	180	167	155	142	129
15	220	207	194	182	169	156	143
16	235	222	209	200	184	171	158
17	249	236	224				
18	164	251	239				
19	278	266	253				
20	293	281	268				
21	307	295	282				
22	323	310	297				
23	337	324	311				
24	352	339	326				
25	366	353	340				
26	381	368	355				
27	395	382	369				
28	410	397	385				
29	424	411	398				
30	439	427	414	401	388	375	363

GRADE	ANTRAL PRESENTATION	VOLUME IMPLICATIONS	ASPIRATION RISK
0	Empty in both supine and RLD position	Minimal	Low risk
1	Empty in supine, clear fluid visible in the RLD	⩽ 1.5 mL/kg, compatible with baseline gastric secretions	Low risk
2	Clear fluid visible in both positions	> 1.5 mL/kg, likely in excess of baseline gastric secretions	High risk

https://www.gastricultrasound.org/

Decision tree



GLP-1 controversy

- Glucagon-like peptide-1 receptor agonists are FDA-approved medications that mimic the action of a naturally occurring hormone to lower blood sugar and promote weight loss.
  - Prescribed use of these medications for weight loss increased by 352% from 2022 to 2023
- Current ASA guidelines recommend considering holding a patient's usual weekly injection of a GLP-1 for a week before surgery

Endoscopy Suite

DECEMBER 5, 2024

Perioperative Gastric Ultrasound Findings in GLP-1 Receptor Agonist Users

Steve Kwon, MD
Fellow Physician

Elliott Higgins, MD
Assistant Clinical Professor

Rana Movahedi, MD
Clinical Professor

Pamela A. Chia, MD
Assistant Clinical Professor

Department of Anesthesiology and Perioperative Medicine
David Geffen School of Medicine
University of California, Los Angeles

Editor: Karen Sibert, MD

THE FROST SERIES #411

ICU nutrition

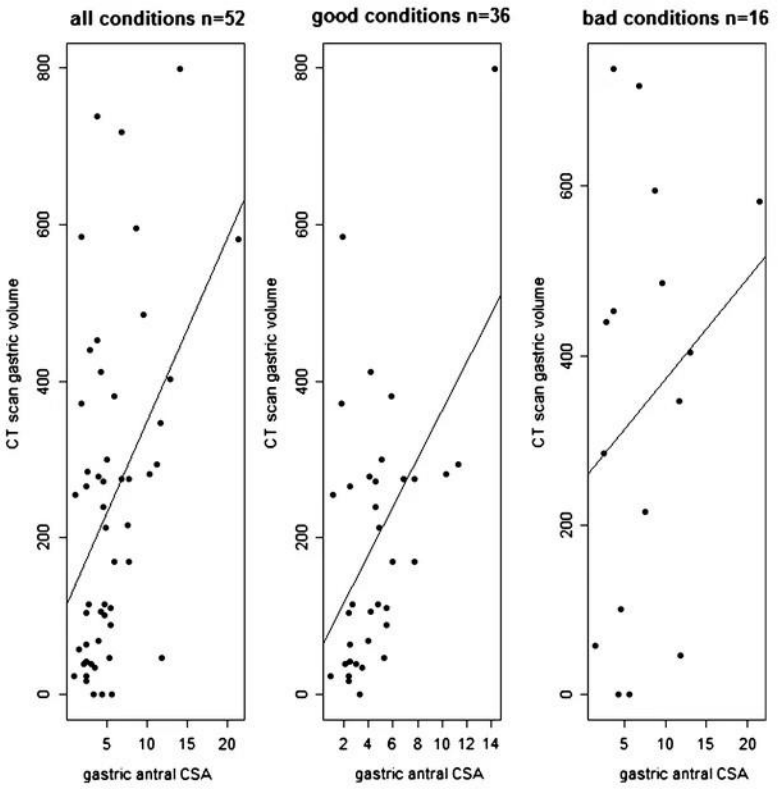
- Critically ill (particularly neurosurgical) patients often have different degrees of gastrointestinal dysfunction, which can increase the occurrence of gastrointestinal intolerance (ie regurgitation, aspiration, diarrhea)

Table 2. Comparison of EN tolerance and feeding interruption between the two groups

Groups	Diarrhea (n, %)	Reflux (n, %)	Aspiration (n, %)	Feeding interruption (n, %)
Study group (n=36)	6 (16.7)	3 (8.3)	1 (2.8)	9 (25.0)
Control group (n=36)	3 (8.3)	10 (27.8)	6 (16.7)	7 (19.4)
P value	0.285	0.032	0.047	0.571

Table 3. Comparison of TEN and albumin levels on the 7th day between the two groups

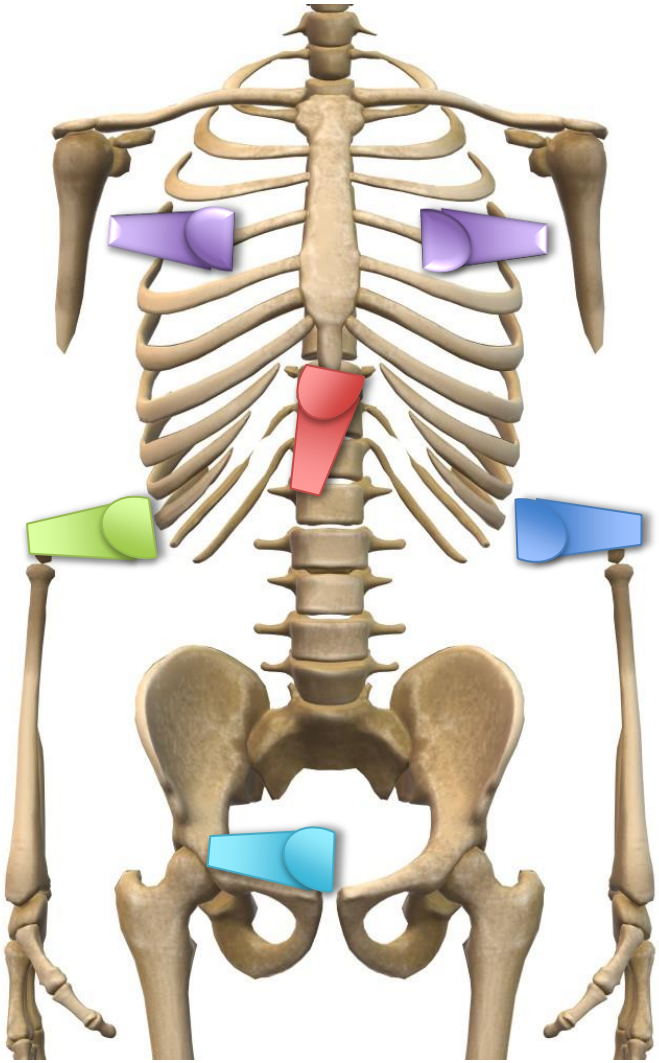
Groups	EN volume (mL/d)	TEN (case %)	Serum albumin (g/L)	Prealbumin (mg/L)
Study group (n=36)	946.4±290.2	32 (88.9)	31.7±4.6	205.7±29.9
Control group (n=36)	806.8±233.1	25 (69.4)	28.8±4.2	190.1±27.1
P value	0.028	0.042	0.032	0.017



UTSouthwestern Medical Center

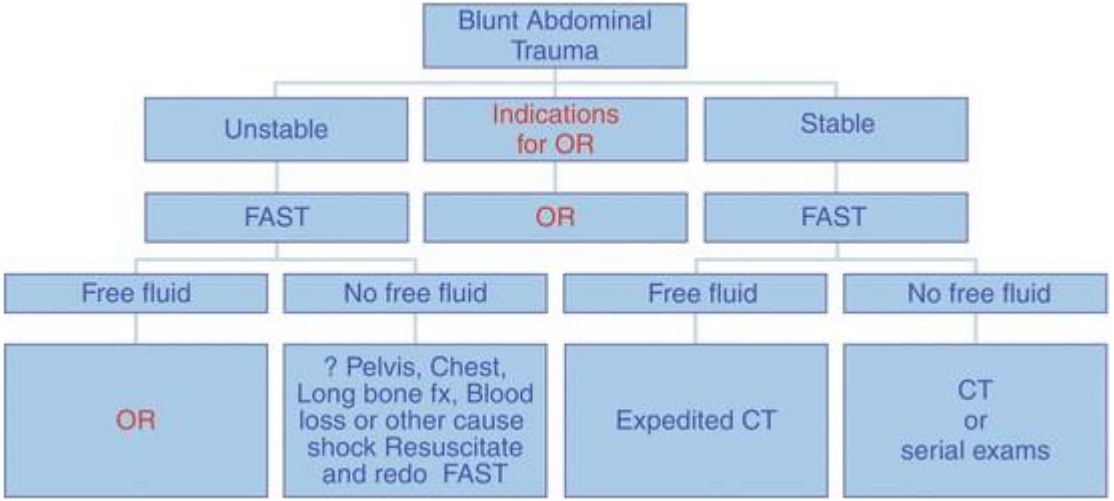
eFAST images

- Pericardium
- Right upper quadrant
- Left upper quadrant
- Pelvis
- Bilateral thorax



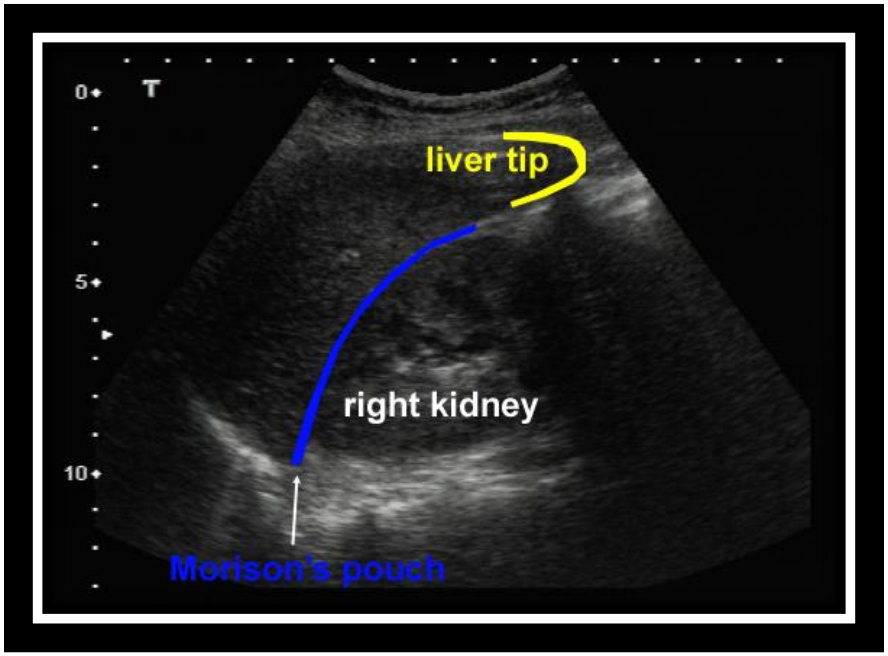
Practice pearls

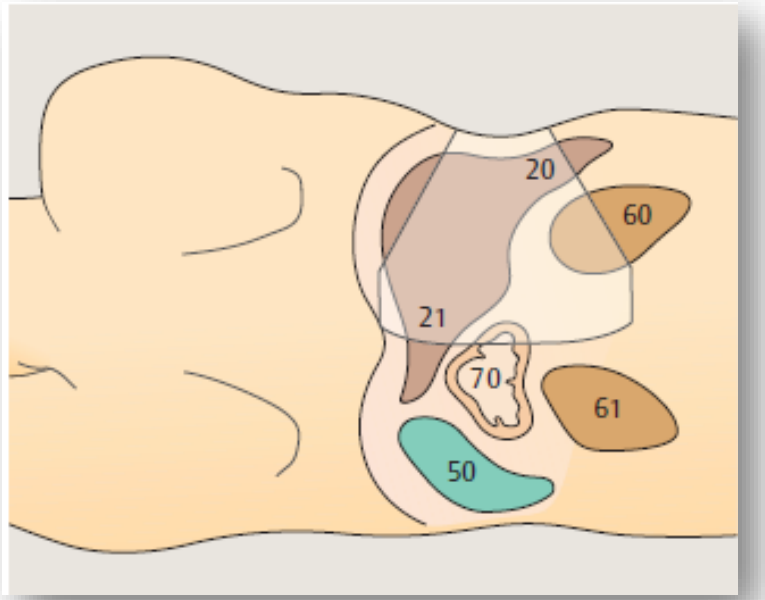
- Should be performed as part of the "**C**" (Circulation and Hemorrhage Control) in the **ABC** approach to trauma.
- In penetrating trauma, the FAST exam is highly specific but not very sensitive (may improve with repeated scanning).
- Locations other than Morrison's pouch may be more difficult to visualize
- Patients with history of ascites may benefit from diagnostic paracentesis



https://radiologykey.com/

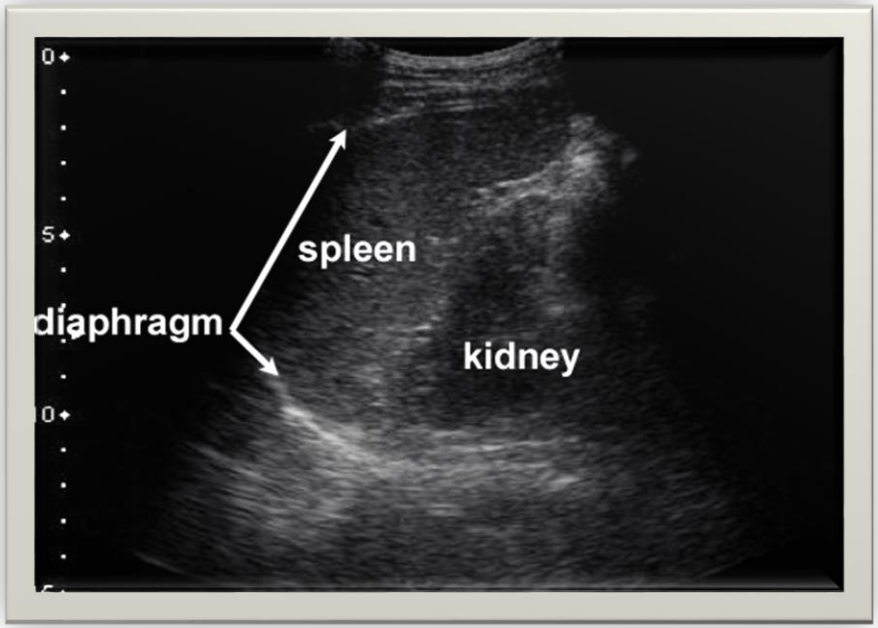
eFAST - RUQ View

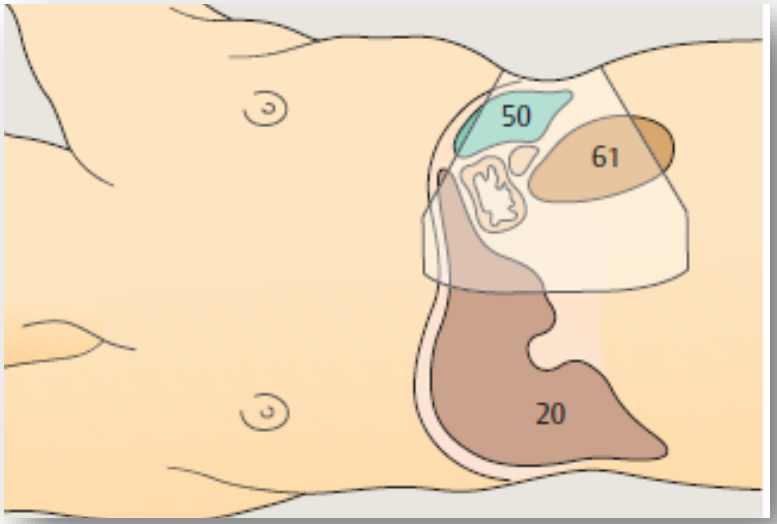




- Probe placed in 11th intercostal space, mid- to posterior axillary line
- Fluid appears as a band of black (anechoic) between liver and kidney (in Morison's pouch)
- Is very sensitive for free fluid in the abdomen (as little as 200mL)
- Extremely sensitive in the setting of abdominal trauma and hemodynamic instability

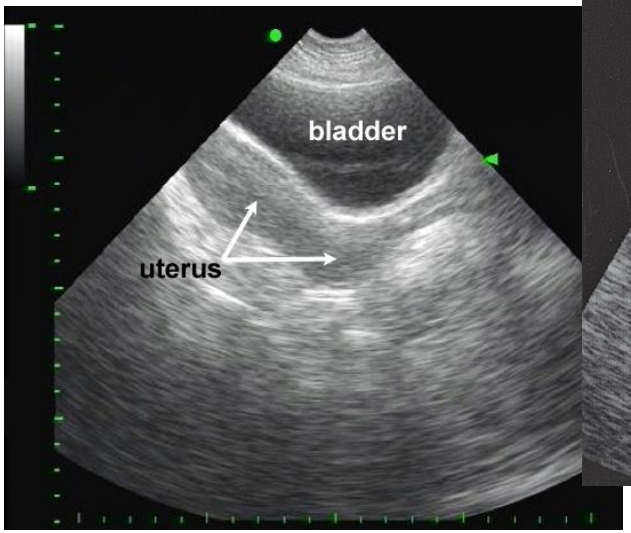
eFAST - LUQ View

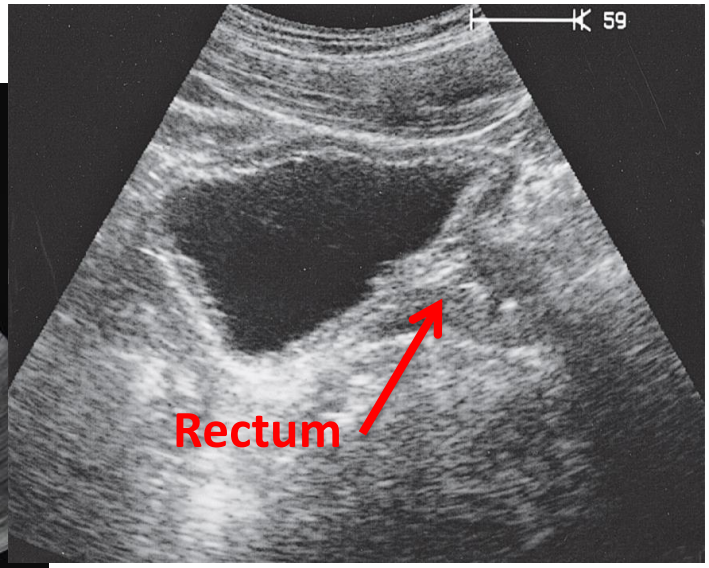


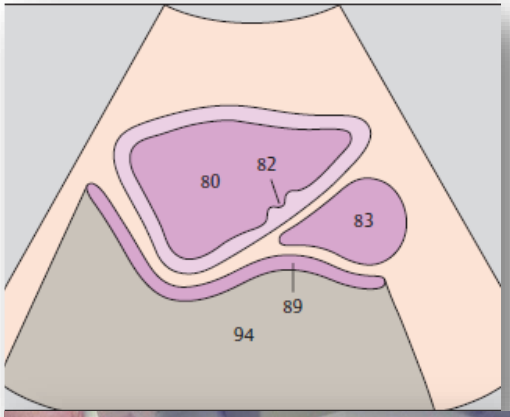


- Transducer between 10th and 11th ribs in posterior axillary line
- **Sub-diaphragmatic** and splenorenal spaces
- Fluid appears as an anechoic band separating the organs

eFAST - Pelvic View

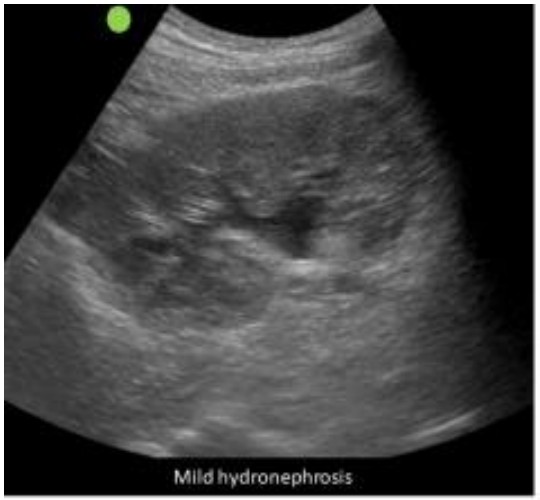


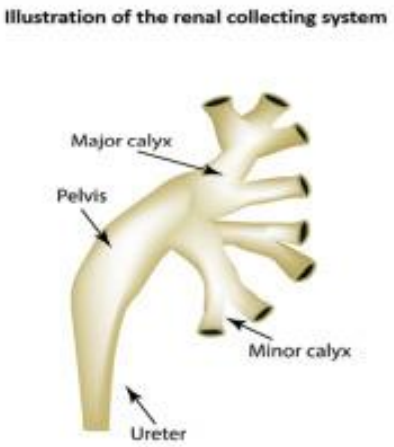


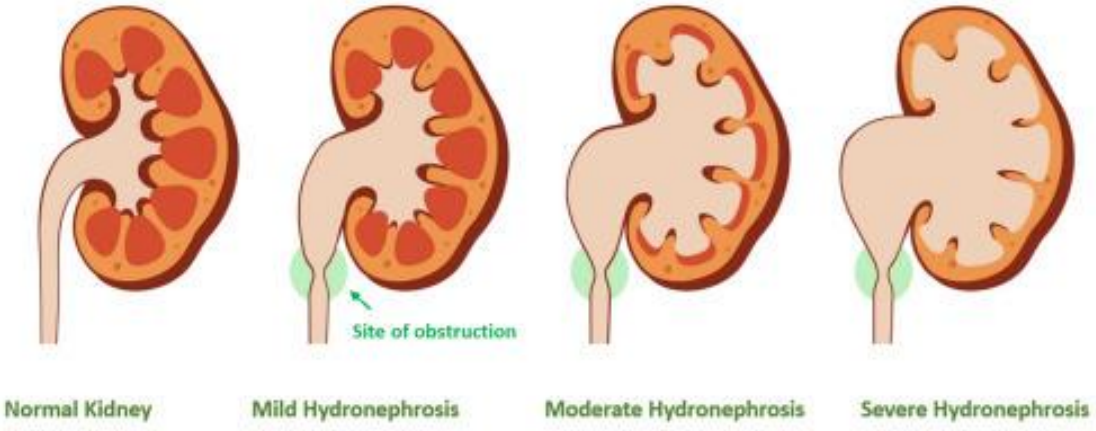


- Transducer is placed transversely and longitudinally just above the symphysis pubis
- Fluid in the retro-vesicular space in men (between bladder and rectum)
- Fluid in between bladder and uterus or Pouch of Douglas in women
- Most dependent portion of peritoneum

Obstructive AKI







Renal resistive index

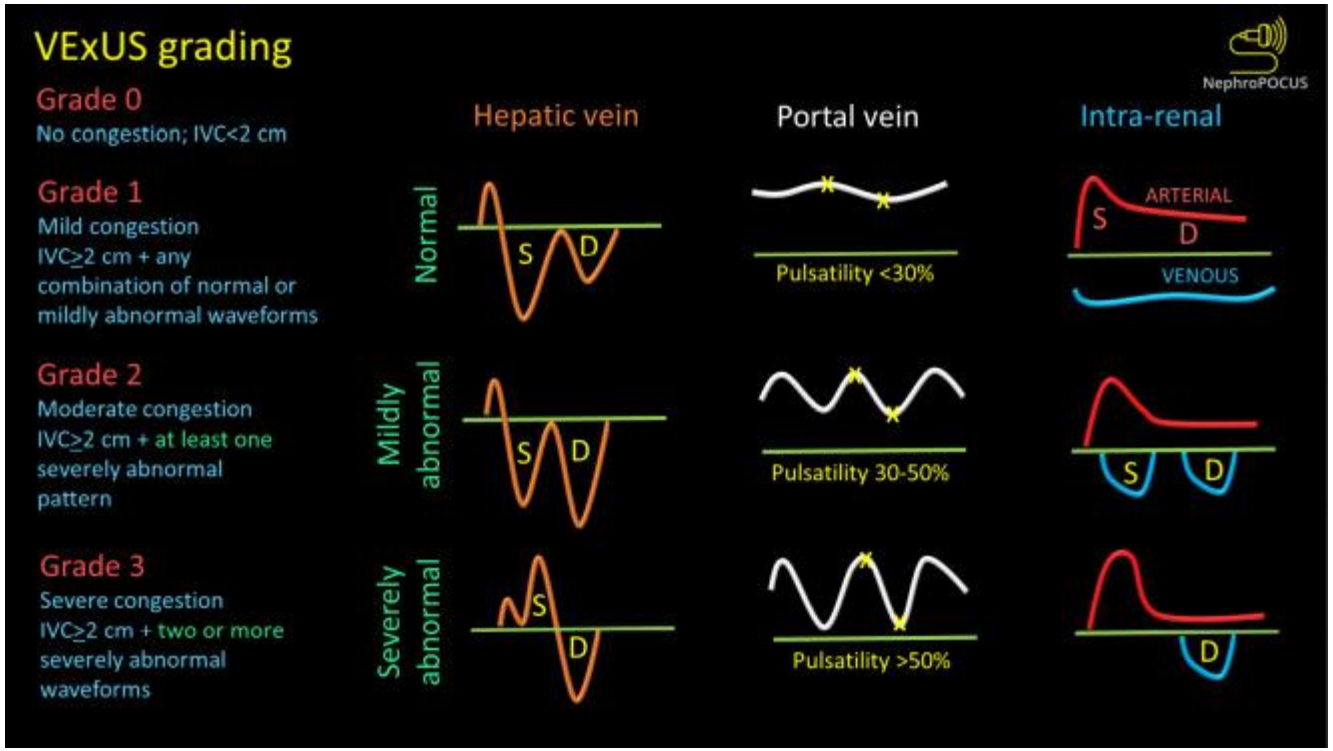
- Appealing method to assess renal perfusion
  - **(peak systolic velocity-end diastolic velocity)/peak systolic velocity**
- High RI is associated with renal dysfunction and adverse cardiovascular events
- High RI in transplant recipients is associated with increased risk of graft loss/death
- Other reasons for elevation:

1. ureteric obstruction
2. extreme hypotension
3. very young children
4. perinephric fluid collection
5. abdominal compartment syndrome

VExUS score

- Occurrence of significant flow abnormalities in two or more veins (hepatic, portal, and kidney parenchymal veins) combined with an enlarged IVC (≥ 2 cm) is a more effective predictor of AKI risk than CVP

- Not limited to cardiac surgery or heart failure patients



References

- Godschalx, Vincent; Vanhoof, Marc; Soetens, Filiep; Van de Putte, Peter; Hadzic, Admir; Van de Velde, Marc; Van Herreweghe, Imré. The role of gastric ultrasound in anaesthesia for emergency surgery: A review and clinical guidance. European Journal of Anaesthesiology and Intensive Care 2(4):p e0027, August 2023

- Mihnovits V, Reintam Blaser A, Gualdi T, Forbes A, Piton G. Gastrointestinal ultrasound in the critically ill: A narrative review and a proposal for a protocol. JPEN J Parenter Enteral Nutr. 2024 Nov;48(8):895-905.

- Kameda, T., Taniguchi, N. Overview of point-of-care abdominal ultrasound in emergency and critical care. j intensive care 4, 53 (2016).

- Batool A, Chaudhry S, Koratala A. Transcending boundaries: Unleashing the potential of multi-organ point-of-care ultrasound in acute kidney injury. World J Nephrol. 2023 Sep 25;12(4):93-103.

- https://www.anesthesiologynews.com/The-Frost-Series/Article/11-24/Perioperative-Gastric-Ultrasound-Findings-in-GLP-1-Receptor-Agonist-Users/75251

Thank you!

UT Southwestern
Medical Center