Abdominal pain

Dr Florence Dupriez

Cliniques universitaires
SAINT-LUC
UCL BRUXELLES

Introduction

- Abdominal pain: 5-10% of ED consultations
- Clinical examination , sensitivity 43 % (*Laurell, Scand J Gastro 2006*)

Original Article

Page 1 of 8

Epidemiology and outcomes of acute abdominal pain in a large urban Emergency Department: retrospective analysis of 5,340 cases

Gianfranco Cervellin[1], Riccardo Mora[2], Andrea Ticinesi[2], Tiziana Meschi[2], Ivan Comelli[1], Fausto Catena[3], Giuseppe Lippi[4]

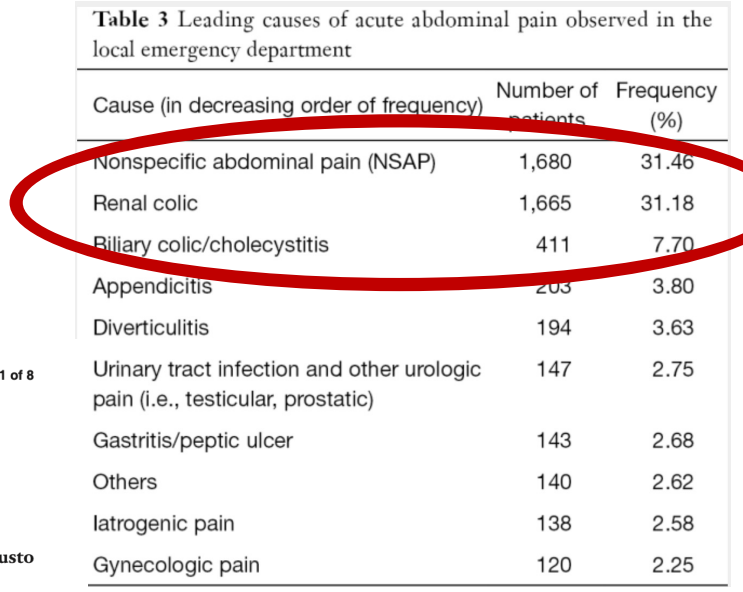


Table 3 Leading causes of acute abdominal pain observed in the local emergency department

Cause (in decreasing order of frequency)	Number of patients	Frequency (%)
Nonspecific abdominal pain (NSAP)	1,680	31.46
Renal colic	1,665	31.18
Biliary colic/cholecystitis	411	7.70
Appendicitis	203	3.80
Diverticulitis	194	3.63
Urinary tract infection and other urologic pain (i.e., testicular, prostatic)	147	2.75
Gastritis/peptic ulcer	143	2.68
Others	140	2.62
Iatrogenic pain	138	2.58
Gynecologic pain	120	2.25

PoCUS and abdominal pain?

Abdominal pain	Clinical examination	Clinical examination + PoCUS*	Chi Carré
Correct diagnosis% Alleman.F et al. 1999	70%	83%	23.9 (p<0,001)
Correct diagnosis% Lindelius et al. 2015	56%	65%	? (p<0,027)

***PoCUS operator: surgeons**

Abdominal PoCUS

PRO - CONS

- Advantages
  - Immediate availability
  - Performed bedside
  - Strenghten the diagnostic approach
  - Low cost
- Disadvantages
  - Diagnostic accuracy PoCUS / RADUS
  - Appropriate teaching - learning

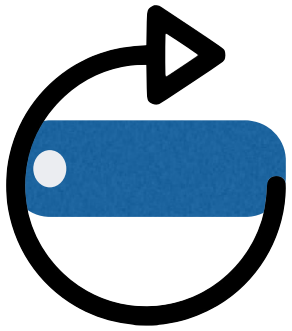

RECALL

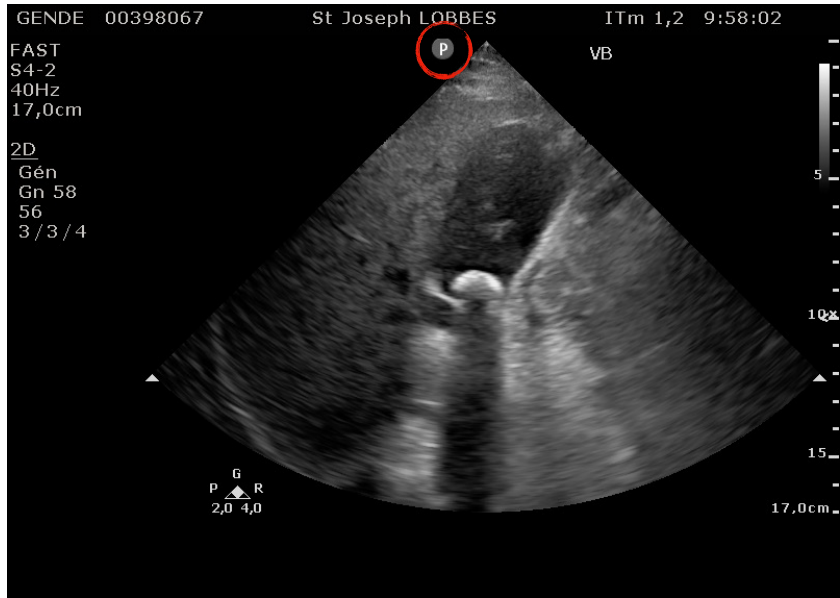
Abdominal PoCUS

Curvilinear probe – low frequency

Abdominal PoCUS

- Transverse view → marker to the patient's right
- Longitudinal view→ marker to the patient's head



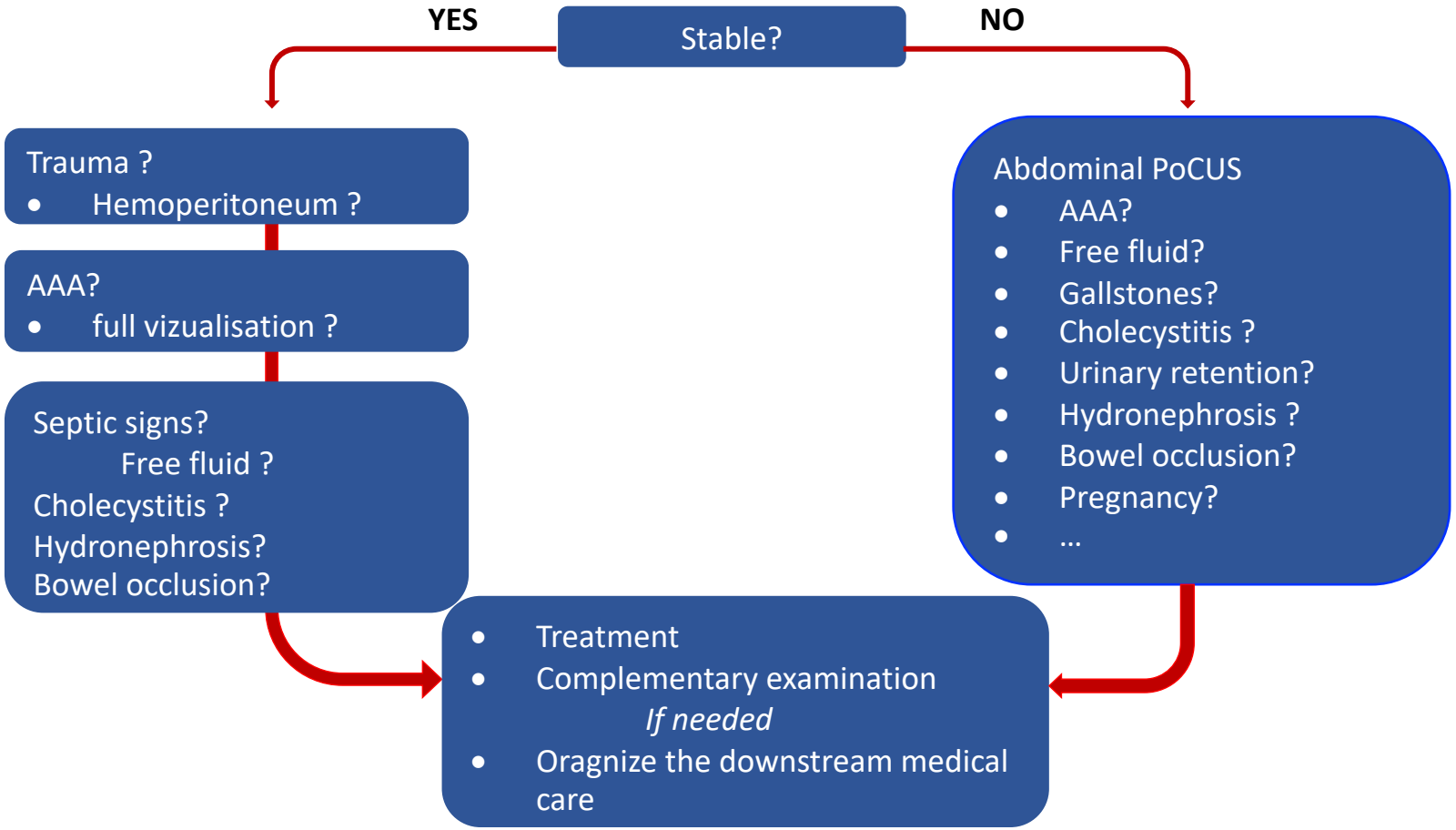


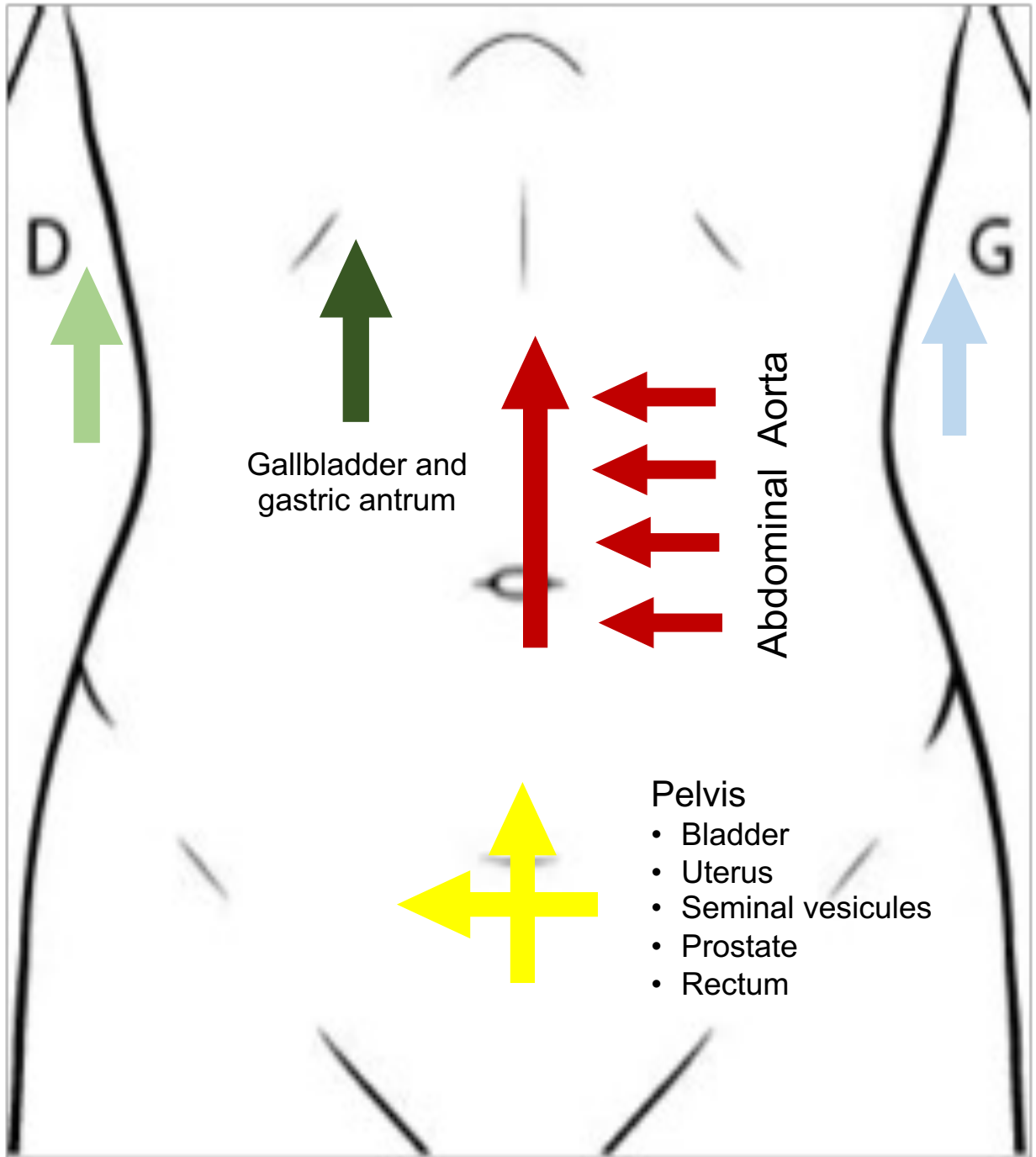
After anamnesis and clinical examination, ask yourself:
would PoCUS be usefull to enhance the diagnosis approach?

Clinical integration!

Abdominal PoCUS

Prevalence / Severe/ Urgent?





RUQ

LUQ

Pelvis
- Bladder
- Uterus
- Seminal vesicules
- Prostate
- Rectum

Tip of the arrow
=Probe marker
direction

Longitudinal

Transverse

Clinical cases

Mister X – 56 YO

- Sudden and strong abdominal pain at 2h30pm
- Left lumbar region irradiation
- Comes in ambulance
- From triage → ED monitored area
- Hypertension, profuse sweating, hyperventilation

Initially

A: OK

B: OK – saturation 97%

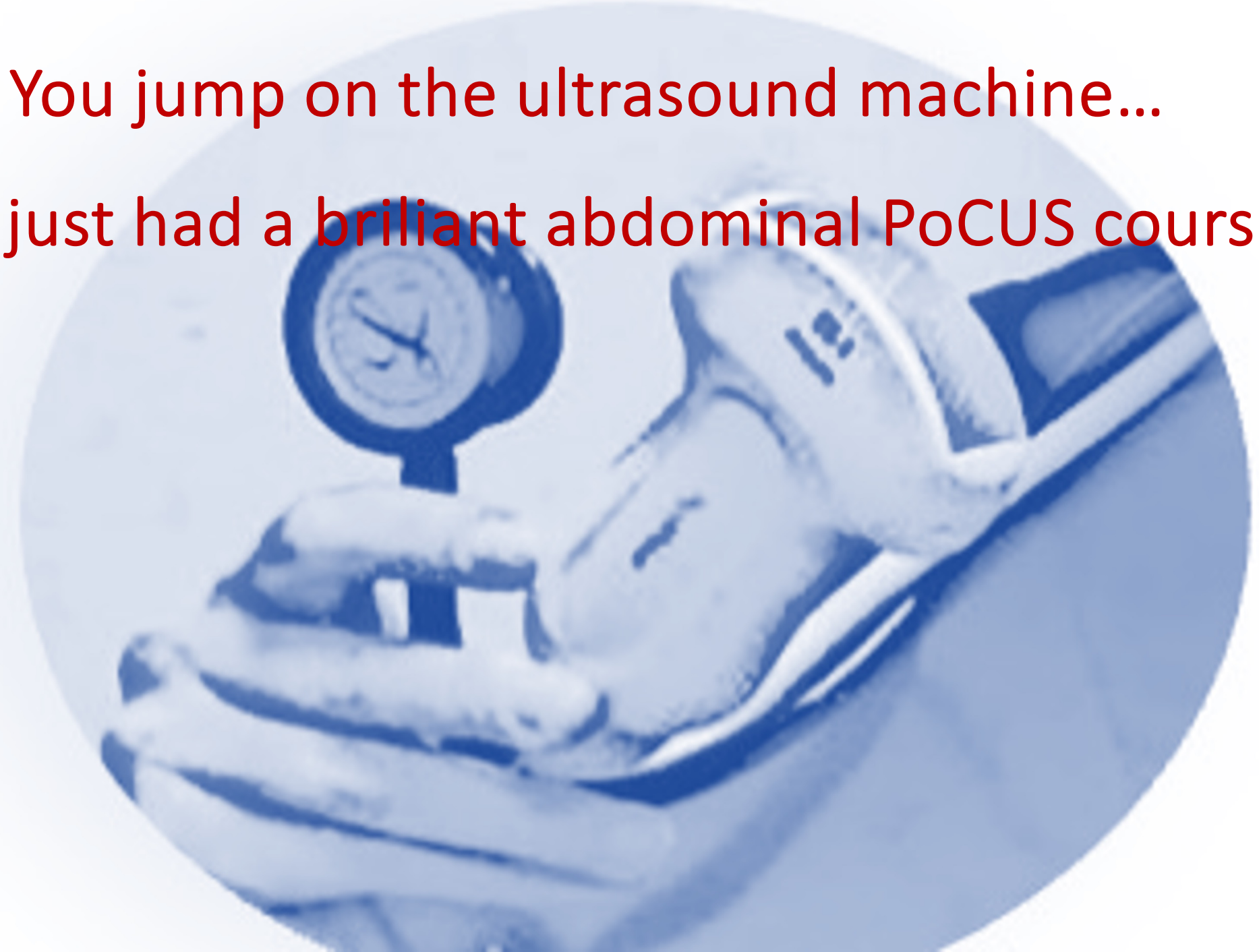
C: BP 190/99 mmHg ; CF 115/min – Abdominal pain

D: OK

E: OK

You jump on the ultrasound machine…

You just had a briliant abdominal PoCUS course




P
RG

Initial workup → easy!

Sensitivity 90%

(CI95% 0.74-0.96)

Specificity 96%

(CI95% 0.89-0.98)

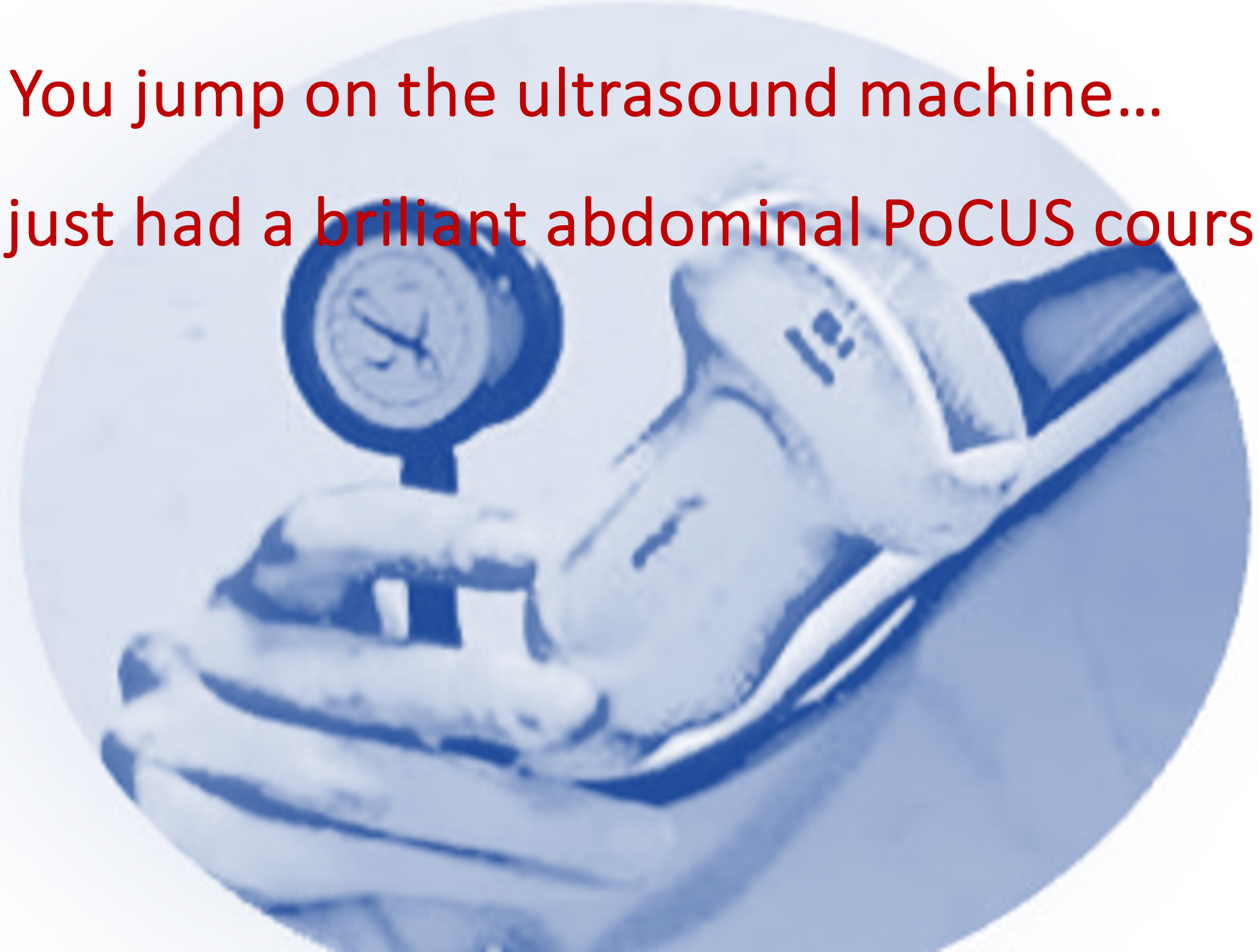
Nixon G et al. point-of-care ultrasound of the kidney and bladder: quality and effect on patient management. J Prim Health Care. 2018 Dec;10(4):324-330.

Morphine – no need for the monitored area

A little later…

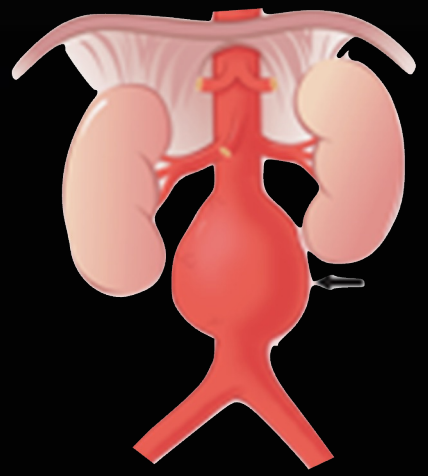
You jump on the ultrasound machine…

You just had a briliant abdominal PoCUS course



PHILIPS N°temporaire-20200722012250 IM 1,1 22/07/2020

UCL St Luc - Urgences ITm 0,1 01:50:41



Abd gén
C5-1
34Hz
15,0cm

2D
HGén
Gn 86
C 56
3/3/3

P

SS XYPH

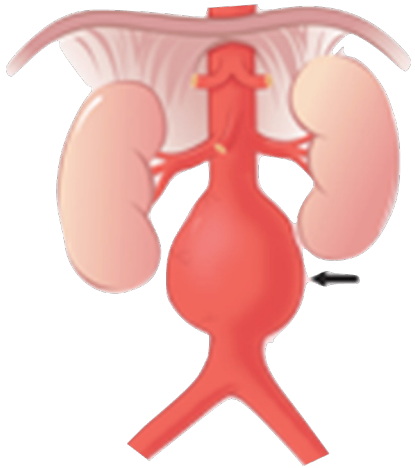
5

10

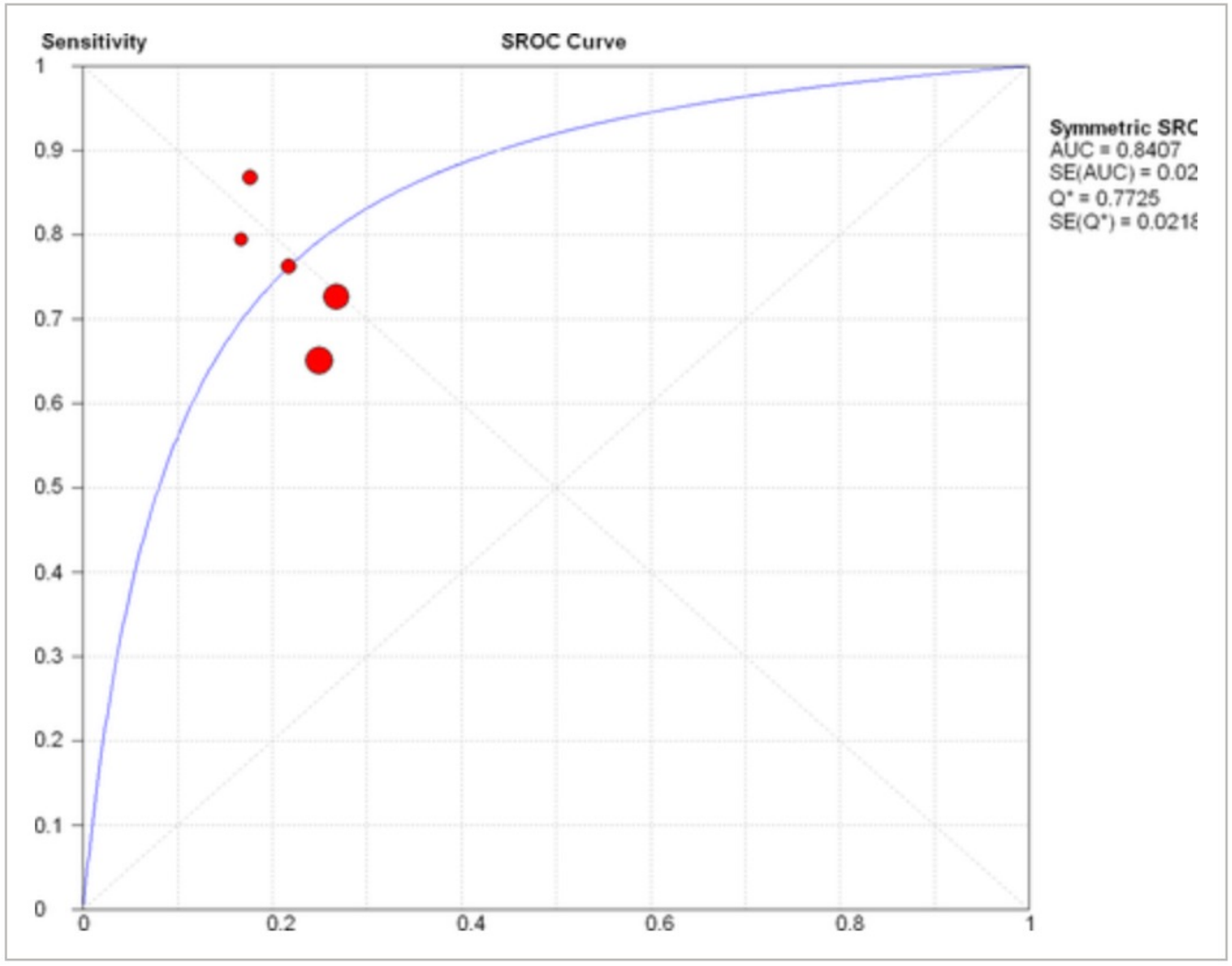
G
P R

« Take home message »

Aorta FIRST!



Study	*n*	TP	FP	TN	FN	Sensitivity (95% CI)	Specificity (95% CI)	LR+ (95% CI)	LR– (95% CI)
Pooled (five studies)	1,773					0.70 (0.67–0.73)	0.75 (0.72–0.78)	2.85 (2.50–3.20)	0.39 (0.36–0.44)



Academic Emergency Medicine / Volume 25, Issue 6 / p. 684-698

Evidence-based Diagnostics | Free Access

The Accuracy and Prognostic Value of Point-of-care Ultrasound for Nephrolithiasis in the Emergency Department: A Systematic Review and Meta-analysis

Charles Wong MD, CCFP-EM, Braden Teitge MD, CCFP, Marshall Ross MD, FRCPC, Paul Young MD, CCFP, Helen Lee Robertson, Eddy Lang MD, CCFP-EM

First published: 10 February 2018

Ultrasound J. 2020 Dec; 12: 31. PMCID: PMC7276462
Published online 2020 Jun 8. doi: 10.1186/s13089-020-00178-3 PMID: 32507905

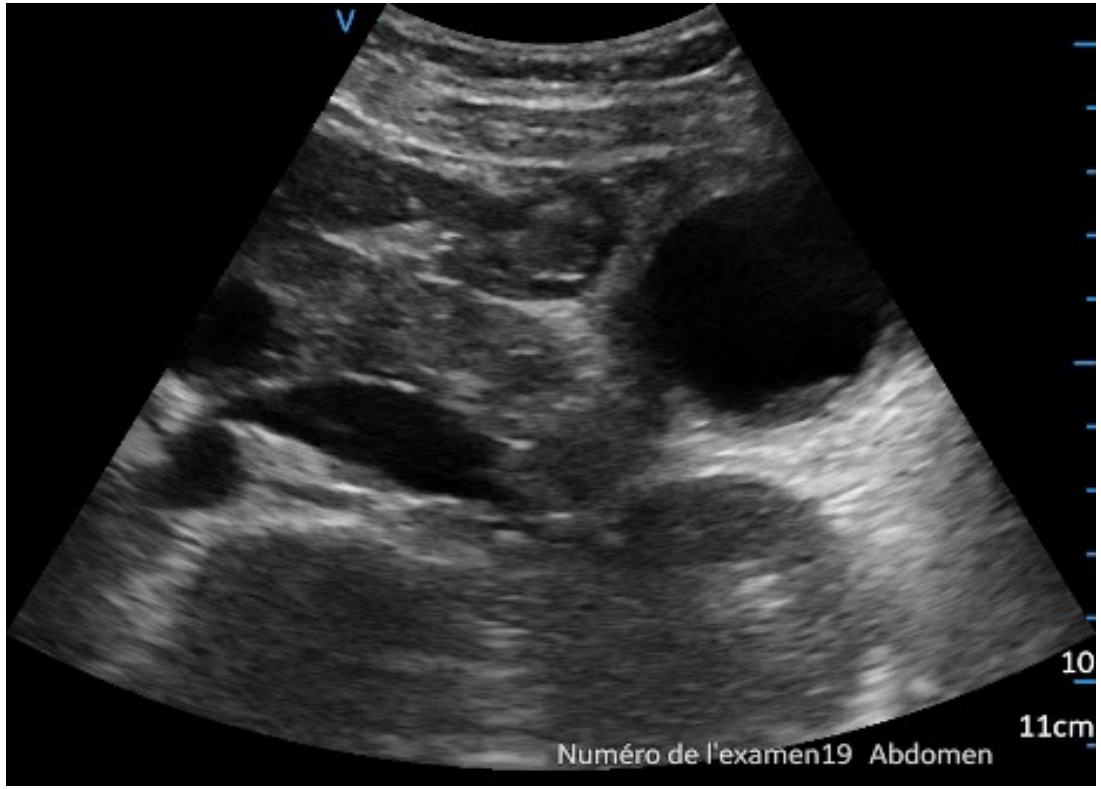
Point-of-care ultrasound for the detection of hydronephrosis in emergency department patients with suspected renal colic

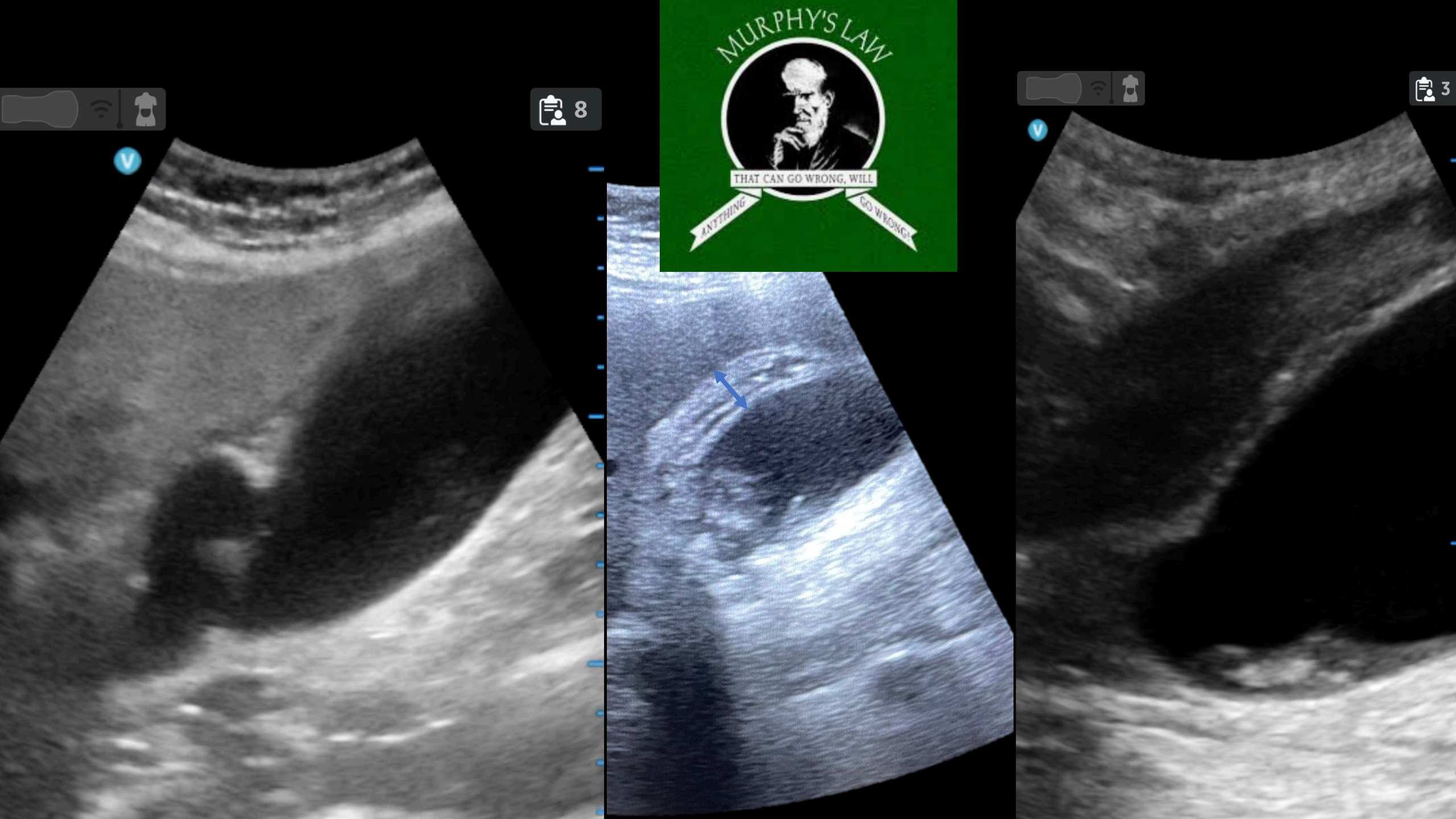
Stephanie Sibley,[1] Nathan Roth,[2] Charles Scott,[3] Louise Rang,[1] Heather White,[1] Marco L. A. Sivilotti,[1] and Eric Bruder[1]

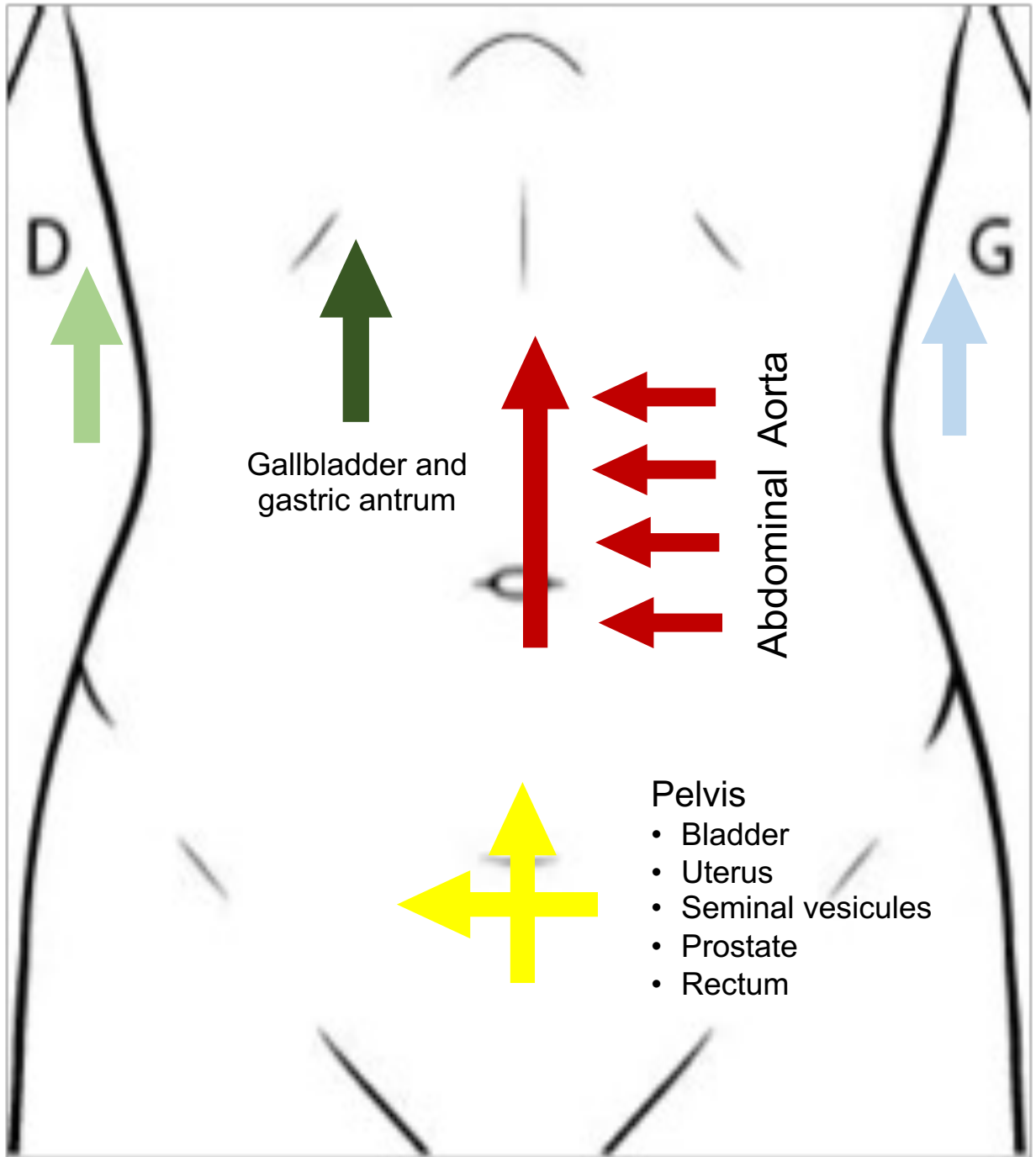
Conclusions

PoCUS for hydronephrosis in suspected renal colic has moderate accuracy when performed by providers with varied experience for the binary outcome of presence or absence of hydronephrosis. Hydronephrosis on PoCUS is associated with increased rates of complications. PoCUS for hydronephrosis is limited in its utility as a stand-alone test, however this inexpensive, readily available test may be useful in conjunction with clinical course to determine which patients would benefit from formal imaging or urologic consultation.

Gallbladder




MURPHY'S LAW
THAT CAN GO WRONG, WILL
ANYTHING
GO WRONG!



RUQ

LUQ

Pelvis
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- Rectum

Tip of the arrow
=Probe marker
direction

Longitudinal

Transverse

Female
Fat
Forty
Fertile

Review > Acad Emerg Med. 2011 Mar;18(3):227-35. doi: 10.1111/j.1553-2712.2011.01012.x.

Emergency physician-performed ultrasound to diagnose cholelithiasis: a systematic review

Marshall Ross [1], Michael Brown, Kyle McLaughlin, Paul Atkinson, Jenny Thompson, Susan Powelson, Steve Clark, Eddy Lang

Sensitivity 89,8% (IC95% 86,4%-92,5%)

Specificity 88% (IC95% 83,7 – 91,4)

Importance of clinico-biological data!

Small bowel obstruction

- Small bowel dilated > 2,5 cm
- Incompressible
- Abnormal stoel movement
- Tanga sign


11
12cm
Numéro de l'examen7 Abdominale


13


15
16cm
Numéro de l'examen136 Abdominale

Diagnostic accuracy compared to CT

- Sensitivity 87.5% (CI95% 71.0% - 96.5%)
- Specificity 75.3% (CI95% 65.2% - 83.6%)
- AUC 0.74 (CI95% 0.66 - 0.82)

ELSEVIER

Annals of Emergency Medicine

Volume 75, Issue 2, February 2020, Pages 246-256

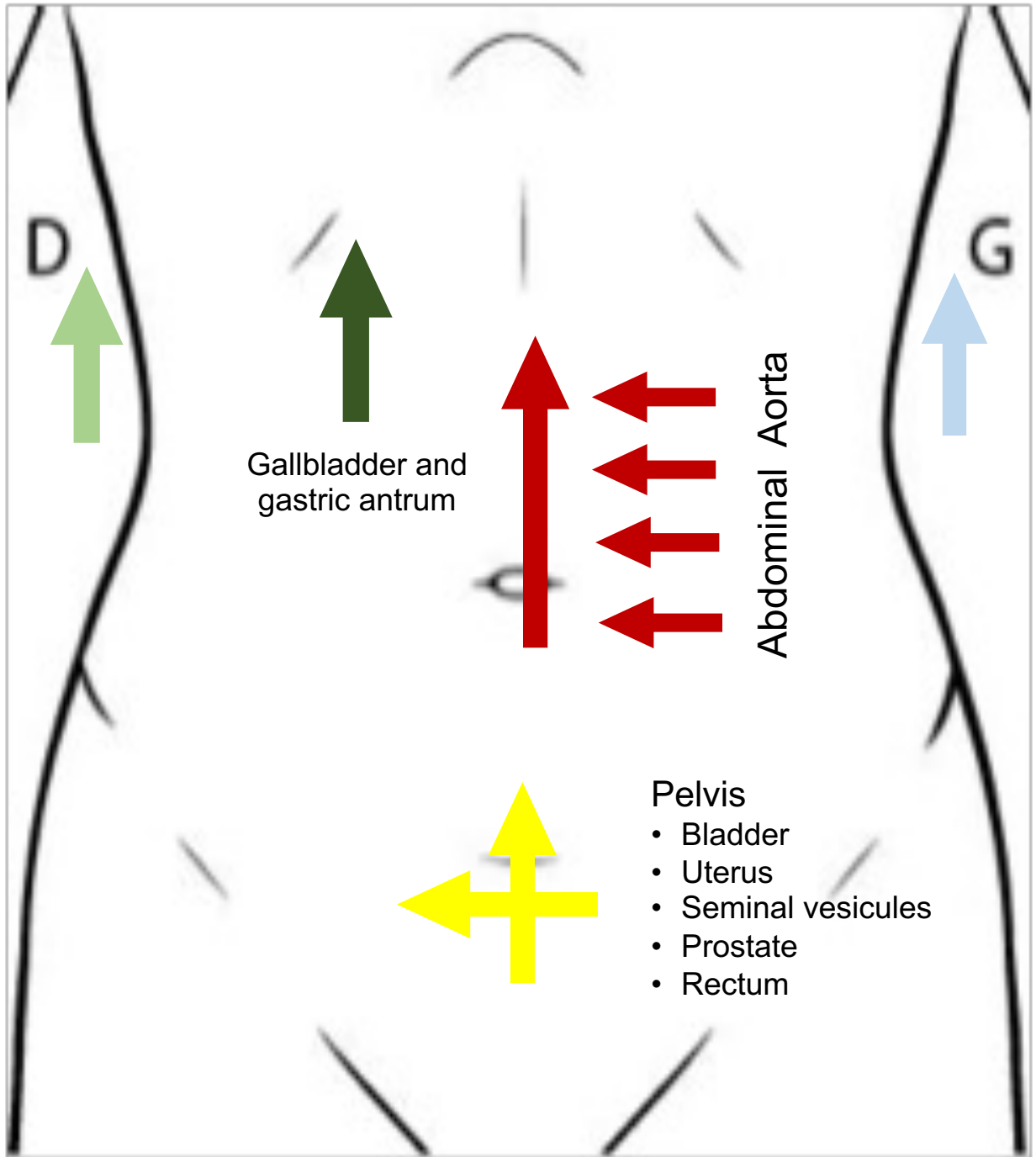
Imaging/original research

Diagnostic Accuracy and Time-Saving Effects of Point-of-Care Ultrasonography in Patients With Small Bowel Obstruction: A Prospective Study

Presented at the Society for Academic Emergency Medicine annual meeting, May 2016, New Orleans, LA.

Keith S. Boniface MD [a], Jordan B. King PharmD, MS [b c], Maxine A. LeSaux BS [a], Stanislaw C. Haciski MD [a d], Hamid Shokoohi MD, MPH [a e]

Gastric antrum



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Gastric antrum

Sensitivity 100% et Specificity 33.3% → auscultation

Sensitivity 86.4% et Specificity 66.7% →PoCUS

Original research | Open access | Published: 12 June 2012

The effectiveness of ultrasonography in verifying the placement of a nasogastric tube in patients with low consciousness at an emergency center

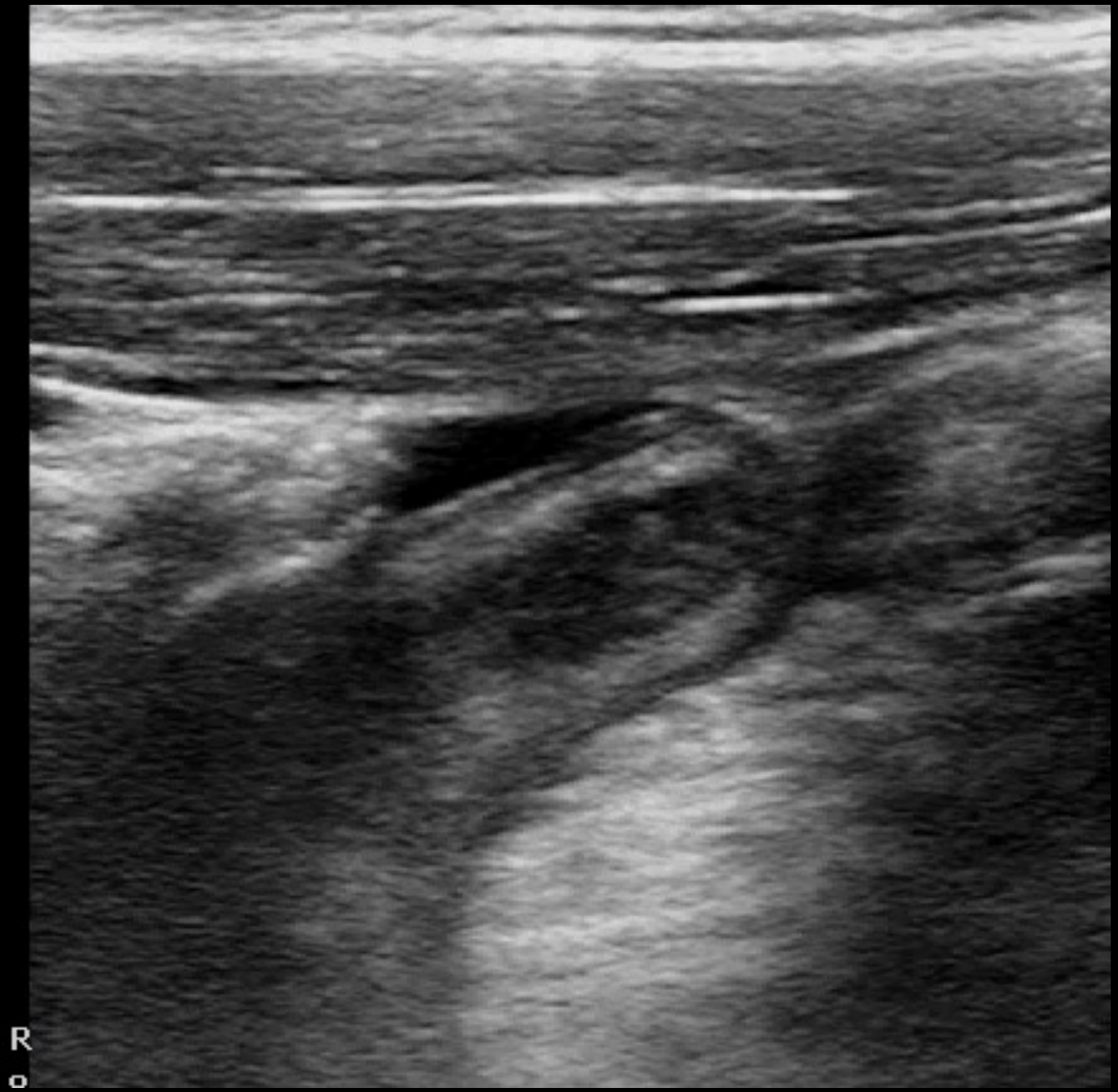
Hyung Min Kim, Byung Hak So, Won Jung Jeong, Se Min Choi & Kyu Nam Park

Scandinavian Journal of Trauma, Resuscitation and Emergency Medicine **20**, Article number: 38 (2012) | Cite this article

Appendicitis

- RIQ
- Abdominal probe then linear probe
- Pathological if :
    - Diameter > 7 mm
    - Thickened wall > 3 mm
    - No de compressibility
    - Roundel appearance
    - Free fluid or abscess
    - No bowel movement

It can be difficult and it takes time…


R

Appendicite performance PoCUS vs CT

- Sensitivity 50% à 98%
- Specificity 88% à 99%

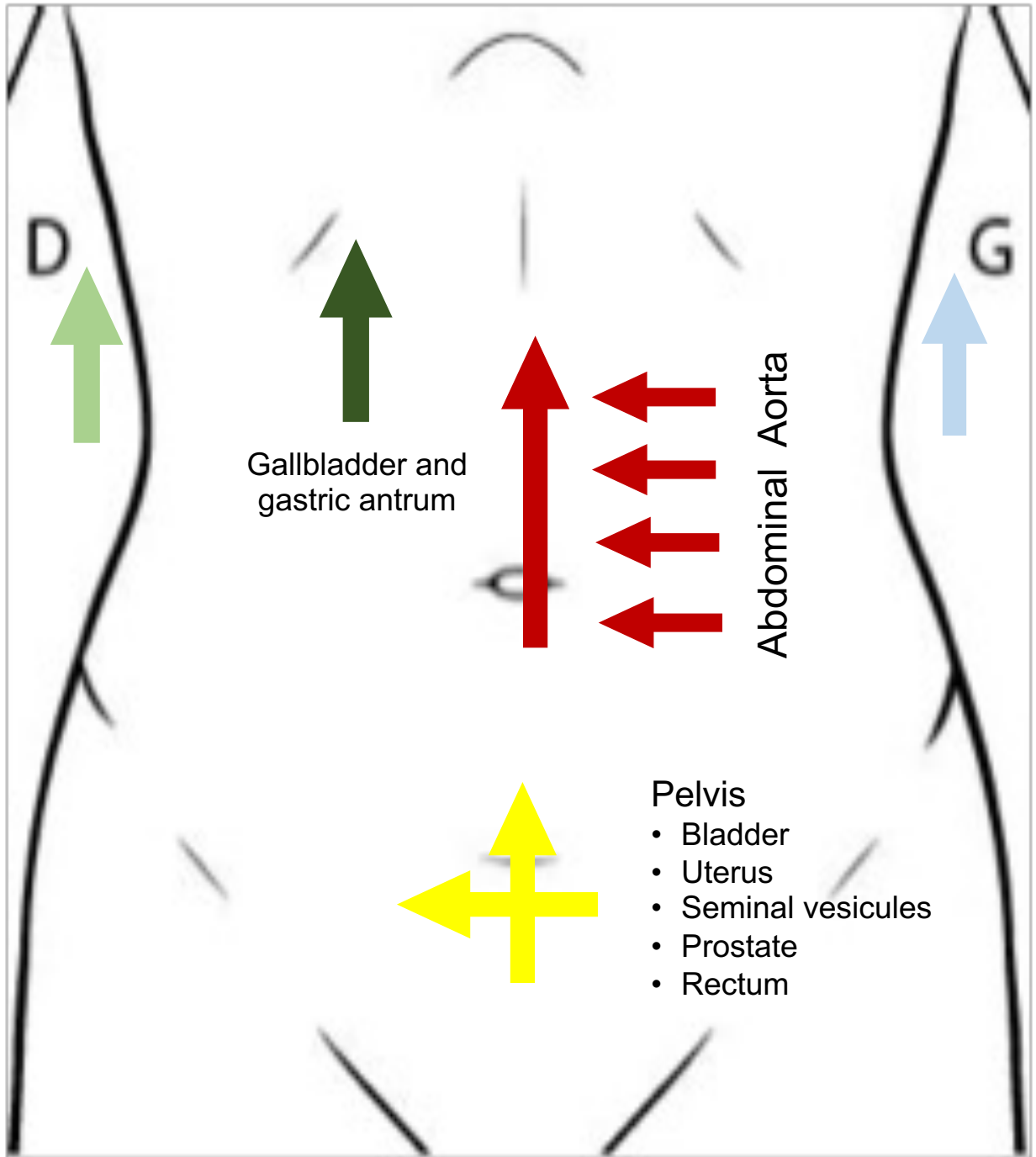
AJR Am J Roentgenol. Author manuscript; available in PMC 2015 Dec 1.
Published in final edited form as:
AJR Am J Roentgenol. 2015 Jun; 204(6): 1212–1219.
doi: 10.2214/AJR.14.13512

PMCID: PMC4524518
NIHMSID: NIHMS707071
PMID: 26001230

A Novel Reporting System to Improve Accuracy in Appendicitis Imaging

Benjamin D. Godwin,[1] Frederick T. Drake,[2] Vlad V. Simianu,[2] Jabi E. Shriki,[1,3] Daniel S. Hippe,[1] Manjiri Dighe,[1] Sarah Bastawrous,[1,3] Carlos Cuevas,[1] David Flum,[2] and Puneet Bhargava[1]

Free fluid



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Transverse


QSD
QSD
5
10


d gén
-1
Hz
,0cm
Gén
n 100
56
/3/3
P
Sus pub
SUS PUB
5
10

Peritoneal free fluid

Search for it!

May be the sign of a complication

Clinical context integration!

- Specificity 95% - 100% → Excellent !
  - ✓ Rises with the amount!
  - ✓ Clinical context !
- Sensitivity 64% - 80% → mediocre
  - ✓ No acess if less than 500ml à 250ml!
  - ✓ Pelvis a bit less (100-200ml)
  - ✓ Better on the right than on the left

Radonjić T et al. Point-of-Care Abdominal Ultrasonography (POCUS) on the Way to the Right and Rapid Diagnosis. Diagnostics (Basel). 2022 Aug 24;12(9):2052.

Urinary retention

- Specificity100% (CI95% 0.88-1) → Excellent !
- Sensitivity 100% (CI95% 0.93-1) → Excellent !

Nixon G et al. point-of-care ultrasound of the kidney and bladder: quality and effect on patient management. J Prim Health Care. 2018 Dec;10(4):324-330.

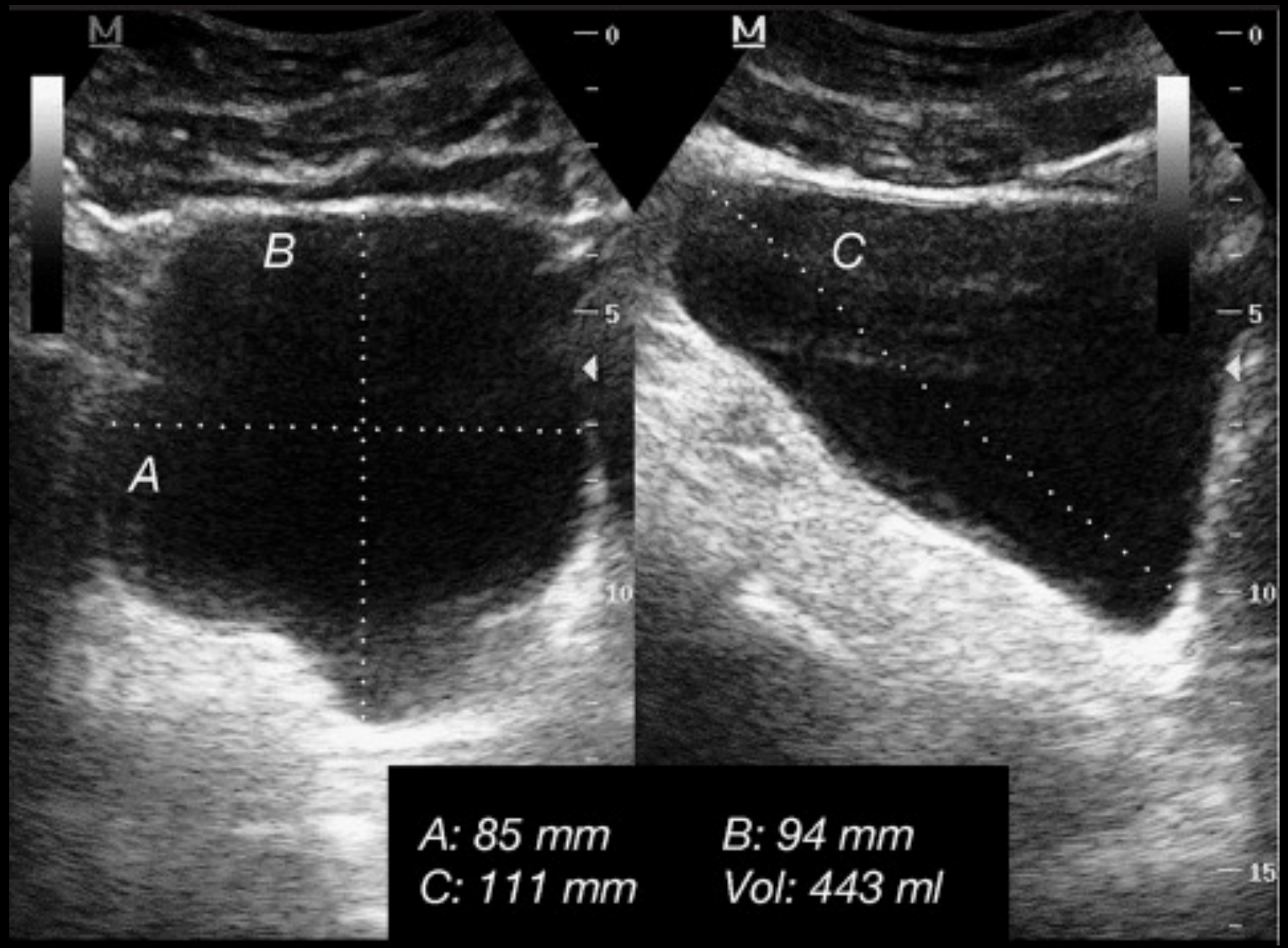
Urinary retention

$$V = 4/3\pi r^3$$

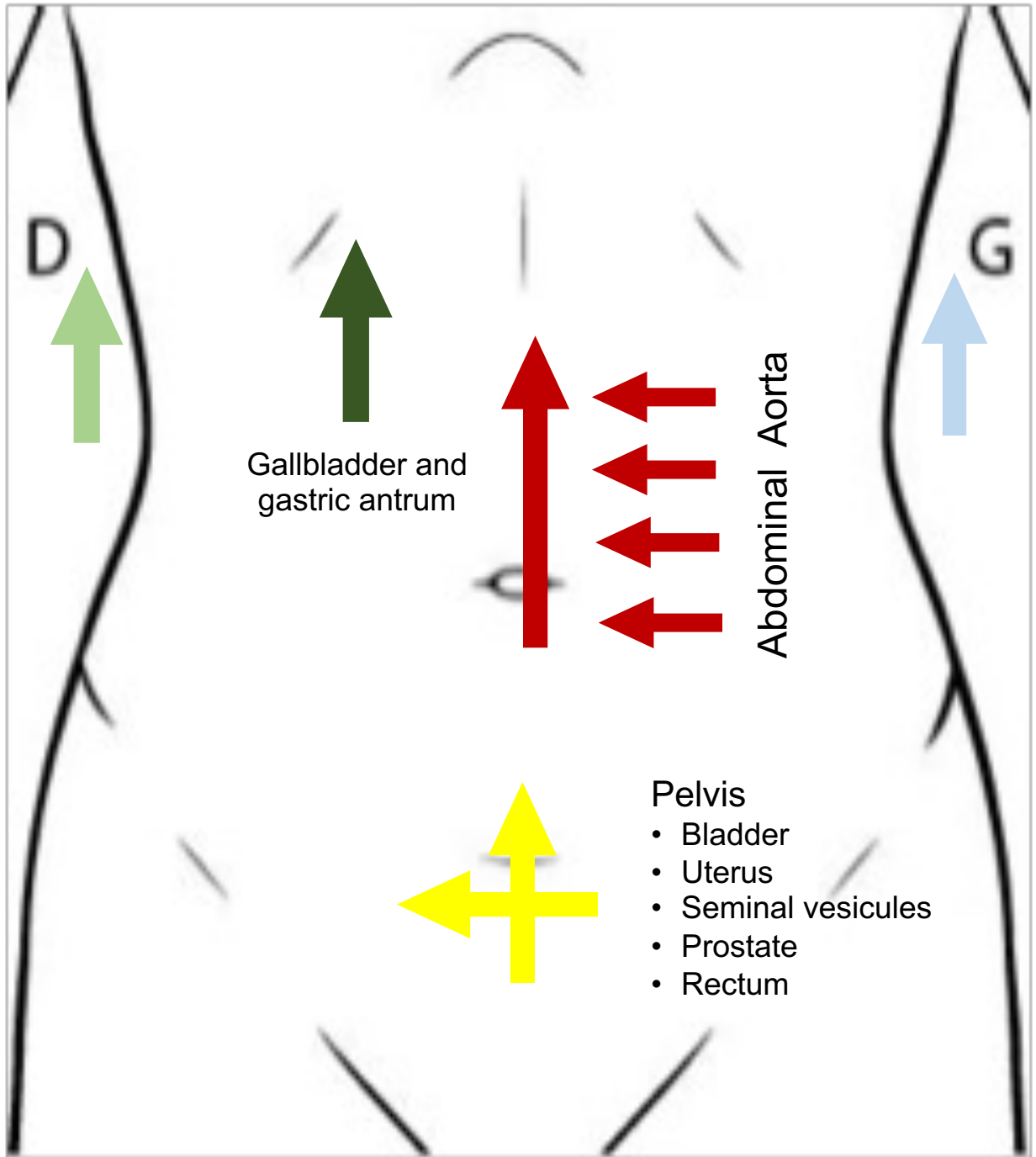
- Measure 3 diametres
  - ✓ 2 transverse (A – B)
  - ✓ 1 longitudinal (C)

A x B x C x 0,72 = volume

Nixon G et al. point-of-care ultrasound of the kidney and bladder: quality and effect on patient management. J Prim Health Care. 2018 Dec;10(4):324-330.


M
M
B
C
A
A: 85 mm
B: 94 mm
C: 111 mm
Vol: 443 ml

And finally…



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« Take home » messages

- Importance of clinical context
- Aorta first, think after…
- Search for free fluid, « Rule in » (do not « rule out! »!)
- Be systematic but ask yourself if PoCUS may help the diagnostic approach
- Integrate your results to clinical findings, biological results and ask for more complementary examination if needed!

Questions?

Un peu de littérature - *Lindelius, Emerg Med J 2008*

- Étude prospective randomisée écho vs non
- Écho clinique (chirurgiens formés 4 semaines)
- CP : performance diagnostique écho vs non / diagnostic à J28
- 800 patients inclus
- Exactitude diagnostique 64.7 vs 56.8%
- Écho
  - Fait ou confirme diagnostic 24%
  - Contribue : 3%
  - Confirme douleur non-spécifique 22%
  - Induit en erreur : 10%
  - Pas d'influence : 40%

Assessment of emergency physician-performed ultrasound in evaluating nonspecific abdominal pain

✓Analyse de deux composants mais de manière distincte!

→Impact DD et examens complémentaires – Jang et al

→Anamnèse + Examen clinique **SANS PoCUS**

→ Hypothèses diagnostiques

→ Plan d'examens complémentaires

→Anamnèse + Examen clinique **AVEC PoCUS**

→ Hypothèses diagnostiques

→ Plan d'examens complémentaires

Impact 45%

Jang T et al. Assessment of emergency physician-performed ultrasound in evaluating nonspecific abdominal pain. Am J Emerg Med. 2014 May;32(5):457-60.

Résultats

- Cohorte prospective de 128 patients
- Inclusion : douleur abdominale non-spécifique
- Diagnostic clinique / écho clinique
- Nouveau diagnostic
- Comparaison avec diagnostic J28 (experts)
- Amélioration diagnostic 45 % [36 % - 54 %]
- 50 % auraient été traités sans autre exploration

Impact sur la démarche diagnostique!

- Impact DD
- Impact traitement
- Impact examens complémentaires
- Impact temps de prise en charge
- Coefficient de certitude du médecin

Randomized Controlled Trial > J Coll Physicians Surg Pak. 2022 Oct;32(10):1260-1265.
doi: 10.29271/jcpsp.2022.10.1260.

Abdominal Pain Management and Point-of-care Ultrasound in the Emergency Department: A Randomised, Prospective, Controlled Study

Yesim Durgun [1], Yusuf Yurumez [2], Necip Gokhan Guner [1], Nuray Aslan [1], Ensar Durmus [1], Yavuz Kahraman [3]

AEM Academic Emergency Medicine
A GLOBAL JOURNAL OF EMERGENCY CARE

Free Access

Decreasing Length of Stay with Emergency Ultrasound Examination of the Gallbladder

Michael Blaivas MD, Robert A. Harwood MD, MPH, Michael J. Lambert MD

First published: 28 June 2008 | https://doi.org/10.1111/j.1553-2712.1999.tb01186.x | Citations: 100

> Ann Emerg Med. 2012 Sep;60(3):346-58.e4. doi: 10.1016/j.annemergmed.2012.01.006. Epub 2012 May 24.

Effect of bedside ultrasonography on the certainty of physician clinical decisionmaking for septic patients in the emergency department

Samir A Haydar [1], Eric T Moore, George L Higgins 3rd, Christine B Irish, William B Owens, Tania D Strout