
# Peripherally Inserted Central Catheter
# PICC (週邊置入中心靜脈導管)

20231014 智慧急重症醫療國際會議超音波工作坊

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WINFOCUS director / instructor
Certified Interventional Pain Sonologist

**急診 / 重症 / 介入 / 急性疼痛**

經歷
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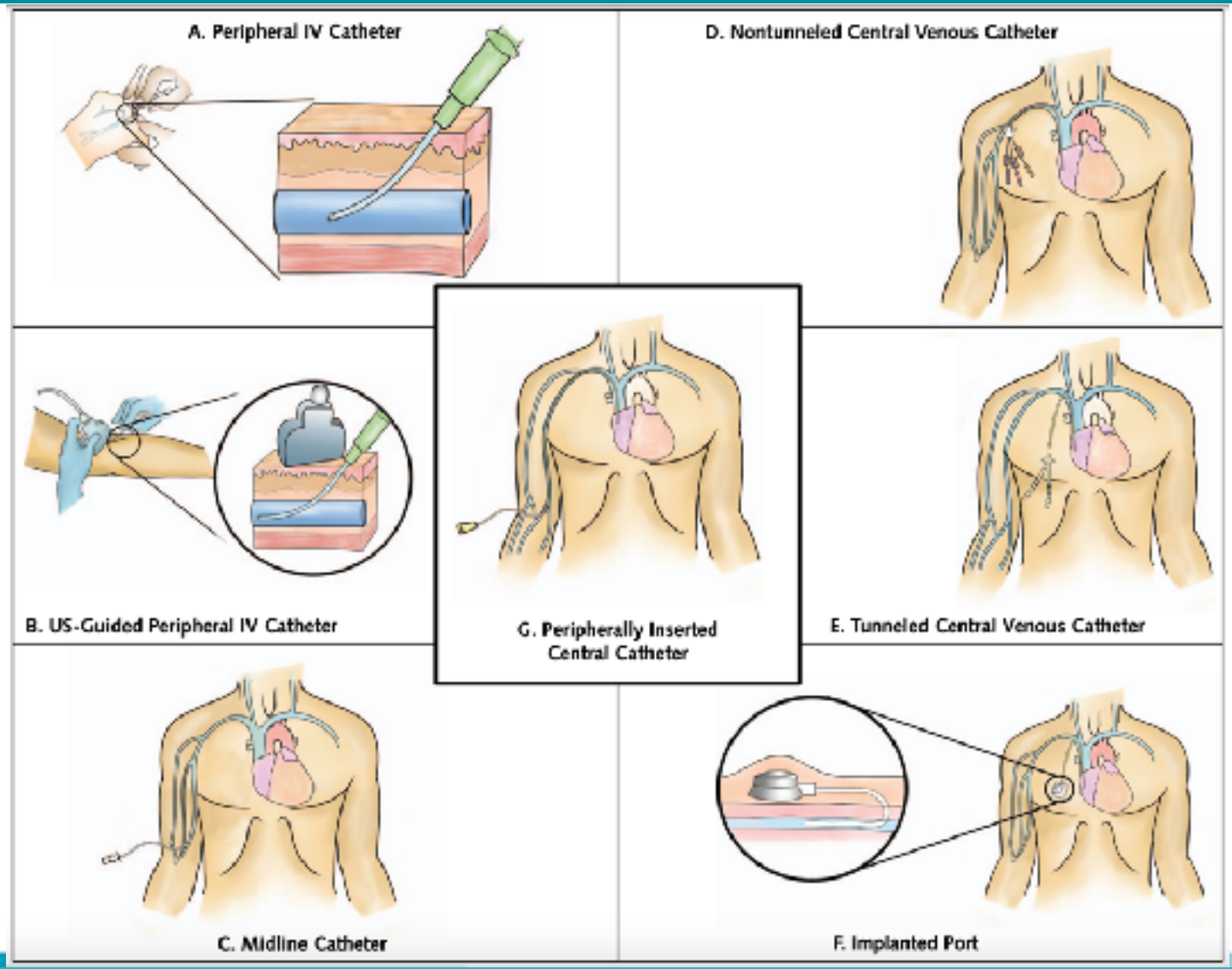
西園醫院急診醫學科主任
急診醫學會超音波委員會主委
台灣疼痛醫學會大體模擬手術講師
急救加護醫學會重症超音波負責人

# VASCULAR ACCESS DEVICES

Chopra V, Ann Intern Med, 2015



# 如何選擇適切的靜脈管路

Annals of Internal Medicine SUPPLEMENT

## The Michigan Appropriateness Guide for Intravenous Catheters (MAGIC): Results From a Multispecialty Panel Using the RAND/UCLA Appropriateness Method

Vineet Chopra, MD, MSc; Scott A. Flanders, MD; Sanjay Saint, MD, MPH; Scott C. Woller, MD; Naomi P. O'Grady, MD; Nasia Safdar, MD, PhD; Scott O. Trerotola, MD; Rajiv Saran, MD, PhD; Nancy Moureau, BSN, RN; Stephen Wiseman, PharmD; Mauro Pittiruti, MD; Elie A. Akl, MD, MPH, PhD; Agnes Y. Lee, MD, MSc; Anthony Courey, MD; Lakshmi Swaminathan, MD; Jack LeDonne, MD; Carol Becker, MHSA; Sarah L. Krein, PhD, RN; and Steven J. Bernstein, MD, MPH

Chopra V, Ann Intern Med, 2015

# 經週邊給予輸液時的建議

Chopra V, Ann Intern Med, 2015

| Device Type | Proposed Duration of Infusion | | | |
|---|---|---|---|---|
| | ≤5 d | 6–14 d | 15–30 d | ≥31 d |
| Peripheral IV catheter | No preference between peripheral IV and US-guided peripheral IV catheters for use ≤5 d | | | |
| US-guided peripheral IV catheter | US-guided peripheral IV catheter preferred to peripheral IV catheter if proposed duration is 6–14 d | | | |
| Nontunneled/acute central venous catheter | Central venous catheter preferred in critically ill patients or if hemodynamic monitoring is needed for 6–14 d | | | |
| Midline catheter | Midline catheter preferred to PICC if proposed duration is ≤14 d | | | |
| PICC | | PICC preferred to midline catheter if proposed duration of infusion is ≥15 d | | |
| Tunneled catheter | | | | PICC preferred to tunneled catheter and ports for infusion 15–30 d |
| Port | | | | |

Appropriate | Neutral | Inappropriate | Disagreement

# 無法由週邊管路治療時的建議

Chopra V, Ann Intern Med, 2015

| Device Type | Proposed Duration of Infusion | | | |
|---|---|---|---|---|
| | ≤5 d | 6–14 d | 15–30 d | ≥31 d |
| Peripheral IV catheter | | | | |
| US-guided peripheral IV catheter | | | | |
| Nontunneled/acute central venous catheter | Central venous catheter preferred in critically ill patients or if hemodynamic monitoring is needed for 6–14 d | | | |
| Midline catheter | | | | |
| PICC | | PICCs rated as appropriate at all proposed durations of infusion | | |
| Tunneled catheter | | Tunneled catheter neutral for for use ≥15 d | No preference between tunneled catheter and PICC for proposed durations ≥15 d | |
| Port | | | | No preference among port, tunneled catheter, or PICC for ≥31 d |

Appropriate | Neutral | Inappropriate | Disagreement

# 困難靜脈管路建立時的建議

Chopra V, Ann Intern Med, 2015

| Device Type | Proposed Duration of Infusion | | | |
|---|---|---|---|---|
| | ≤5 d | 6–14 d | 15–30 d | ≥31 d |
| Peripheral IV catheter | No preference between peripheral IV and US-guided peripheral IV catheters for use ≤5 d | | | |
| US-guided peripheral IV catheter | US-guided peripheral IV catheters preferred to peripheral IV catheters if proposed duration is 6–14 d | | | |
| Midline catheter | Midline catheters preferred to PICC if proposed duration is ≤14 d | | | |
| Nontunneled/acute central venous catheter | Central venous catheter preferred to PICC for use ≤14 d in critically ill patients | | | |
| PICC | Disagreement on appropriateness of PICC for durations <5 d | PICC use appropriate if proposed duration is ≥6 d; PICCs preferred to tunneled catheters for durations of 15–30 d | | |
| Tunneled catheter | | | Tunneled catheter neutral for difficult IV access for use ≥15 d | No preference between tunneled catheter or port for use ≥31 d |
| Port | | | | |

Appropriate | Neutral | Inappropriate | Disagreement

# 需要經常抽血時的建議

Chopra V, Ann Intern Med, 2015

| Device Type | Proposed Duration of Infusion | | | |
|---|---|---|---|---|
| | ≤5 d | 6–14 d | 15–30 d | ≥31 d |
| Peripheral IV catheter | No preference between peripheral IV and US-guided peripheral IV catheter for use ≤5 d<br>US-guided peripheral IV catheter preferred if venous access difficult | | | |
| US-guided peripheral IV catheter | | | | |
| Midline catheter | Midline catheter preferred to PICCs if proposed duration is ≤14 d | | Midline catheter neutral for frequent phlebotomy at this duration | |
| Nontunneled/acute central venous catheter | Central venous catheter preferred to PICC for use ≤14 d in critically ill patients | | | |
| PICC | Disagreement on appropriateness of PICC for durations <5 d | PICC use appropriate if proposed duration ≥6 d; PICC preferred to tunneled catheter for durations of 15–30 d | | |
| Tunneled catheter | | | Tunneled catheter neutral for difficult intravenous access for use ≥15 d | |
| Port | Ports inappropriate for frequent phlebotomy, regardless of proposed duration of use | | | |

Appropriate | Neutral | Inappropriate | Disagreement


# MICHIGAN MAGIC

Michigan Appropriateness Guide for Intravenous Catheters

21:19 Question 1 of 5

Which of the following indication are you ordering a PICC for?

(select one)

- IV Antibiotics
- Vesicant or Irritant Chemotherapy
- Non chemotherapy Vesicant or Irritant
- Difficult Venous Access
- Frequent Blood Draws

1:20 Duration

What is your proposed duration of therapy?

(select one)

- Less than 5 days
- 6-14 days
- 15-30 days
- More than 31 days

21:20 Recommendations

Appropriate | Inappropriate

Click (i) for preference recommendations

- PICC
- Tunneled Catheter
- Peripheral IV Catheter
- Ultrasound Guided Peripheral Catheter
- Non-tunneled/Acute Central Venous Catheter

21:20 Preference

PICCs rated as appropriate at all proposed duration of infusion

Click here to see the MAGIC algorithm

OK

# IMPROVE

# PICC

https://www.improvepicc.com/

# Critical and Honest Conversations

## The Evidence Behind the "Choosing Wisely" Campaign Recommendations by the American Society of Nephrology

Williams, Amy W.; Dwyer, Amy C.; Eddy, Allison A.; Fink, Jeffrey C.; Jaber, Bertrand L.; Linas, Stuart L.; Michael, Beckie; O'Hare, Ann M.; Schaefer, Heidi M.; Shaffer, Rachel N.; Trachtman, Howard; Weiner, Daniel E.; Falk, and Ronald J.

Author Information

*Clinical Journal of the American Society of Nephrology* 7(10):p 1664-1672, October 2012. | *DOI:* 10.2215/CJN.04970512

**Avoid PICC on Patients with eGFR <45ml/min**

**4. Preserving veins for future creation of an arteriovenous fistula (AVF) is paramount to ensure better outcomes for patients with CKD who may eventually need HD.**

**CWCr: "Do not place peripherally inserted central venous catheters (PICCs) in stage 3–5 CKD patients without consulting nephrology."**

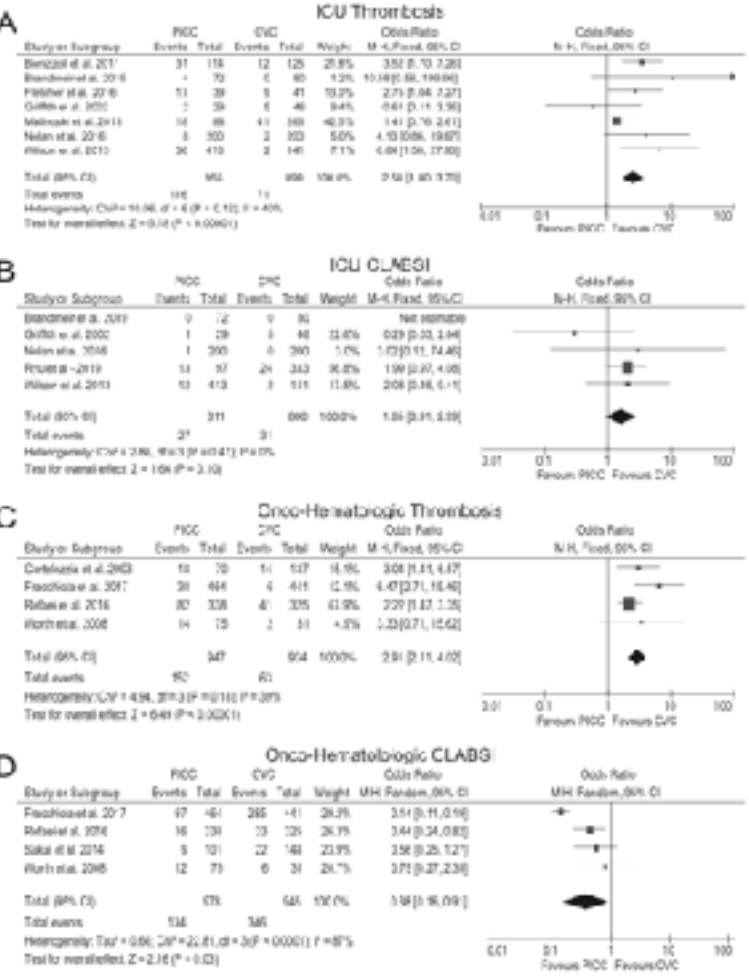
# Peripherally Inserted Central Catheter lines for Intensive Care Unit and onco-hematologic patients: A systematic review and meta-analysis

Georgios Mavrovounis, MD[a,*], Maria Mermiri, MD[a], Dimitrios G Chatzis, MD, PhD[b], Ioannis Pantazopoulos, MD, MSc, PhD[a]

[a] *Department of Emergency Medicine, Faculty of Medicine, School of Health Sciences, University of Thessaly, General University Hospital of Larissa, Mezourlo 41110, Larissa, Greece*

[b] *School of Medicine, European University of Cyprus, Nicosia, Cyprus, Diogenous Str 2404, Nicosia, Cyprus*

Mavrovounis G, et al. Heart Lung 2020




## Thrombosis risk

**PICC > CVC**

## CLABSI risk

**CVC > PICC onco-hematologic patients**

# PICC在病人端的好處

不會影響活動、較舒適和美觀

抽血給葯方便、不必反覆挨針

葯物注射時無疼痛、化療葯物不外漏較安全

可以保護血管、療程結束後即可移除



黃耀廣醫師網站 HTTPS://WWW.CVSDOCTOR.COM/PICC-INTRODUCTION/

# PICC在醫療端的好處

低侵入性、重大合併症不易發生

可長期放置、可給特殊性輸液及葯物

臨床照護較CVC容易、感染率也較低

PRESSURE INJECTABLE (CT)



黃耀廣醫師網站 HTTPS://WWW.CVSDOCTOR.COM/PICC-INTRODUCTION/

# 常用的靜脈導管比較

黃耀廣醫師網站 HTTPS://WWW.CVSDOCTOR.COM/PICC-INTRODUCTION/

| 輸液導管 | 週邊靜脈留置針 | 週邊置入中心靜脈導管 | 中央靜脈導管 |
|---|---|---|---|
| |  |  |  |
| 留置時間 | 需要每3天更換 | 半年以上 | 每7至10 天需更換 |
| 置放者 | 由護理師置放 | 由醫師置放 | 由醫師置放 |
| 功能 | 當靜脈輸液的酸鹼值和滲透壓值和血液不同時，容易刺激血管內皮細胞而造成損傷，進而形成化學性的血栓 | 可監測中心靜脈壓(威力週邊置入中心導管、中央靜脈導管)<br>有雙腔、三腔管路，可同時提供病人多種或大量輸液<br>具刺激性之化學治療藥物建議應由中心靜脈導管給予，尤其是起跑性的化學治療藥物，為了避免藥物外滲時所造成的重大傷害 | |
| 合併症 | 無重大併發症<br>可能引起靜脈炎、藥物外滲、皮膚壞死 | 無重大併發症 | 放置過程可能會產生氣、血胸、大動脈穿刺、血栓感染機率較高 |
| 抽血 | 每次抽血均需重覆扎針 | 放置後**不需重覆**紮針，<br>自外露管路抽血即可 | 放置後**不需重覆**紮針，<br>自外露管路抽血即可 |
| 電腦斷層 | 由留置針施打顯影劑<br>可能會造成顯影劑外滲 | 自管路直接施打顯影劑即可<br>(威力週邊置入中心導管) | 仍需另放置週邊靜脈留置針<br>(可能會造成顯影劑外滲) |
| 放置部位 | 前臂或手易影響活動 | 手臂上段內側，**不會影響活動** | 頸部或鼠蹊部，易影響活動 |

第六卷第四期
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Taiwan Emergency Medicine Bulletin 6(4)：e2023060408

# How I do it: 如何在急診開始第一隻PICC？

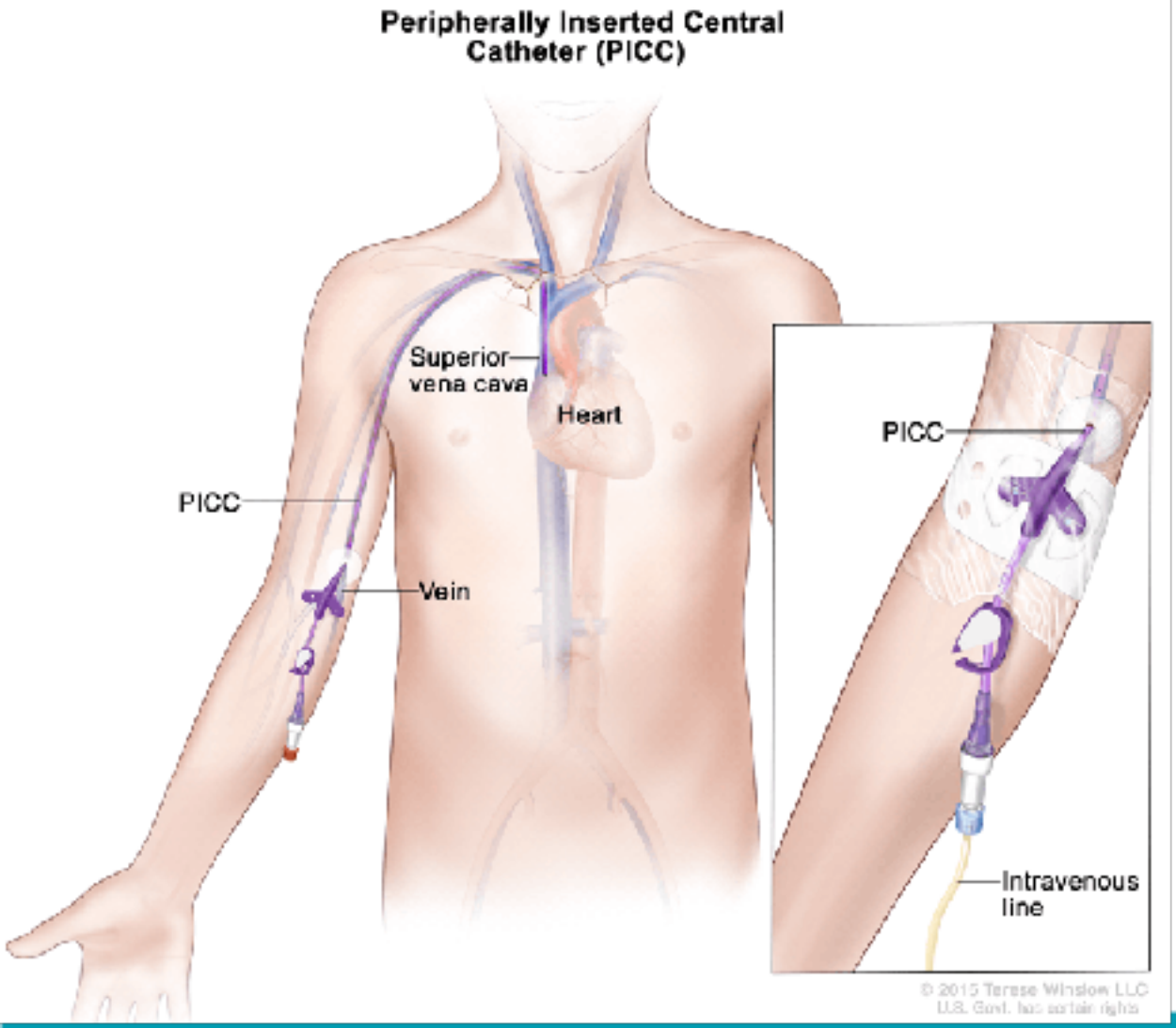
下載PDF 分享 分享

王鎮玨、范閎皓、陳國智、翁健瑞

衛生福利部雙和醫院 急診醫學科

台灣急診醫學通訊

# PICC 週邊置入中心靜脈導管




適應情境

置放選擇

導管置放

確認位置

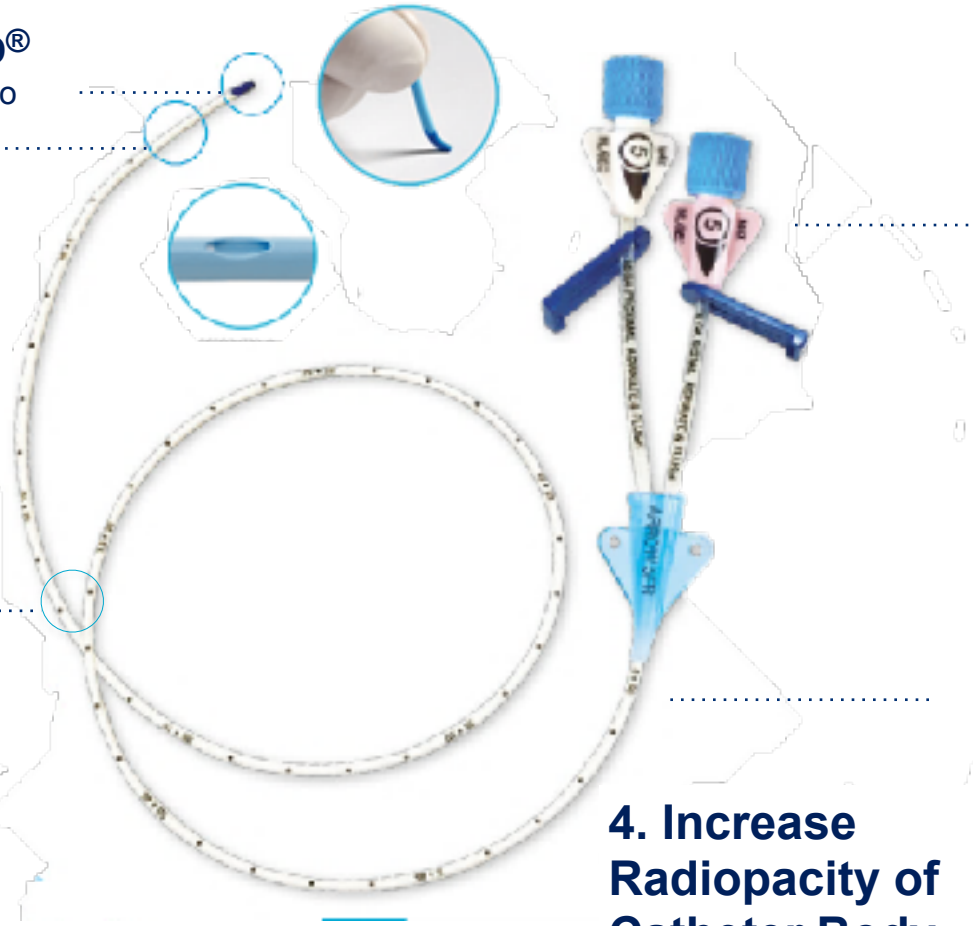
管路照護

# *Teleflex Pressure Injectable PICC*

## 1. BlueFlex Tip®
Soft, reduces damage to delicate intima during threading process[1]

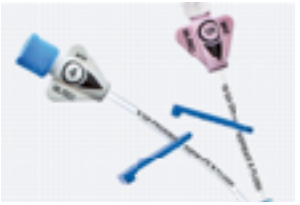
## 2.Staggered Exit Ports
Reduce risk of mixing incompatible drugs and solutions that may create precipitate[2]

## 3.Labeled Depth Marker
Every 1 cm on Catheter Body



## 4. Increase Radiopacity of Catheter Body

## 6.Indicate Maximum Injection Rates



## 5.Taper-Free Catheter
Allow for increase blood flow around the catheter and minimizes risk of Catheter related thrombosis

# PICC健保支付標準 - 4適應症

## 47065B 點數 3101 (111.3.1 ~)

**癌症化學治療及癌症末期之疼痛治療**

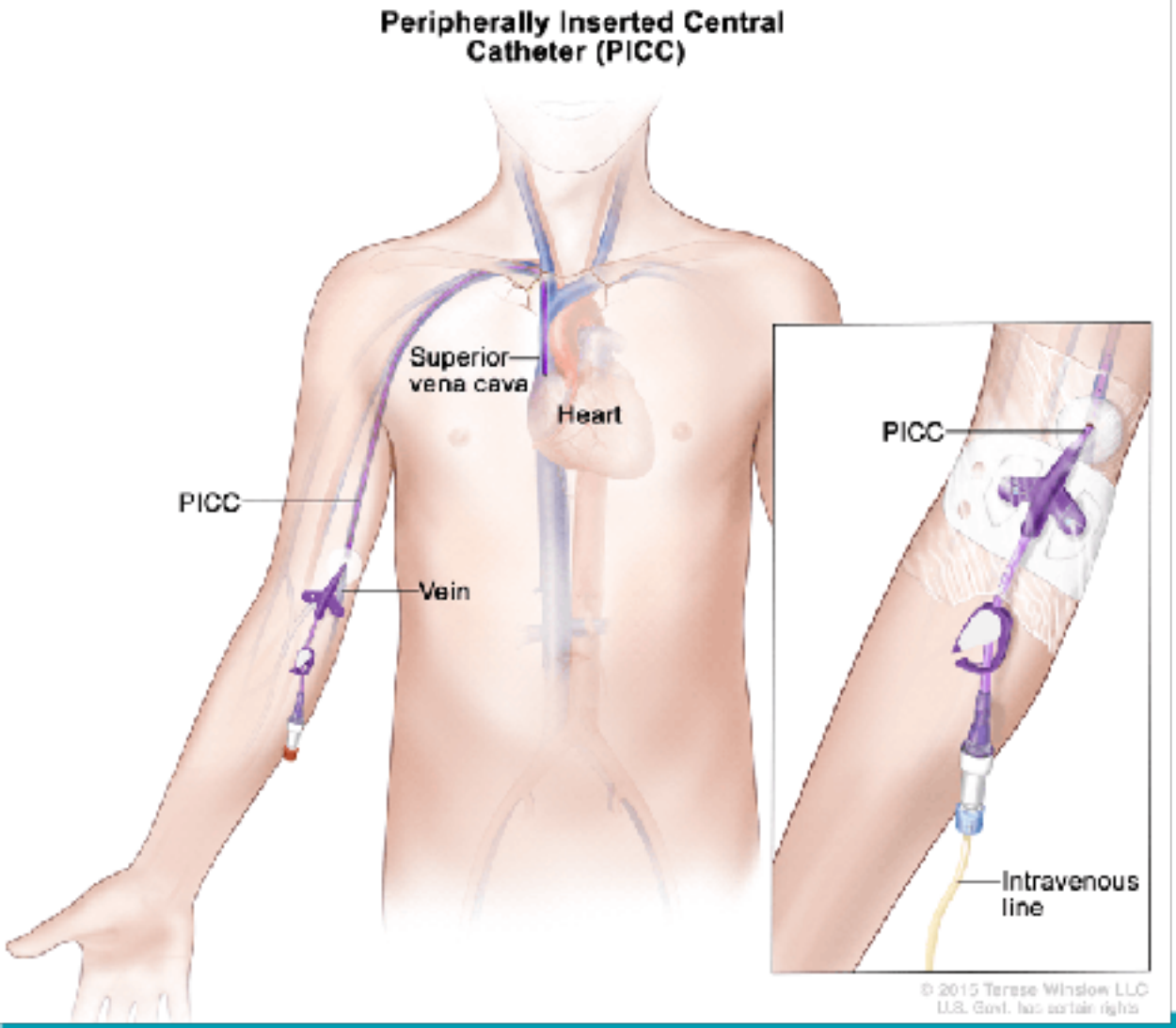
**下列三項適應症且預期同時治療達二週以上之病人**

-使用全靜脈營養輸液(TPN)(1歲以下嬰兒本項為靜脈營養輸液，不限TPN)

-免疫不全與使用免疫抑制劑

-須接受中心靜脈導管置入(CVC)

# PICC可放置期間




6個月～1年

Editorial

JVA The Journal of Vascular Access

# The SIP protocol update: Eight strategies, incorporating Rapid Peripheral Vein Assessment (RaPeVA), to minimize complications associated with peripherally inserted central catheter insertion

The Journal of Vascular Access
1–9
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SAGE

Fabrizio Brescia[1], Mauro Pittiruti[2], Timothy R Spencer[3] and Robert B Dawson[4]

# SIP PROTOCOL

## Safe insertion of PICCs

# SIP PROTOCOL

## Safe insertion of PICCs

| | |
|---|---|
| Step 1 | *Pre-procedural evaluation*—choose most appropriate vein by systematic ultrasound examination of the veins of the arms (see the RaPeVA protocol) |
| Step 2 | *Appropriate antiseptic technique*—adopt a strict policy of hand hygiene, skin antisepsis with 2% chlorhexidine in 70% isopropyl alcohol, and use of maximal barrier precautions |
| Step 3 | *Choice of vein size and exit site*—evaluate the diameter of the vein so to have an ideal catheter-vein ratio (1:3 or less); place the exit site in the green zone (see Dawson's ZIM™); consider the opportunity of tunneling the catheter, if the most appropriate vein is in the yellow zone (see the RAVESTO protocol) |
| Step 4 | *Clear identification of median nerve and brachial artery*—identify each structure before venipuncture, using ultrasound |
| Step 5 | *Ultrasound-guided venipuncture*—access a deep vein of the arm (either basilic or brachial vein), preferably adopting the short axis/out-of-plane approach, and use of a micro-introducer kit |
| Step 6 | *Ultrasound-based tip navigation*—assess the correct direction of the guidewire, by a supra-clavicular ultrasound scan (see the ECHOTIP protocol) |
| Step 7 | *Intra-procedural assessment of tip location*—use intracavitary ECG and/or ultrasound (subcostal or apical view, using the "bubble test": see the ECHOTIP protocol) |
| Step 8 | *Appropriate securement of the catheter and protection of the exit site*—use sutureless devices only; reduce the risk of bleeding and bacterial contamination using cyanoacrylate glue and semi-permeable transparent membrane dressings |

# RaPeVa protocol

## Rapid Peripheral Vein Assessment

| | |
|---|---|
| Step 1 | Visualization of the cephalic vein at the antecubital fossa |
| Step 2 | Identification of the artery and brachial veins and of the confluence between the antecubital vein and basilic vein |
| Step 3 | Identification of the basilic vein in the bicipital-humeral groove |
| Step 4 | Examination of the nerve-vascular bundle of the arm |
| Step 5 | Visualization of the cephalic vein over the biceps muscle |
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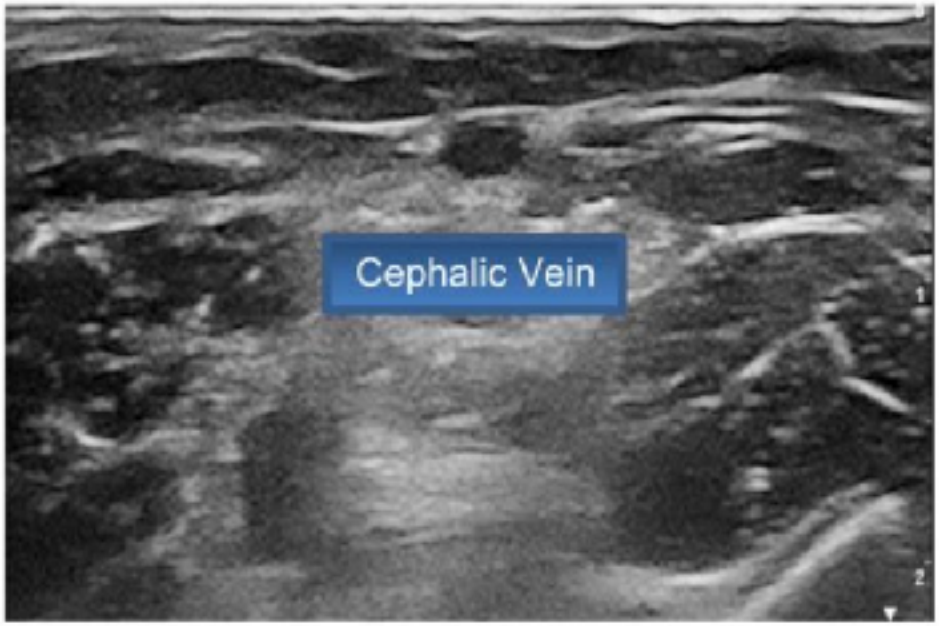
| Step 7 | Examination of the internal jugular, the subclavian, and the brachio-cephalic vein in the supraclavicular area |

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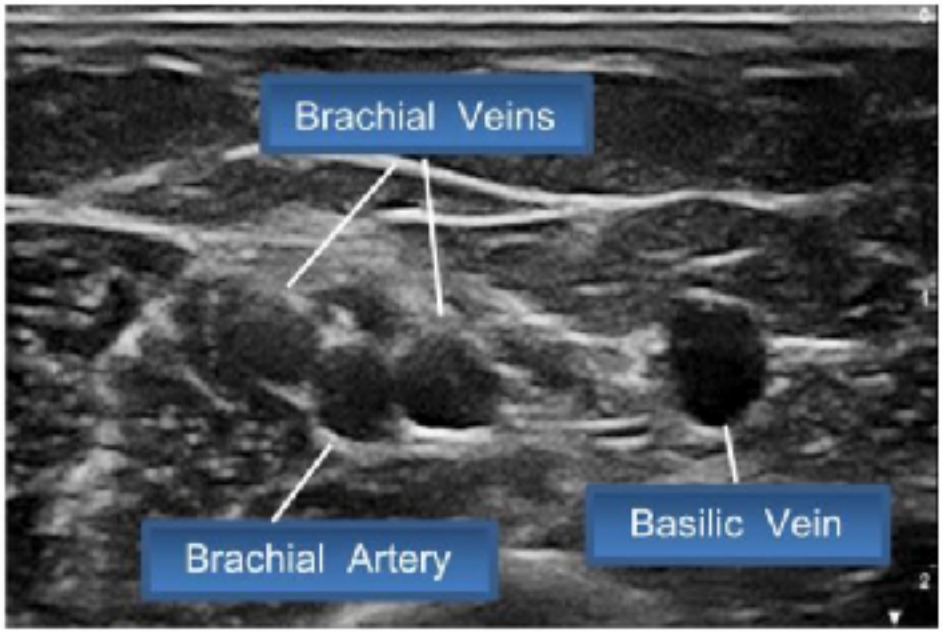

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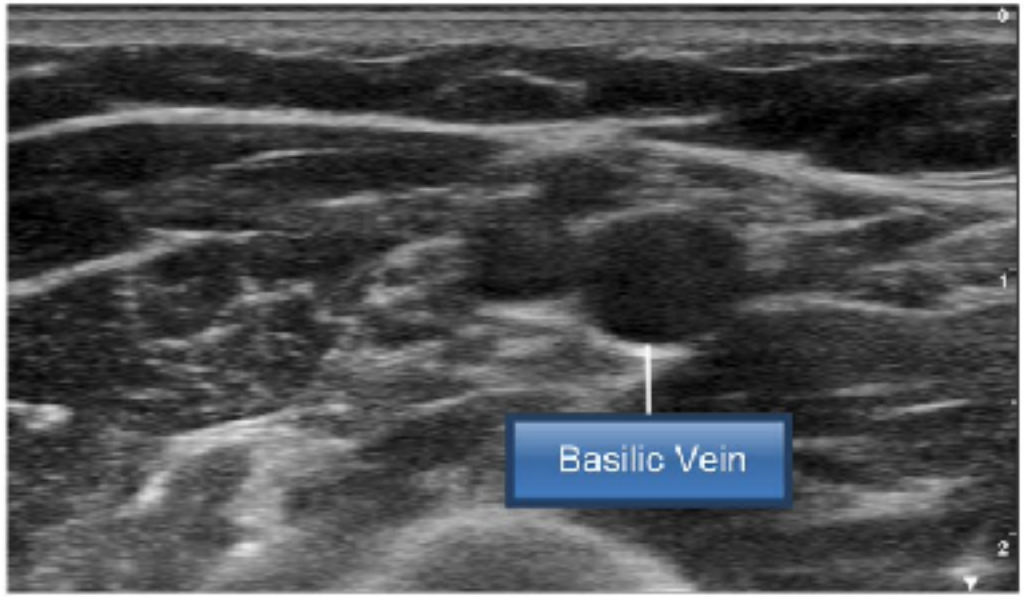

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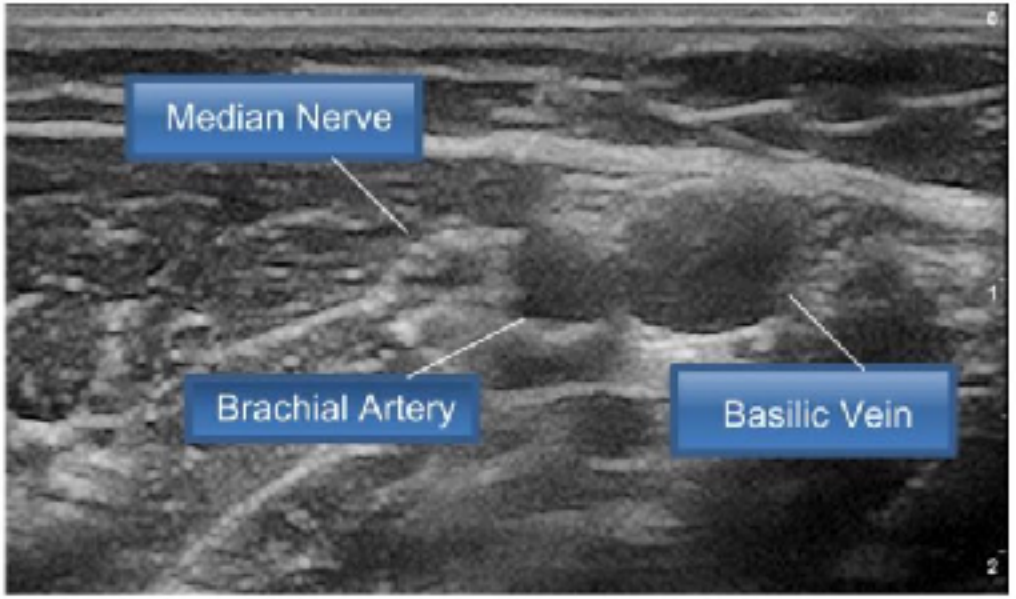

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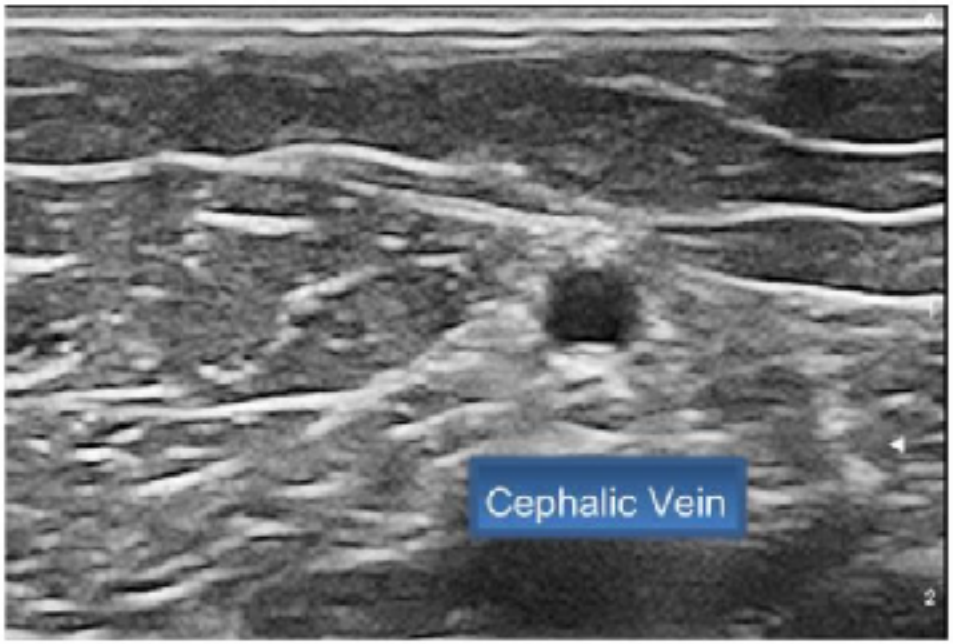

# RaPeVa protocol

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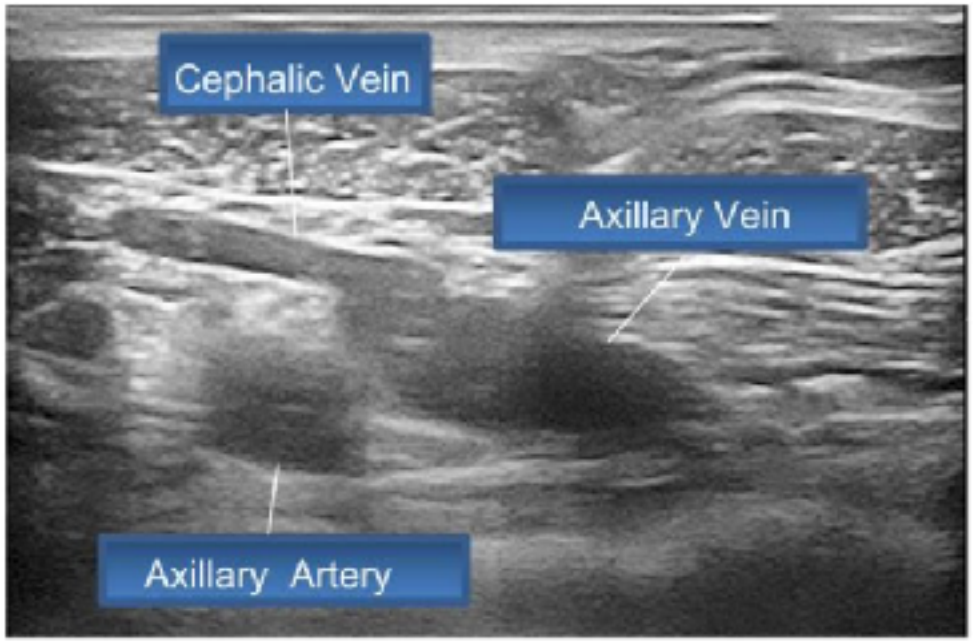

# RaPeVa protocol

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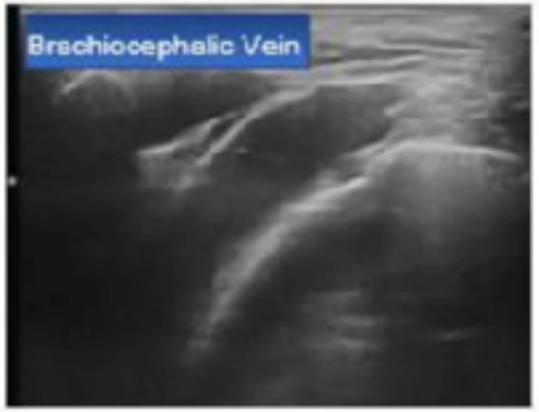
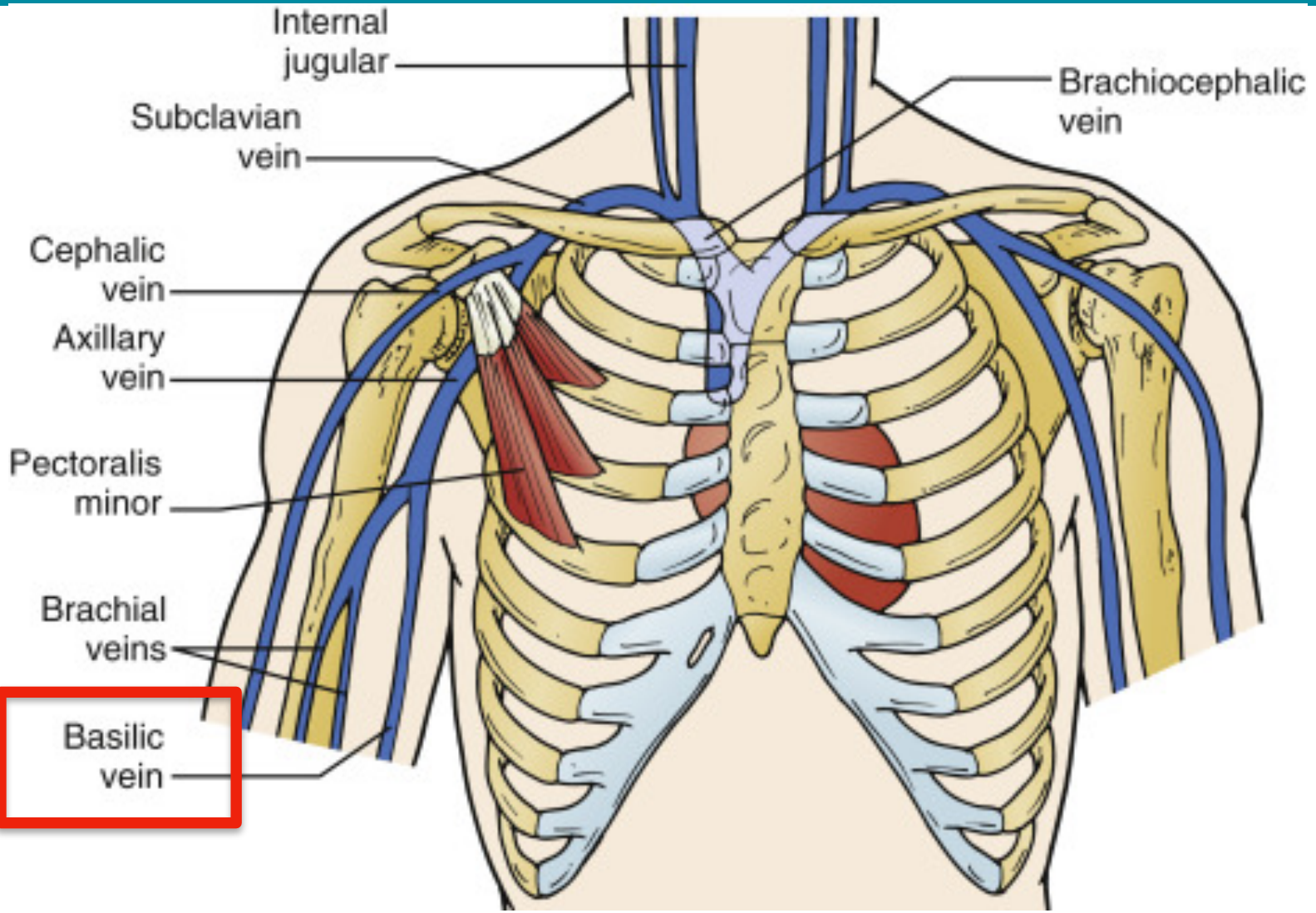





# PICC置放選擇


Internal jugular
Subclavian vein
Brachiocephalic vein
Cephalic vein
Axillary vein
Pectoralis minor
Brachial veins
Basilic vein

首選

# APPROPRIATE VEIN
# ZON INSERTION METHOD (ZIM)

| | | Radius of Vessel (mm)[4] | Length (CM) | Actual Diameter |
|---|---|---|---|---|
| Cephalic |  | $3^4$ | 38 cm | 2-4 mm |
| Basilic |  | $4^4$ | 24 cm | 4-6 mm |
| Axillary |  | $8^4$ | 13 cm | 16 mm |
| Subclavian |  | $9.5^4$ | 6 cm | 19 mm |
| SVC |  | $12.5^4$ | 7 cm | 20 mm |

## ZIM FOR EXIT SITE

Length of the arm
(Acromion - Olecranon)

**Yellow**: proximal third
**Green**: middle third
**Red**: distal third

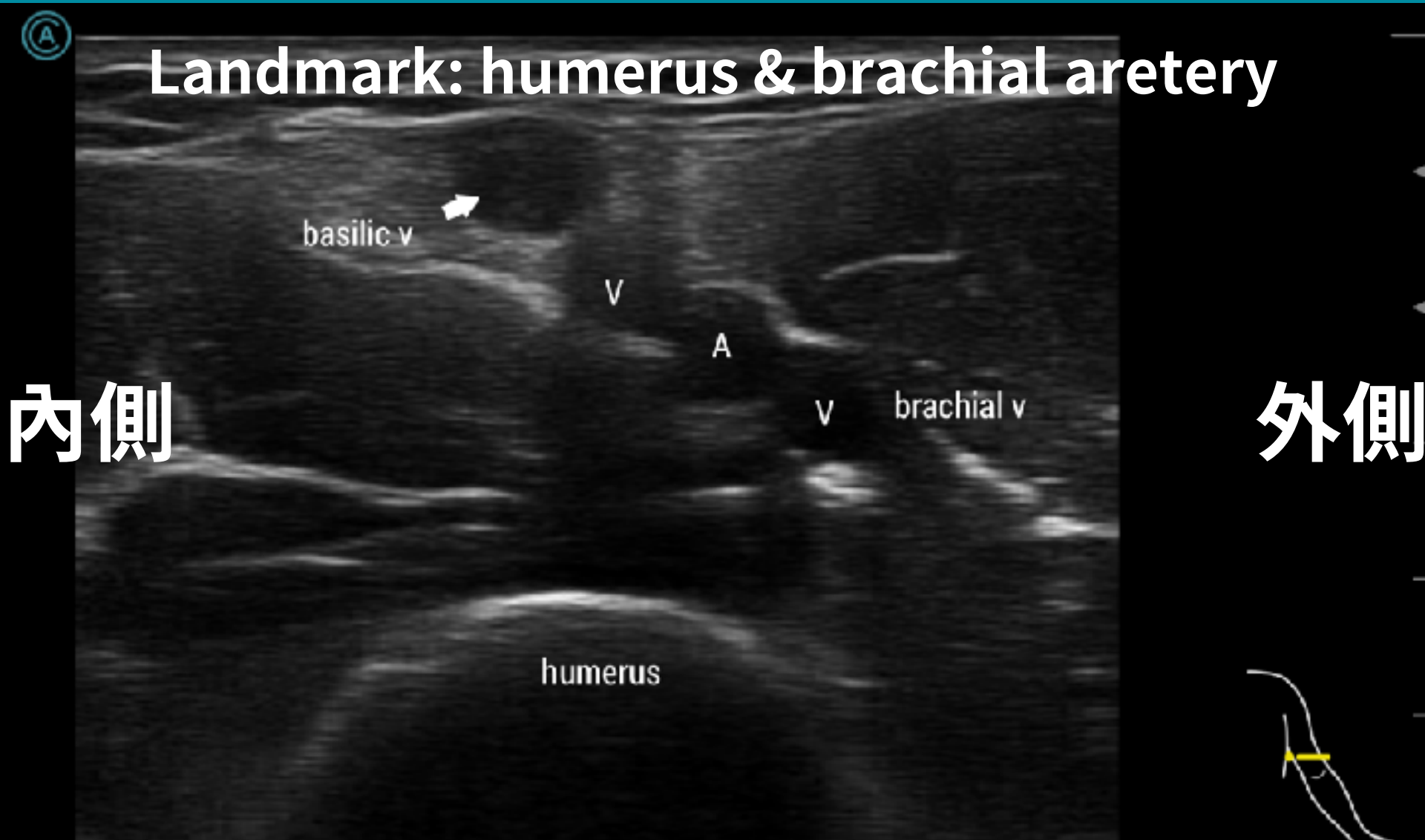
**C-V RATIO**

**1 : 3**

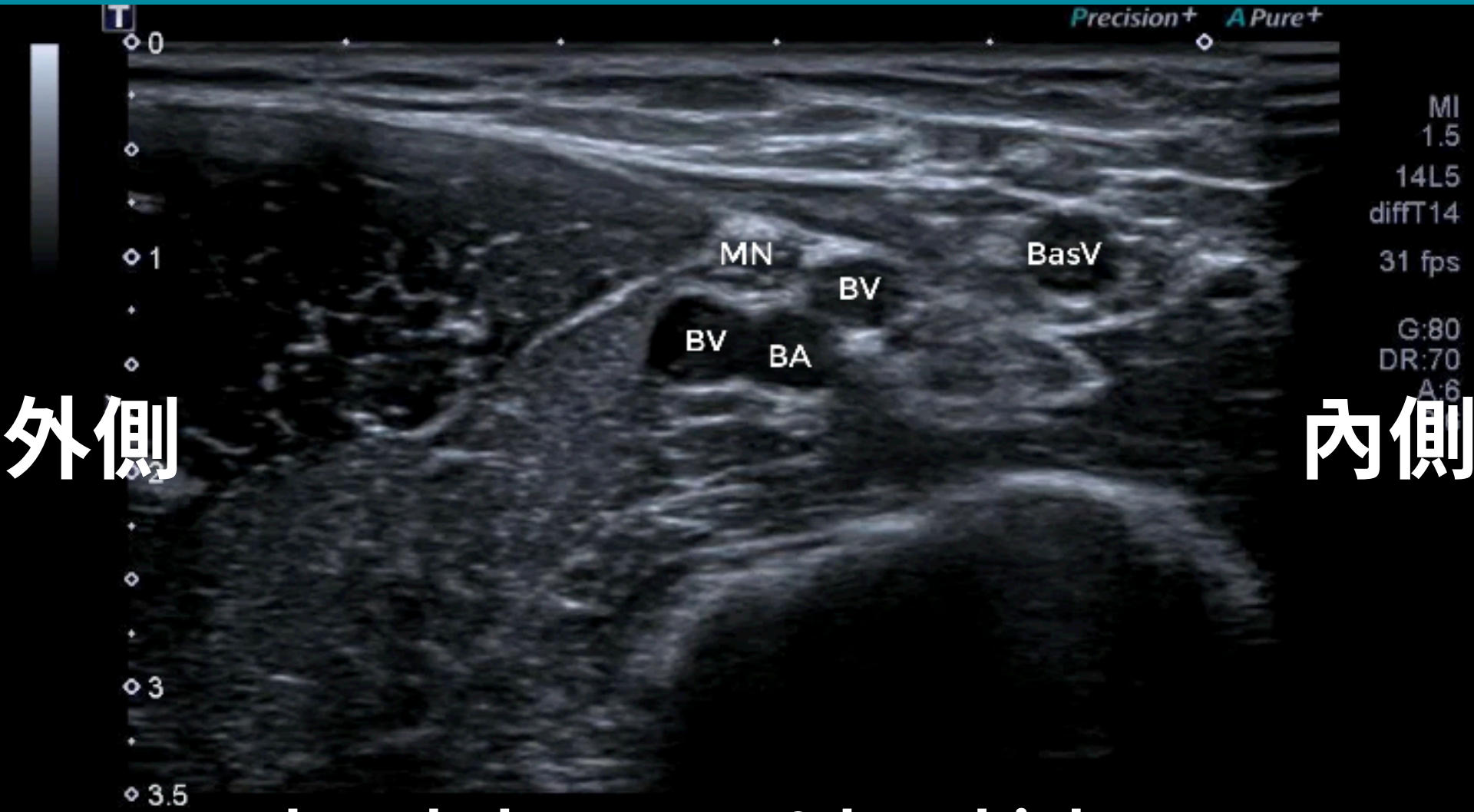
1Fr 0.33mm

3Fr 1mm

# US GUIDED PIV

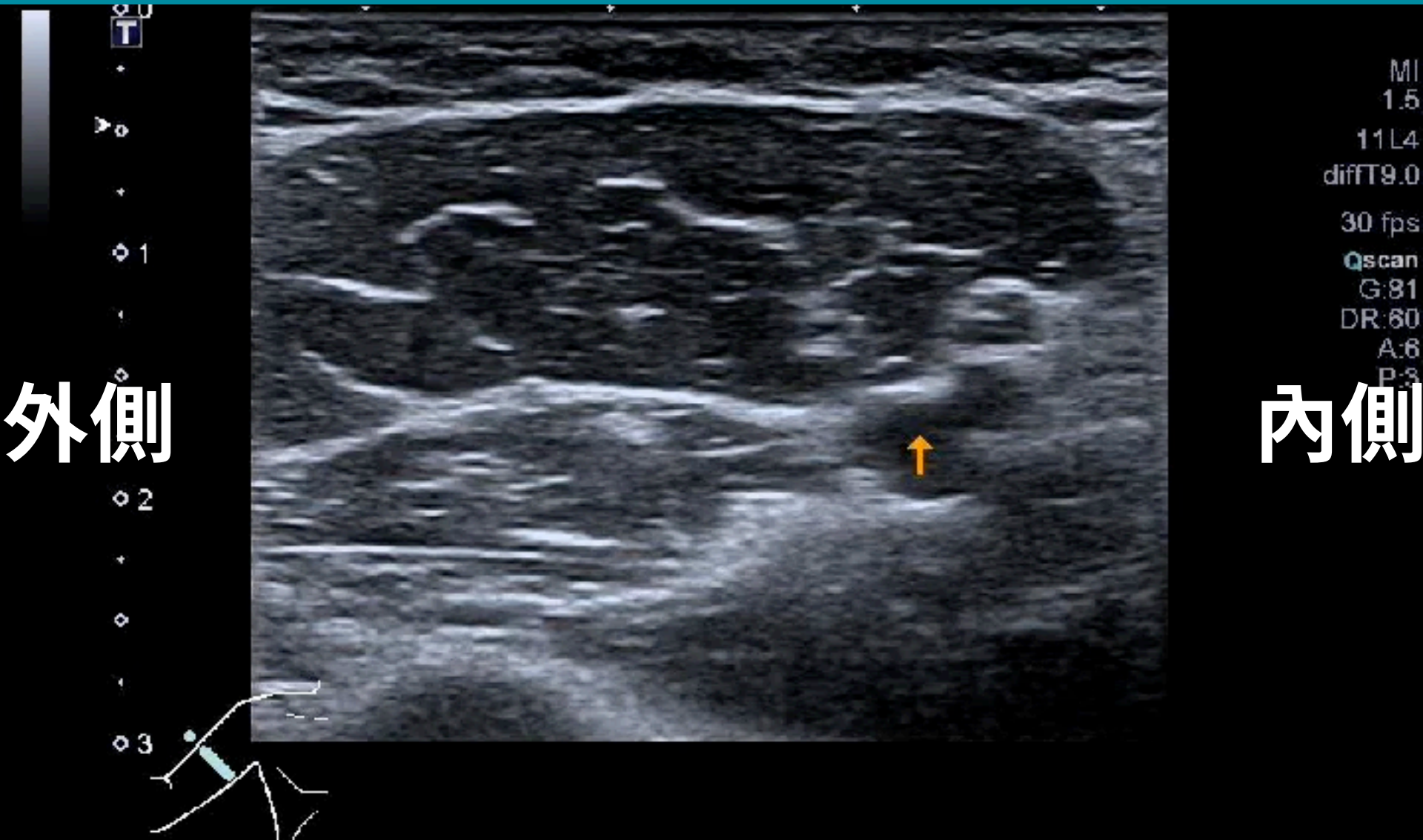


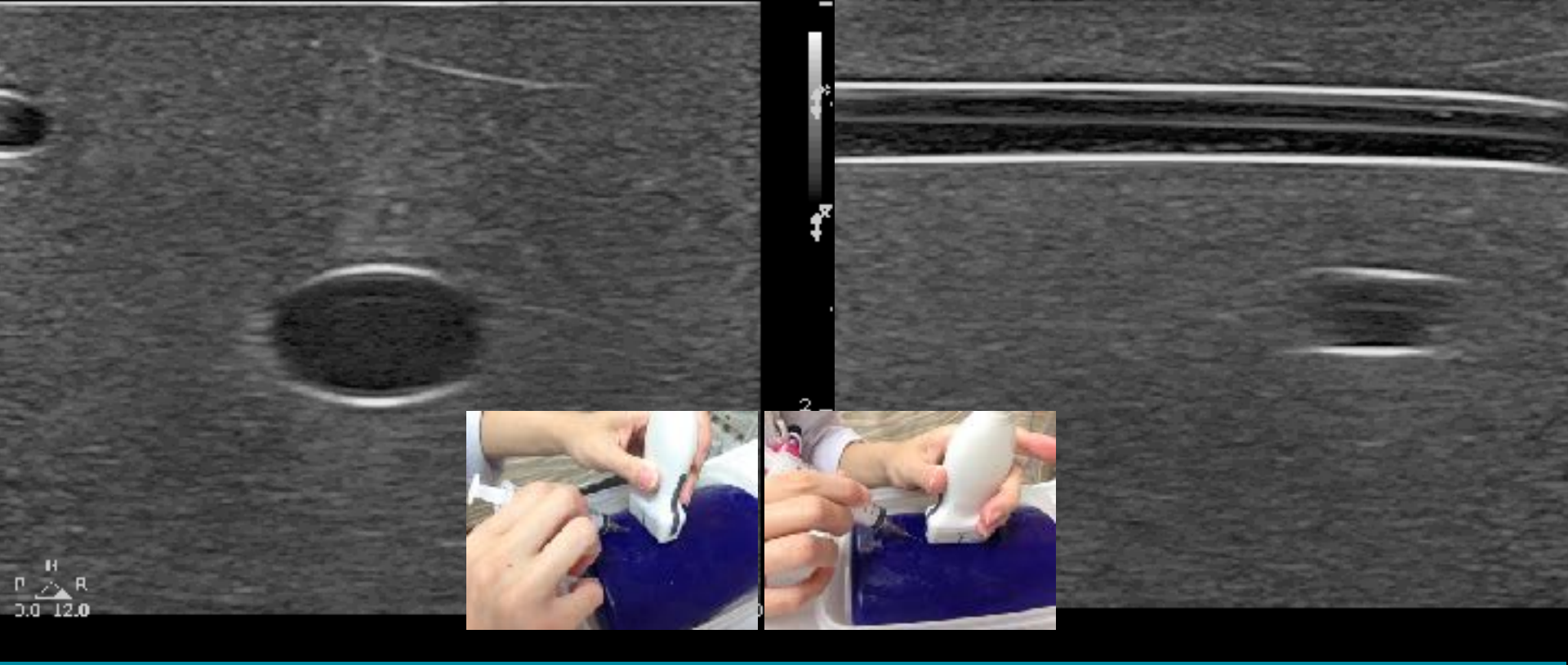
# BASILIC VEIN & BRACHIAL VEIN




Landmark: humerus & brachial aretery

# CEPHALIC VEIN

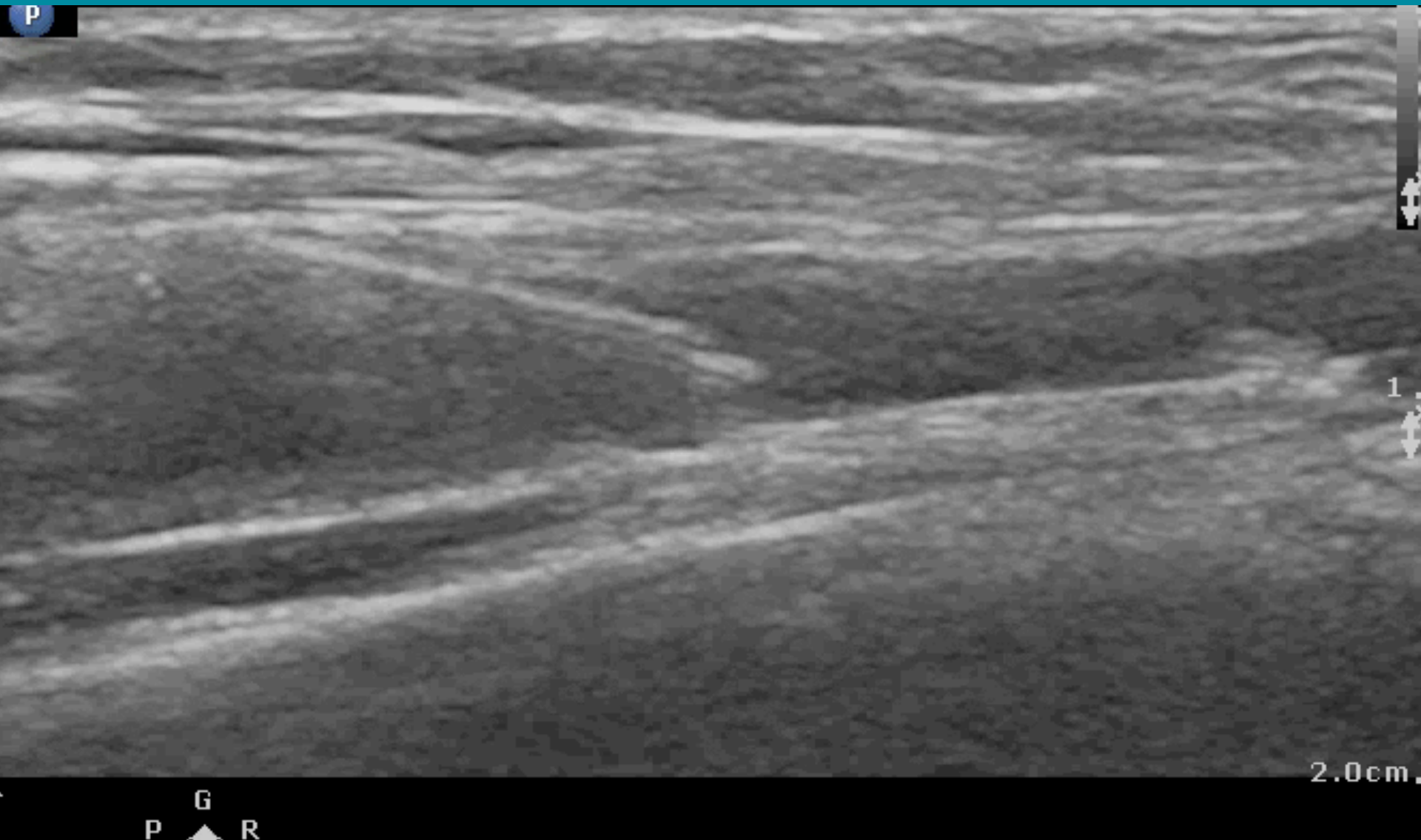


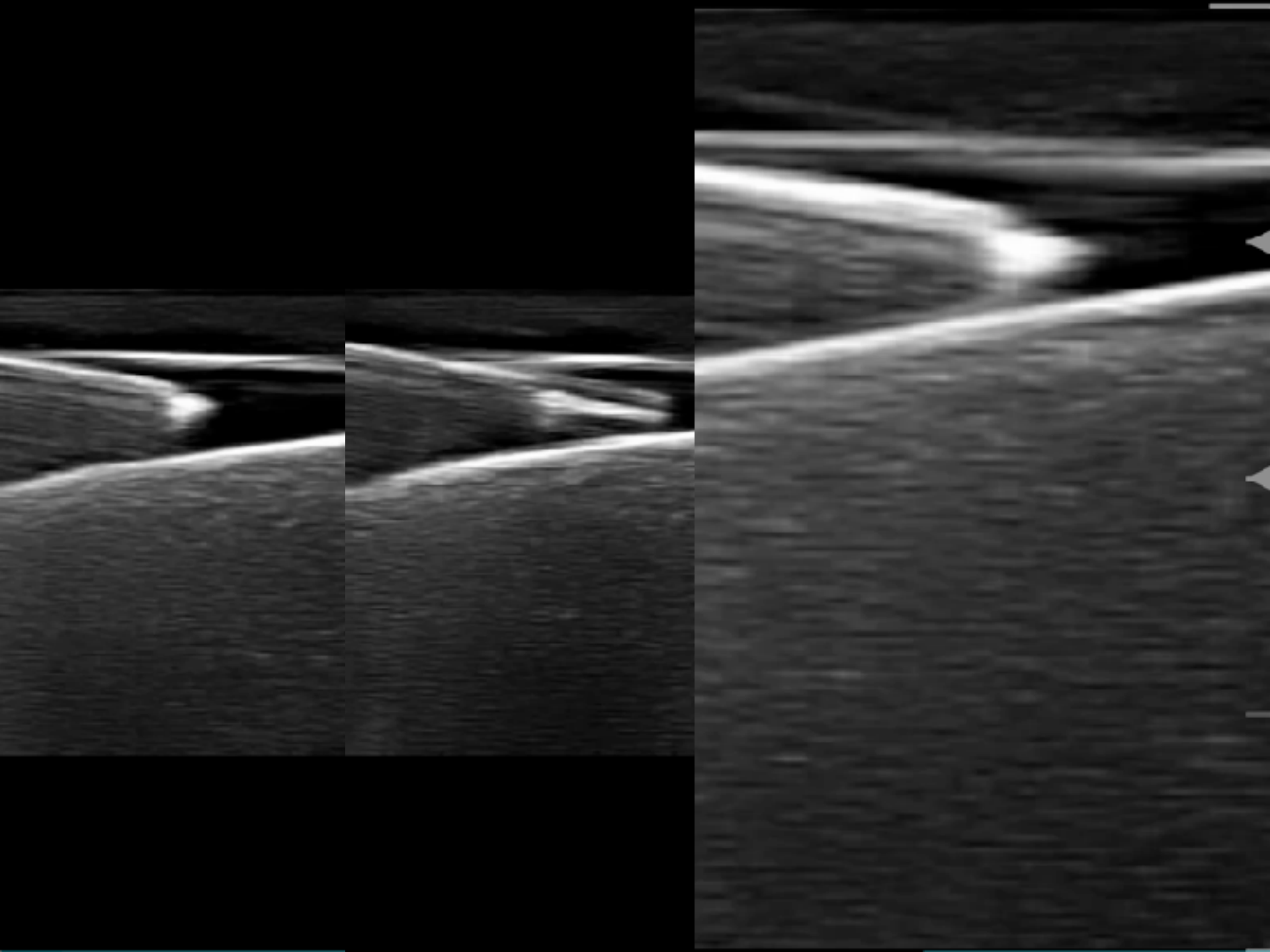


# MASTER NEEDLING

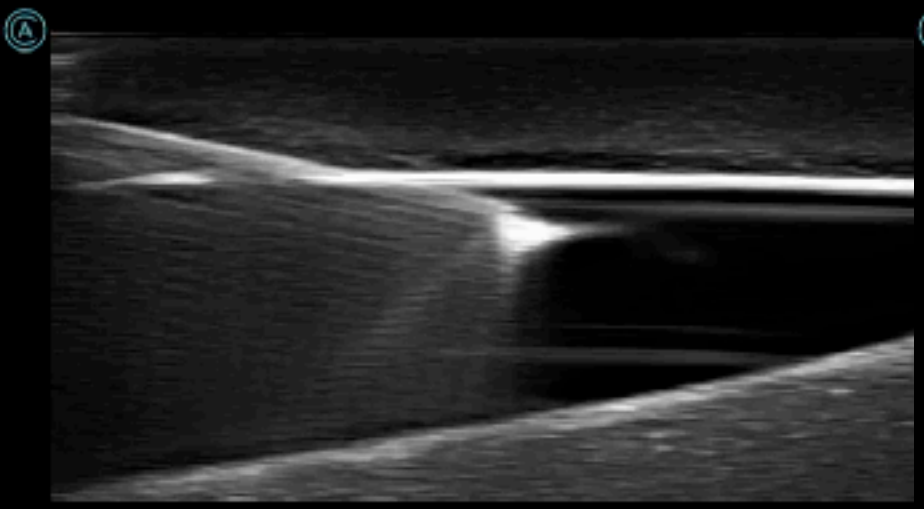
**Off-plane** **In-plane**

# IN-PLANE APPROACH

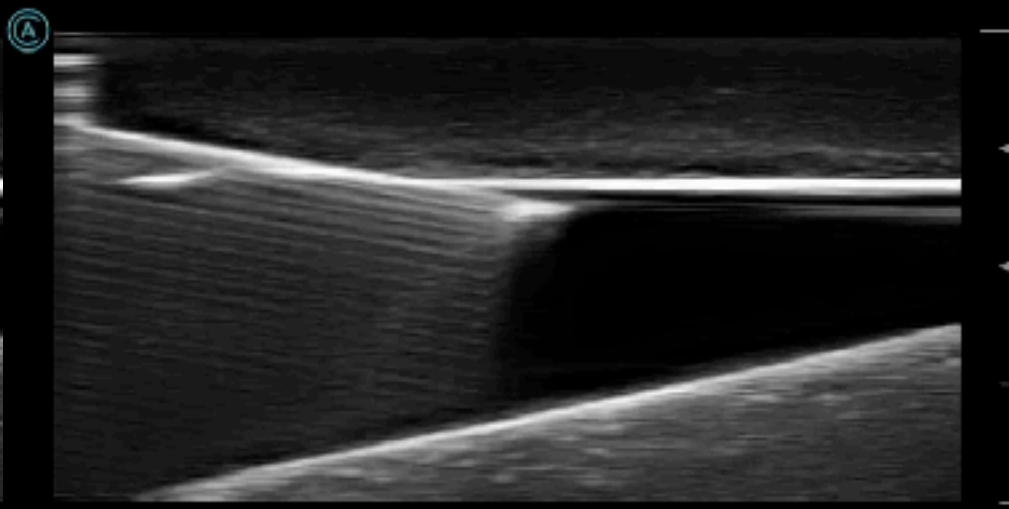




斜面由朝上轉朝下



斜面由朝下轉朝上

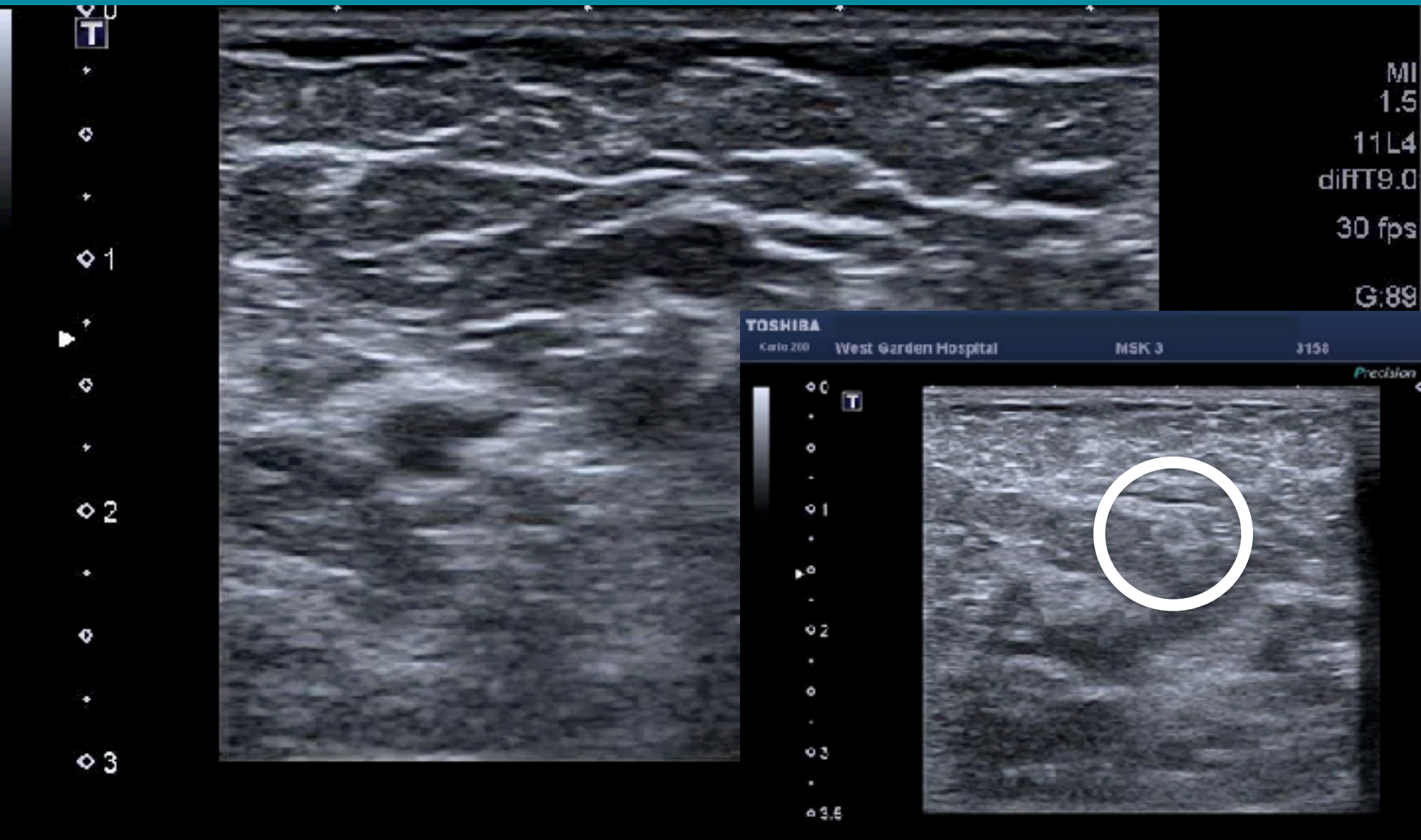


送Guidewire斜面朝下

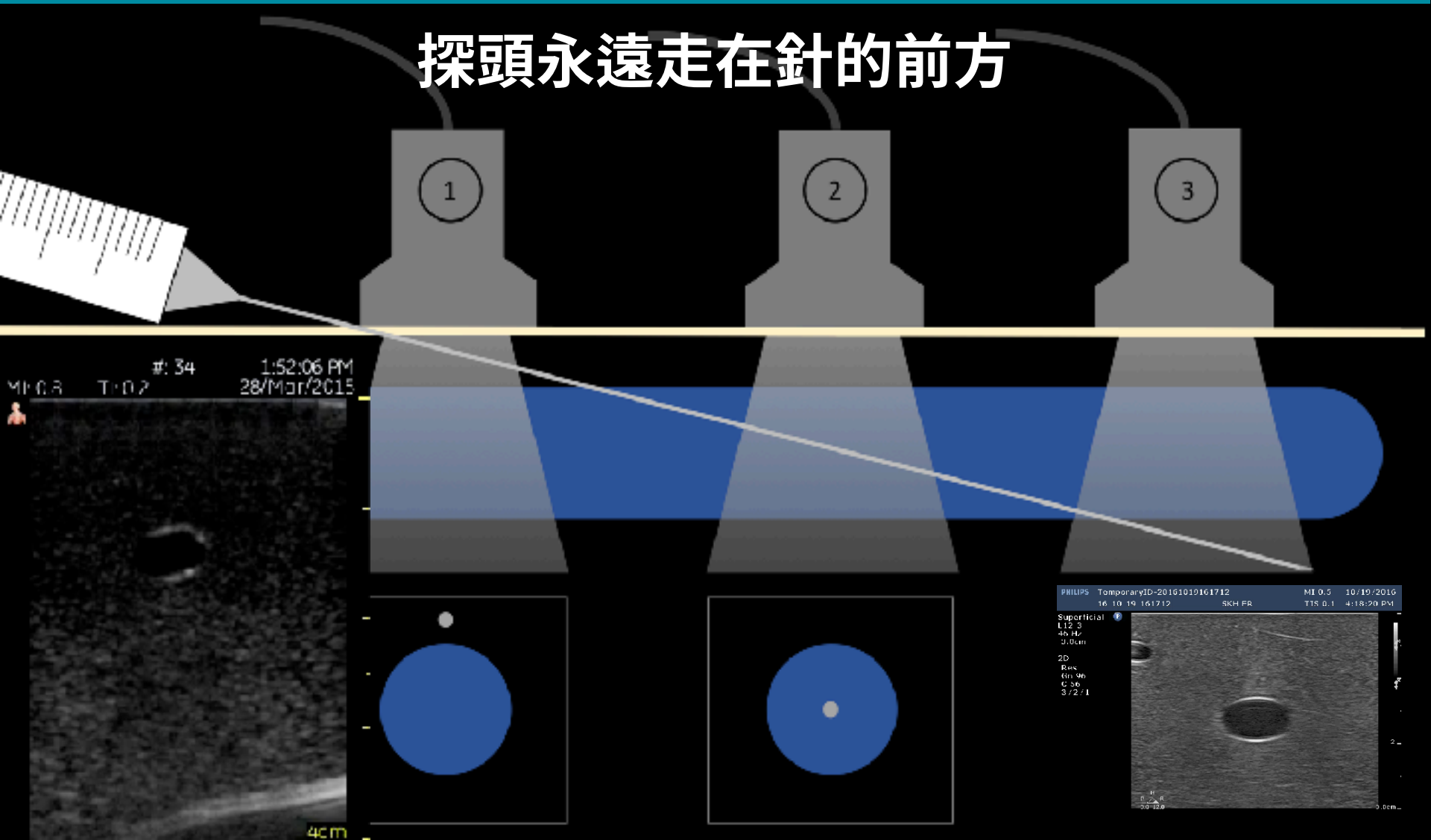
送Catheter則斜面朝上

# OFF-PLANE APPROACH

## PREFERRED CHOICE FOR PICC



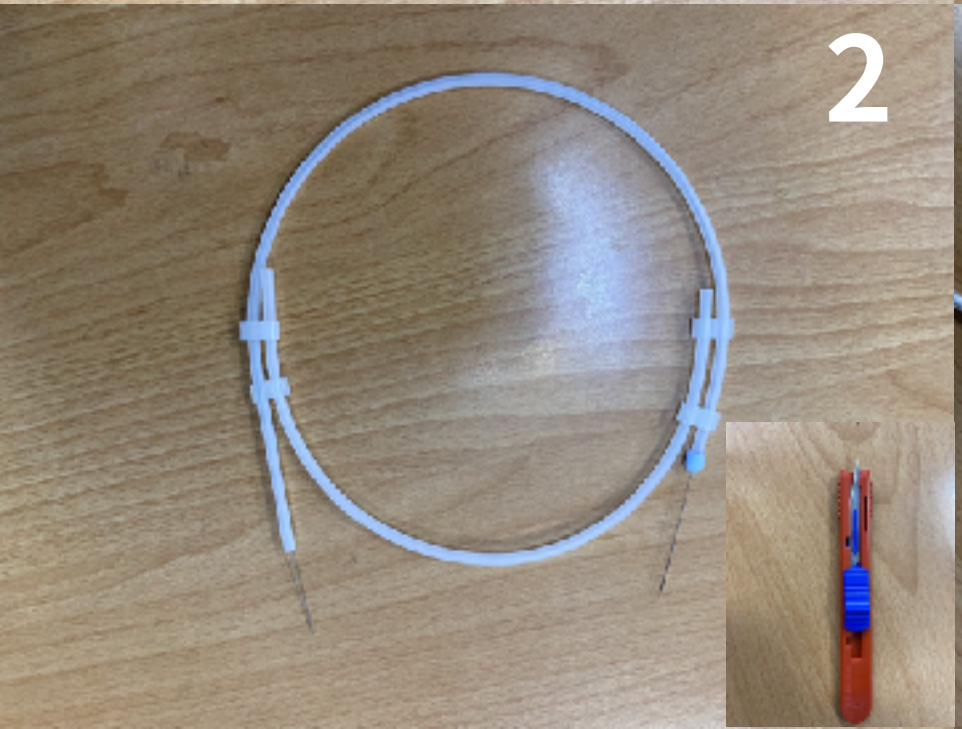
# OFF-PLANE首重針尖




Statlock
Catheter Stabilization Device


1


3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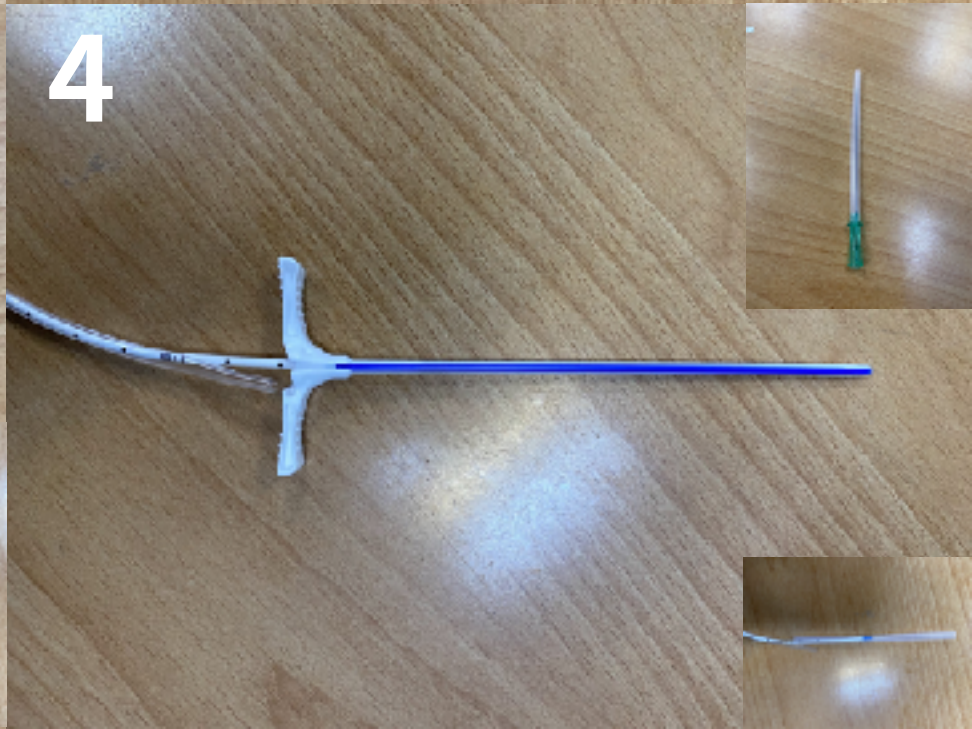
4

Anaesthesia, 2007, **62**, pages 818–823 doi:10.1111/j.1365-2044.2007.05139.x

# Optimal skin surface landmark for the SVC-RA junction in cancer patients requiring the implantation of permanent central venous catheters

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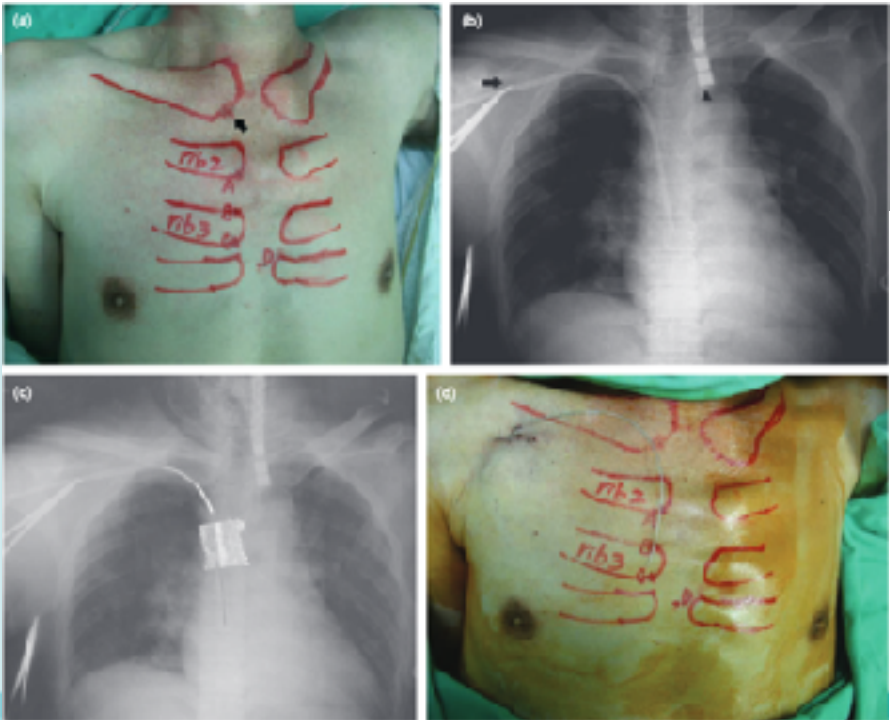
*2 Department of Surgery, Chang Gung Memorial Hospital, no. 6, Section west, Chia Pu Road, Puzi City, Chiayi 613, Taiwan*
*Department of 3 Anaesthesiology and 5 Paediatrics, Kaohsiung Municipal Hsiao-Kang Hospital, 482 San-Ming Road,*




## CAJ: Lower margin of R 3rd

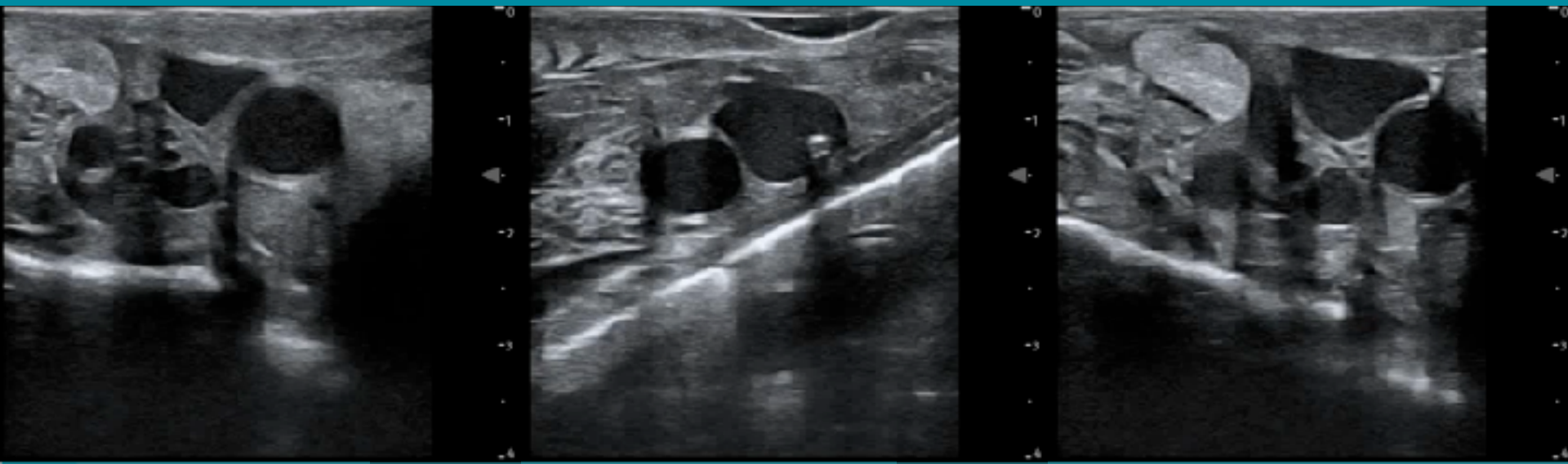
**Table 3** Number and percentage of patients with satisfactory positioning guided by different skin surface landmarks ($n = 20$).

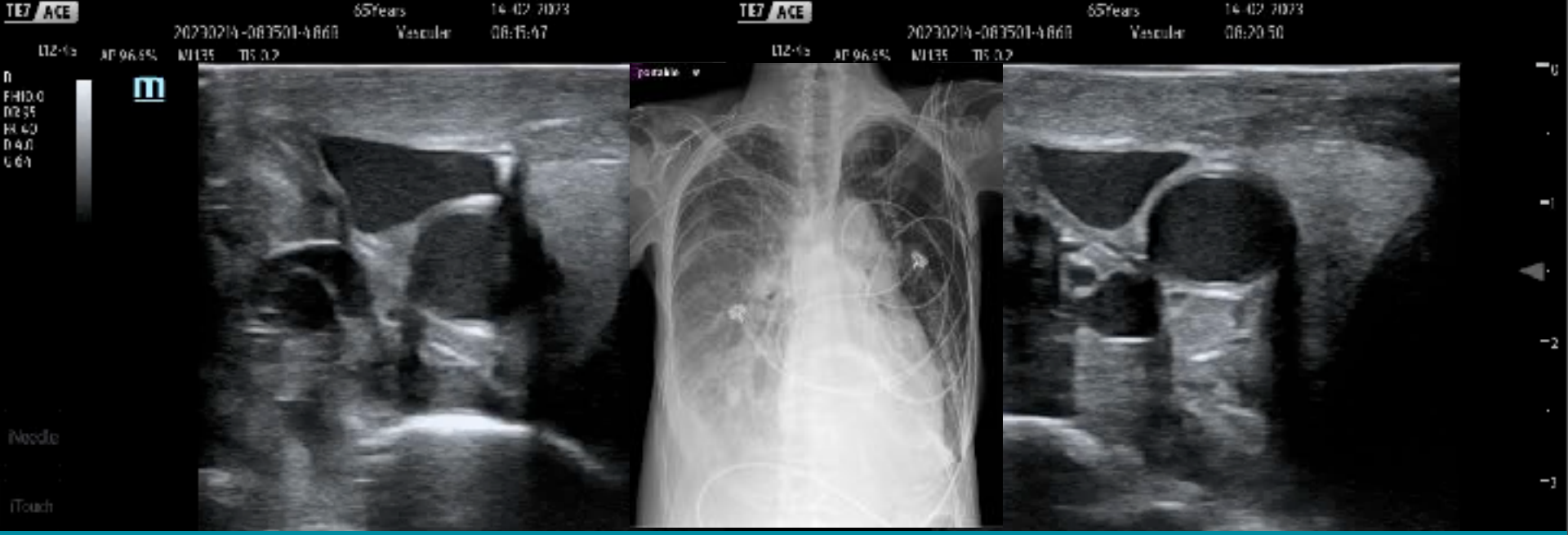
| Skin surface landmark | No. of patients with satisfactory positioning | Percentage of patients with satisfactory positioning | p value* |
|---|---|---|---|
| Point A | 0 | 0% | < 0.0001 |
| Point B | 4 | 20% | |
| Point C | 14 | 70% | |
| Point D | 6 | 30% | |

# PICC導管置放

# PICC導管置放

# US-GUIDED PICC TIP NAVIGATION

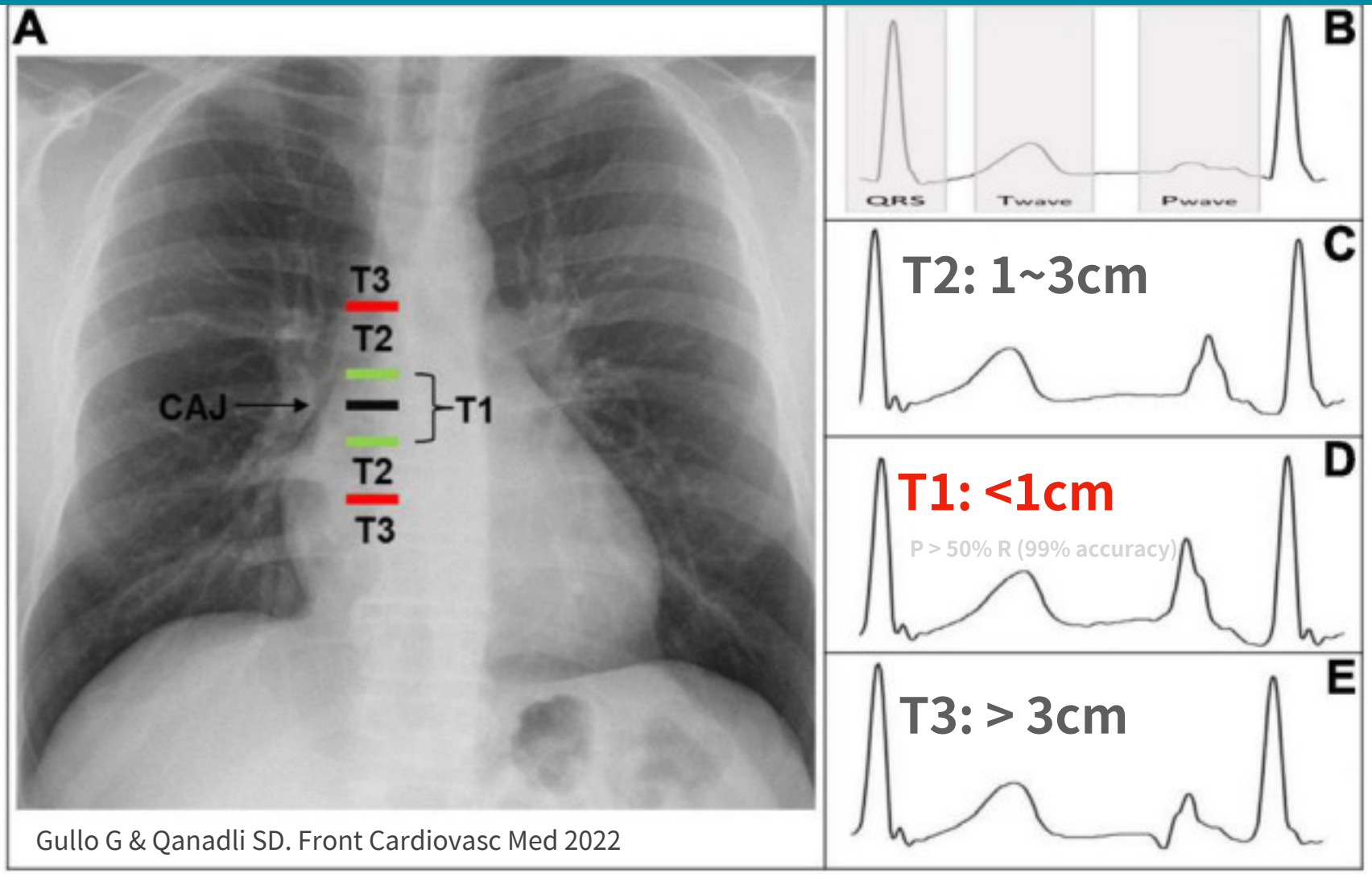




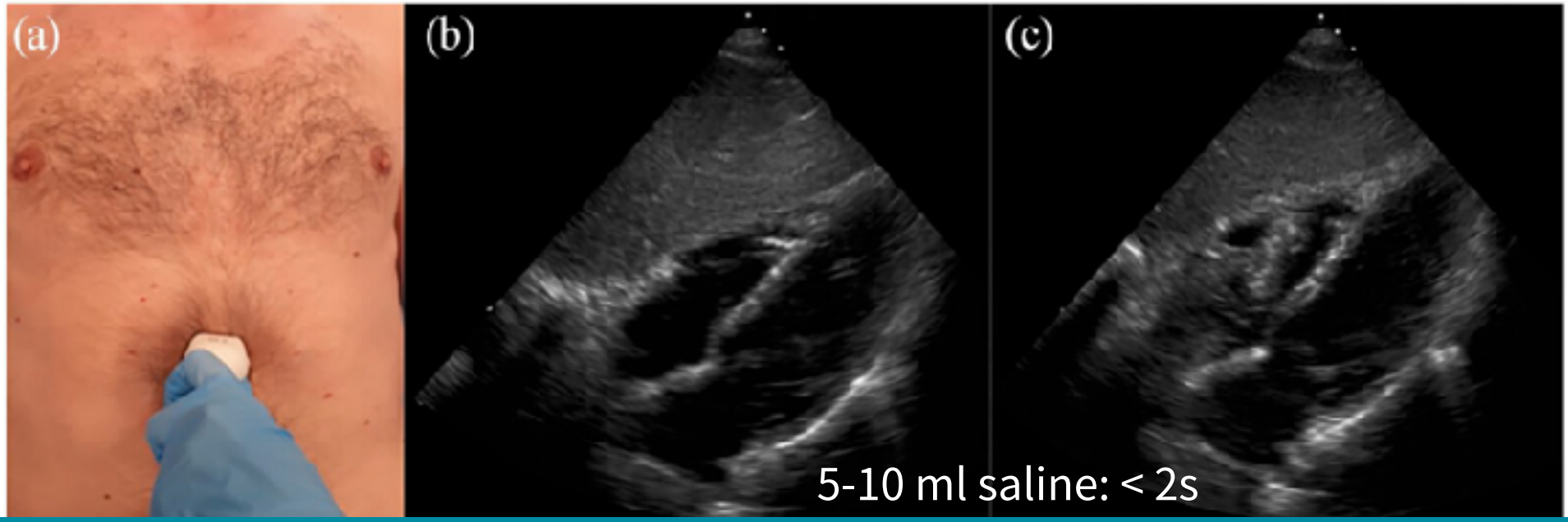

# ECHOTIP PROTOCOL
# TIP NAVIGATION

# ECG-BASED TECHNIQUE FOR PICC TIP

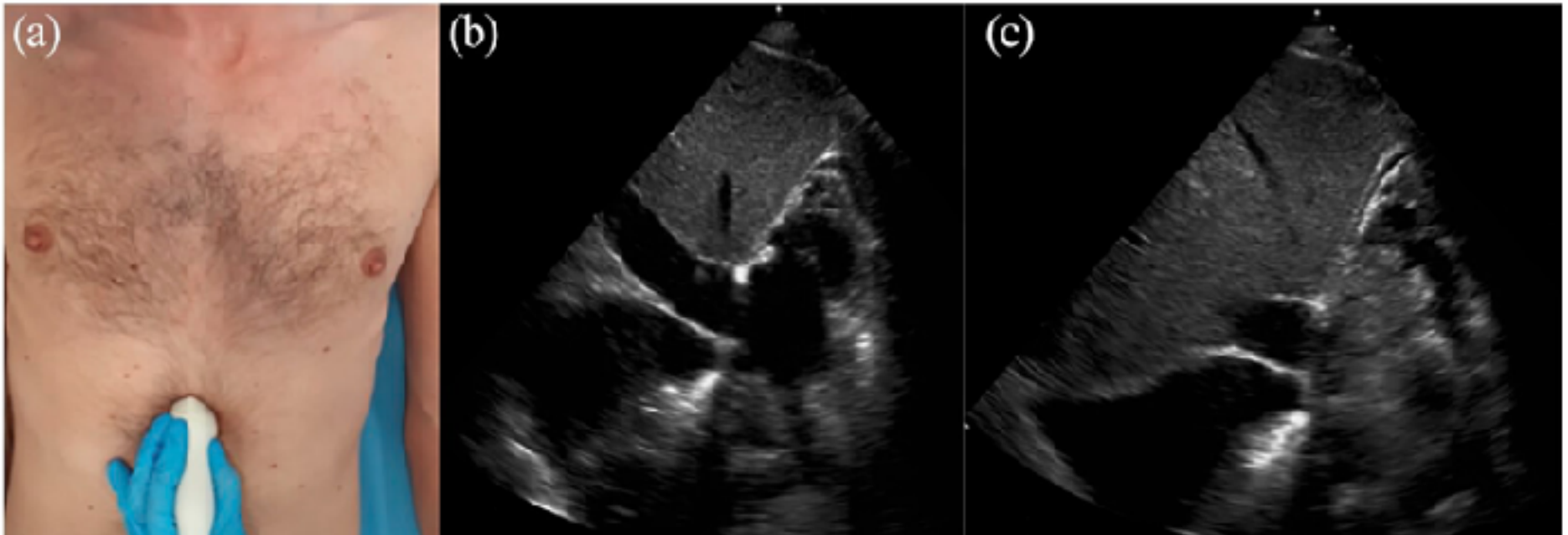
## LEAD II FOR MAXIMAL P-WAVE SIGNAL (RA - LL)



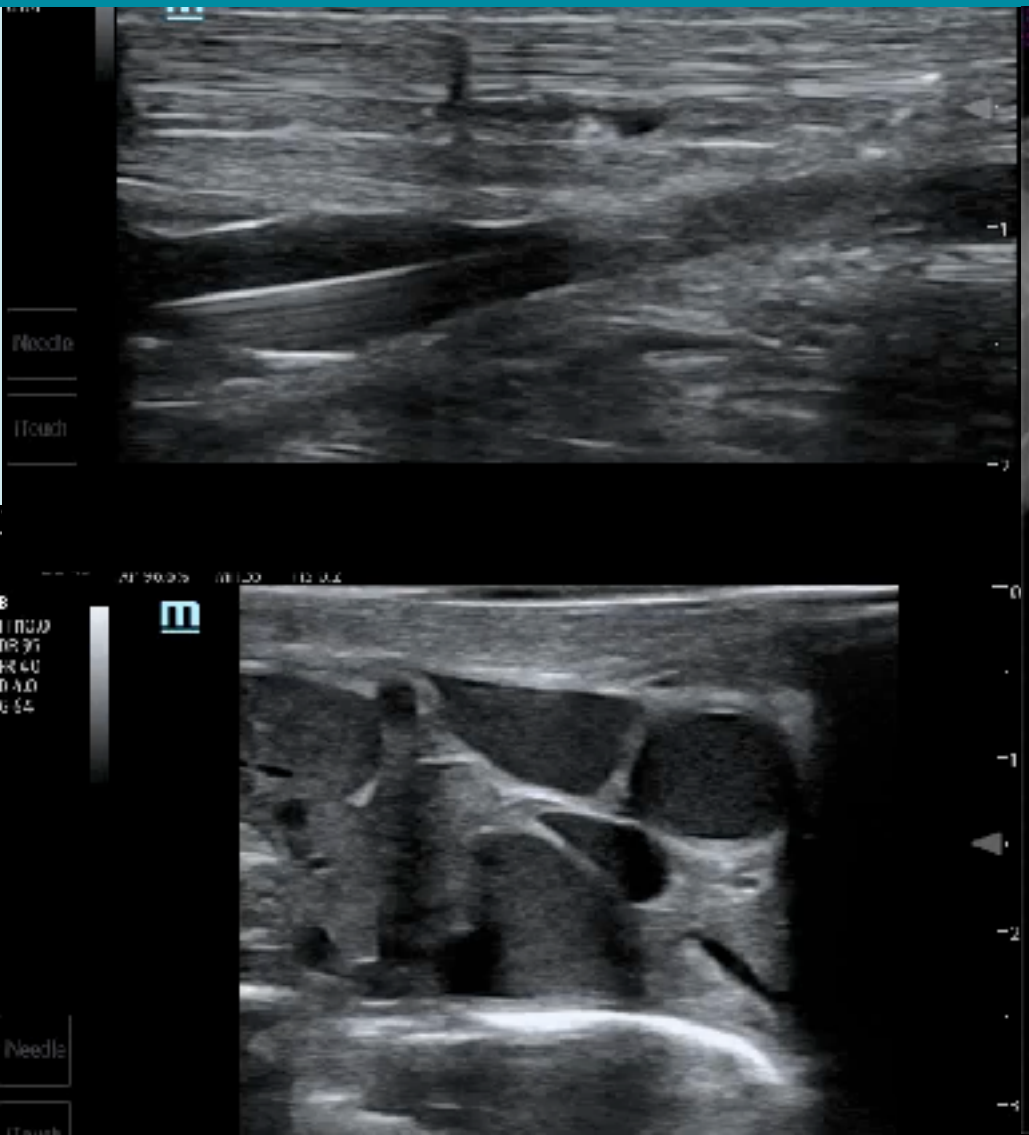

Gullo G & Qanadli SD. Front Cardiovasc Med 2022




# TIP LOCALIZATION



# PICC確認位置 (ECHO + CXR)



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# 沖管

**Q8H以10 mL  N/S推停推停方式沖洗一次，**

推停推停方式沖洗方式:快速推進1-2ml &每次推進間隔約0.4秒[1]

每次輸液前後、抽/輸血前後、更換管路及／或脂質輸注時

沖洗必須涵蓋所有導管管腔

1. ISBN 978-3-030-03148-0 ISBN 978-3-030-03149-7 (eBook) https://doi.org/10.1007/978-3-030-03149-7.S82

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# 採血/給予藥物

1.停止全身靜脈輸注液體或血液製品 **2 分鐘**

2.消毒無針連接器或導管銜接孔 **5-15秒**

3.以 **10 mL N/S 推停推停方式**沖洗管路

4.棄血 **5 mL**

5.連接新的10 mL 針筒

6.採血

7.消毒無針連接器銜接孔或導管銜接孔 **5-15秒** ( 使用適當消毒劑 如chlorhexidine, povidone iodine, 或70% alcohol，請務必注意，若後續換藥施加敷料覆蓋前，應待消毒液體完全乾燥)

8.採血後以 **20 mL N/S** 脈動式沖洗管路，及適當清潔導管及任何附加裝置

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# 閉管

1. 停止使用時及施打藥物並完成最後沖洗之後，務必進行**正壓閉管** ，保留0.5ml NS(勿全部推注完)以大拇指壓住針筒活塞後，接著關閉閥夾後再移除注射器，避免血液回流入導管內[1]

1. N/S使用，請依醫院程序及注意事項

文獻出處:
1. Gorski LA, Hadaway L, Hagle ME, et al. Infusion therapy standards of practice.J Infus Nurs. 2021;44(suppl 1):S1-S224. doi:10.1097/NAN.0000000000000396

# PICC管路照護

# PICC併發症

Infection (CRBSI 1.1/1000 PICC days)
Catheter malposition / migration
Mechanical malfunction (10 ~ 27%)
Phlebitis / infiltration (2.2% ~ 23%)
Air embolism
Cardiac arrhythmia
Catheter occlusion-thrombotic
High SVC 78% v.s. Distal SVC/RA 16%
Catheter occlusion-non-thrombotic

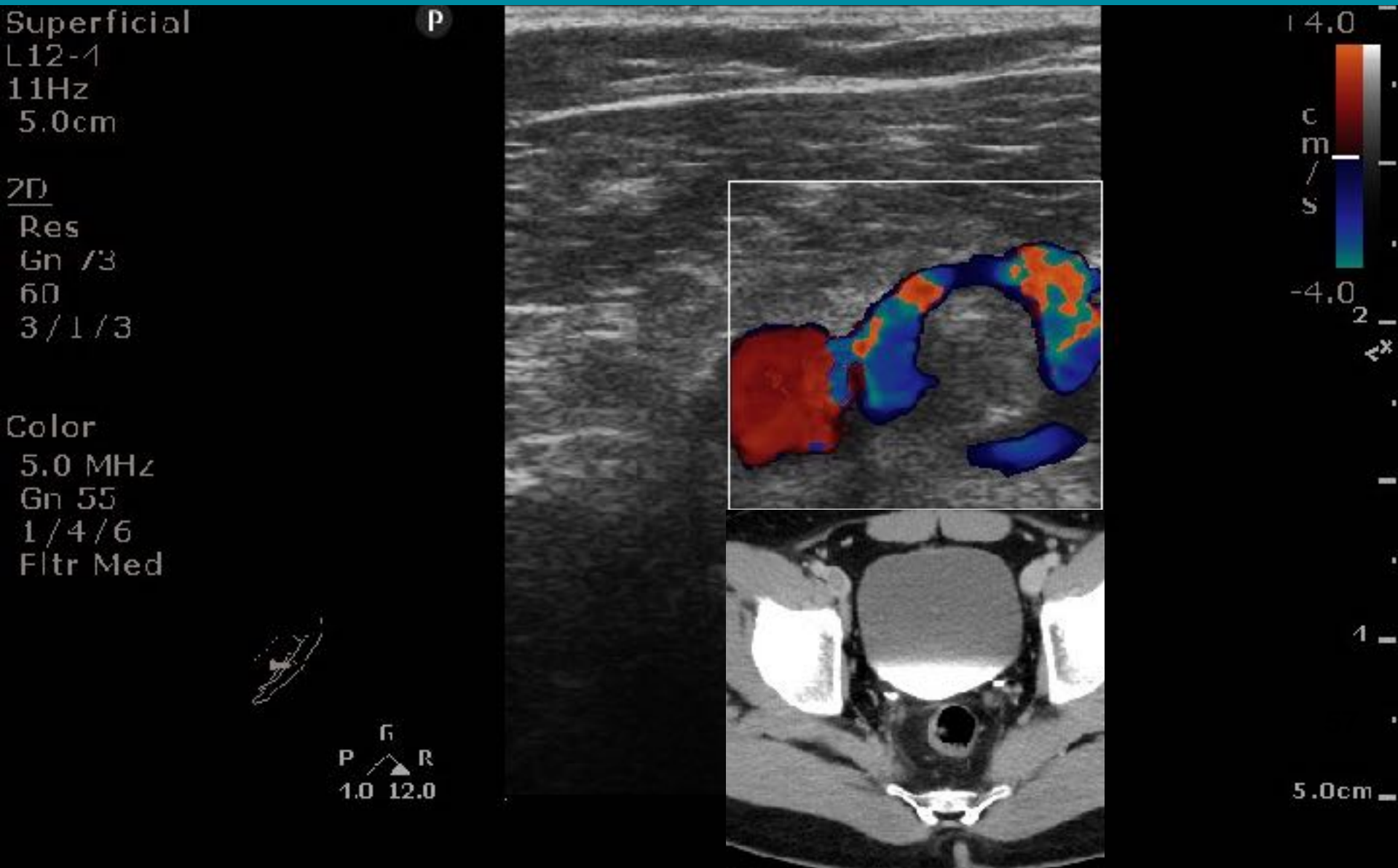
IMPROVE

PICC

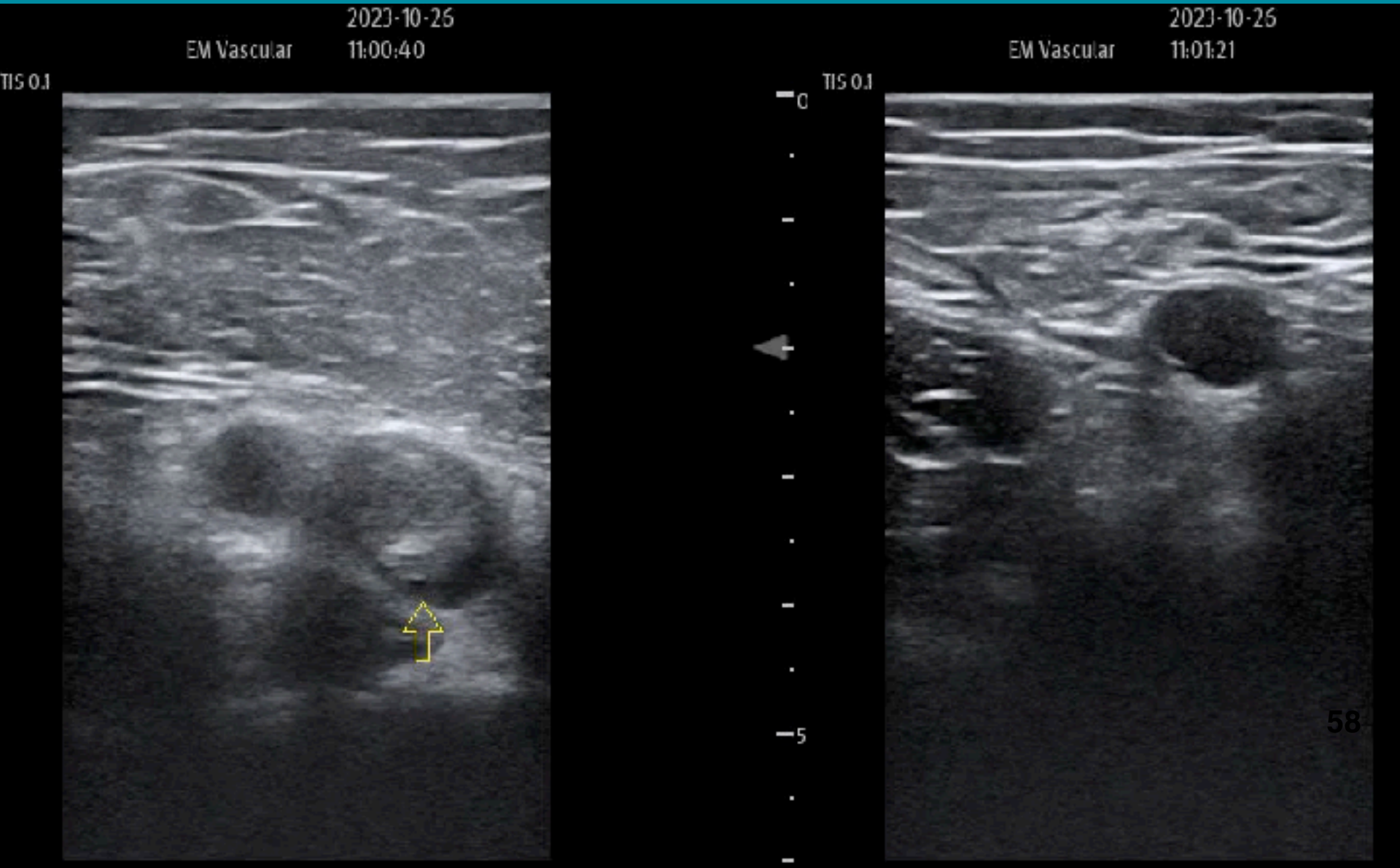
SIP

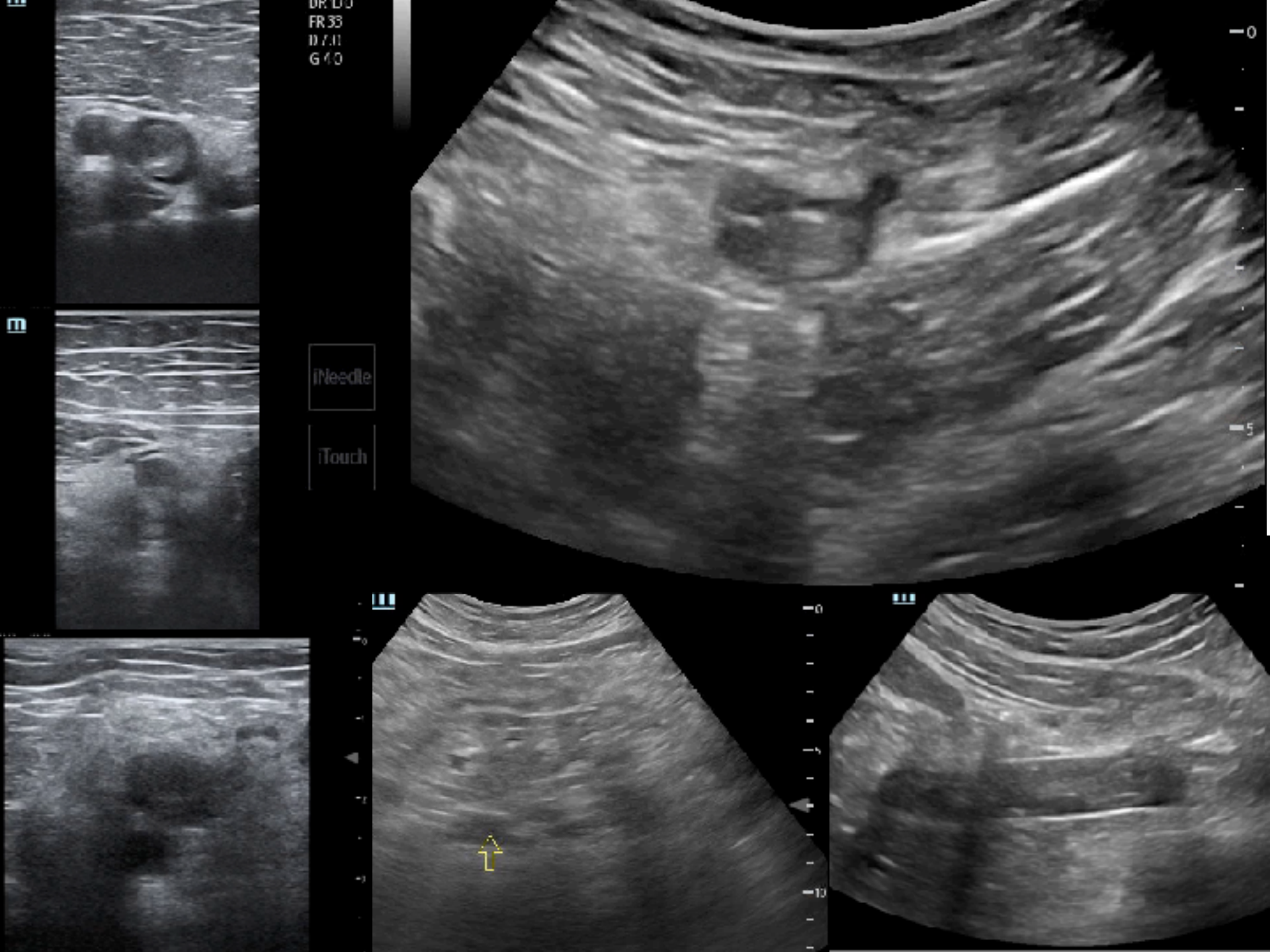
ECHOTIP

# 25M, RIGHT THIGH SWELLING 2D

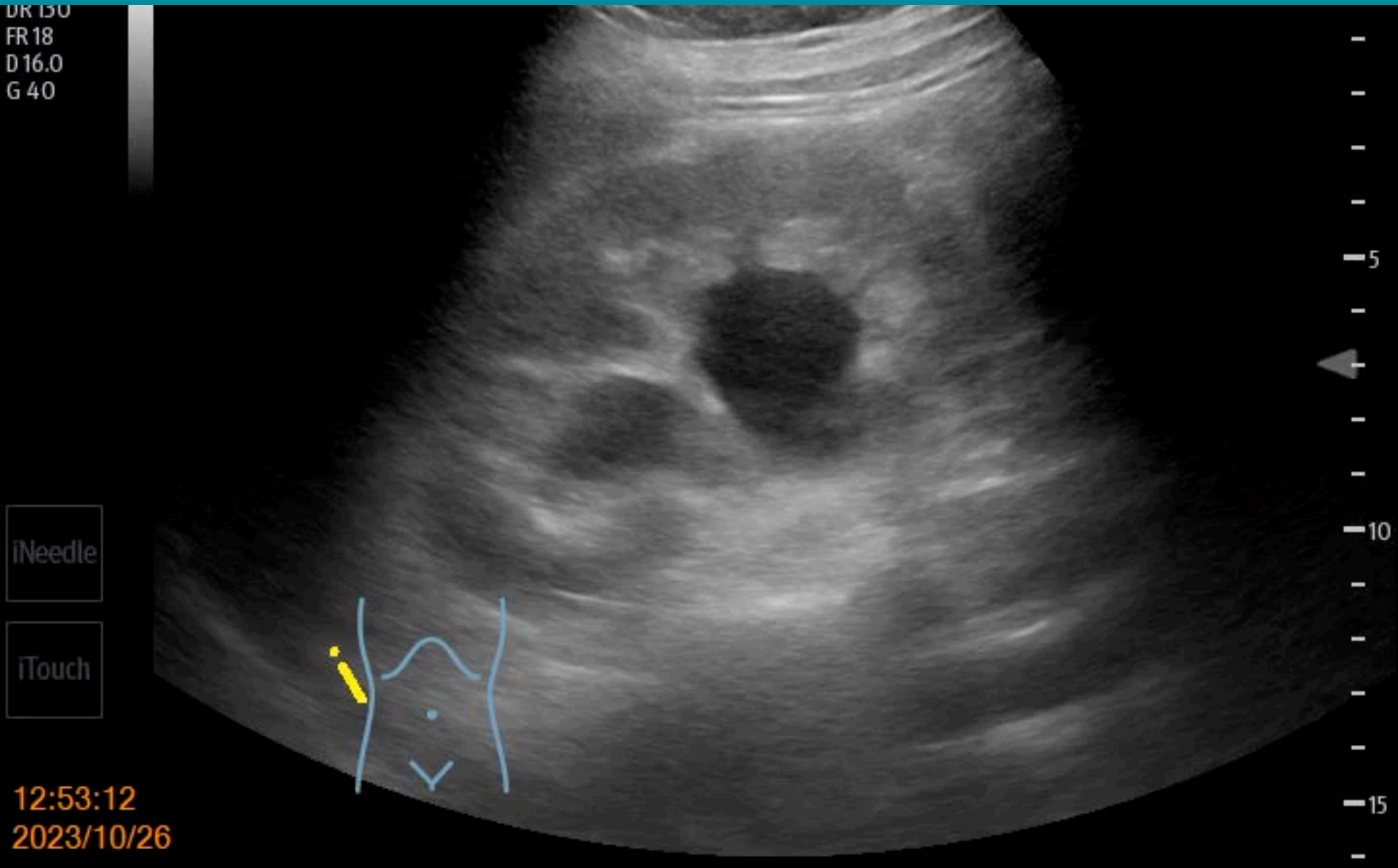


# DVT

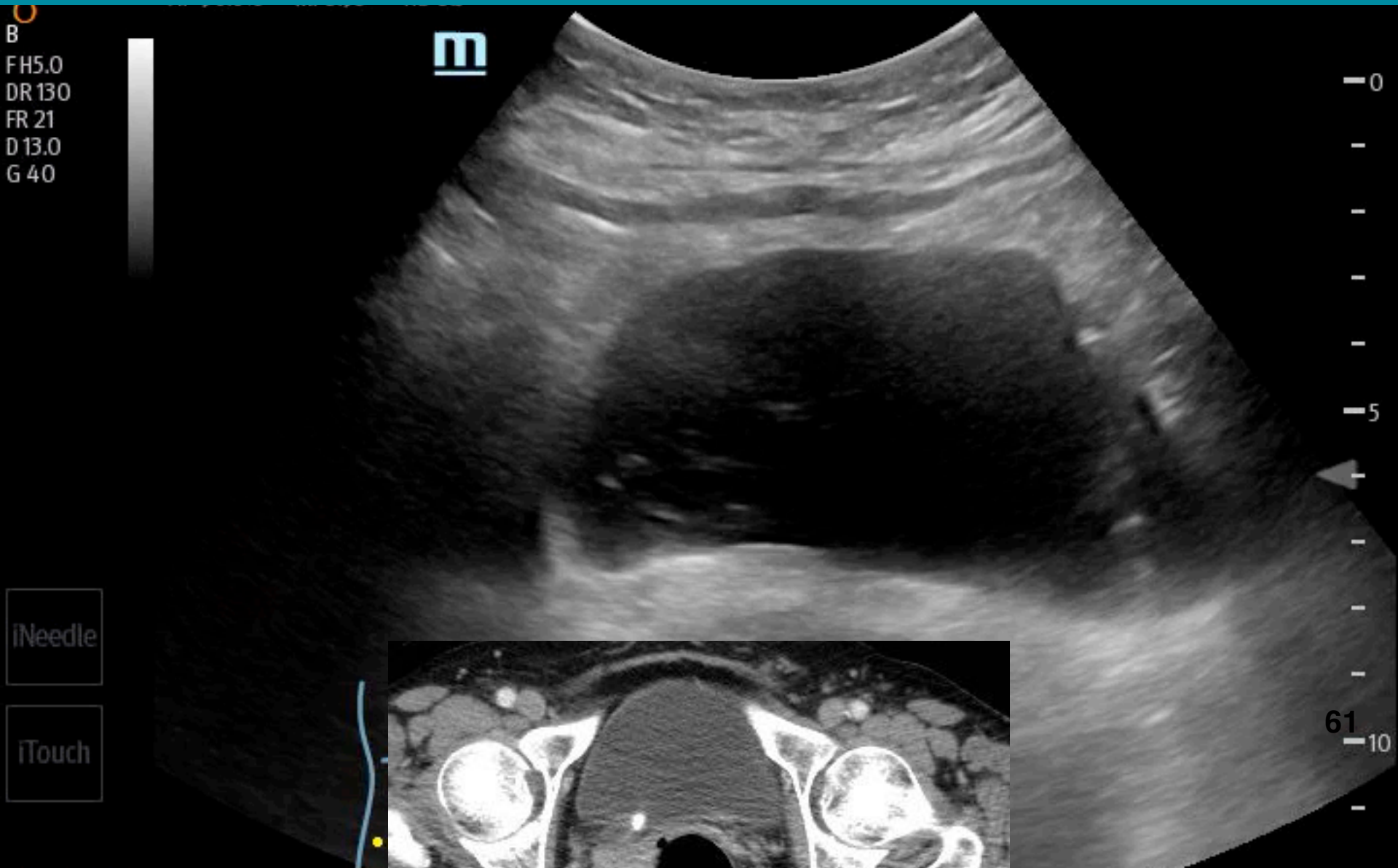

2023-10-26
EM Vascular
11:00:40
TIS 0.1
0
5
2023-10-26
EM Vascular
11:01:21
TIS 0.1


iNeedle
iTouch

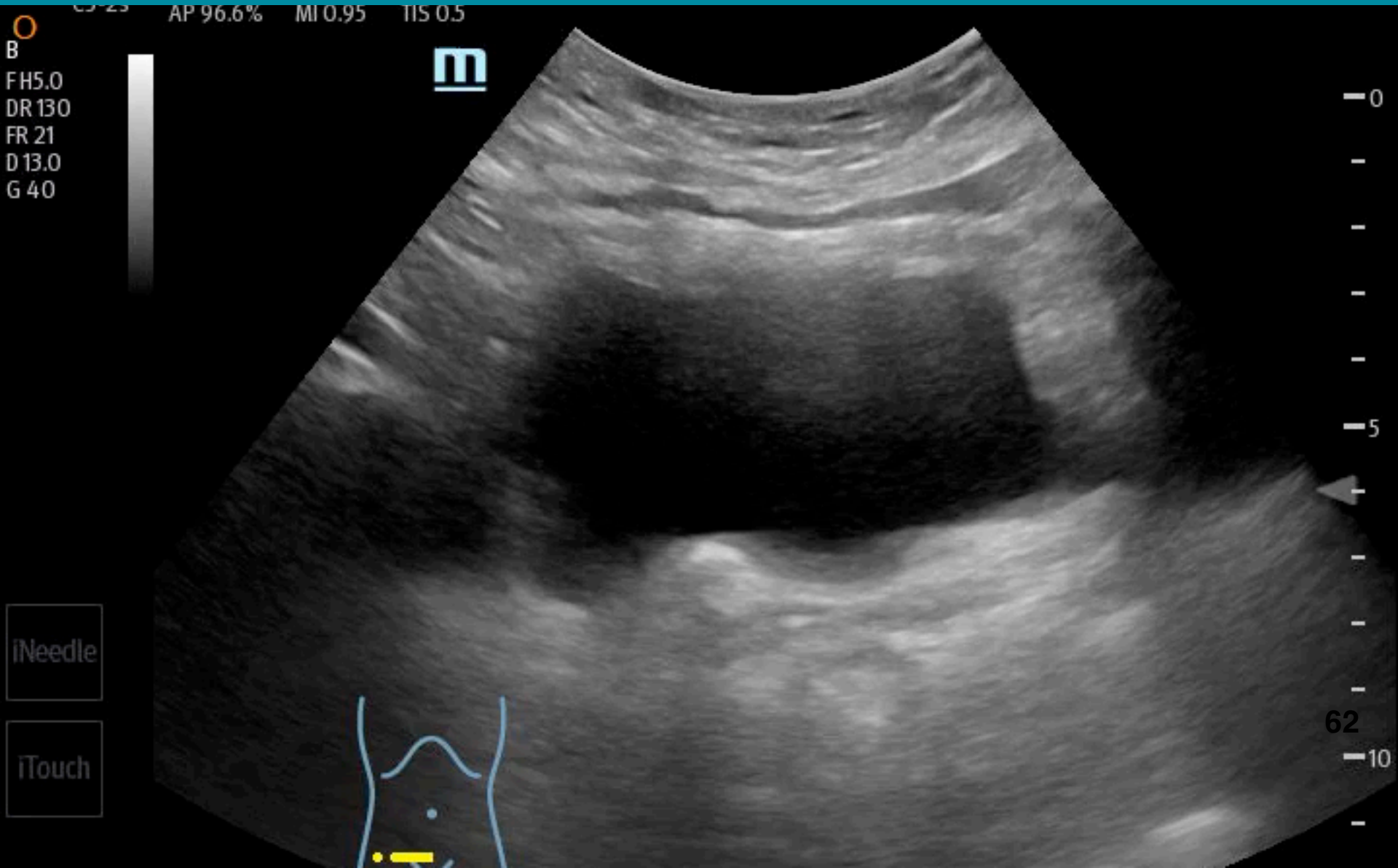
# 65F, F & R FLANK PAIN, CRP 16



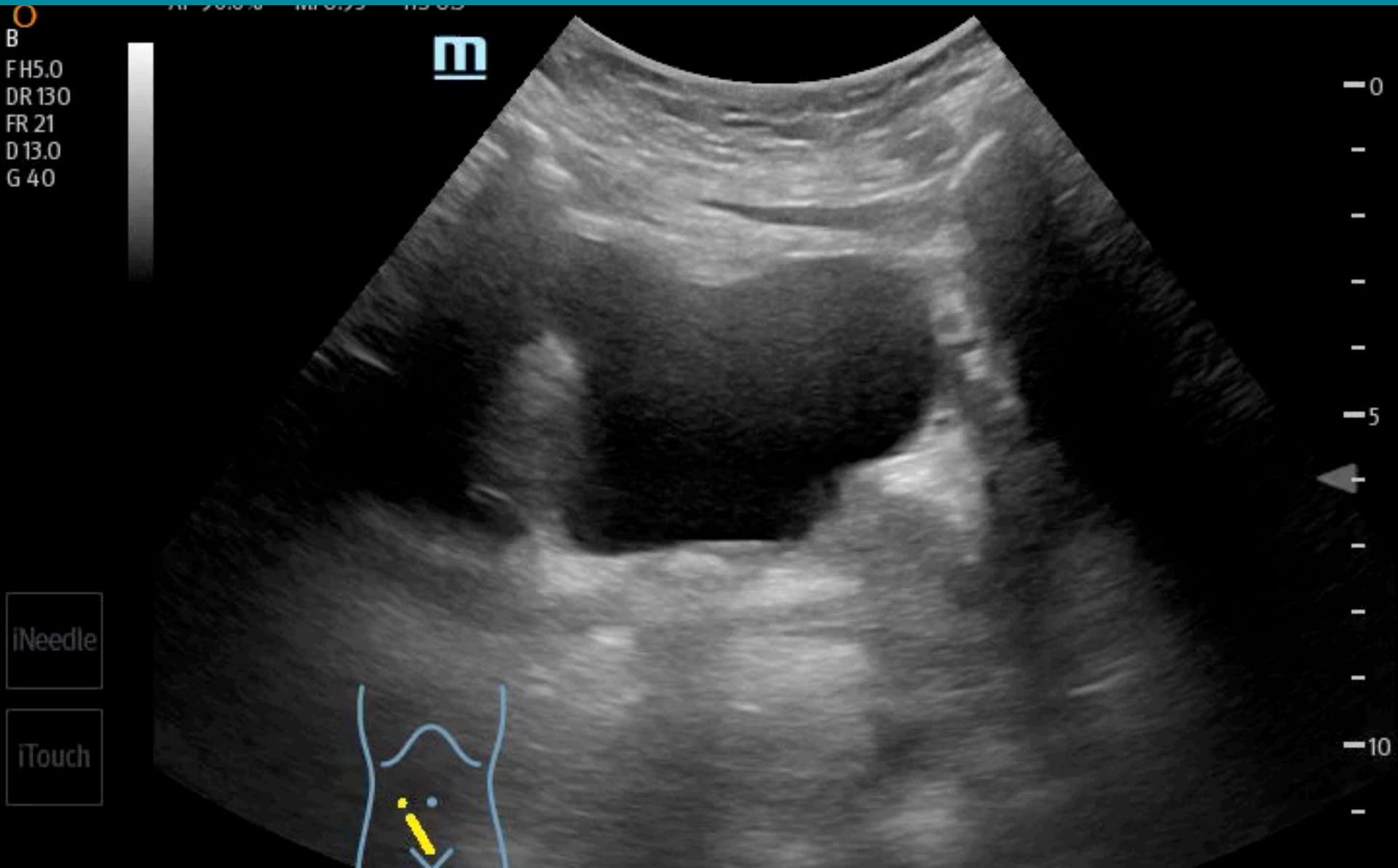
# 65F, F & R FLANK PAIN, CRP 16



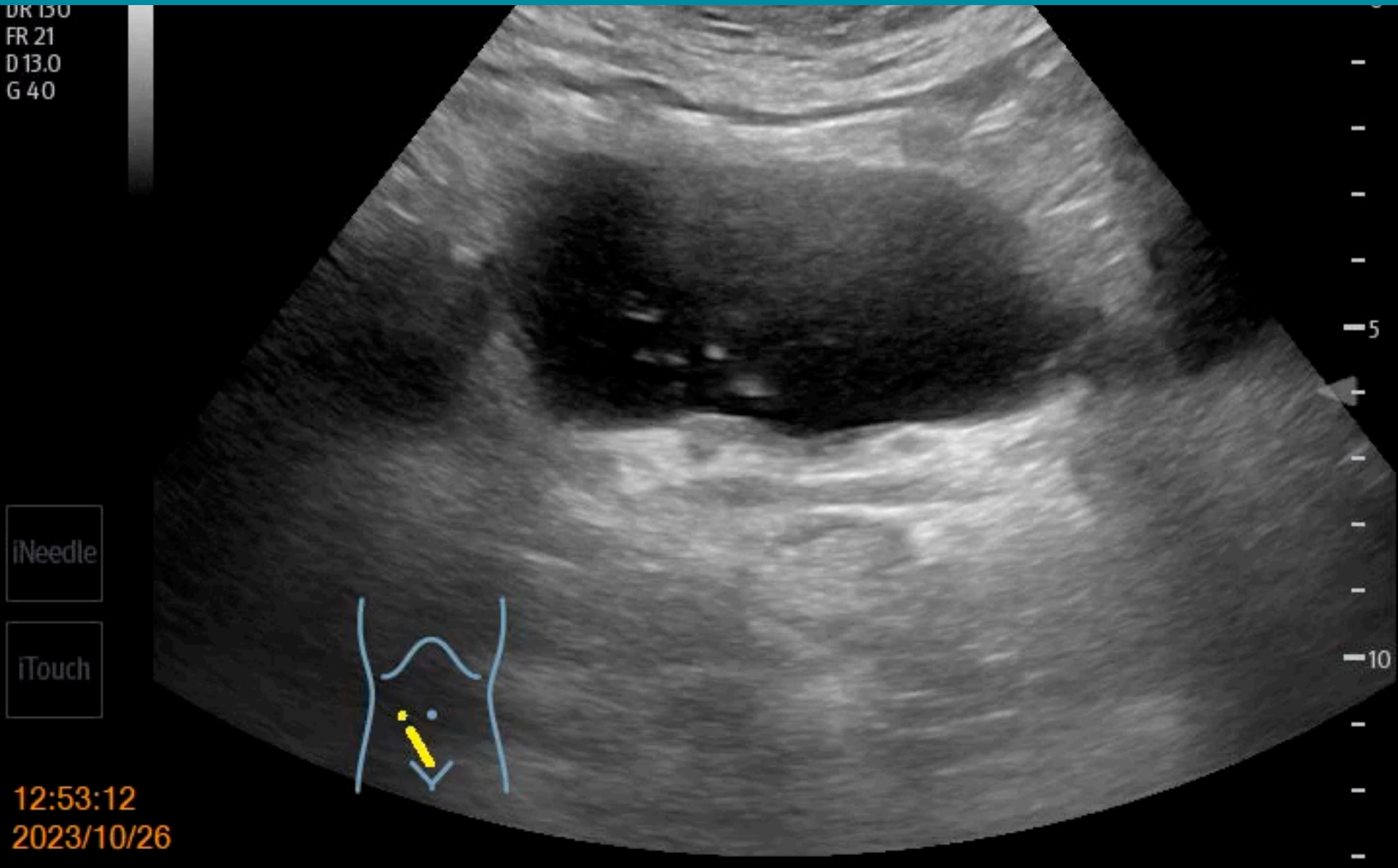
# 65F, F & R FLANK PAIN, CRP 16



# 65F, F & R FLANK PAIN, CRP 16



# UVJ STONE



# HYDROURETER