

# Ultrasound for Difficult Access “Tip in the Target Every Time”

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## Disclosures

- I am a paid consultant for General Electric
- No off label use



“Looks like you’re on top of the new regulations.”

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# Objectives

**'That's What I'm  
'Talking About**

- Describe the factors contributing to difficult or failure with ultrasound guided procedures
- Discuss ways to improve ultrasound procedural success
- Identify some of the “Hot” topics in vascular access

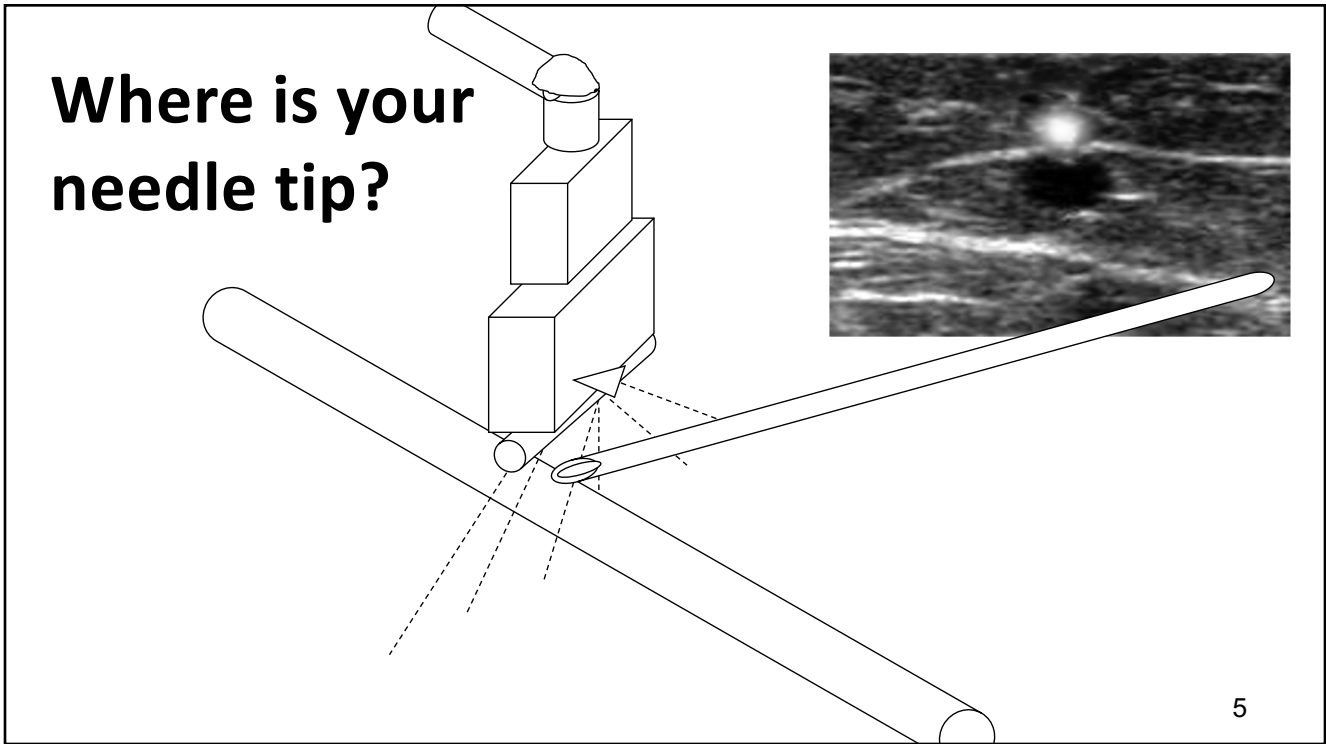
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# Ideal Vascular Access Encounter

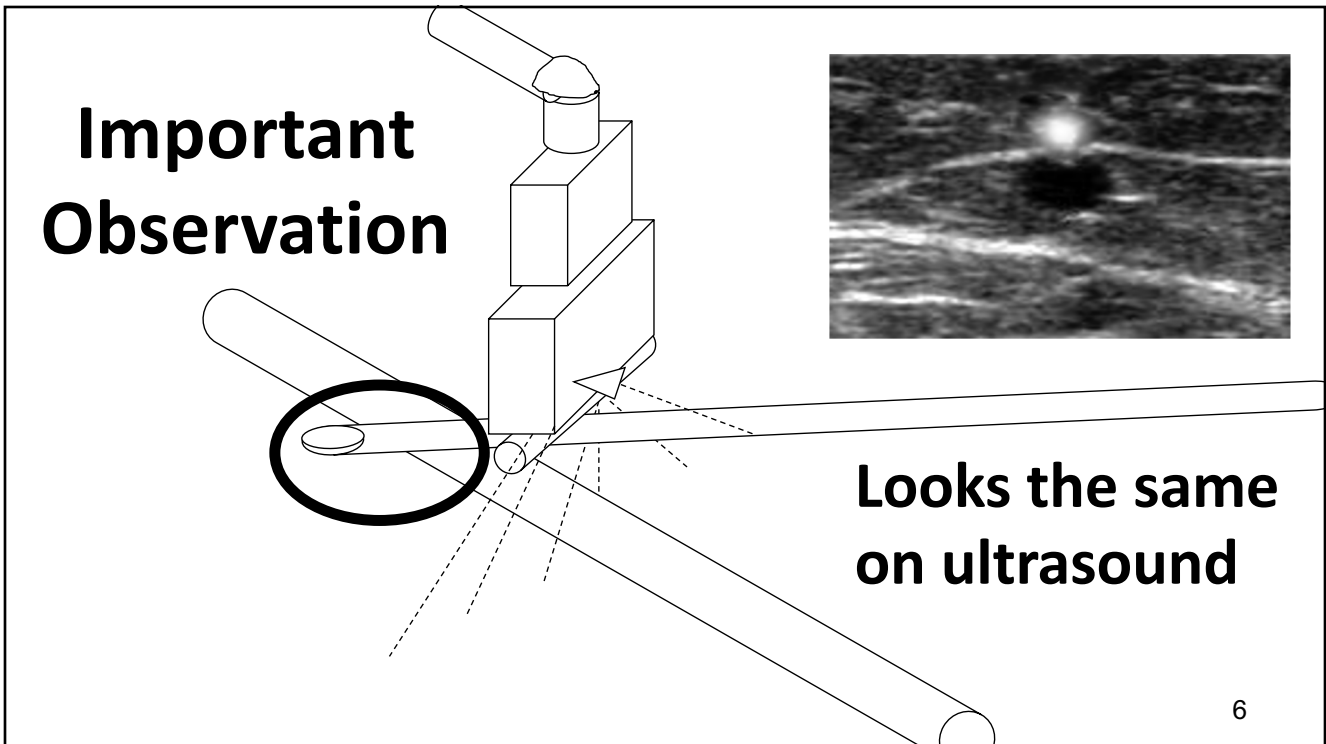
- Provide Pre-Access Assessment<sup>1</sup>
- Pt VA Hx, Understand Therapeutic Goals<sup>1</sup>
- Examine Pt, Quantify Viable Venous Targets<sup>1</sup>
- Consider Vascular Access Device Options<sup>1</sup>
- Educate & Partner with the Patient, Family<sup>1</sup>
- Select & Optimally Place Best Device
- Optimal management, timely removal<sup>1</sup>
- No Complications, Everyone's Satisfied

<sup>1</sup>Infusion Nurses Society: (2021): Infusion Therapy Standards of Practice JIN (Jan/Feb) 39(1S)

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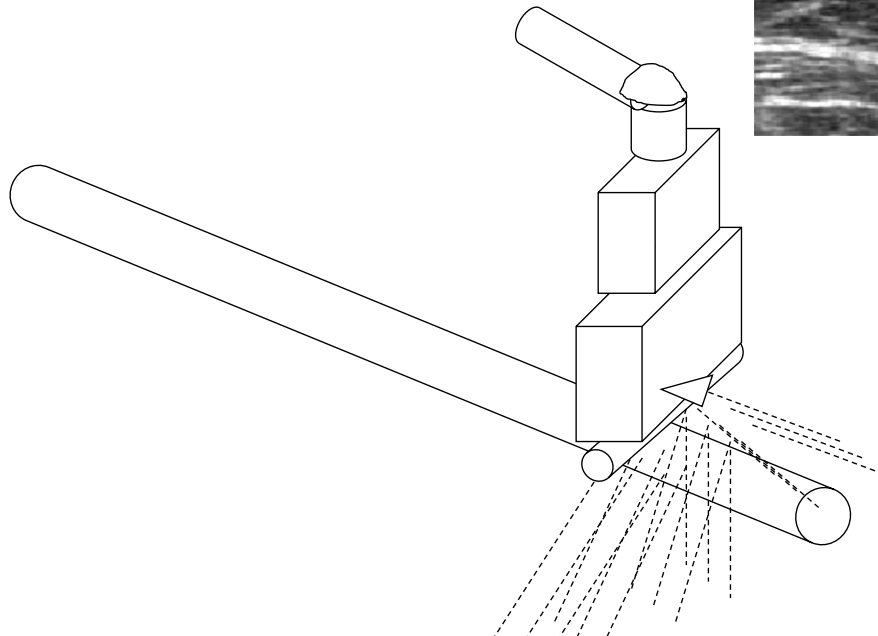
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# Key Ultrasound Points

- Everyone's comfortable-ergonomics
- Optimize image, light transducer touch
- Proper asepsis for intended dwell
- Appropriate angle of entry
- Needle tip tracking very important!
- Adequate catheter length in vein

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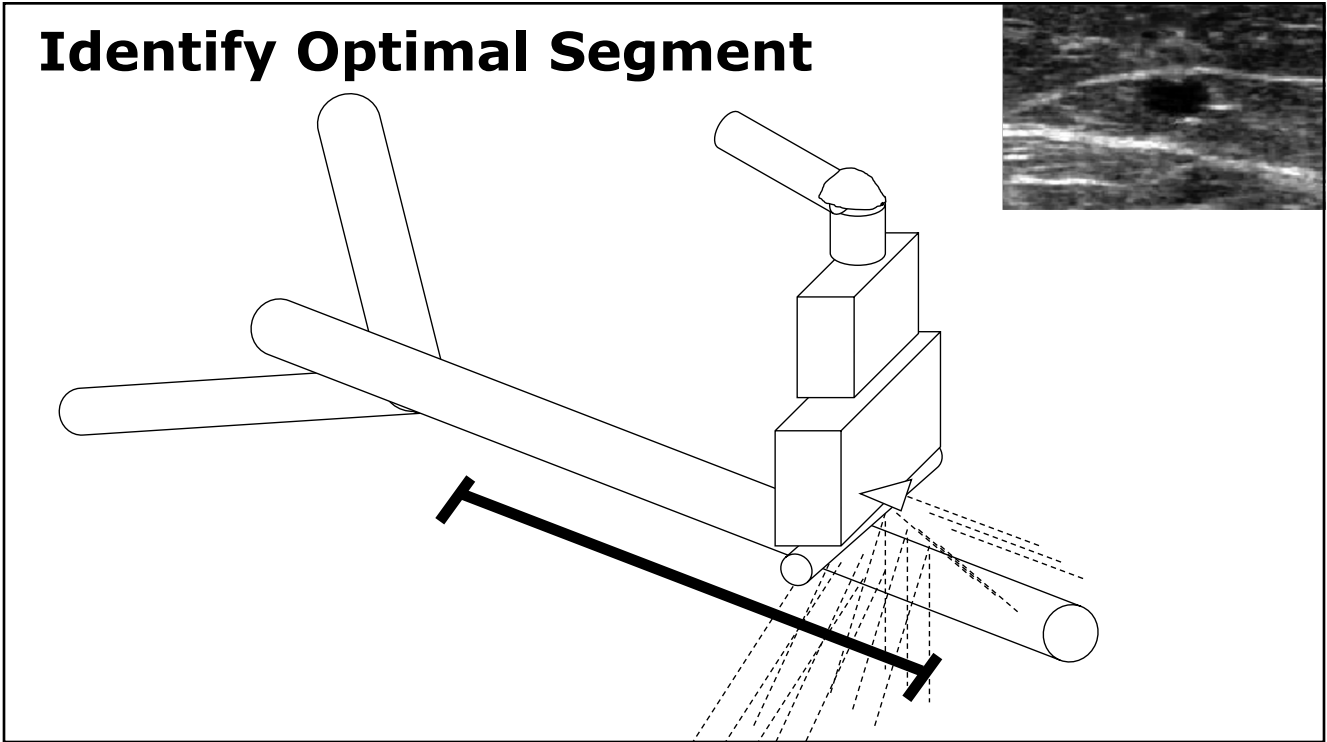
## Always Scan First



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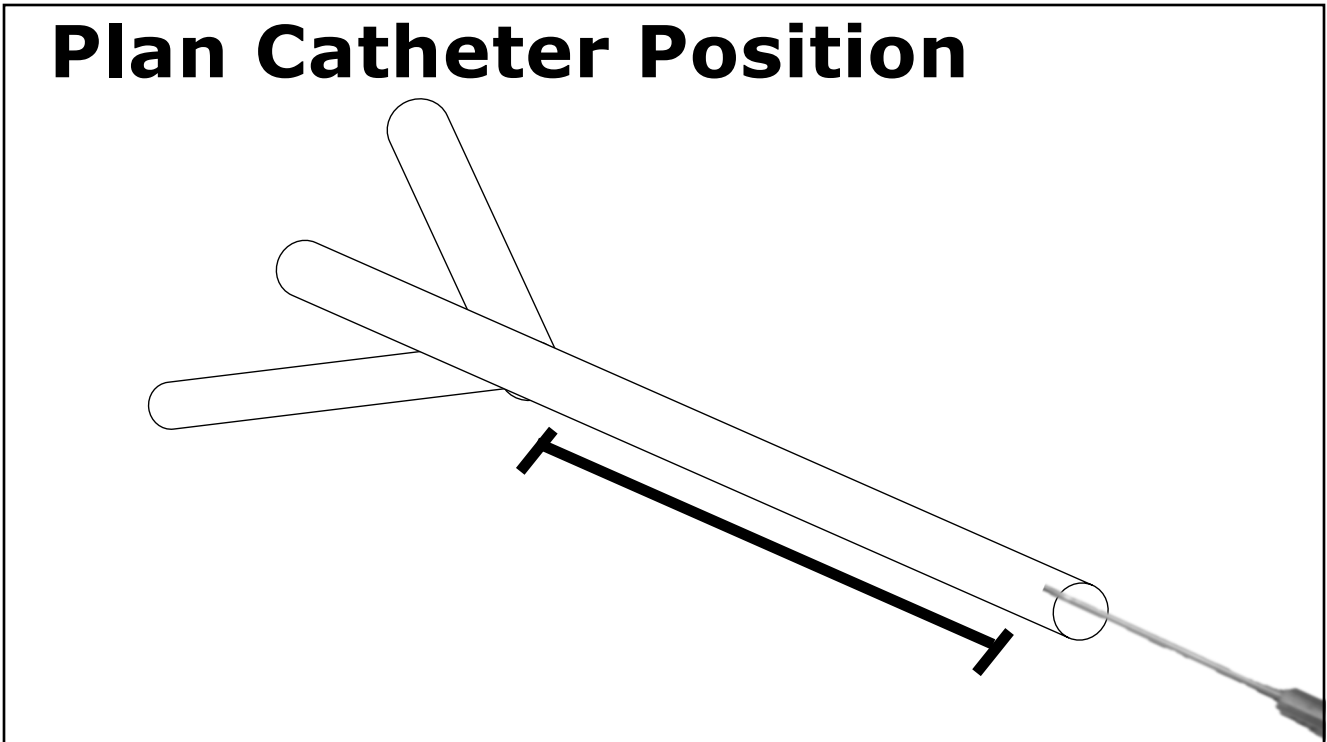


# Identify Optimal Segment



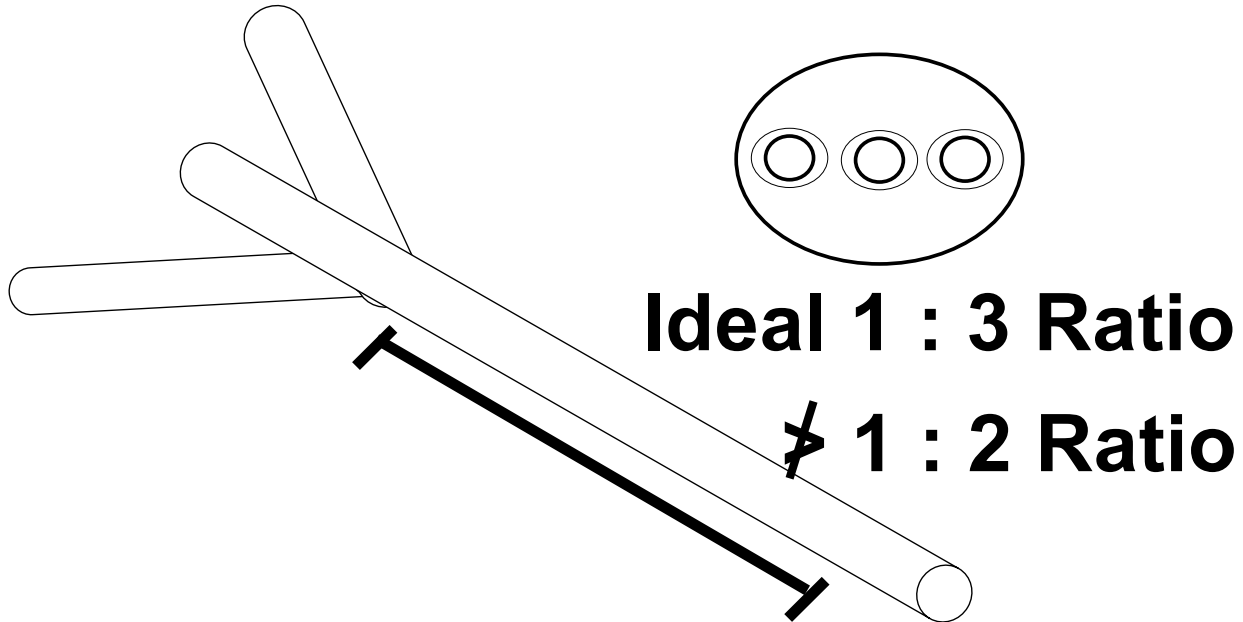
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# Plan Catheter Position



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## Plan Catheter Diameter



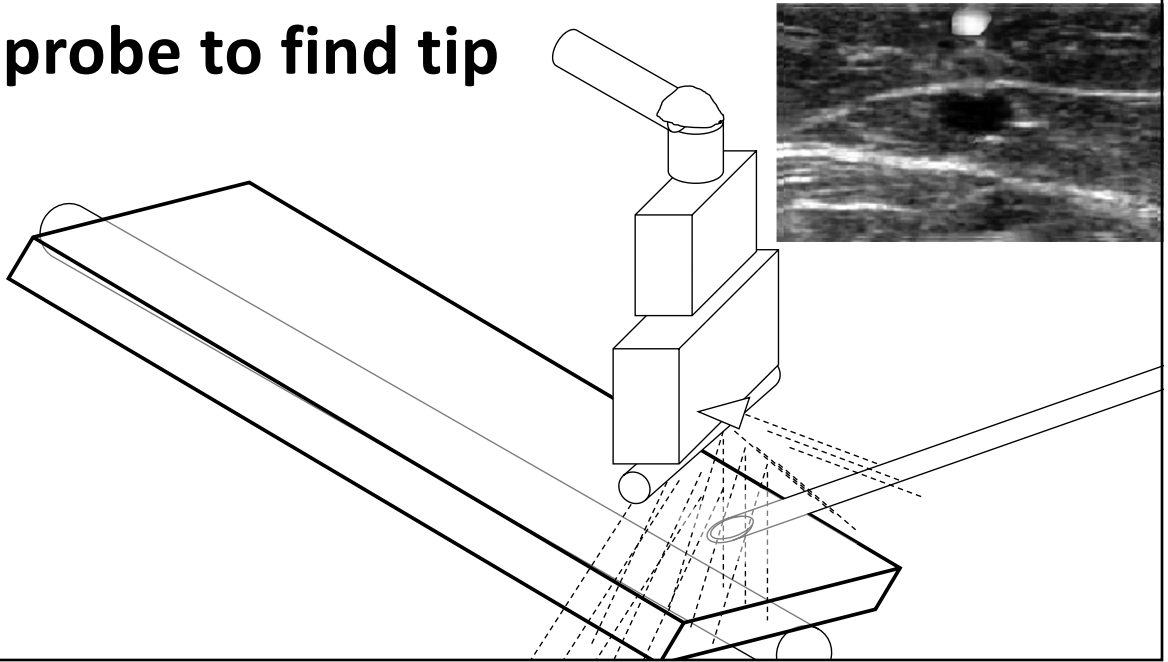
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## Insertion Process With Needle Tip Tracking



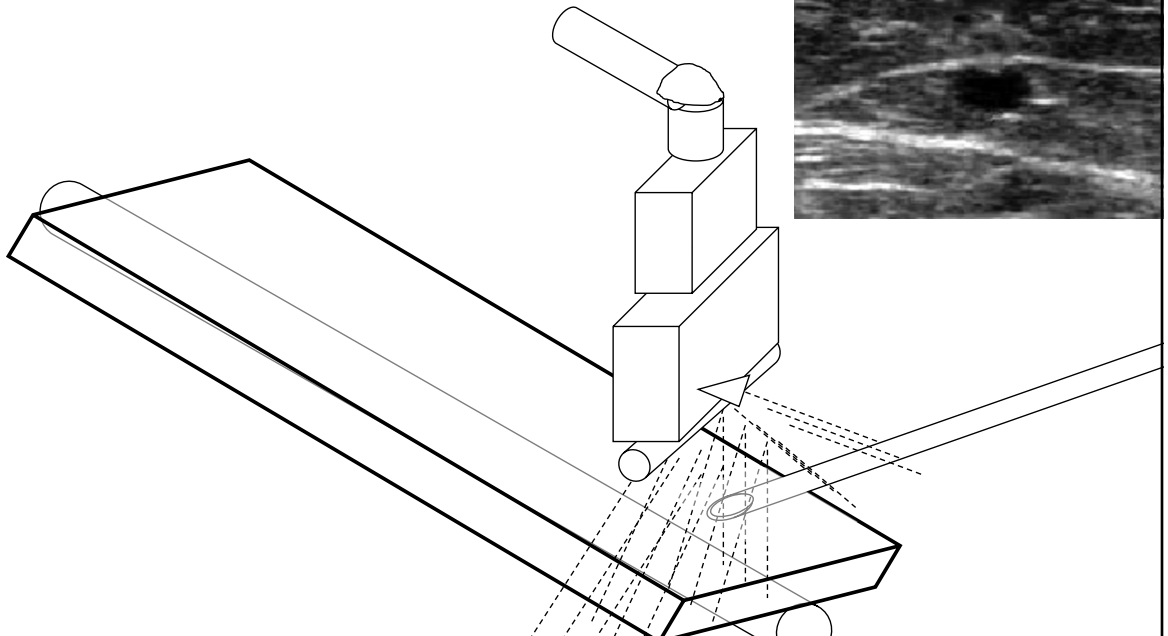
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**Needle in skin 2 mm, parallel over vessel  
slide probe to find tip**



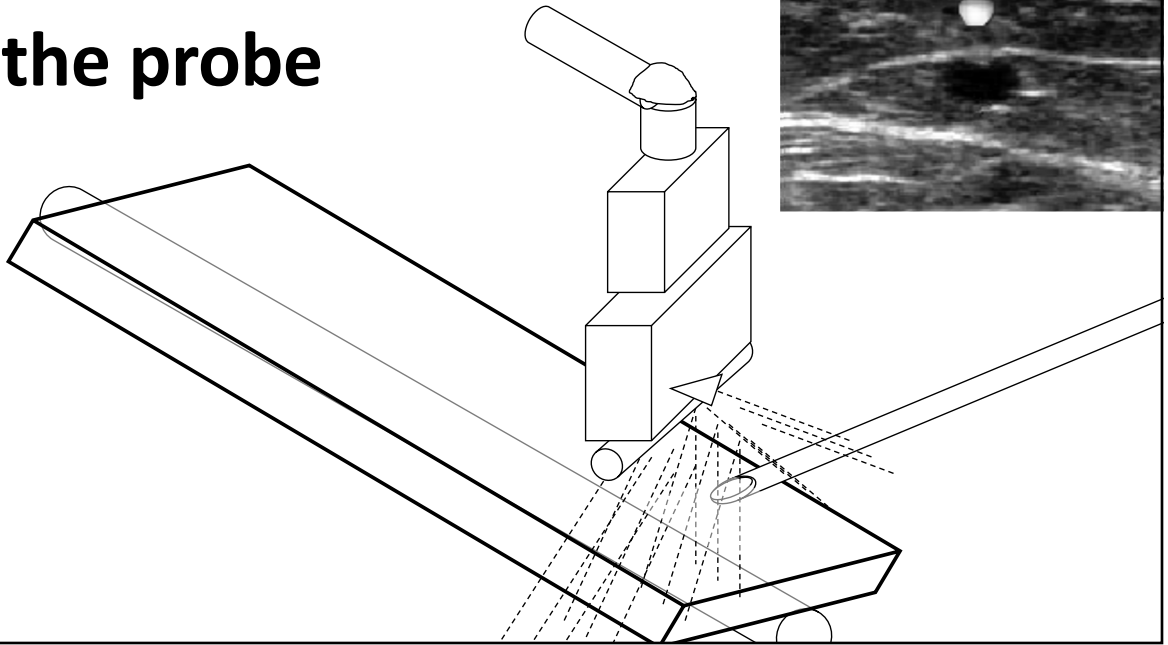
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**Slide probe forward 2mm and stop**



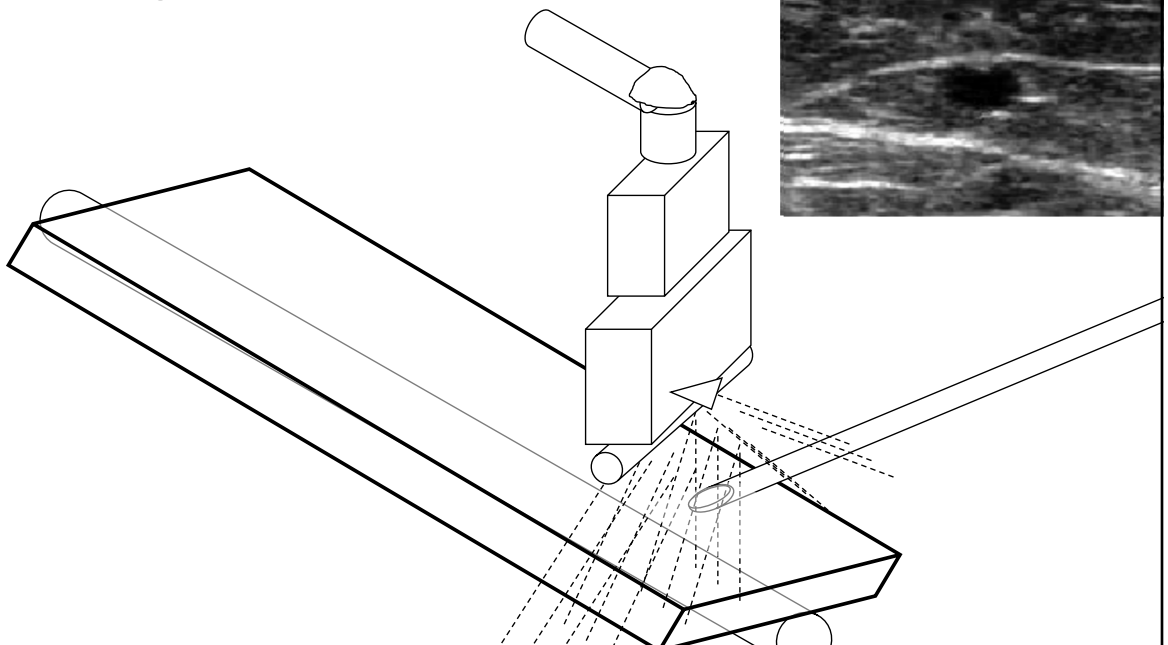
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**Advance needle 2 mm and  
find the probe**



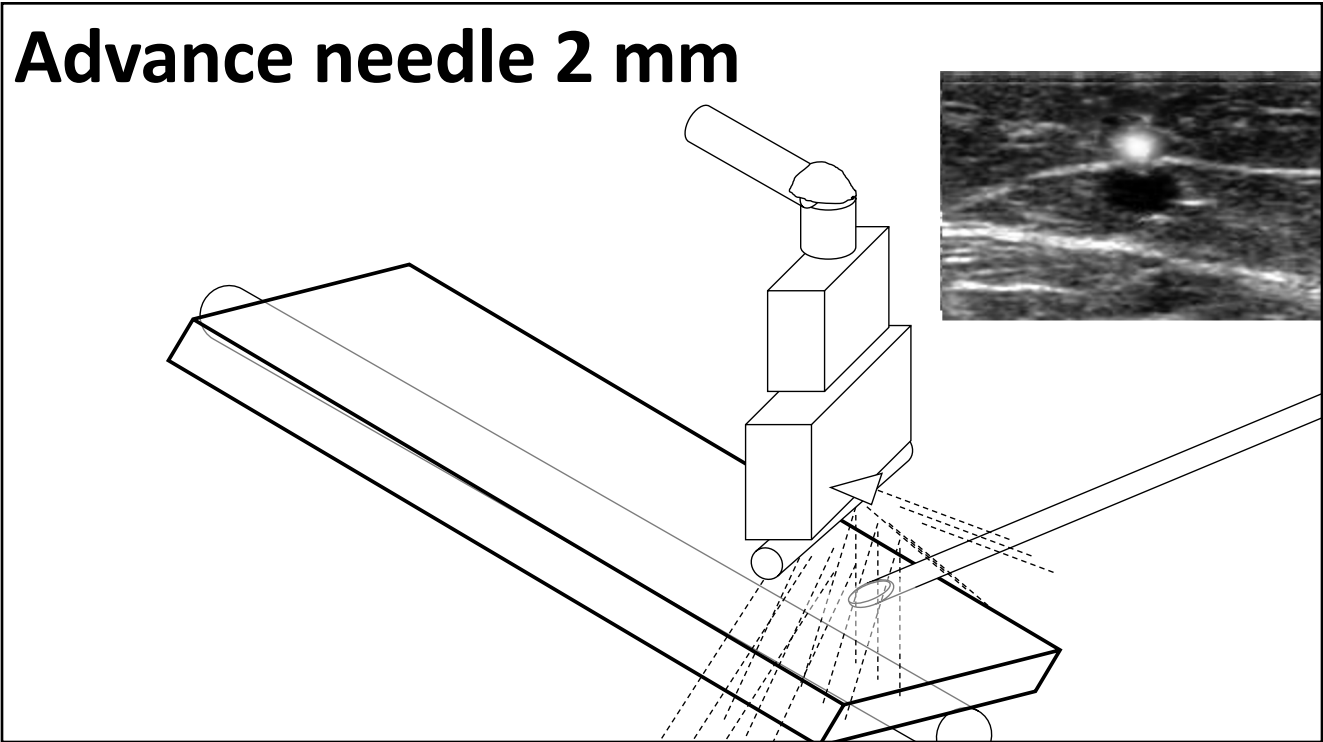
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**Advance probe 2 mm**



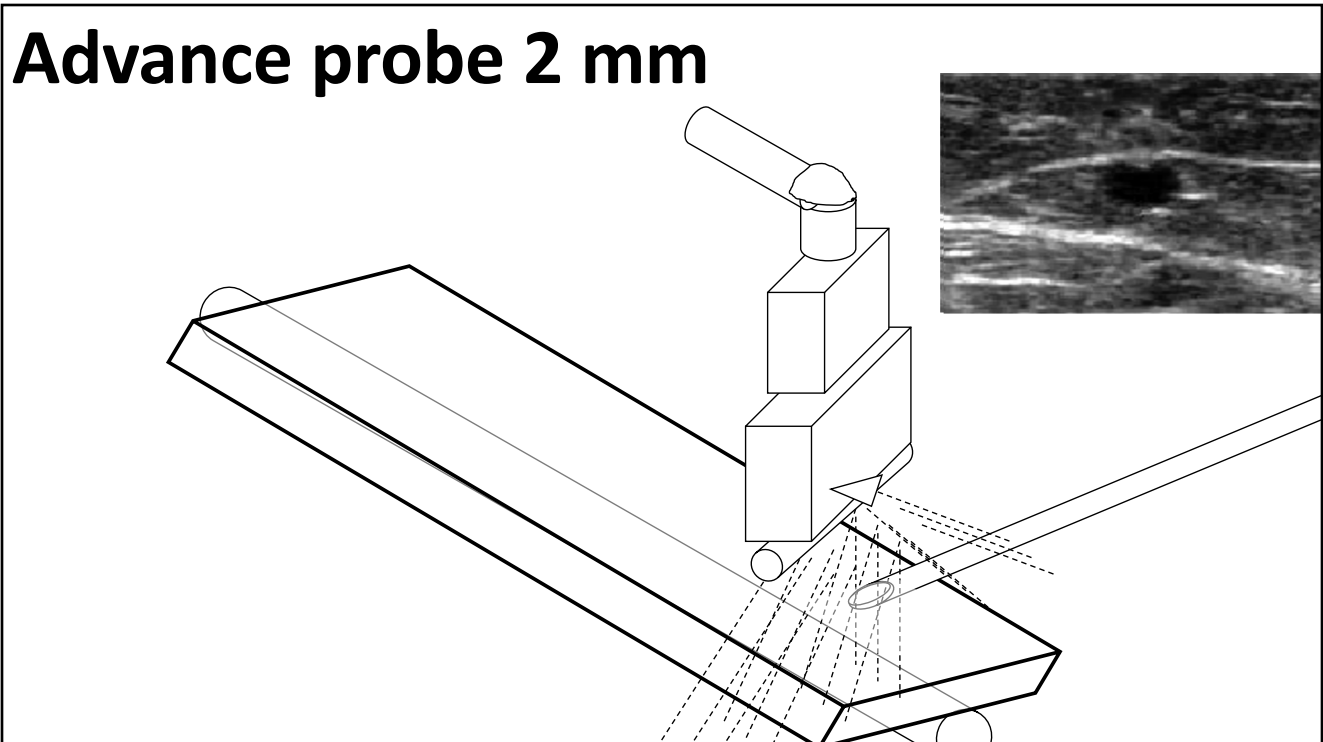
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# Advance needle 2 mm



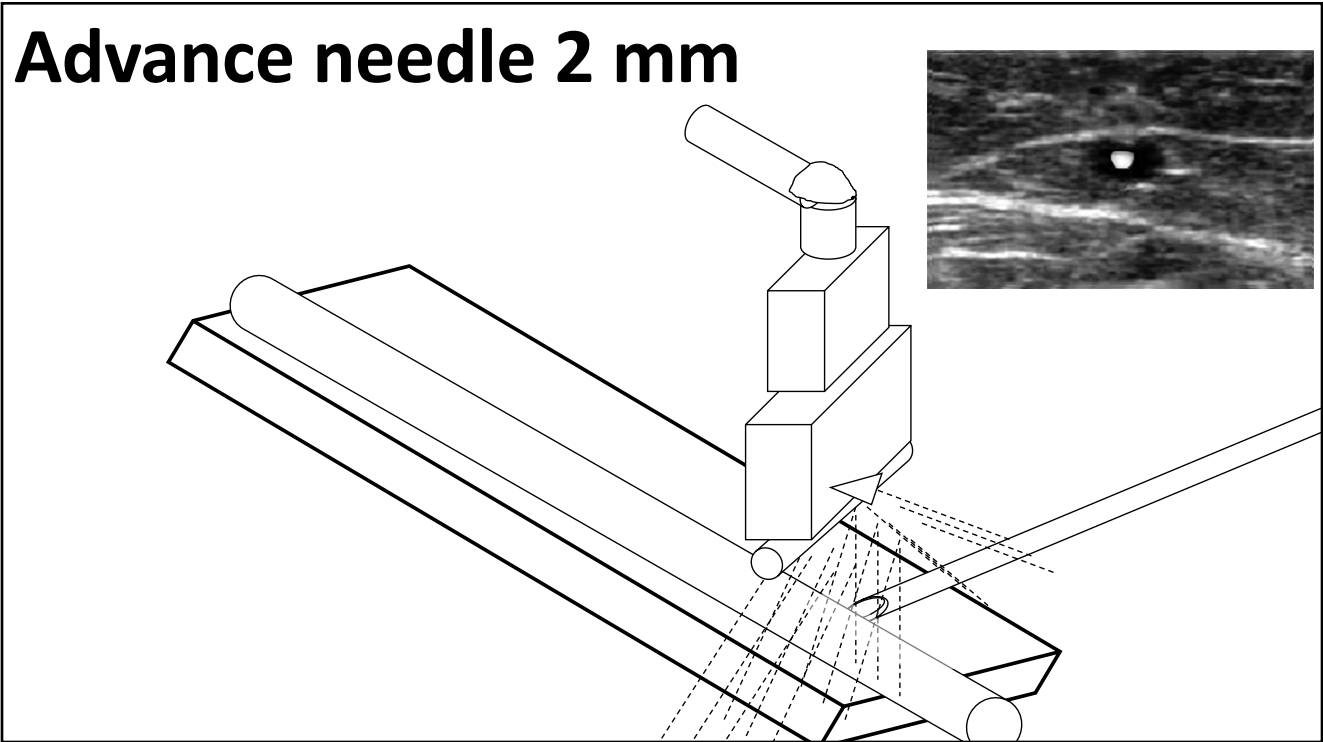
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# Advance probe 2 mm



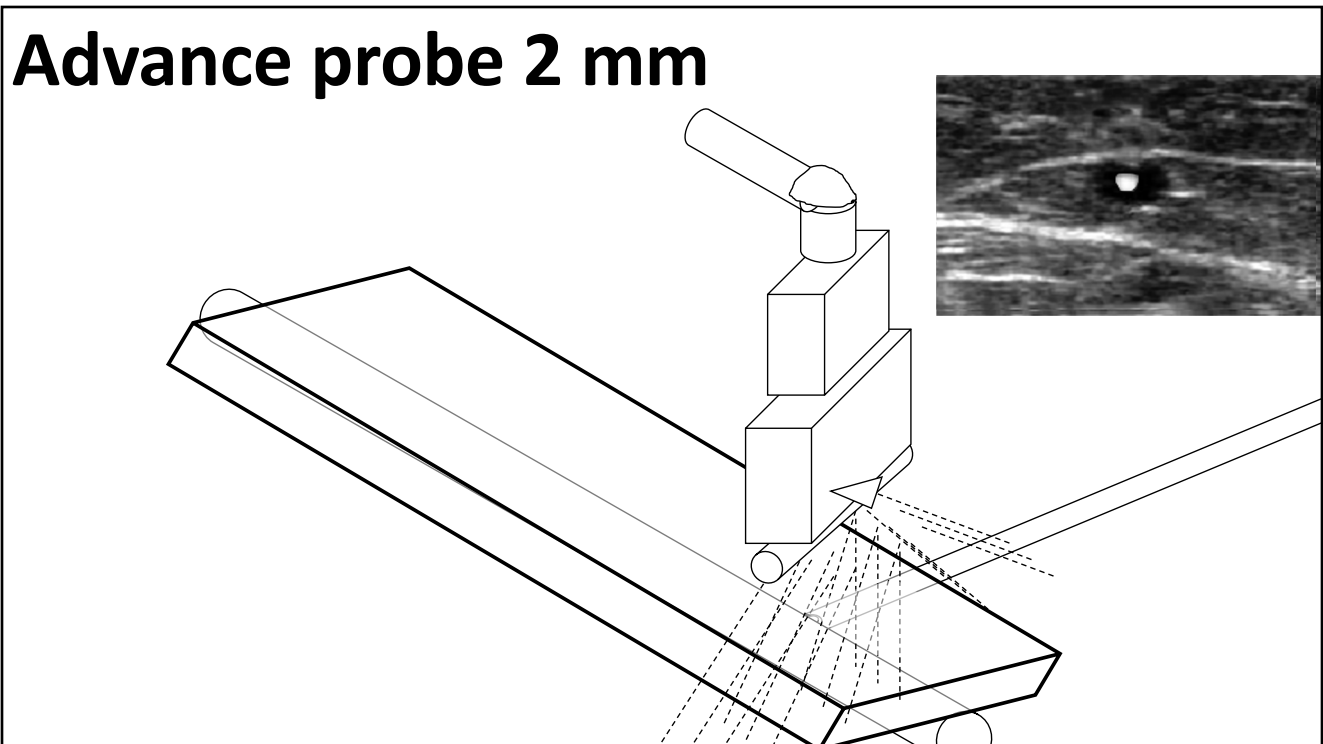
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# Advance needle 2 mm

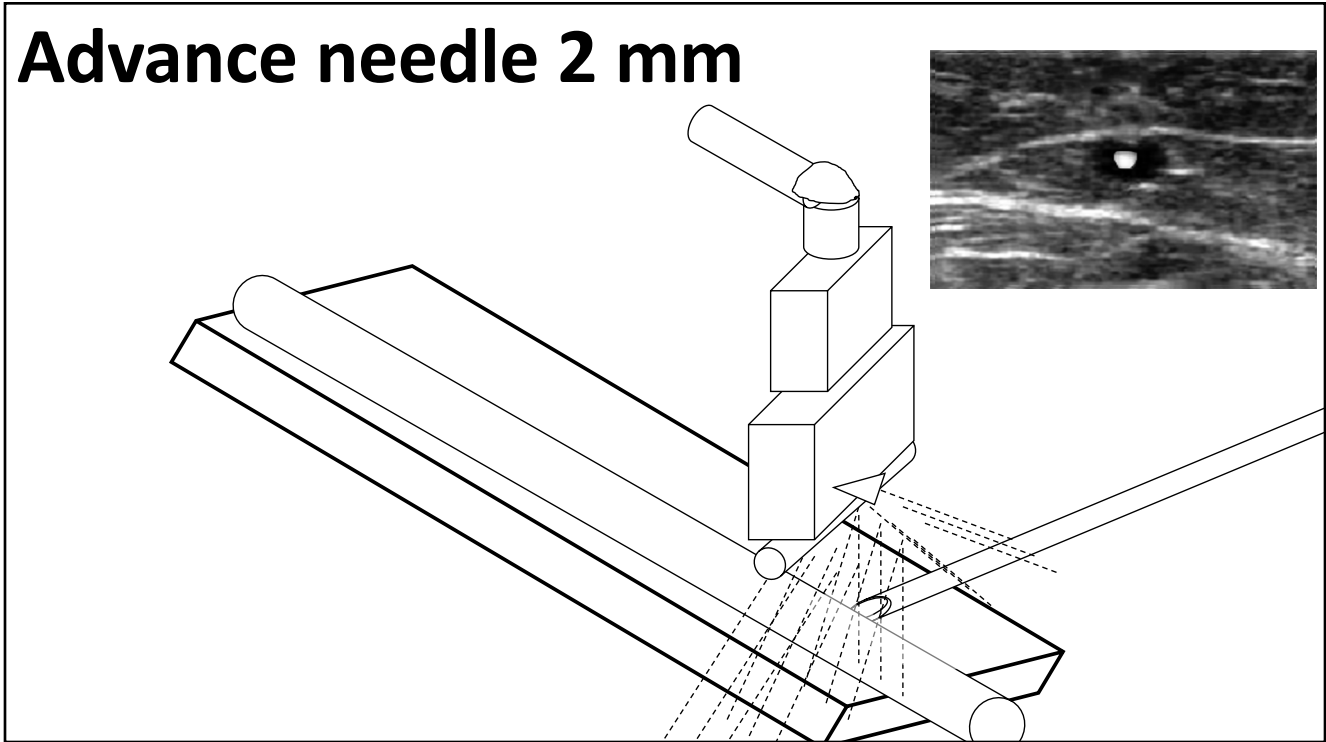


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# Advance probe 2 mm



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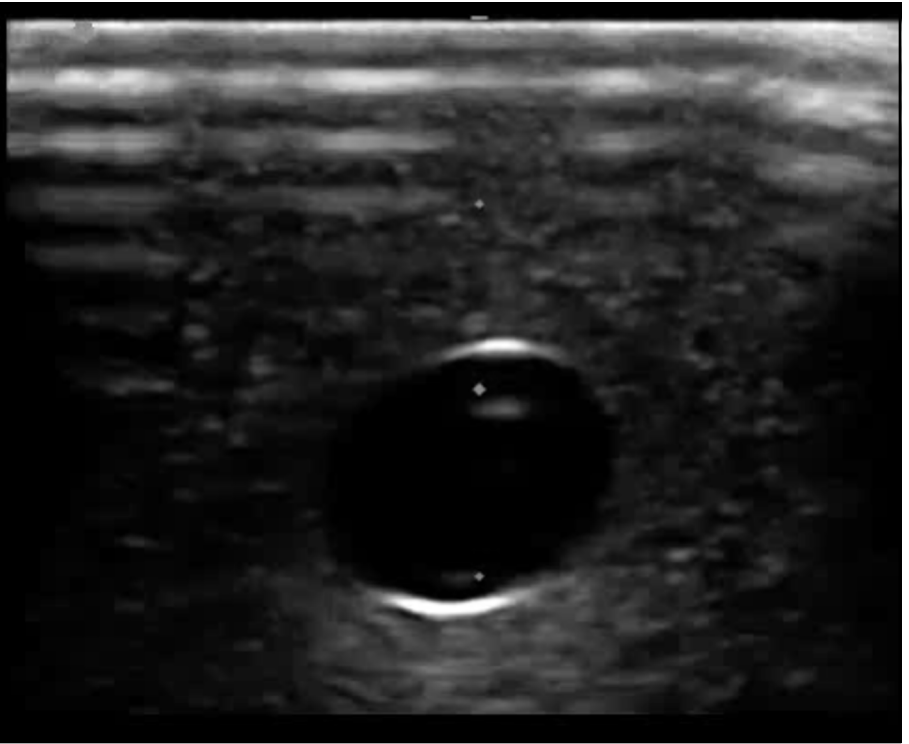


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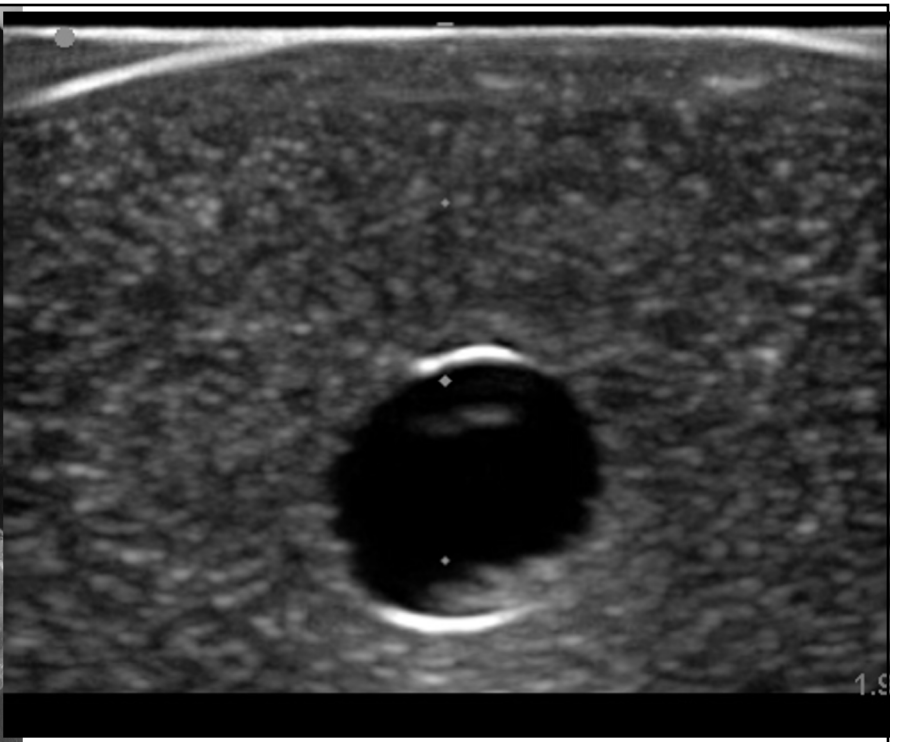


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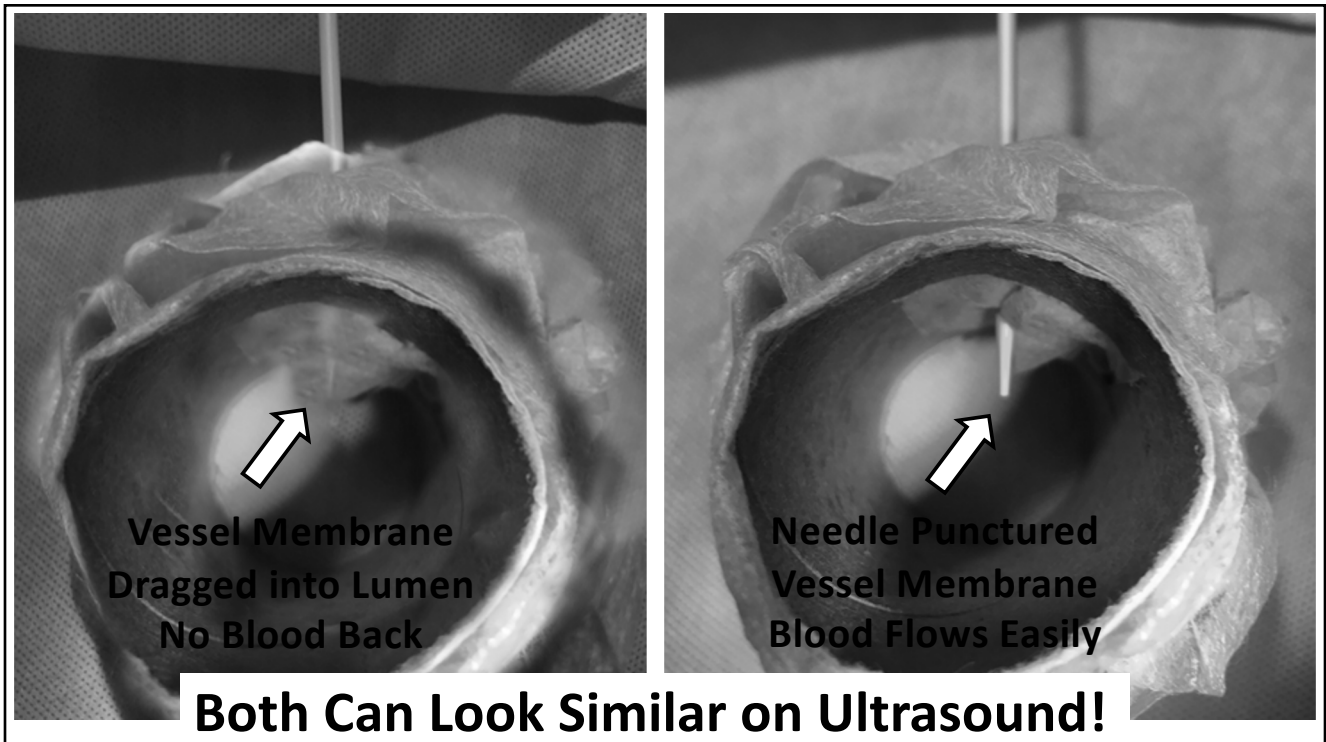
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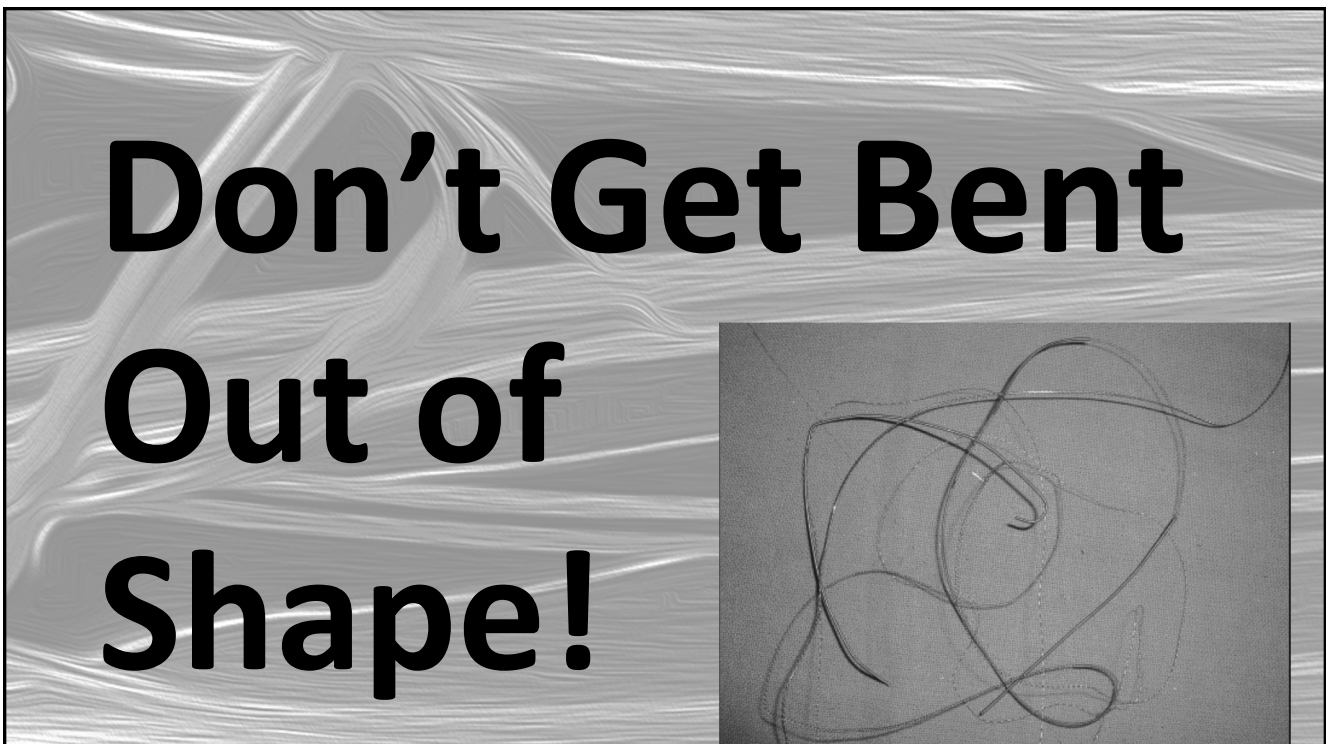
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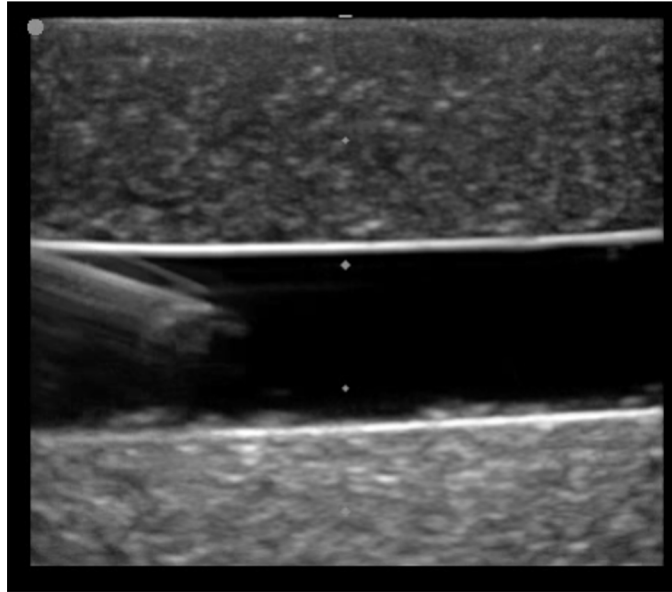


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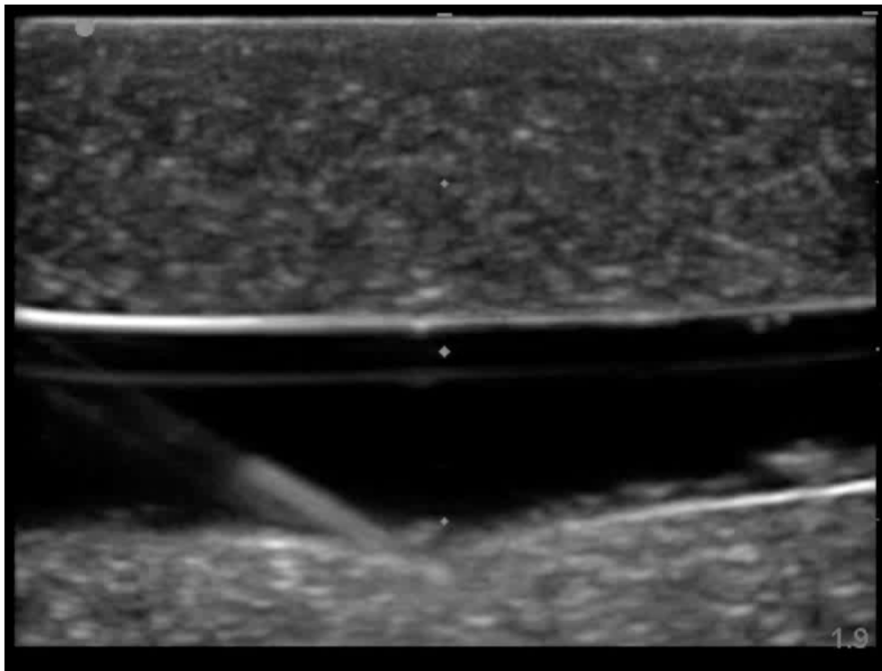
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### In Plane Needle Tip in Lumen in Direction of Flow

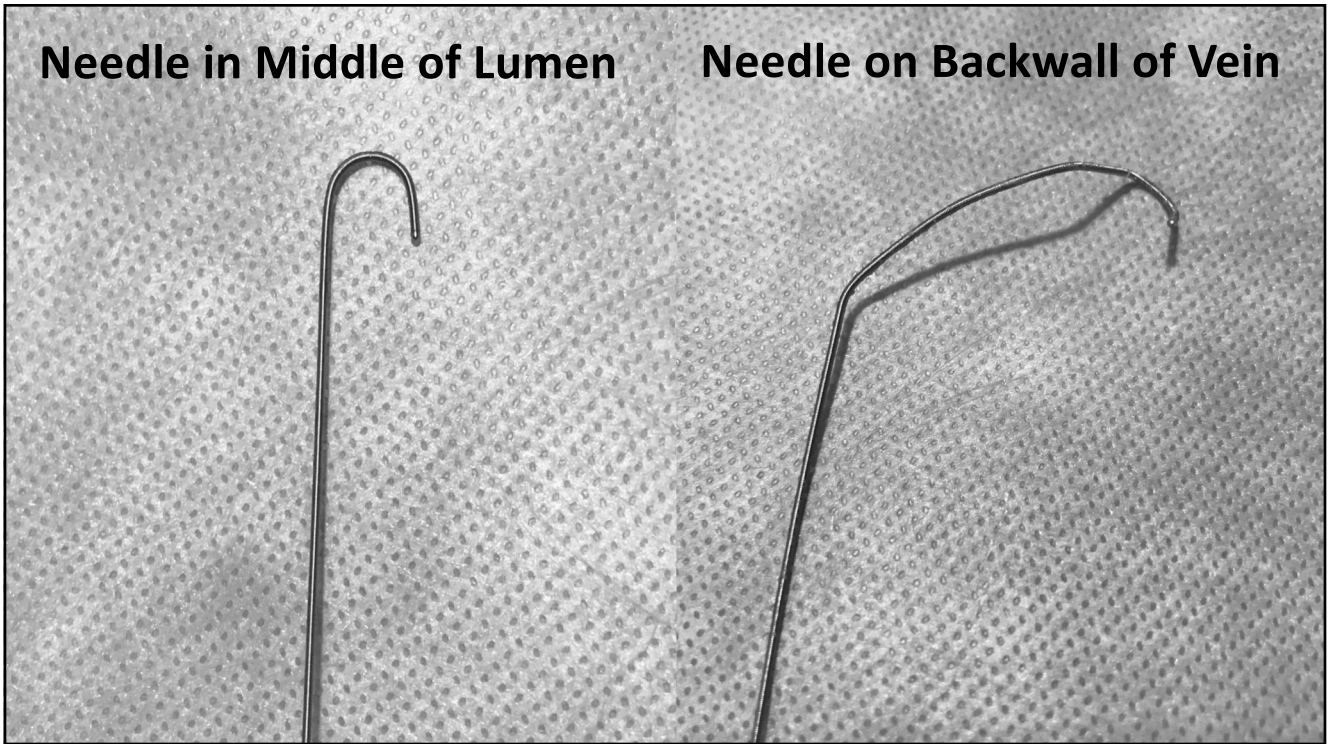


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### Needle on Back Wall With Increased Resistance and Kinking



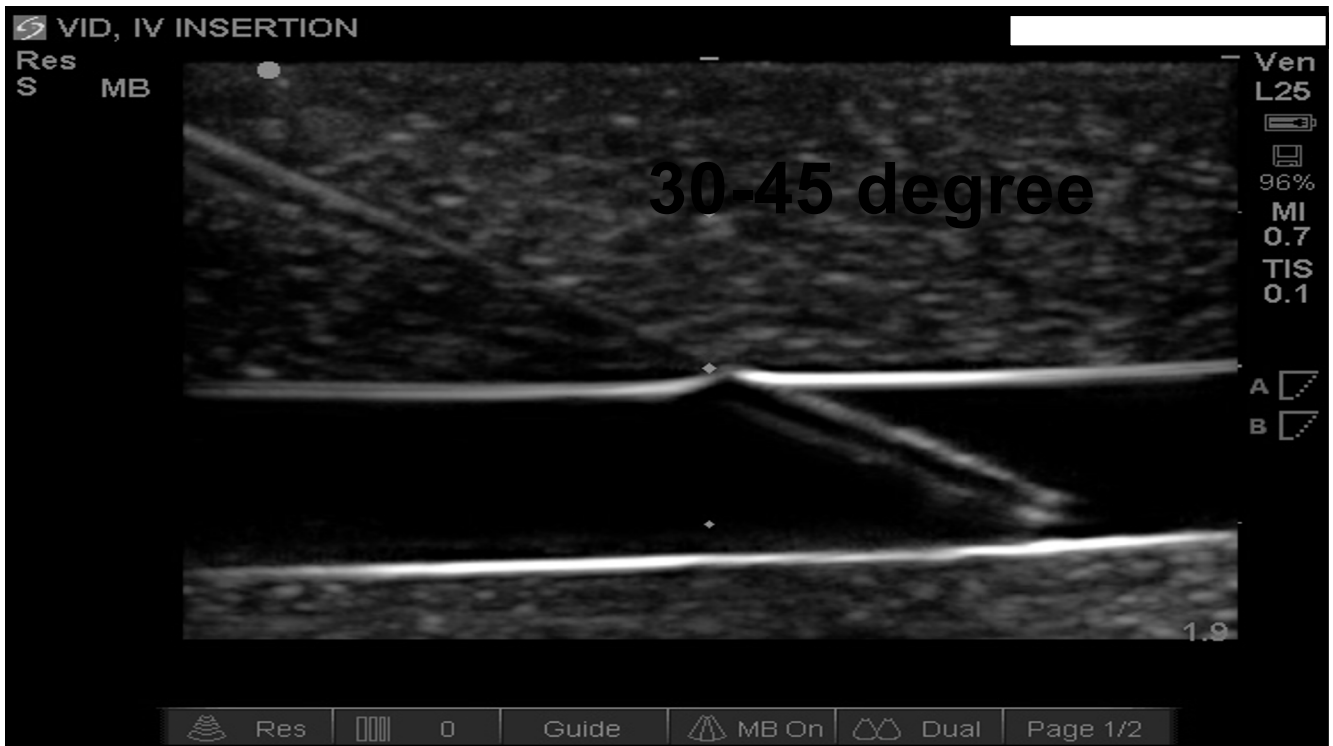
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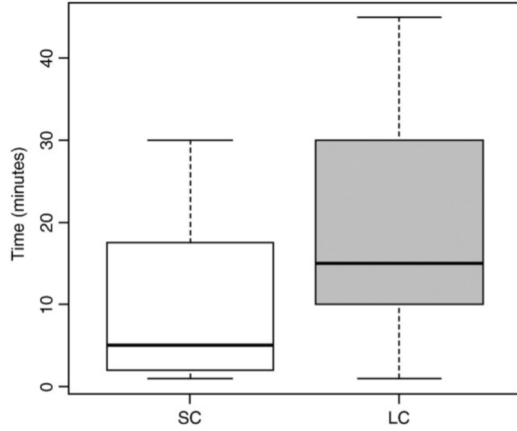
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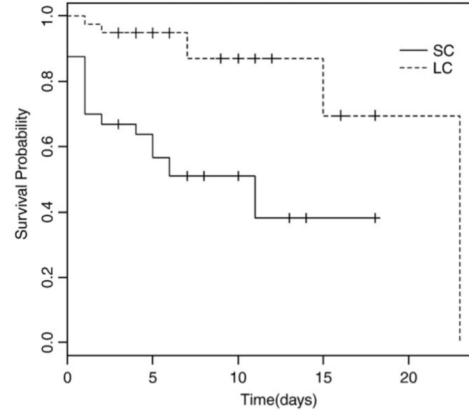
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# Short vs Long PIVs



**Fig. 1** Box plot of time required to catheter positioning. The central line represents the median value, the box boundaries represent the 25th and 75th percentiles, and the whiskers represent the minimum and the maximum values. Procedure time was



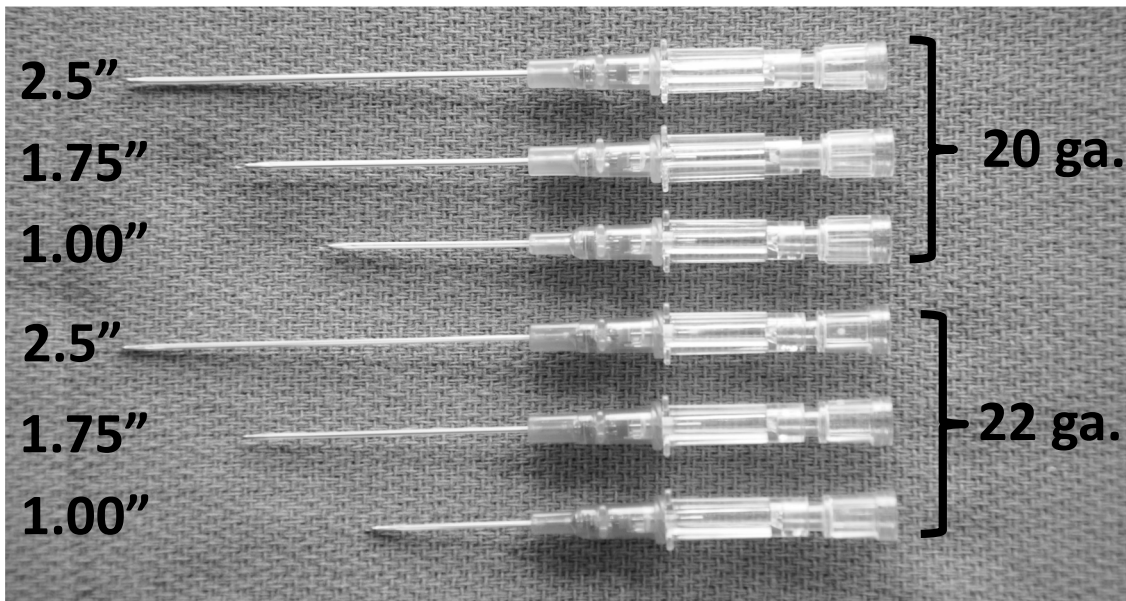
**Fig. 2** Kaplan-Meier survival probability comparing patients with SC to those who received LC. The curves are significantly different (log-rank test;  $P = .000165$ ).

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American Journal of Emergency Medicine (2012) 30, 712–716

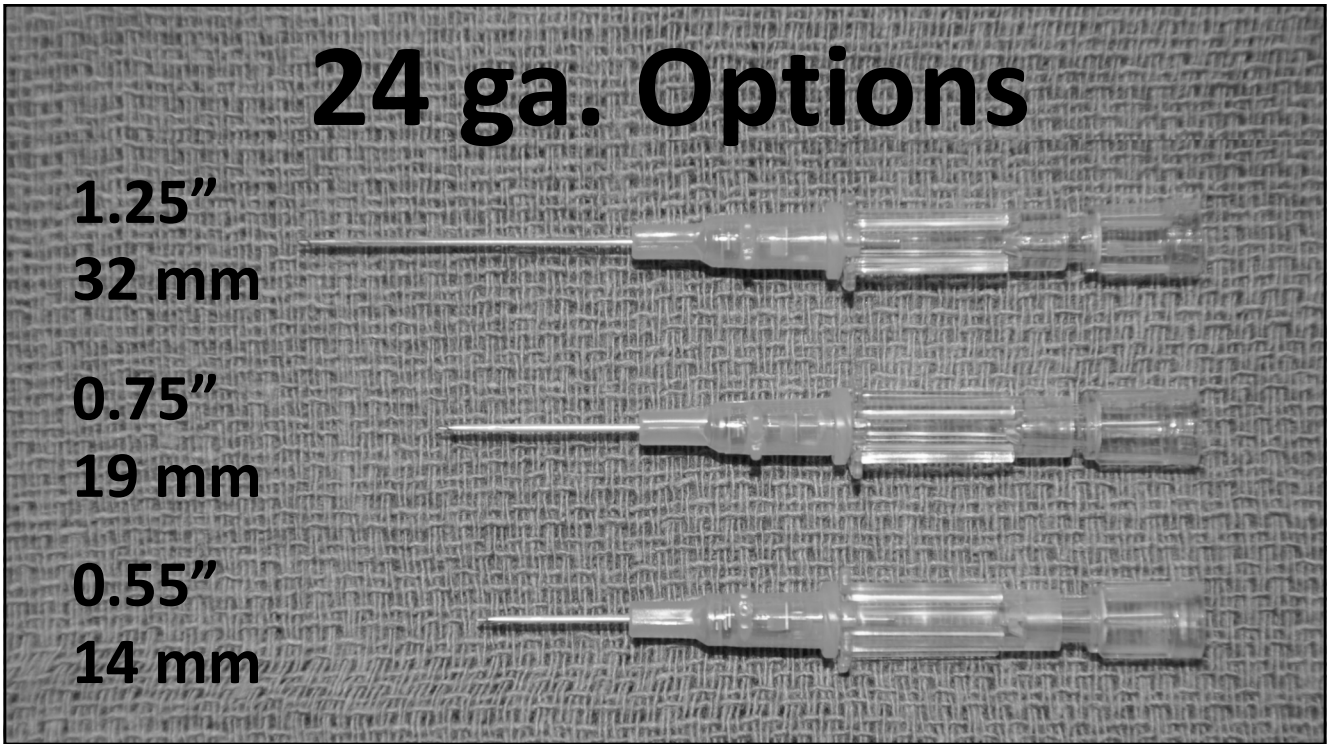
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# Catheter Choices



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# Venous Access Realities

- Catheter insertion injures the endothelium
- Catheters take up volume within the vein
- All catheters alter the flow pathway of veins
- A high Catheter to Vein Ratio will create venous stasis leading to thrombosis

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## Risk of Thrombosis

Diagnosis <sup>c</sup>	Solid tumour	0 (0)	35 (27)	35 (26)	5.490	0.672-∞	0.120
	Haematological cancer	4 (100)	29 (22)	33 (24)			
	Infection	0 (0)	60 (45)	60 (44)			
	Other	0 (0)	8 (6)	8 (6)			

Catheter to vein ratio and cases of venous thromboembolism.

Characteristic	Venous thromboembolism			RR	95% CI	Sig. <sup>a</sup>
	Yes (n=4) n (%)	No (n=132) n (%)	Total (n=136) n (%)			
Catheter to vein ratio	18-33%	1 (25)	66 (50)	1.04	0.99-1.09	0.097
	34-45%	0 (0)	44 (33)			
	46-70%	3 (75)	18 (14)			
	>71%	0 (0)	4 (3)			

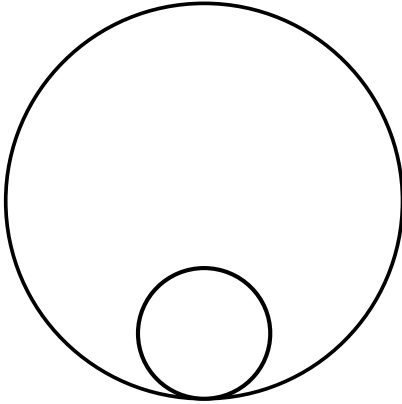
<sup>a</sup> Based on log binomial generalised linear model (analysed as a continuous variable); CI= confidence interval; RR =relative risk.

Sharp R, et al. International J Nurs Studies 2015;52:677-685

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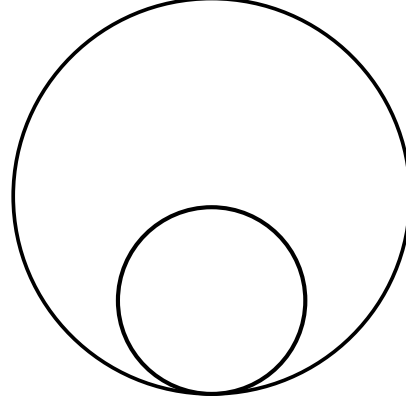
## Surface Area Comparison

33% Diameter



11.1% Surface Area

45% Diameter



20.3% Surface Area

J Thromb Thrombolysis (2017) 44:427–434

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## Summary

- Needle tip tracking provides continuous control of the needle and improves procedural success
- Optimizing catheter lie and catheter to vein ratio may help reduce PIV related complications
- A more proactive approach to vascular access may help improve device selection and increase complication free dwell times

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**Thank You!**  
**Questions?**

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