

# Les abords vasculaires dirigés

Michel Slama

Amiens

France

Je n'ai jamais raté  
La mise en place  
d'un cathé central,  
Tu me fais marrer avec  
tes conneries d'écho

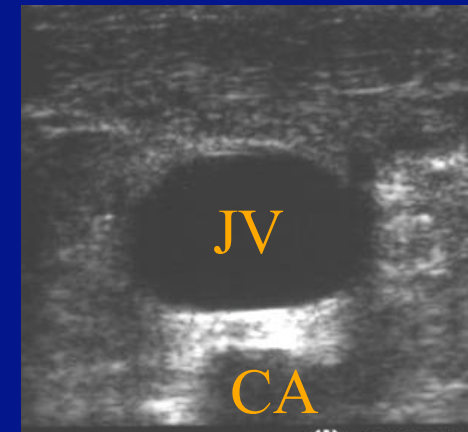
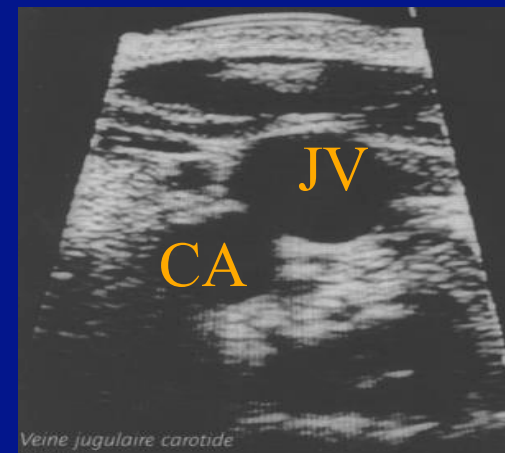


Pourquoi ce n'est pas vrai?

# La position des veines centrales peut être anormale.

Caridi JG AJR 1998;171:1259-63; Slama M, Intens Care Med 1997;23:916-9

- 80 patients
  - 71% position était typique
  - 16% position médiale: en avant de la carotide interne
  - 9% sont thrombosées
  - 4% sont positionnées latéralement à plus de 1 cm de la carotide
- Sur 79 patients : petit taille de la VJI < 5 mm: 10%



# Le patient ne veut pas coopérer!

- Anomalies de la coagulation
- Hypovolemie
- Obésité
- Pansements
- Chirurgie
- Position couchée difficile

# Etudes prospectives de mise en place avec repères externes

- 10-30% échecs
- 64-75% des cathéters mis en place après plus d'une tentative (douleur et inconfort)
- 5-25% ponction carotidiennes
- Hématome: 0.6-12%
- Pneumothorax <1%
- AVC après dissection carotidienne (n=4)(Acta Neurol Scand 2002;105:235)

**Table 2.** Frequency of Mechanical Complications, According to the Route of Catheterization.\*

Complication	Frequency		
	Internal Jugular	Subclavian <i>percent</i>	Femoral
Arterial puncture	6.3–9.4	3.1–4.9	9.0–15.0
Hematoma	<0.1–2.2	1.2–2.1	3.8–4.4
Hemothorax	NA	0.4–0.6	NA
Pneumothorax	<0.1–0.2	1.5–3.1	NA
Total	6.3–11.8	6.2–10.7	12.8–19.4

\* Data are from Merrer et al.,<sup>5</sup> Sznajder et al.,<sup>6</sup> Mansfield et al.,<sup>8</sup> Martin et al.,<sup>22</sup> Durbec et al.,<sup>23</sup> and Timsit et al.<sup>24</sup> NA denotes not applicable.

**L'utilisation des techniques  
ultrasoniques permet-t-elle d'aider le  
réanimateur?**

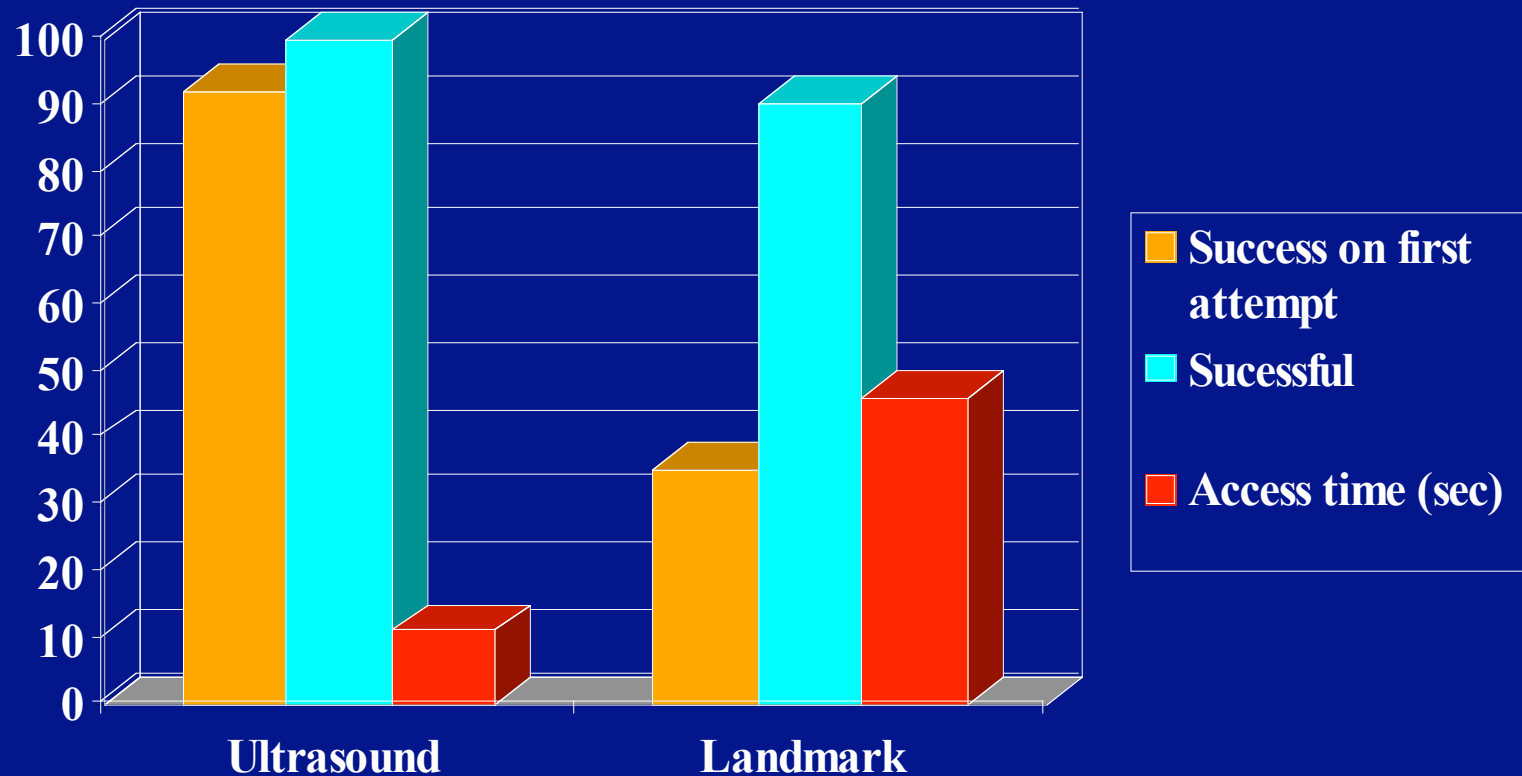


# L'échographie



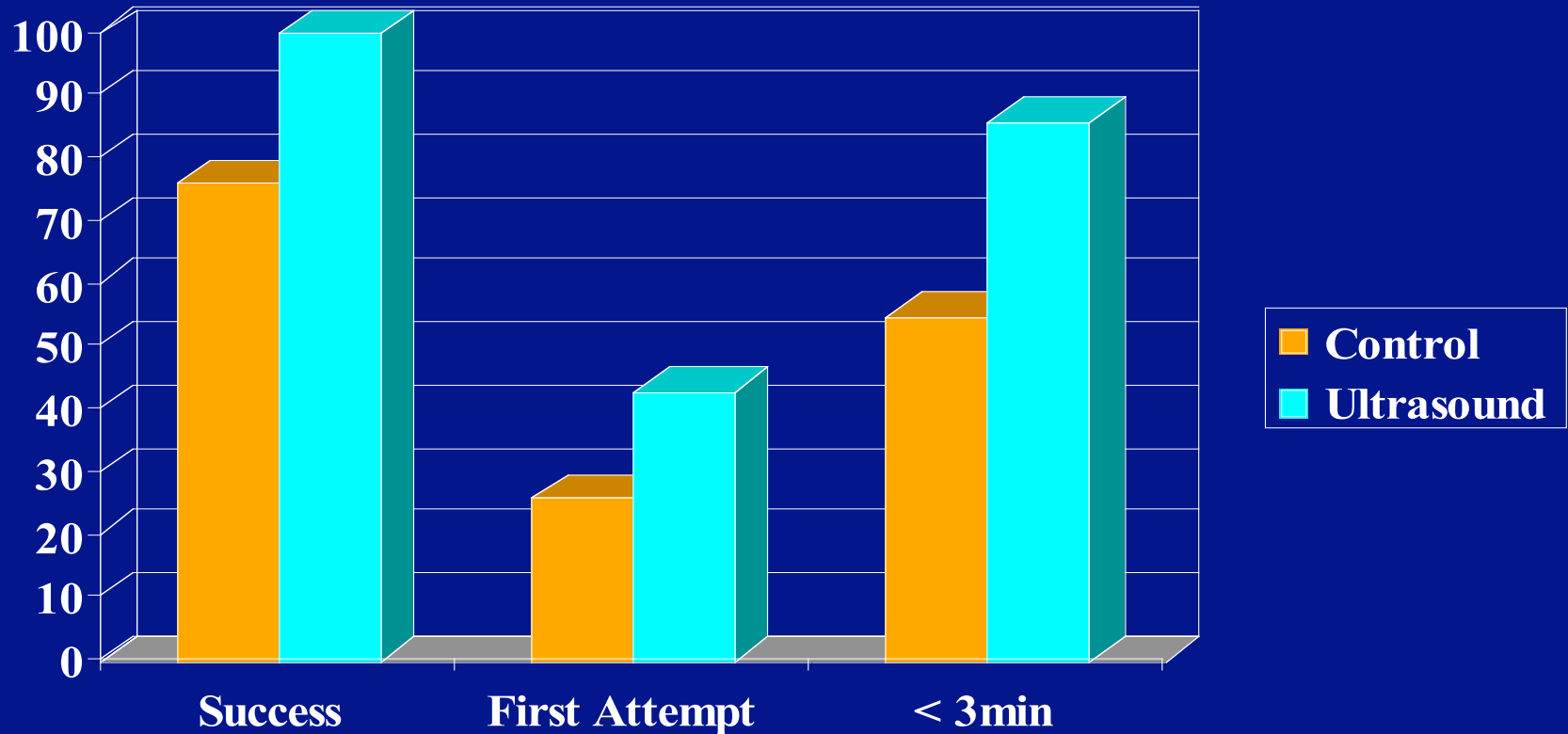


# Efficacy of Ultrasound Guided technique (n = 1230 patients for myocardial biopsy)



# Ultrasound-Guided Technique in ICU (n = 79)

Prospective and randomized study



Slama M, Intens Care Med 1997;23:916-9

# Subclavian Venous Cannulation by inexperienced operators using ultrasound technique

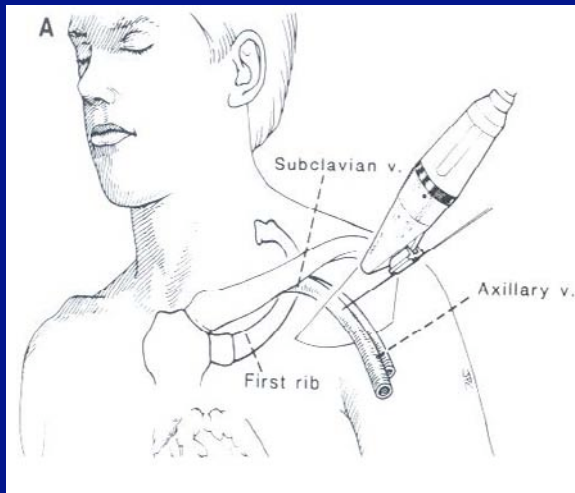


Table 1. Summary of study results

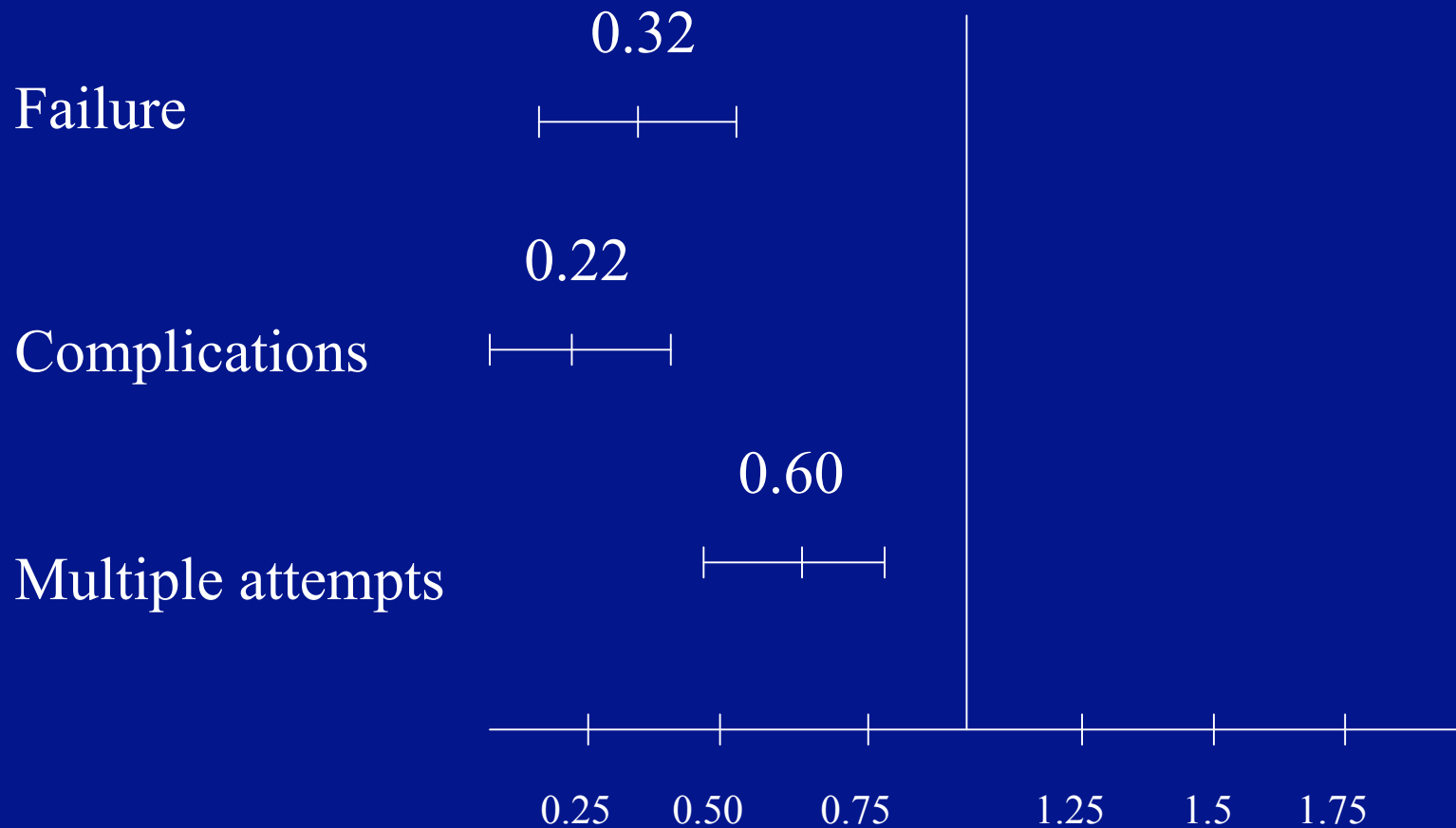
	Landmark (n = 27)	Ultrasound (n = 25)	p Value
Success rate	12 (44)	23 (92)	.0003 <sup>a</sup>
Minor complications	11 (41)	1 (4)	.002 <sup>a</sup>
Venipunctures required	2.5	1.4	.0007 <sup>b</sup>
Insertion kits required	1.4	1.0	.0003 <sup>b</sup>

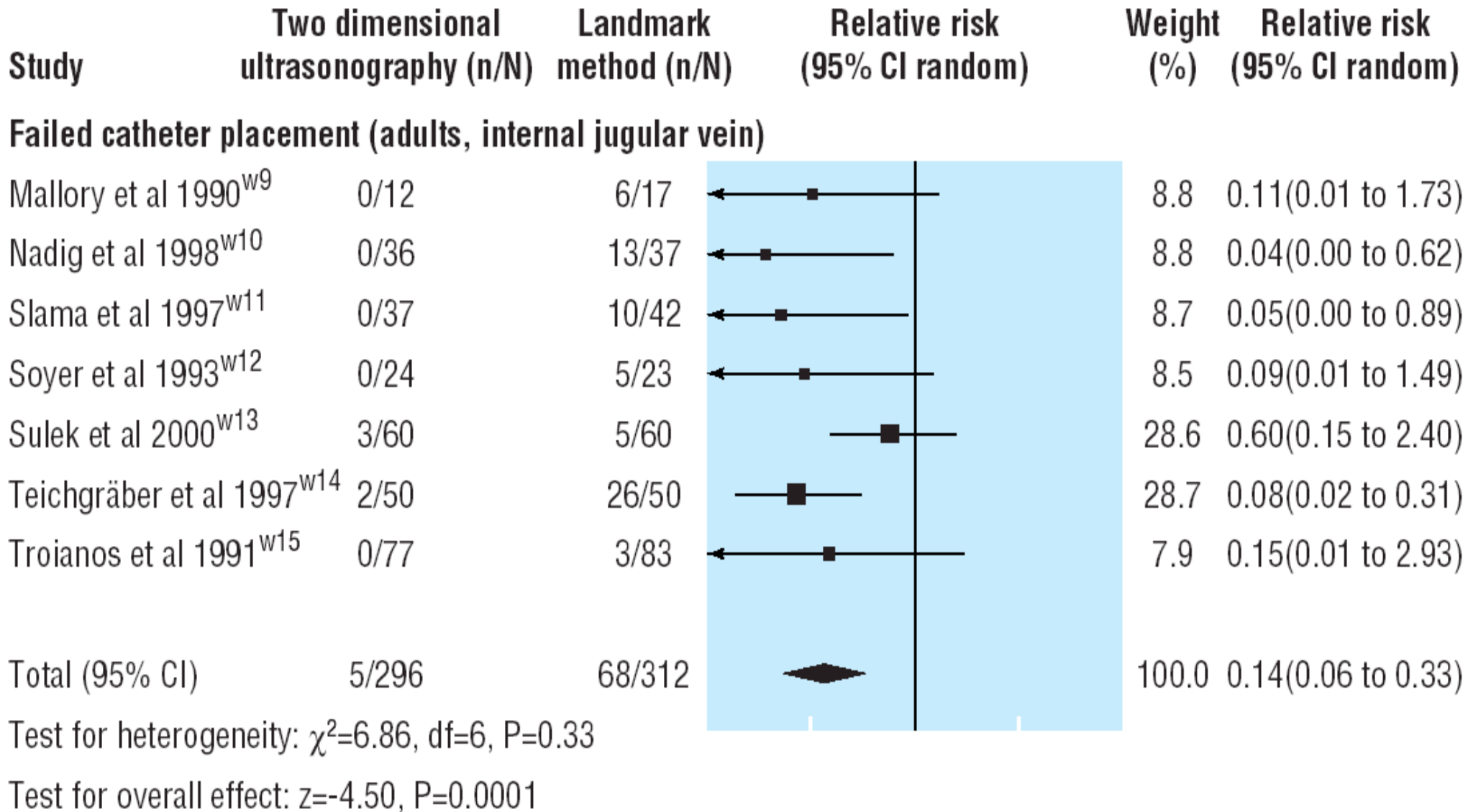
<sup>a</sup>*p* values were obtained using the chi-square test; <sup>b</sup>*p* values were obtained using the Mann-Whitney test.

Values in parentheses are percentages.

# Meta-analyzis

Randolph AG Crit Care Med 1996;24:2053







Variable	Internal jugular vein			
	No of placements		Effect size (95% CI)	P value
	2-D ultrasound guidance	Landmark method		
<b>Adults</b>				
Relative risk:				
Failed catheter placement	296	312	0.14 (0.06 to 0.33)	<0.0001
Complication with placement	284	295	0.43 (0.22 to 0.87)	0.02
Failure on first attempt	162	179	0.59 (0.39 to 0.88)	0.009
Mean No:				
Attempts to successful catheterisation	131	136	-1.50 (-2.53 to -0.47)	0.004
Seconds to successful catheterisation	180	192	-69.33 (-92.36 to -46.31)	<0.0001

# Méta-analyse 2 écho

Hind D BMJ 2003;327: 361

## Failed catheter placement (adults, subclavian vein)



Test for heterogeneity:  $\chi^2=0.0$ ,  $df=0$

Test for overall effect:  $z=-2.77$ ,  $P=0.006$

# Méta-analyse 2

Hind D BMJ 2003;327: 361

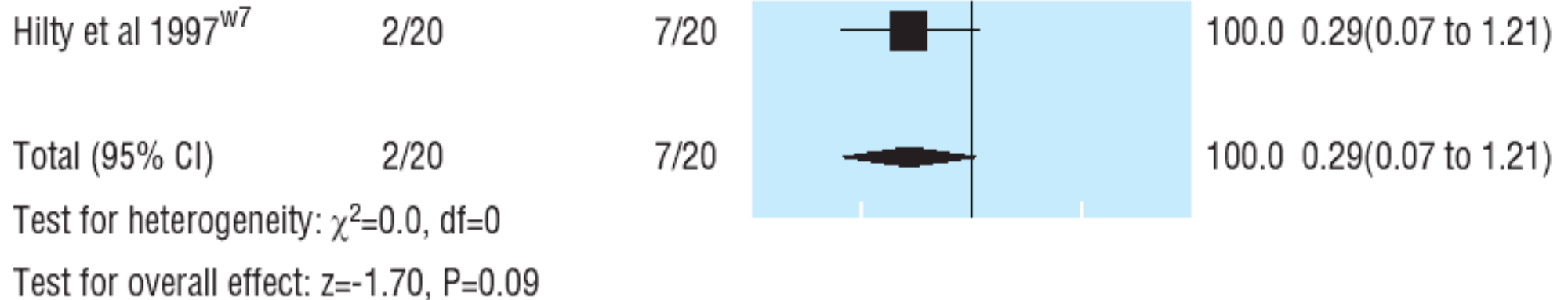
Variable	Subclavian vein			
	No of placements		Effect size (95% CI)	P value
	2-D ultrasound guidance	Landmark method		
<b>Adults</b>				
Relative risk:				
Failed catheter placement	25	27	0.14 (0.04 to 0.57)	0.006
Complication with placement	25	27	0.10 (0.01 to 0.71)	0.02

Hind BMJ 2003;327:361.

# Méta-analyse 2 écho

Hind D BMJ 2003;327: 361

## Failed catheter placement (adults, femoral vein)



# Le Doppler

# Méta-analyse Doppler

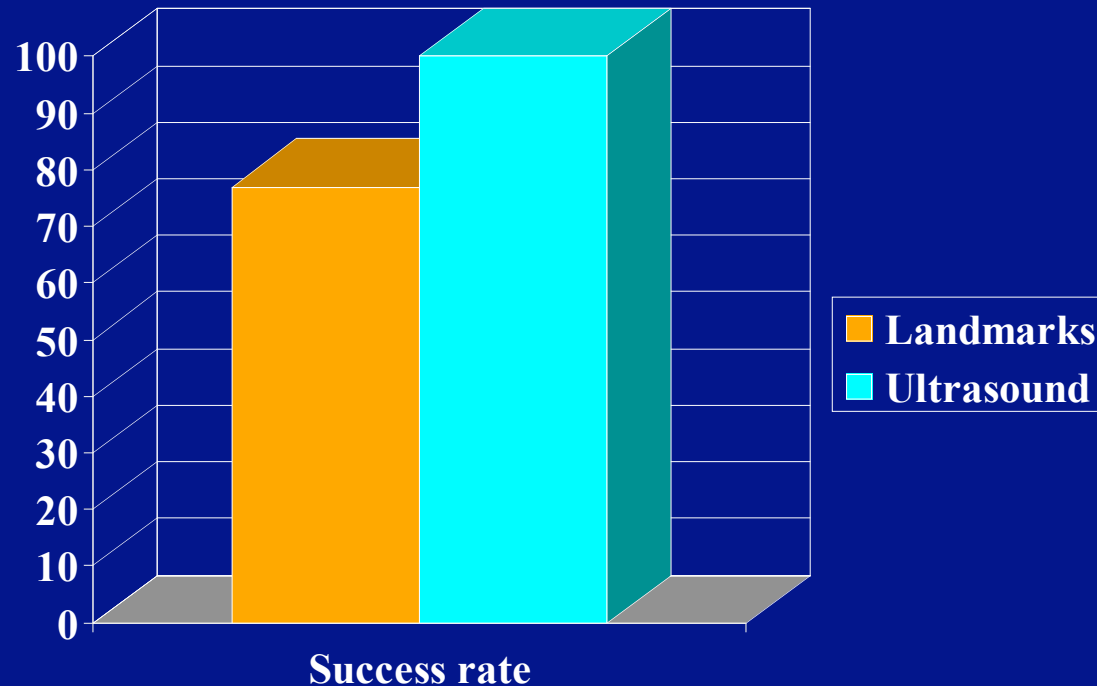
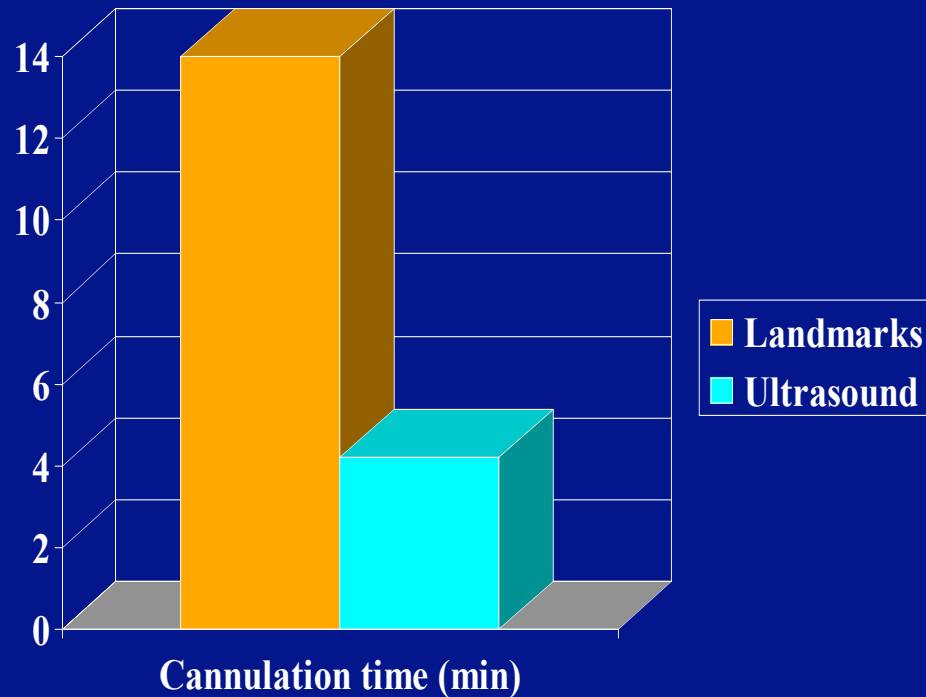
Hind D BMJ 2003;327: 361

Variable	Internal jugular vein		Subclavian vein	
	Effect size (95% CI)	P value	Effect size (95% CI)	P value
<b>Adults</b>				
Relative risk:				
Failed catheter placement	0.36 (0.11 to 1.19)	0.09	0.09 (0.02 to 0.38)	0.0008
Complication with placement	1.00 (0.32 to 3.13)	1.00	0.18 (0.01 to 2.57)	0.2
Failure on first attempt	1.04 (0.57 to 1.88)	0.9	NA	NA

Hind BMJ 2003;327:361.

Chez le nouveau né et le nourrisson

# Ultrasound-Guided Internal Jugular Venous Cannulation in Infants

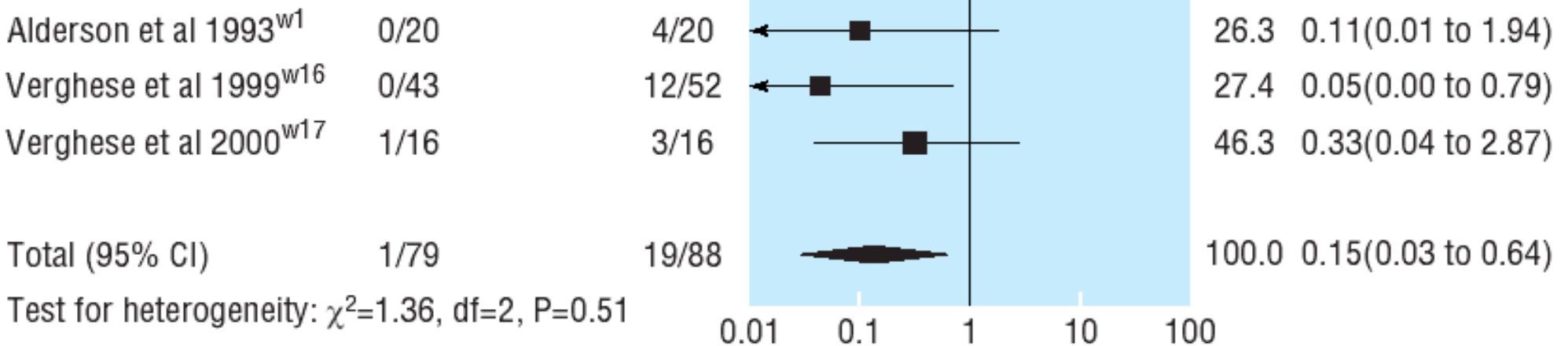




# Méta-analyse 2

Hind D BMJ 2003;327: 361

## Failed catheter placement (infants, internal jugular vein)



# Méta-analyse 2

Hind D BMJ 2003;327: 361

Variable	Internal jugular vein			
	No of placements		Effect size (95% CI)	P value
	2-D ultrasound guidance	Landmark method		
<b>Infants</b>				
Relative risk:				
Failed placement	79	88	0.15 (0.03 to 0.64)	0.01
Complication with placement	79	88	0.27 (0.08 to 0.91)	0.03

Hind BMJ 2003;327:361.

**Does Ultrasound Imaging Before Puncture Facilitate Internal Jugular Vein Cannulation? Prospective Randomized Comparison With Landmark-Guided Puncture in Ventilated Patients**

Hideaki Hayashi, MD, and Masaru Amano, MD

**Table 1. Patient Demographic Data**

	Landmark	Ultrasound	
		7.5 MHz	3.75 MHz
n	120	60	60
Sex (M/F)	77/43	32/28	35/25
Age (y)	62 ± 12	62 ± 14	59 ± 13
Range	28-86	24-89	21-79
Height (cm)	159 ± 8	158 ± 9	161 ± 8
Weight (kg)	56 ± 10	57 ± 11	58 ± 9
Body mass index	22.2 ± 3.5	22.7 ± 3.7	22.3 ± 3.5

NOTE. Values are mean ± SD or the number of patients.

**Table 2. Results of Right Internal Jugular Vein Cannulation:  
Venous Access Rate**

	Landmark		Ultrasound	
	Visible	Invisible	Visible	Invisible
Dr. A	17/18 (94.4)	0/2 (0)	12/16 (75)	4/4 (100)
Dr. B	16/17 (94.1)	1/3 (33.3)	11/13 (84.6)	5/7 (71.4)
Dr. C	8/16 (50)	1/4 (25)	9/11 (81.8)	8/9 (88.9)
Dr. D	11/15 (73.3)	2/5 (40)	16/17 (94.1)	2/3 (66.7)
Dr. E	17/18 (94.4)	1/2 (50)	16/19 (84.2)	1/1 (100)
Dr. F	12/13 (92.3)	2/7 (28.6)	14/15 (93.3)	5/5 (100)
<i>Total</i>	81/97 (83.5)	7/23 (30.4)	78/91 (85.7)	25/29 (86.2)*

NOTE. Values are the frequency of cases, as tabulated by groups and the visibility of respiratory jugular venodilation, with percentage in parentheses.

\* $p < 0.01$  v venodilation-invisible in landmark group.

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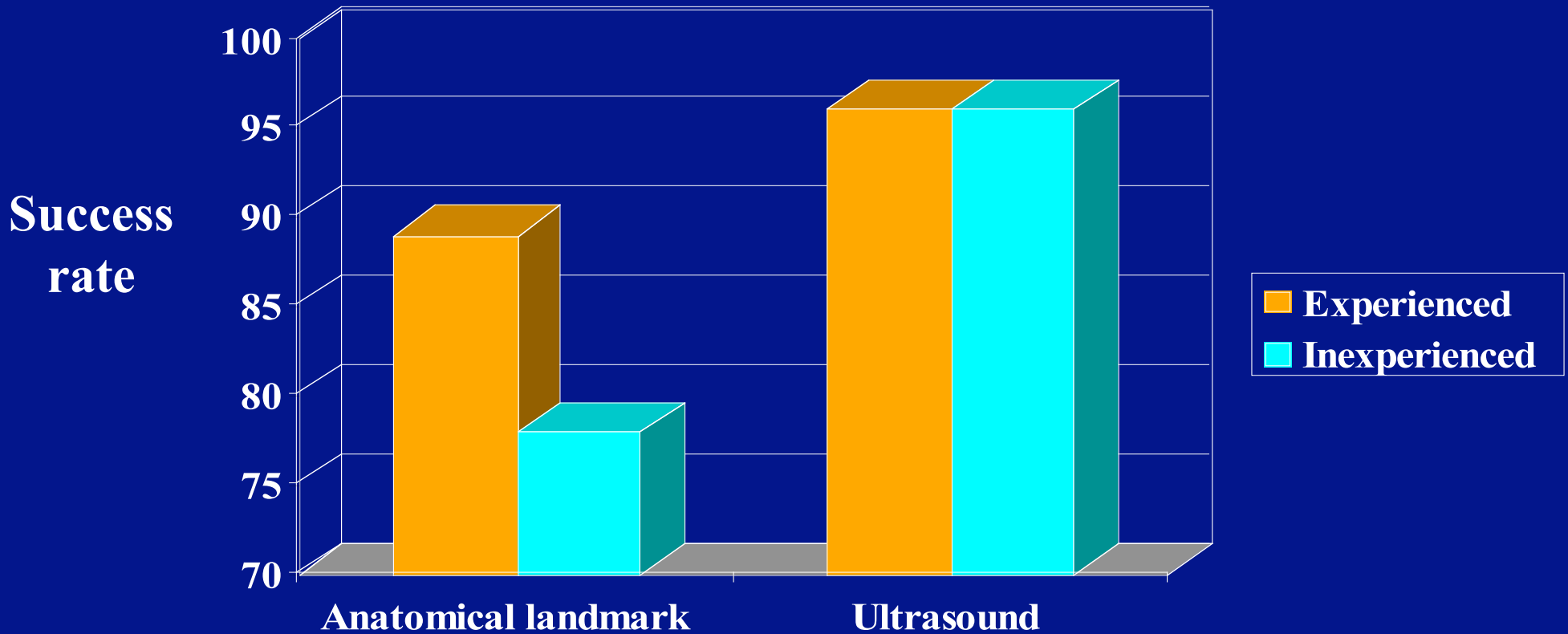
**Conclusion: Prepuncture ultrasound evaluation did not improve the result of right internal jugular vein cannulation compared with the respiratory jugular venodilation-guided approach. When the landmark was not observed, however, the prepuncture ultrasound guidance was helpful in facilitating the cannulation.**

Hayashi H, Amano M. J Cardiothorac Vasc Anesth. 2002;16:572-5.

Quel est le rôle de l'expérience de celui qui met en place le cathéter?



# Internal Jugular vein Cannulation with ultrasound guidance: comparison between experienced and inexperienced Operators



Sznajder JL Arch Intern Med 1986;146:259-61

Geddes CC Clinical Nephrology 1998;50:320-5



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**Does Ultrasound Imaging Before Puncture Facilitate Internal Jugular Vein Cannulation? Prospective Randomized Comparison With Landmark-Guided Puncture in Ventilated Patients**

Hideaki Hayashi, MD, and Masaru Amano, MD

- On peut utiliser des sondes de basses fréquences.
- Les plus expérimentés ont environ 10% d'échecs et les inexpérimentés de 25-70%.
- Les inexpérimentés bénéficient de façon majeure de l'écho même si ce n'est qu'un repérage.
- Mais le repérage seul ne suffit pas car dans le groupe expérimenté contrairement à toutes les autres études pas d'amélioration.

# A Randomized Study of Left Versus Right Internal Jugular Vein Cannulation in Adults

Cheri A. Sulek, MD,\* Mark L. Blas, MD,†  
Emilio B. Lobato, MD‡

Conclusions: *Left IJV cannulation is more time consuming than RIJV cannulation and is associated with a higher incidence of complications. The use of ultrasound improves success rate and decreases the number of complications during IJV cannulation.* © 2000 by Elsevier Science Inc.

Sulek CA, Blas ML, Lobato EB.

J Clin Anesth. 2000 Mar;12(2):142-5.

# Hémodialyse

# Accès centraux pour hémodialyse

	Anat Fem	U/S Fem
Successful cannulation	100%	100%
U/S Salvage	–	Not required
Successful first attempt	56.25%	85.7%
No. of passes (mean $\pm$ SD)	1.5 $\pm$ 0.63	1.14 $\pm$ 0.36
No. of vein cannulation sets (mean $\pm$ SD)	1.125 $\pm$ 1	1.00
Arterial Puncture	6.25%	0%

Farrell J, Gellens M. Nephrol Dial Transplant. 1997 Jun;12(6):1234-7

## Accès centraux pour hémodialyse

	Anat Int Jug	U/S Int Jug
Successful cannulation	82.0%	96.67%
U/S Salvage	—	7/7 (100%)
Successful first attempt	35.9% <sup>a</sup>	83.3% <sup>a</sup>
No. of passes (mean $\pm$ SD)	2.05 $\pm$ 1.00	1.17 $\pm$ 0.38
No. of vein cannulation sets (mean $\pm$ SD)	1.154 $\pm$ 1.00	1.00
Arterial Puncture	7.7%	0%

Farrell J, Gellens M. Nephrol Dial Transplant. 1997 Jun;12(6):1234-7

# Cathéter artériel



# Artère radiale

	Echo	Palpation	p
Accès 1er Tentative	21 (62%)	12 (31%)	0,03
Nombre tentatives	1,6±1	3,1 ±2,4	0,003
Durée (sec)	26 ±2	17,3 ±1,6	0,001
Echec	1	4	-



# Conclusion

- L'écho guidage de la mise en place des cathéters veineux centraux (et artériels):
  - Est techniquement facile
  - Augmente le taux de réussite de pose
  - Augmente le taux d'accès obtenu au premier essai
  - Diminue le risque de complications mécaniques
  - Améliore la qualité des soins en diminuant l'inconfort et la douleur des patients
  - Est probablement coût/efficace

# Indications absolues: accès difficiles

- Repères difficiles : obésité, pansements
- Sites limités : autres cathéter, pacemaker, chirurgie locale, infection.
- Difficultés antérieures : plus de 3 piqûres, deux sites essayés, échec d'accès
- Complications lors d'un précédent accès (artère, pneumothorax, atteinte nerveuse)
- Coagulopathie non corrigée : INR>2; TCA>1,5; Plaquettes <50 000)
- Patient ne tolérant pas la position couchée.

# Si vous refusez encore!

- N'oubliez pas que vous attendent :
  - Veine jugulaire de petite taille
  - Jugulaire en avant de la carotide (AVC, hémorragie)
  - Jugulaire thrombosées





« Au royaume des aveugles le borgne..... »  
Erasmus (1466-1536)