Accidents et Complications vasculaires des accès veineux

Dr Rosay H – UAV - Centre Léon Bérard

Département d'anesthésie

Lyon - France

Conflits d'intérêts

- Salarié du CLB

- Conférencier Enseignant
  - Bard, Perouse

Pas de conflit d'intérêt dans cette communication

- Ça n’arrive pas qu’aux autres!.....

Marie, 32 ans, mère de 2 enfants.

- auto examen, petite boule dans le sein gauche, mammographie
- Cancer du sein,
- Mastectomie partielle , ganglion sentinel -, → chemotherapie aduvante (4 mois)
- Chambre implantable en veine jugulaire droite
- Michèle. Interne dernière année.

Ponction sous écho

- Introducteur pelable avancé avec seulement une petite résistance,
- Découverte d'un jet pulsatile rouge
- Appel du chirurgien senior en urgence
- "problème non fréquent mais pas grave"
- "retire et comprime"
- Marie ne répond plus aux questions…
- Marie respire avec difficultés et bruyamment…
- Anesthesiste appelé, constate un coma (glasgow 7), et doit intuber la patiente….
- Angio CT scan, accident vasculaire massif, dissection carotidienne; fibrinolyse…,
- Marie décède….
- Michèle, chirurgien senior, infirmière -> entendus par la police

Take home message

Take home message

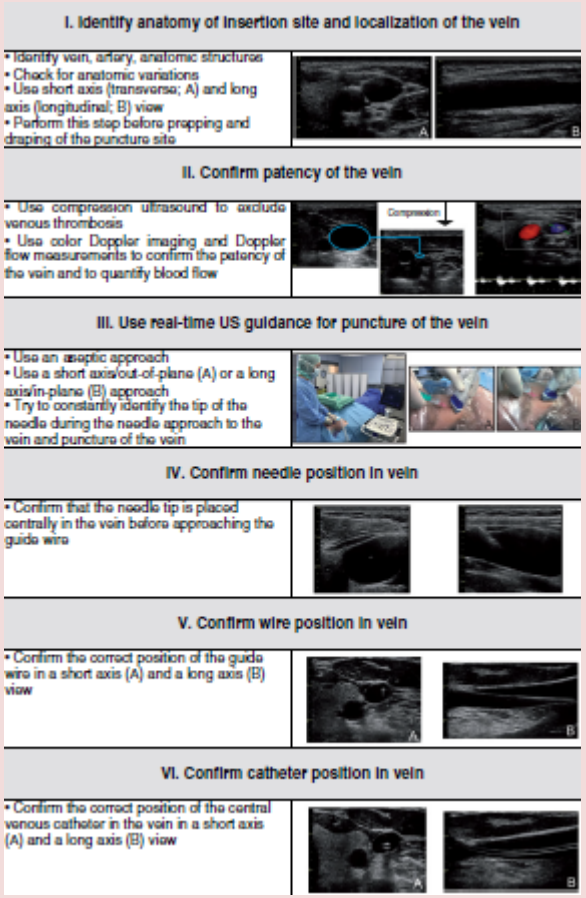
Prévention de ces lésions est primordiale

- **Ponction sous échographie!**

Ultrasound-guided central venous catheter placement: a structured review and recommendations for clinical practice

Bernd Saugel[1*], Thomas W. L. Scheeren[2] and Jean-Louis Teboul[3]

Saugel et al. Critical Care (2017) 21:225
DOI 10.1186/s13054-017-1814-y



Take home message

Prévention de ces lésions est primordiale

Les guides et les dilatateurs ne doivent jamais être avancés contre résistance.

Dilatateur ne devrait pas être avancé plus loin que nécessaire dans la veine: juste dans le début de la veine et pas plus loin. 5 à 7 cm

Si le cathéter (ou le dilatateur) est mal placé (artère, plaie veineuse…),

→ **le laisser en place.**

Anesthesia Closed Claims

1970-1994

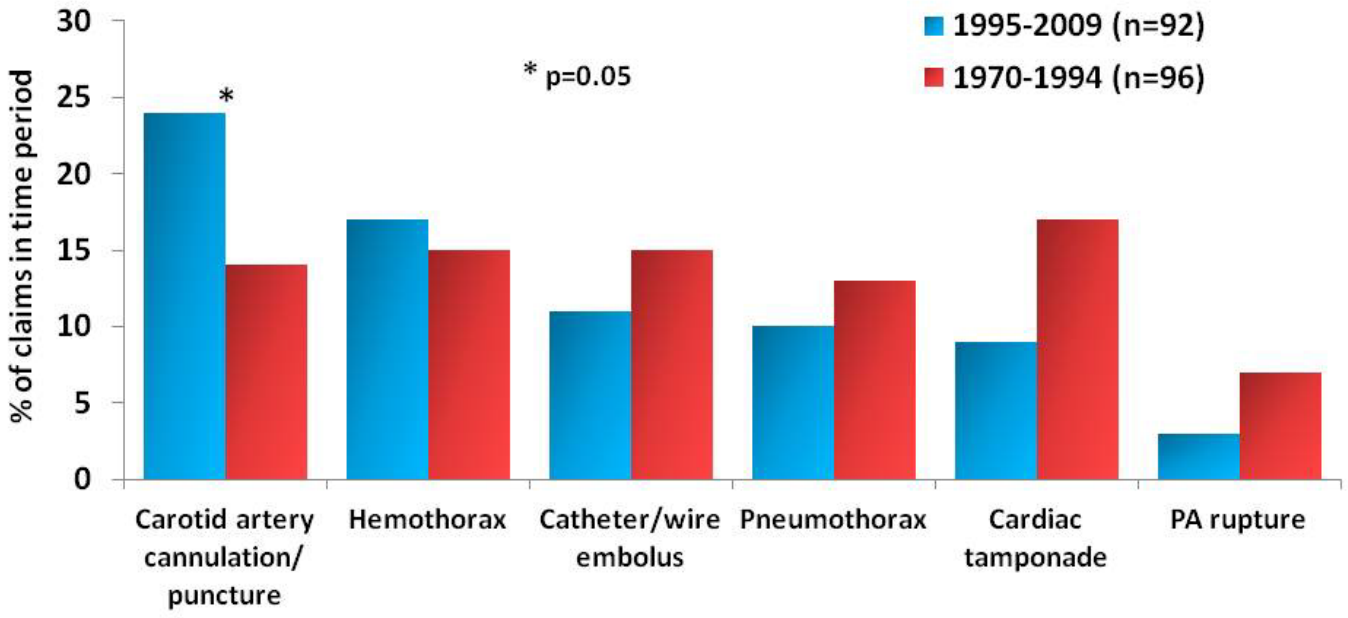
Table 2. Severity of Injury, Standard of Care, and Payment by Type of Central Catheter Complication (n = 110)

Type of Complication	No.	Death		Substandard Care		Payment Made		Median Payment, $	Range of Payment, $
		No.	%	No.	%*	No.	%*		
Wire/catheter embolus	20	1	5†	14	82†	7	85	39,725†	654–132,500
Cardiac tamponade	16	13	81†	5	42	11	69	160,245	34,499–6,912,000
Carotid artery puncture/cannulation	16	5	31	4	31	7	54	40,870	12,975–527,000
Hemothorax	15	14	93†	4	27	8	62	297,000	17,850–1,435,293
Pneumothorax	14	3	21	4	31	4	33	143,250	1,280–208,750
Miscellaneous other vessel injury	8	3	38	2	40	6	75	184,625	1,000–1,717,775
Pulmonary artery rupture	7	7	100†	1	14	3	50	89,600	48,000–152,000
Hydrothorax/pleural effusion	5	2	40	3	100	5	100	110,250	1,604–726,600
Air embolism	4	3	75	2	100	4	100	517,125	304,000–1,076,653
Fluid extravasation in neck	3	1	33	2	67	1	100	444,500	444,500
Other nonvessel injury	2	0	0	0	0	0	0	—	—
All central catheter claims	110	52	47	41	45	66	66	105,500	654–6,912,000

Anesthesiology 2004; 100:1411–8

Closed Claims

Most Common Central Line Complications



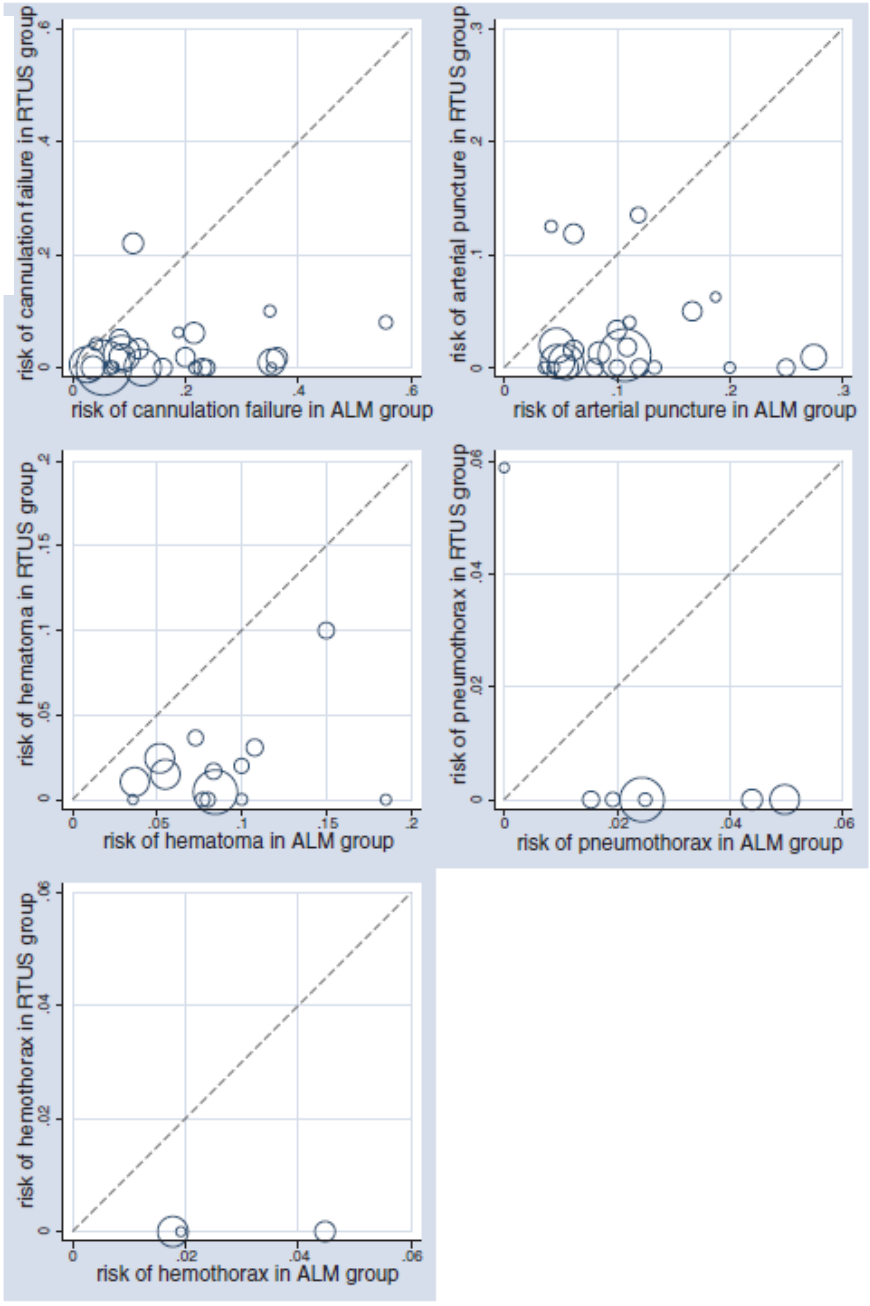
1. Domino et al. Anesthesiology 2004; 100:1411-8.
2. Anesthesiology 2012; 116:539-73.

Real-time Two-dimensional Ultrasound Guidance for Central Venous Cannulation

A Meta-analysis

Shao-yong Wu, M.D.,* Quan Ling, M.D.,† Long-hui Cao, M.D., Ph.D.,‡ Jian Wang, M.D., § Mei-xi Xu, M.D.,‡ Wei-an Zeng, M.D., Ph.D.‖

Anesthesiology, V 118 • No 2
February 2013



Complication au décours de la pose d'une VVC

A review of patient safety incidents reported as 'severe' or 'death' from critical care units in England and Wales between 2004 and 2014

A. N. Thomas[1] and J. J. MacDonald[2]

Anaesthesia 2016, 71, 1013–1023

- 1743 accidents graves iatrogènes
- 50 en rapport avec l'accès vasculaire;
  - 27 entre 2005 et 2009; 23 entre 2010 et 2014
- 14 DL; 6 SousClavière, 17 Jug int,
- 13 placements artériels; 2 reconnus lors de la pose; 4 Rx nle
- 6 embolies guides
- 8 déplacements secondaires (hypotension, 2 arrêts cardiaques)
- 14 saignements majeurs
- 4 pneumothorax

Mechanical complications of central venous catheter insertions: A retrospective multicenter study of incidence and risks

Malin Björkander [1] | Peter Bentzer[1,2] | Ulf Schött[1,3] | Marcus E. Broman[1,3] | Thomas Kander[1,3]

Acta Anaesthesiol Scand. 2018;1–8.

- Etude rétrospective 8 hopitaux suèdois
- N= 10949 insertions
- 1.1% complications mécaniques
  - 0.2 % graves
- 0.8 % saignements
- 0.2% pneumothorax
- FDR:
  - tr hémostase
  - Nb de ponction
  - Ponction artérielle

	Bleeding Grade 2-4 n = 4203		
	OR	(95% CI)	P-value
Age	1.0	(0.99-1.04)	0.20
Female gender	1.6	(0.9-1.5)	0.35
Coagulopathy[a]	1.8	(1.5-2.2)	<0.001
Ultrasonography	1.0	(0.6-1.4)	0.84
CVC location[b]			
Internal jugular vein			
External jugular vein	2.2	(0.9-3.1)	0.10
Subclavian vein	0.6	(0.4-1.4)	0.15
Femoral vein	1.3	(0.1-2.5)	0.66
Bore size	1.1	(0.9-1.3)	0.36
Nr. Needle passes	1.8	(1.6-2.0)	<0.001
Arterial puncture	2.7	(2.2-3.2)	<0.001

A multicentre snapshot study of the incidence of serious procedural complications secondary to central venous catheterisation

R. K. Lathey,[1] R. E. Jackson,[2] A. Bodenham,[3] D. Harper[4] and V. Patle[5] on behalf of the Anaesthetic Audit and Research Matrix of Yorkshire (AARMY)

Anaesthesia 2017, 72, 328–334

15 centres, VVC sous écho,

Table 1 Serious complications relating to central venous catheter insertion as specified in the study design.

Complications requiring intervention	Complications leading to permanent damage
Failure to site an appropriate device at the chosen time	Nerve injury
Pneumothorax	Limb damage secondary to vascular injury
Bleeding requiring surgical referral	Cerebrovascular accident
Bleeding requiring interventional radiology referral	Airway obstruction with hypoxic brain injury
Thrombus requiring anticoagulation	Death
Thrombus requiring thrombolysis	
Cardiac arrhythmia requiring pharmacological management	
Cardiac arrhythmia requiring electrical cardioversion	
Cardiorespiratory arrest with successful resuscitation	
Cardiac tamponade	
Haemothorax	
Haemoperitoneum	
Arterial cannulation	

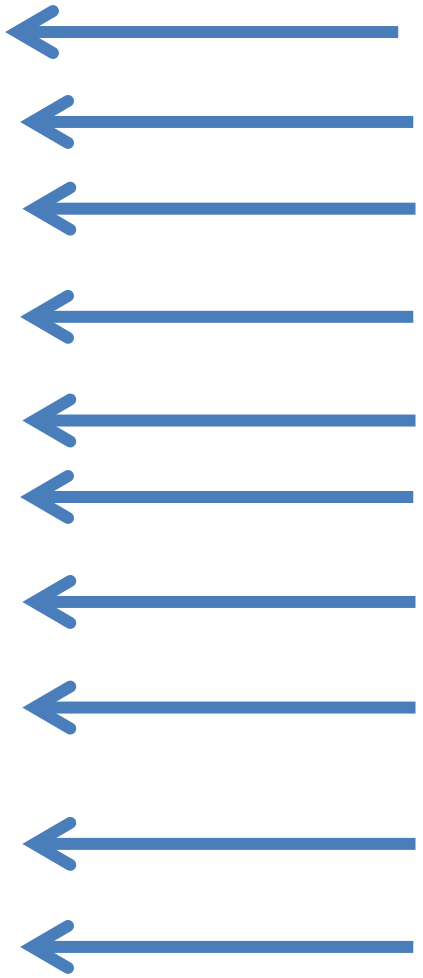
Recherche des complications durant les 4 premières semaines

Lathey et al. | Serious procedural complications of central venous catheterisation

Anaesthesia 2017, 72, 328–334

- 487 VVC , dont 430 courte durée
- Posées par des anesthésistes sous écho
- 3.1% complications:
  - 1.4% échecs
  - 0.2%pneumothorax
  - 0.2% hémothorax
  - **0.2% cannulation artérielle**
  - 1,1% autres: ponction carotidienne sans cannulation, mauvais placement nécessitant une reprise

Survey Question	Yes
Does your hospital commonly insert CVCs in locations other than theatre or critical care?	7/11
Is ultrasound recommended for CVC insertion in your departmental guidelines?	10/11
Are there adequate numbers of high resolution ultrasound devices to allow timely access at all times?	11/11
Do you have a range of lengths of adult CVCs readily available in theatres and critical care?	6/11
Do you have a difficult vascular access trolley with devices for difficult insertions?	1/11
Is there anybody in the department fulfilling the role of vascular access lead?	4/11
Does your hospital have protocols for the recognition and management of major vascular access complications?	1/11
Does your hospital have dedicated vascular access lists to allow timely (within 24 h) insertion of short term devices?	1/11
Does your hospital have dedicated vascular access lists to allow timely (within 5 days) insertion of long term devices?	3/11
Does your hospital have a lines coordinator to ensure lines are inserted in a timely manner?	2/11
Do any of the following specialties provide daily 24 h cover on-site at your hospital?	
Cardiac surgery	2/11
Thoracic surgery	1/11
Vascular surgery	3/11
Interventional radiology	6/11
Interventional cardiology	5/11



Arterial trauma during central venous catheter insertion

Guilbert MC, Elkouri S, Bracco D, et al
J Vasc Surg 48:918-925, 2008

13 cases /7200 VVC dans base de données Hôpital universitaire Montreal : 0.05%

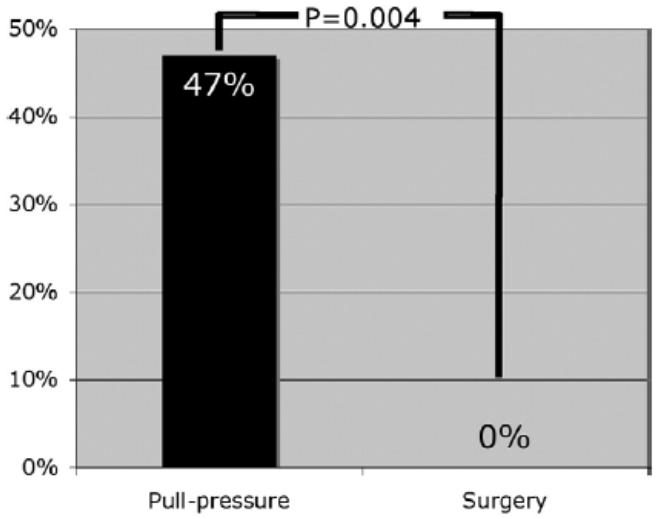
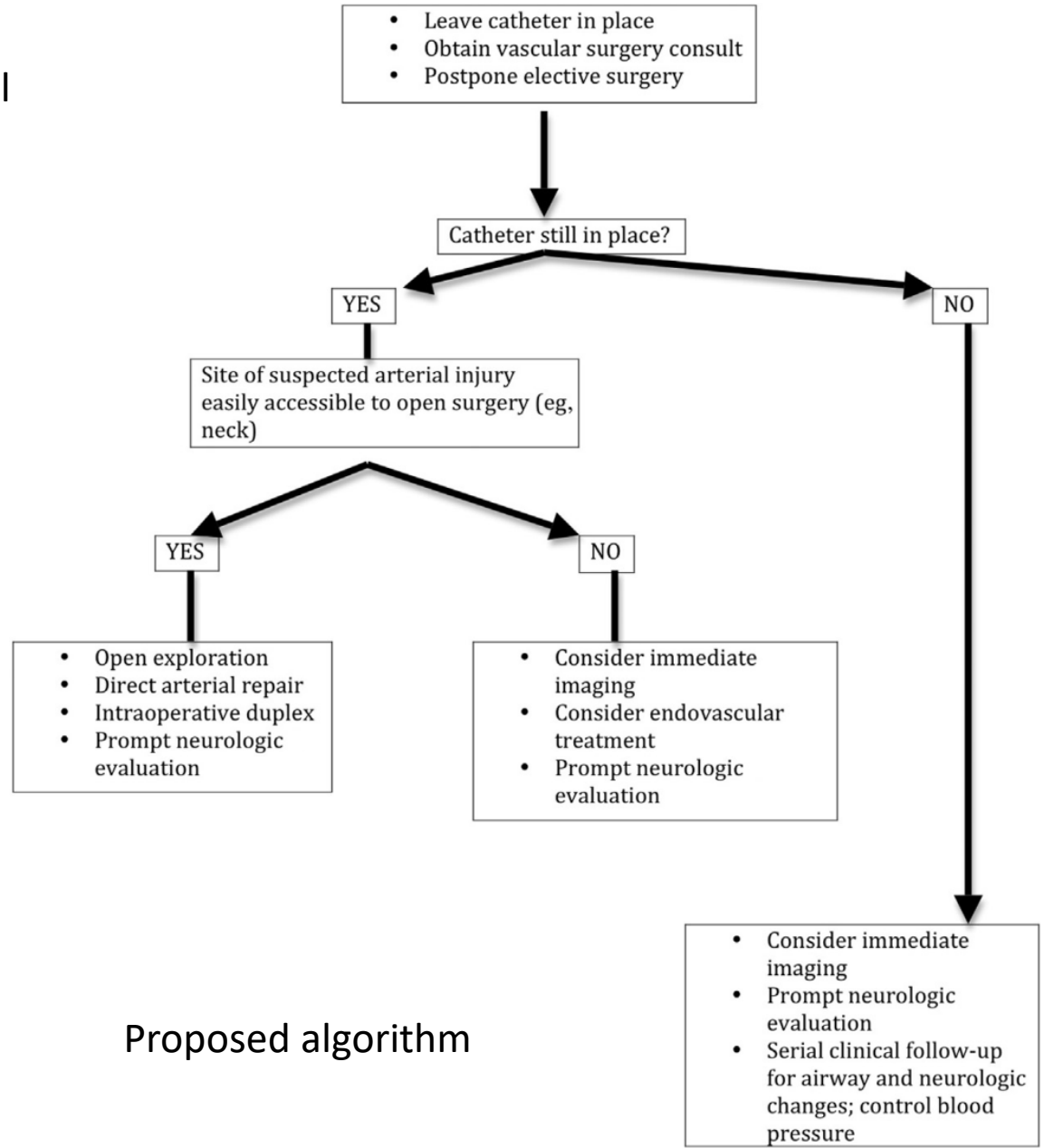


Fig 3. Complications related to differential management of catheter-related cervicothoracic artery injury.

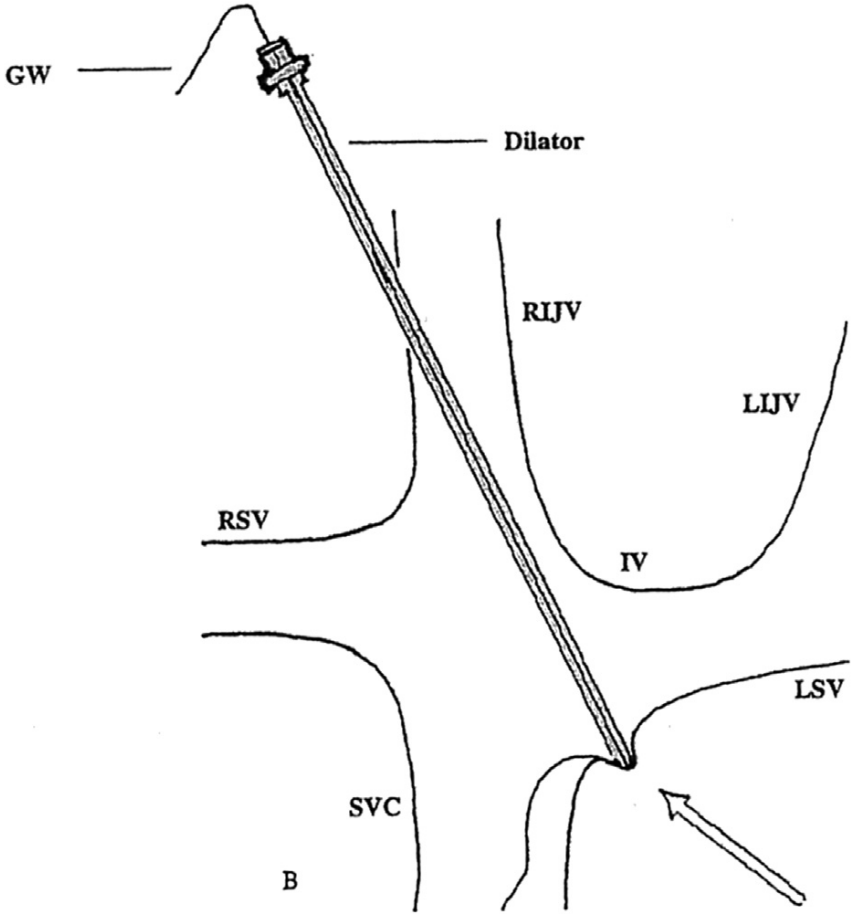


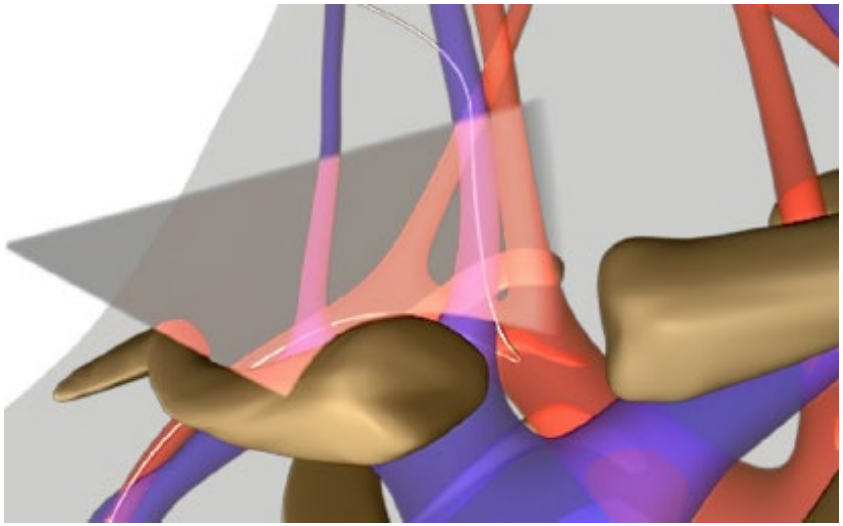
Proposed algorithm

Vascular Complications of Central Venous Catheter Placement: Evidence-Based Methods for Prevention and Treatment

Andrew Bowdle, MD, PhD

Journal of Cardiothoracic and Vascular Anesthesia, Vol 28, No 2 (April), 2014: pp 358–368





Brachiocephalic Vein Perforation During Cannulation of Internal Jugular Vein: A Case Report

Atsushi Kainuma, MD,* Keiichi Oshima, MD,* Chiho Ota, MD,§ Yu Okubo, MD,†
Naoto Fukunaga, MD,‡ and Soon Hak Suh, MD*

cases-anesthesia-analgesia.

November 1, 2017 • Volume 9 • Number 9

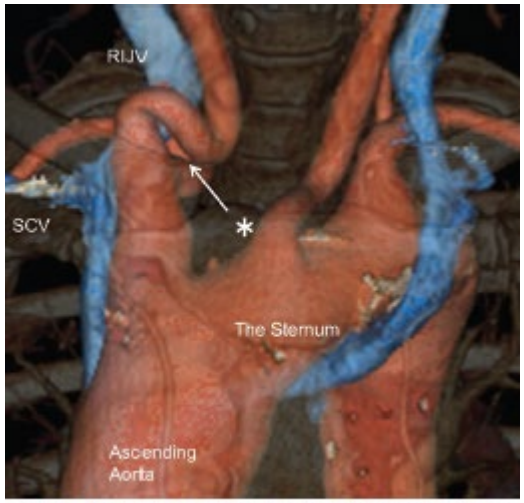
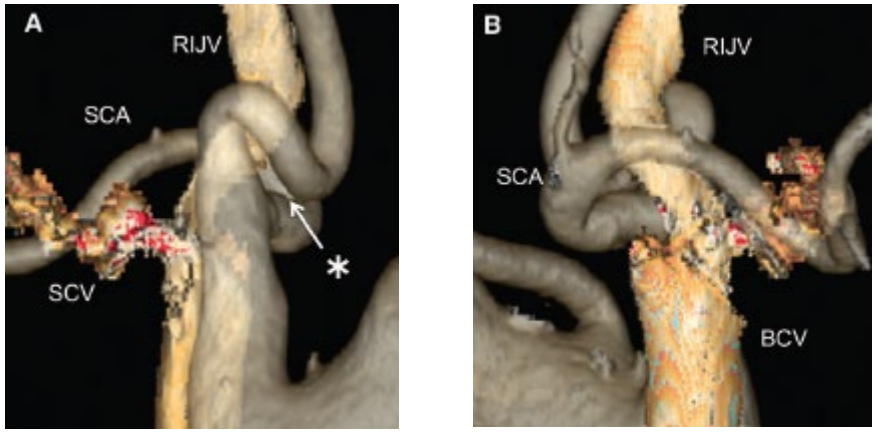


Figure 3. Computed tomographic angiography (front view) showing the tortuous right common carotid artery. *Tortuous common carotid artery. RIJV indicates right internal jugular vein; SCV, subclavian vein.



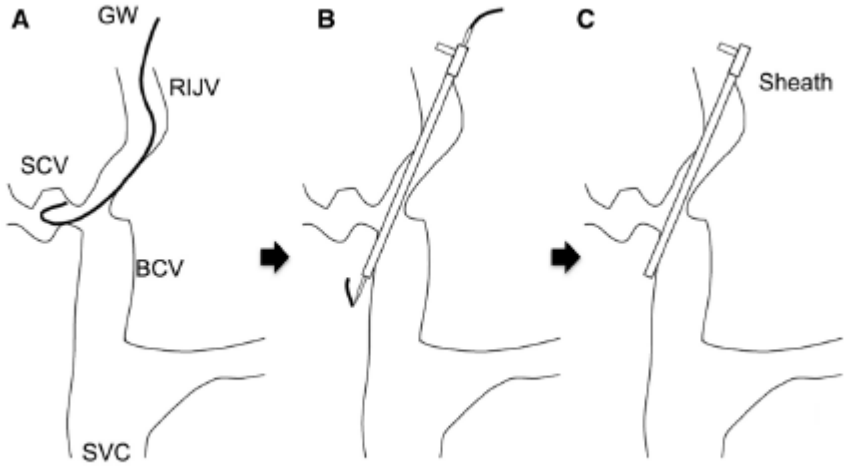
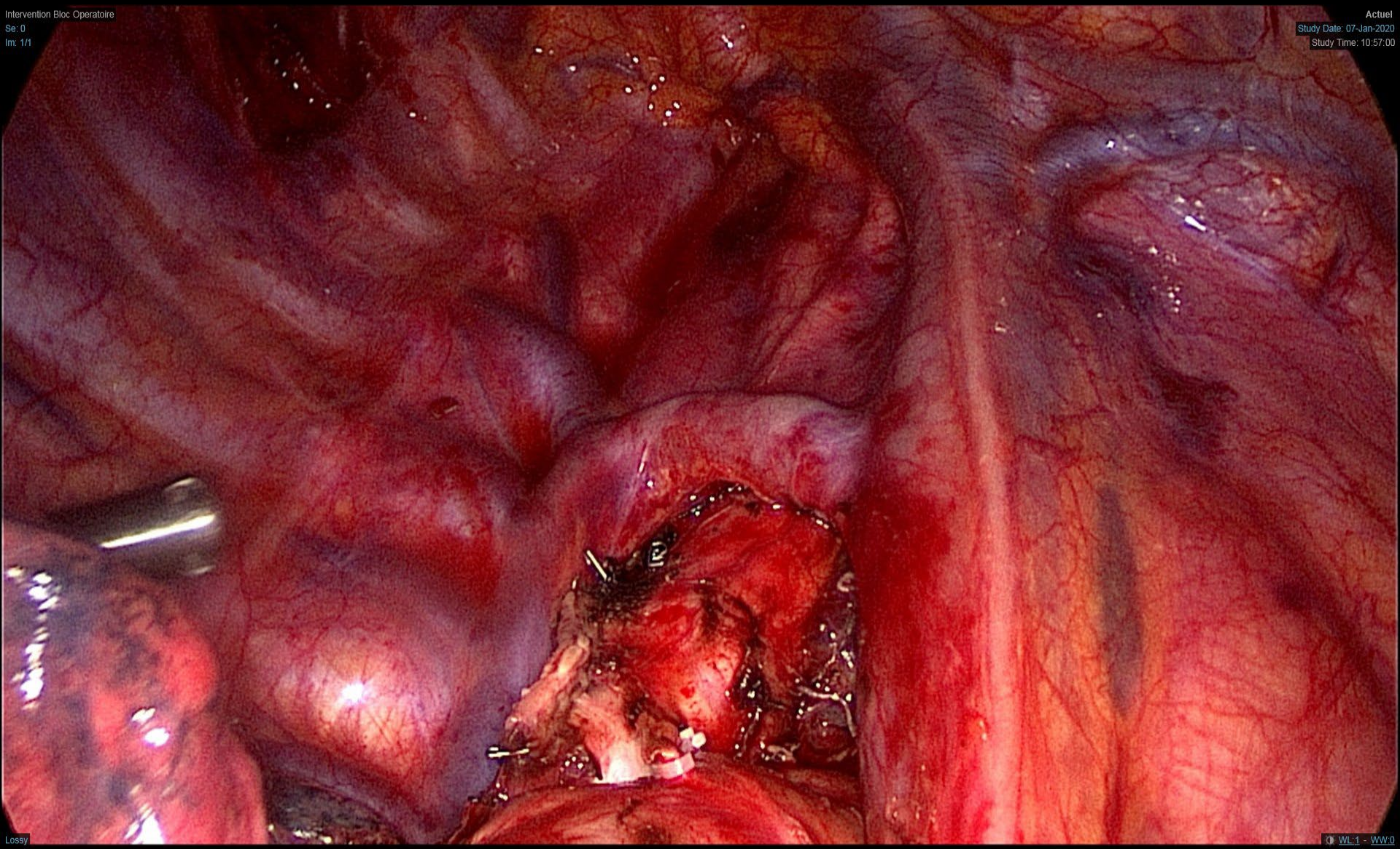


Figure 5. Suspected mechanism of perforation. A, The guidewire went into the subclavian vein. B, The stiff dilator sheath penetrated the brachiocephalic vein wall. C, The tip of the sheath remains outside the vessel. BCV indicates brachiocephalic vein; GW, guidewire; RIJV, right internal jugular vein; SCV, subclavian vein; SVC, superior vena cava.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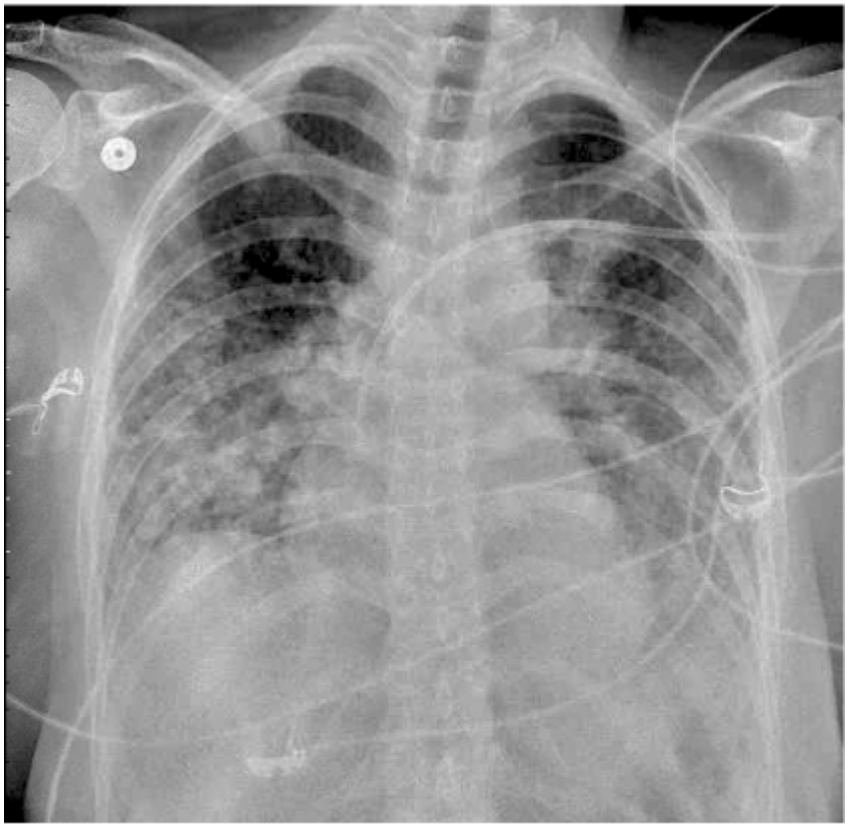
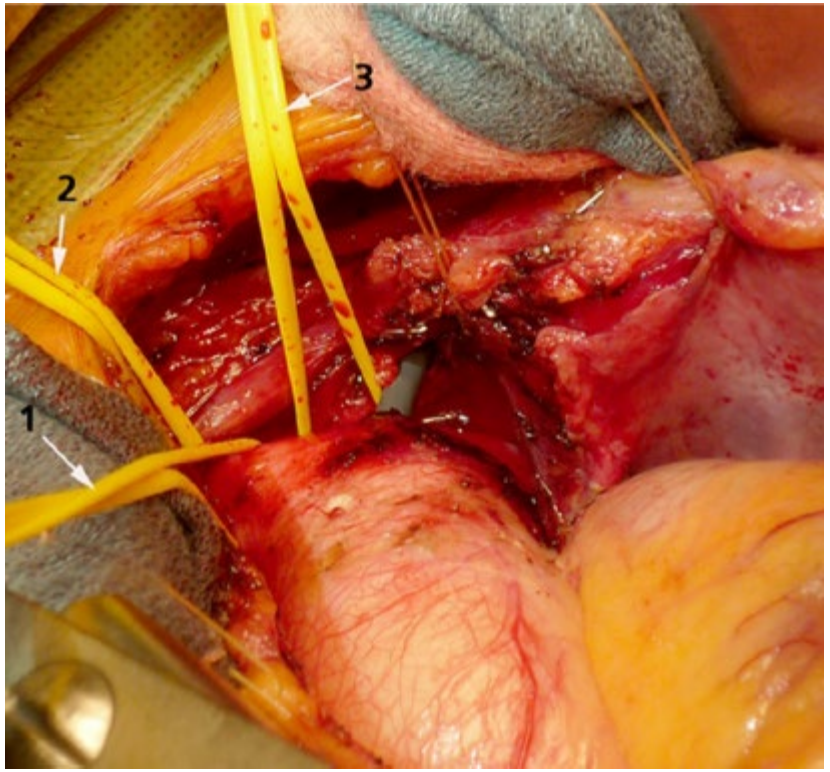
Journal of Cardiothoracic and Vascular Anesthesia, Vol 28, No 2 (April), 2014: pp 358–368



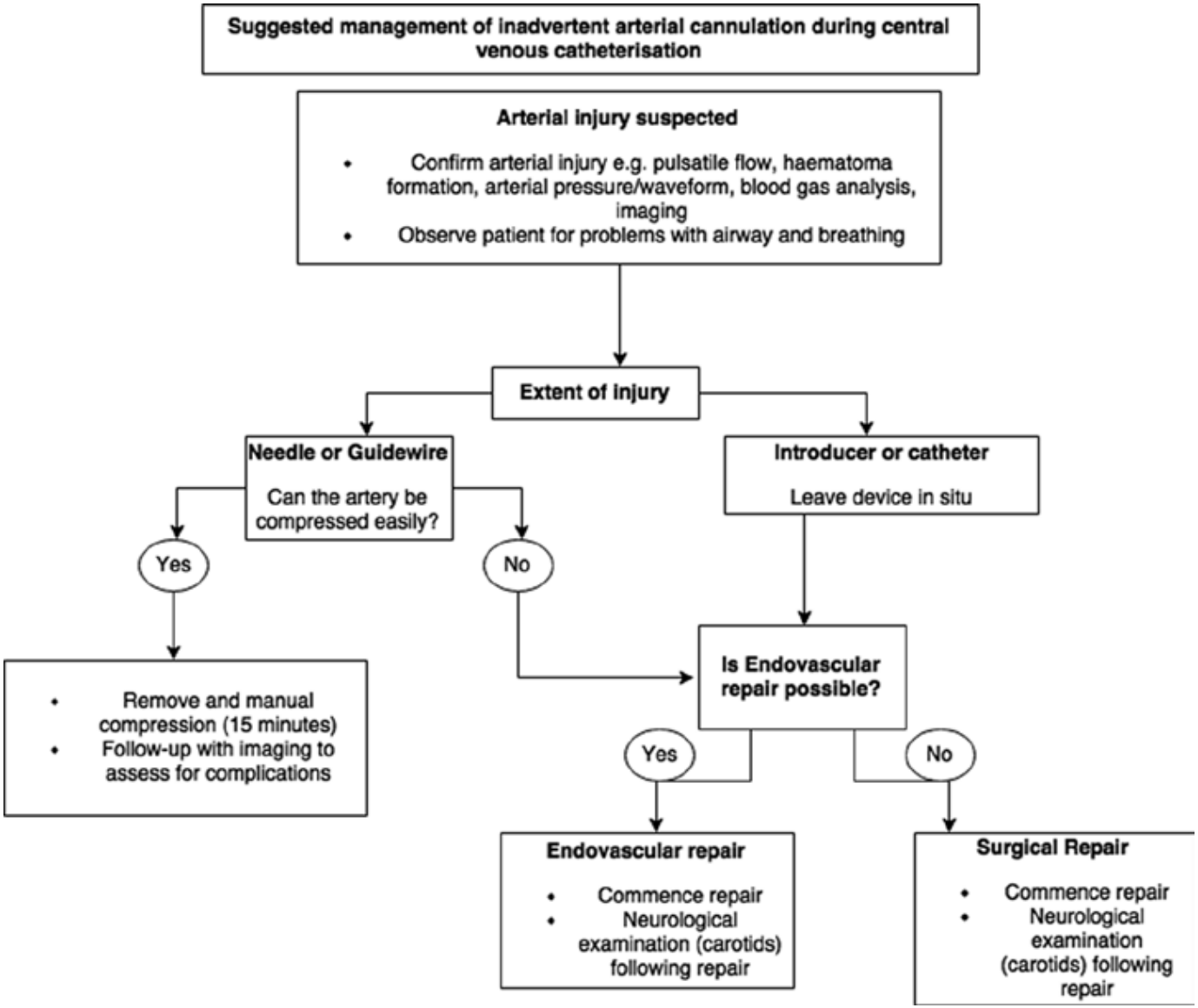


Management of Arterial Trauma or Injury Arising from Central Venous Catheterization

A systematic review of management of inadvertent arterial injury during central venous catheterisation

Oliver G.B. Dixon, George E. Smith, Daniel Carradice, Ian C. Chetter

J Vasc Access 2017; 18 (2): 97-102



J Vasc Access 2017; 18 (2): 97-102

Résultats

TABLE II - Management methods employed and success rate

	Removal and compression	**Endovascular**	**Surgery**
No complications (n)	1	35	37
Complications (n)	17	2	0
Complication types	5 failure to control haemorrhage 1 haemothorax 1 left lung collapse 1 pseudoanuerysm 4 embolic stroke 2 arteriovenous fistula 3 deaths	1 failure to control haemorrhage 1 cerebral embolus	None
Success rate (%)	5.6	94.6	100.0

Prevention and treatment of dilator injuries during central venous catheter placement

https://doi.org/10.1016/j.jvsv.2019.06.020

Paul E. Collier, MD, FACS, *Sewickley, Pa*

Journal of Vascular Surgery: Venous and Lymphatic Disorders

- 2008-2014
- 20 catheterismes 21 venous damages
- 5 vena cava, 6 right innominate vein, 10 left innominate vein.
- 17 opérators remmembers to push completely the dilatator or radiologic documentation.
- Venous damages. No arterial damage in this serie.
- 17 death, 19 claims

Dissection veine jugulaire

Scanner ORL
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Im: 449/808

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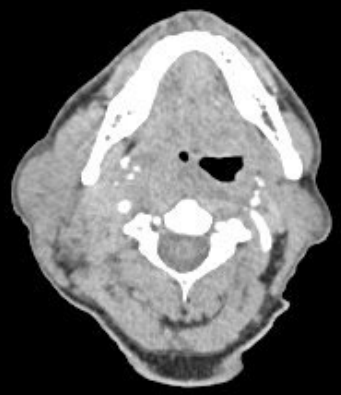
Actuel
Centre Léon Bérard - Radiologie
Study Date: 26-Mar-2021
Study Time: 08:54:03



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WL:-3 - WW:310

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Study Time: 08:54:03

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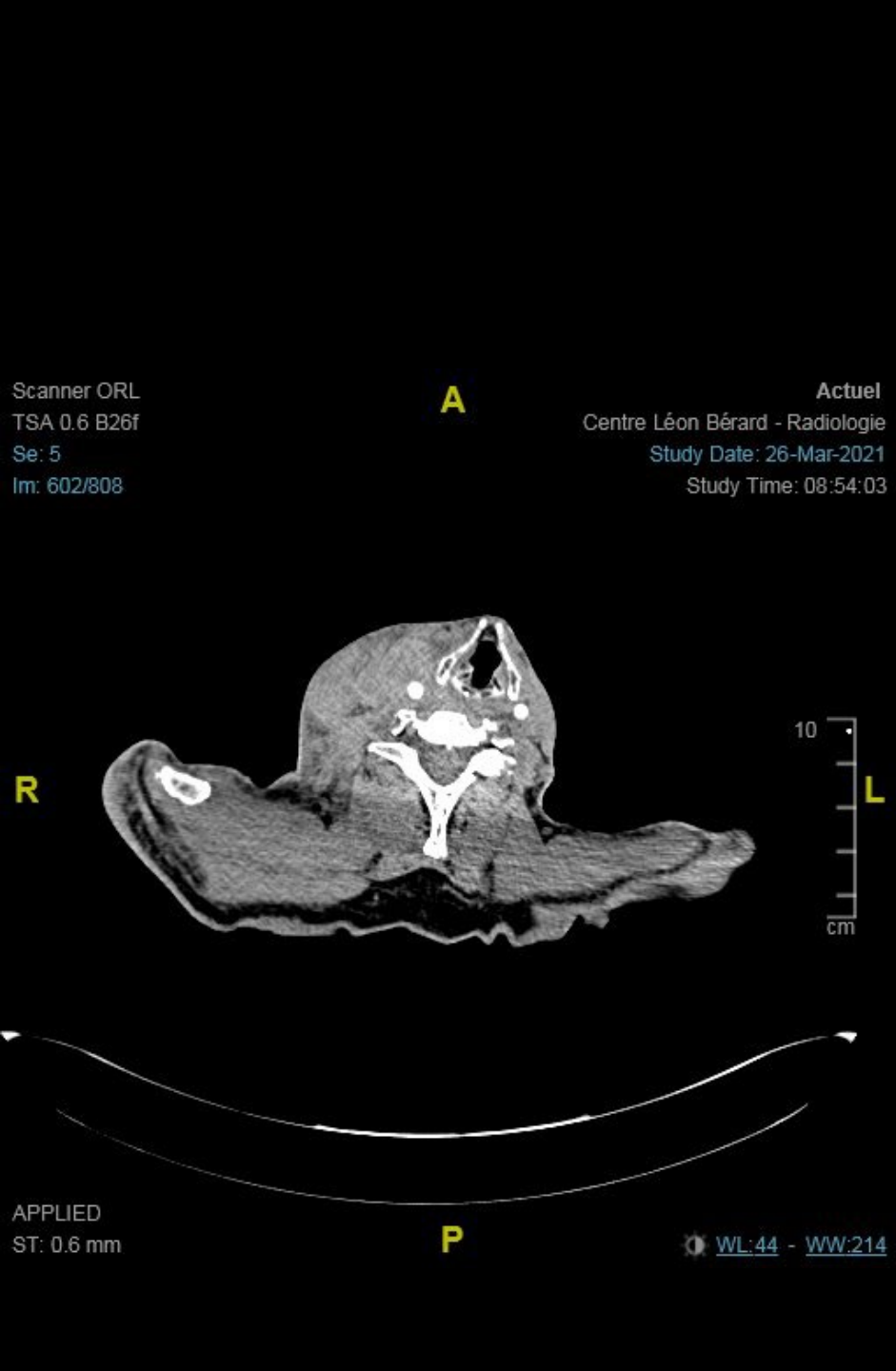
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Centre Léon Bérard - Radiologie
Study Date: 26-Mar-2021
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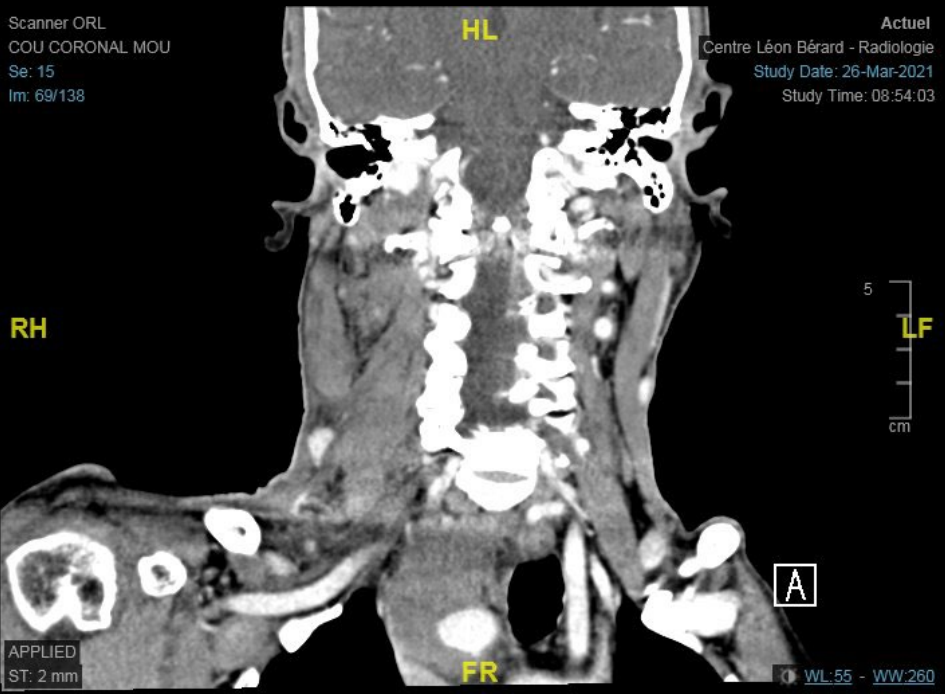
WL:44 - WW:214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COU CORONAL MOU
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Centre Léon Bérard - Radiologie
Study Date: 26-Mar-2021
Study Time: 08:54:03
HL
RH
LF
5
cm
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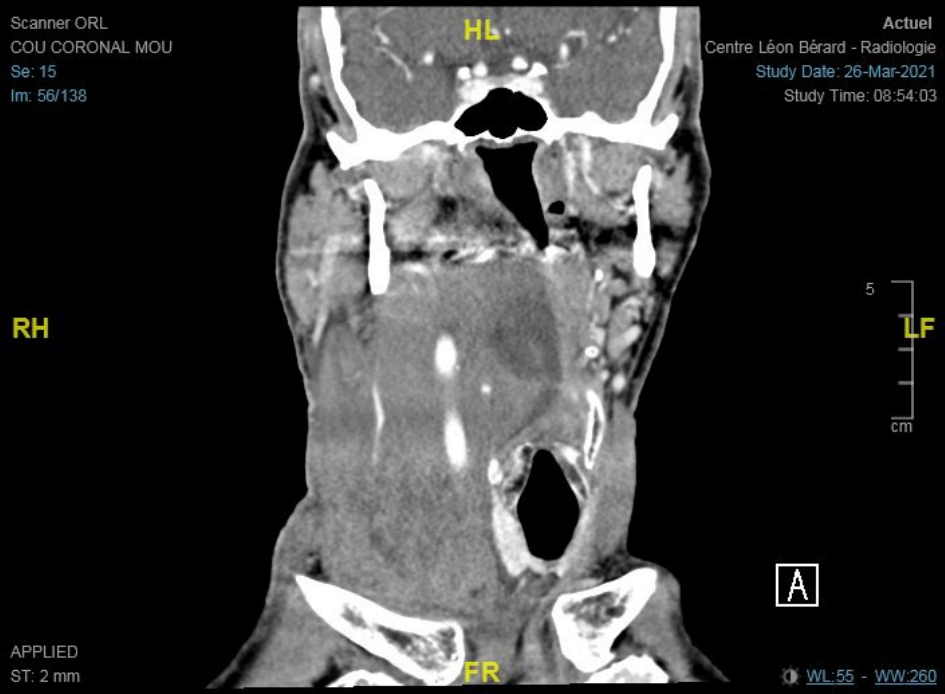
APPLIED
ST: 2 mm
FR
WL:55 - WW:260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cm
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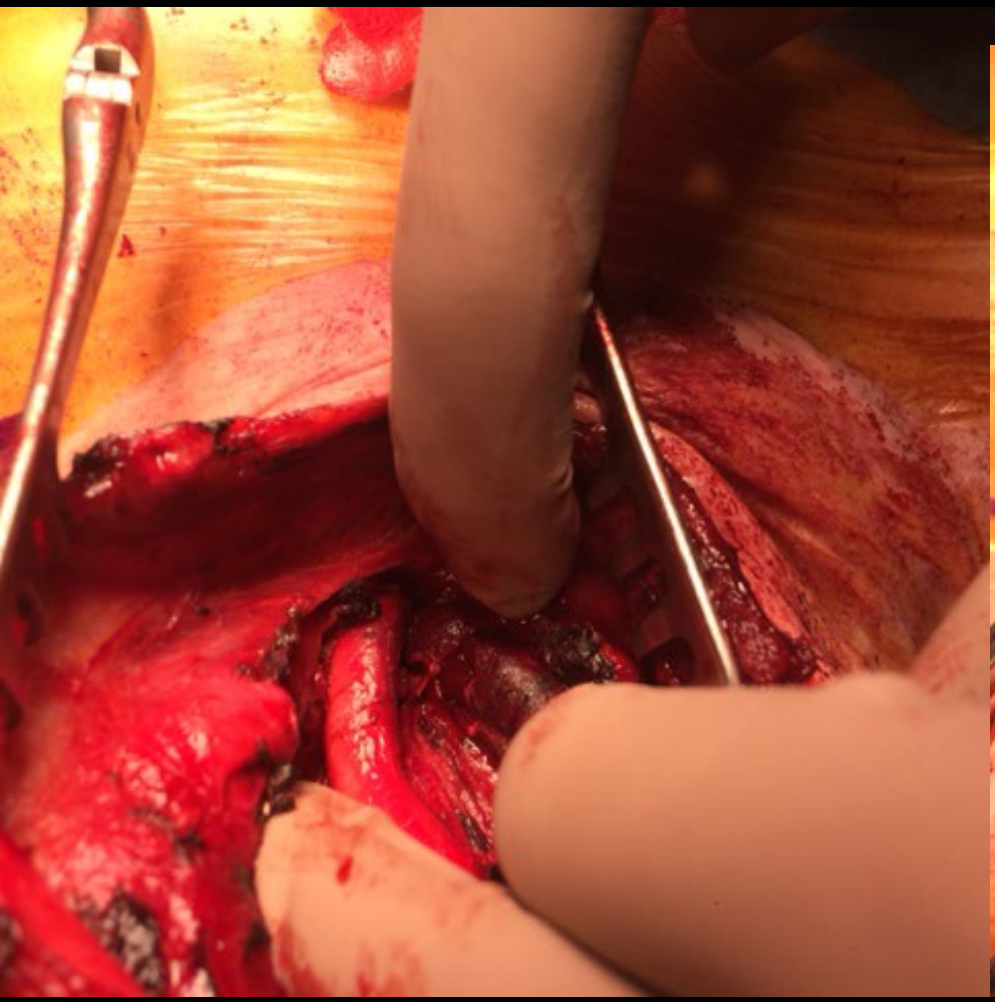
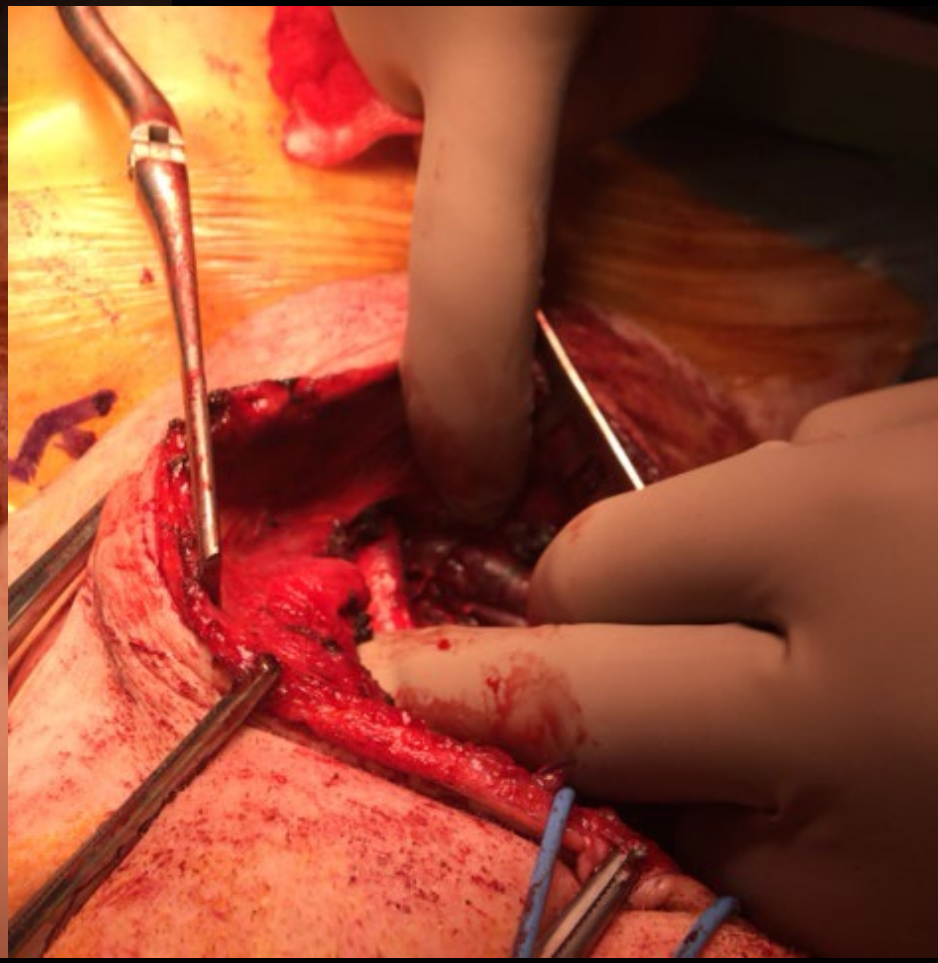
APPLIED
ST: 2 mm
FR
WL:55 - WW:260





Take home message

- La prévention des complications est essentielle.

Utiliser l'échoguidage lors des ponctions des gros vaisseaux.

Take home message

La prévention des complications est essentielle.

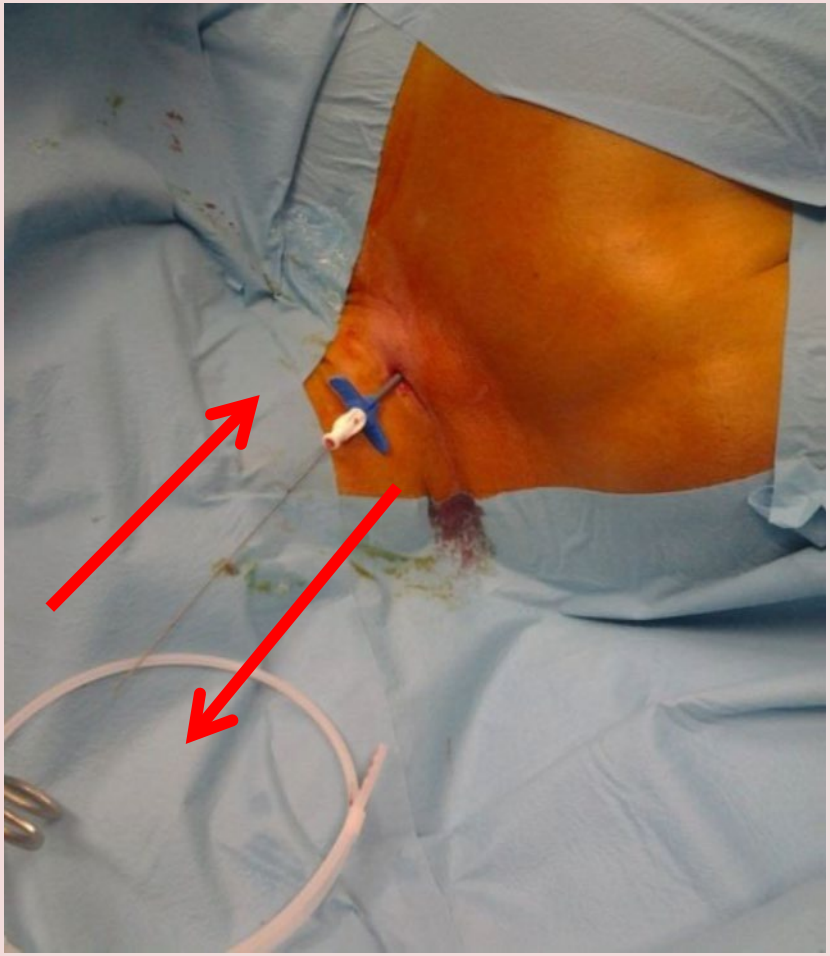
Les guides et les dilatateurs ne doivent JAMAIS être poussés contre résistance.

Le guide doit pouvoir glisser librement à travers le dilatateur, et ne pas présenter de déformation.

Les dilatateurs doivent être avancés juste le nécessaire pour être dans la veine et pas plus loin .

Si le cathéter (ou le dilatateur) est mal placé (artère…), Le laisser en place. Il ne doit être retiré que si les conditions de réparation sont obtenues. (avis chirurgical ou radiologique).

Take home message



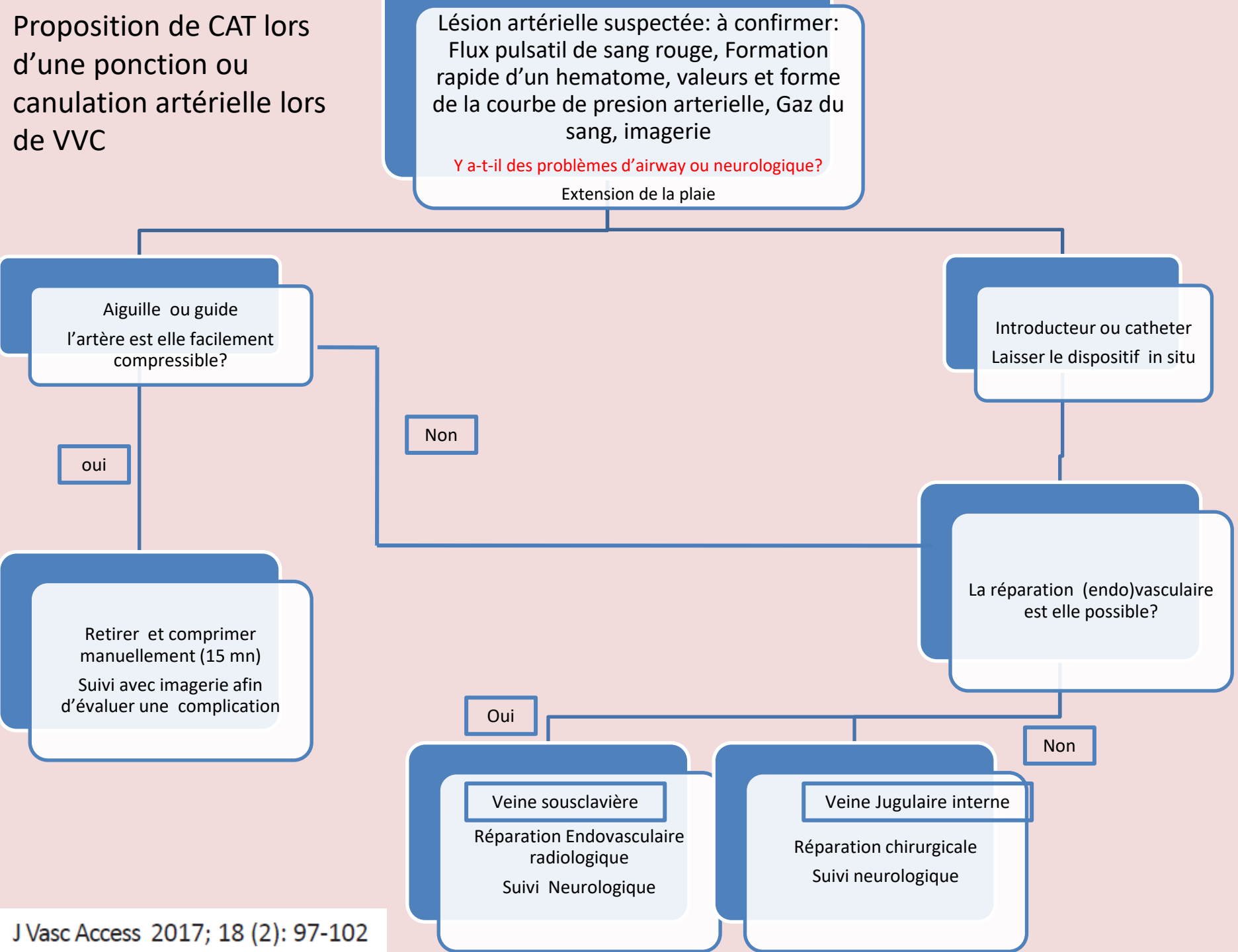
Prévention

Le guide libre

Take home message

- **Des cathéters de taille adaptée (la plus petite pour les besoins du pateint), des petits dilatateurs doivent être préférés dans les kits d'insertions car ils ne sont utiles que pour dilater la peau, le tissu sous cutané et entrer dans la veine.**
- **Une conduite à tenir doit être définie et un arbre décisionnel immédiatement disponible dans votre hopital, dans votre salle d'intervention pour ces cas d'accident.**

Proposition de CAT lors d'une ponction ou canulation artérielle lors de VVC



J Vasc Access 2017; 18 (2): 97-102

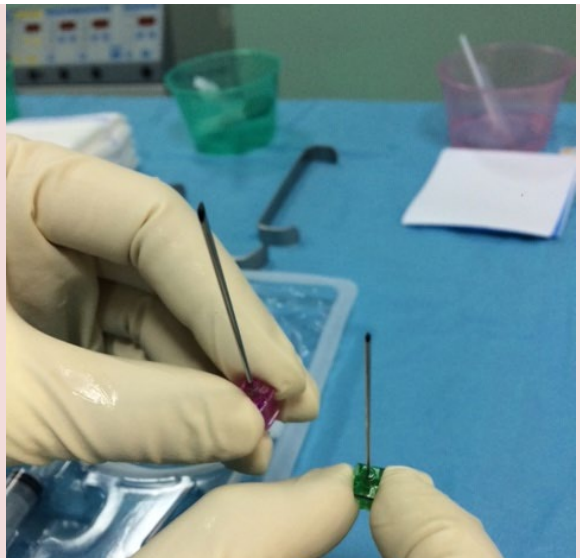
Impact sur la ponction:
Micro ponction?

The Use of Micropuncture Technique for Vascular or Body Cavity Access

Shishir Murarka, MD,[1] Mohammad Reza Movahed, MD, PhD[2-4]
[1]Banner Good Samaritan Medical Center, Phoenix, AZ; [2]Division of Cardiology, The Southern Arizona VA Health Care System, Tucson, AZ; [3]Division of Cardiology, University of Arizona Sarver Heart Center, Tucson, AZ; [4]CareMore Health Care, Tucson, AZ

Vol. 15 No. 3 • 2014 • Reviews in Cardiovascular Medicine • 249

Carotid artery puncture during IJV cannulation can lead to life-threatening hemorrhage, stroke, and airway compromise.



Recommandé par le Gavecelt 2020
SIC protocole doi.org/10.1177/11297298211036002
SIF protocole doi.org/10.1177/11297298211041442


WoCoVA
7th World Congress on Vascular Access
16-18 OCTOBER
2022
MEGARON
ATHENS
GREECE

Ça arrive avec les ponctions brachiales…

Complication artérielle et nerveuse…

Différence entre la mesure des diamètres externes du cathéter choisi, du dilatateur, de la gaine pelable nécessaires à la pose.

Exemples en fonction de fournisseurs différents (données personnelles non exhaustives)

	Bard Powerport Indication packaging 8 F PU	**BBraun Celsite Indication *packaging 8,5 F Si***	***BBraun Celsite Indication packaging 6,5 F Si***	***VYGON POLYSITE 2015ISP Indication packaging 5 F PU***	***VYGON POLYSITE 4008ISP Indication packaging 8 F Si***
Diamètre externe du KT	2.45mm 7.4F	2.8 mm 8.48F	2.2 mm 6.7F	1.65 mm 5F	2.40 mm 7.3F
Diamètre externe du dilatateur	2.9 mm 8.7F	3.09 mm 9.4F	2.41 mm 7.3F	1.75 mm 5.3F	2.74 mm 8.3F
Diamètre externe de la gaine pelable	3.3 mm 10F	3.69 mm 11F	2.86 mm 9F	2.38 mm 7F	3.48 mm 10F
F: French PU: Polyurethane Si: silicone mm: millimetre.					