



CONTROVERSES ET ACTUALITES EN CHIRURGIE VASCULAIRE

CONTROVERSIES & UPDATES IN VASCULAR SURGERY

JANUARY 23-25 2020



MARRIOTT RIVE GAUCHE & CONFERENCE CENTER | PARIS | FRANCE

Peripheral VA-ECMO: open or percutaneous approach?

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Disclosure

Speaker name:

Pierre Mordant

I have the following potential conflicts of interest to report:

Consulting

Employment in industry

Shareholder in a healthcare company

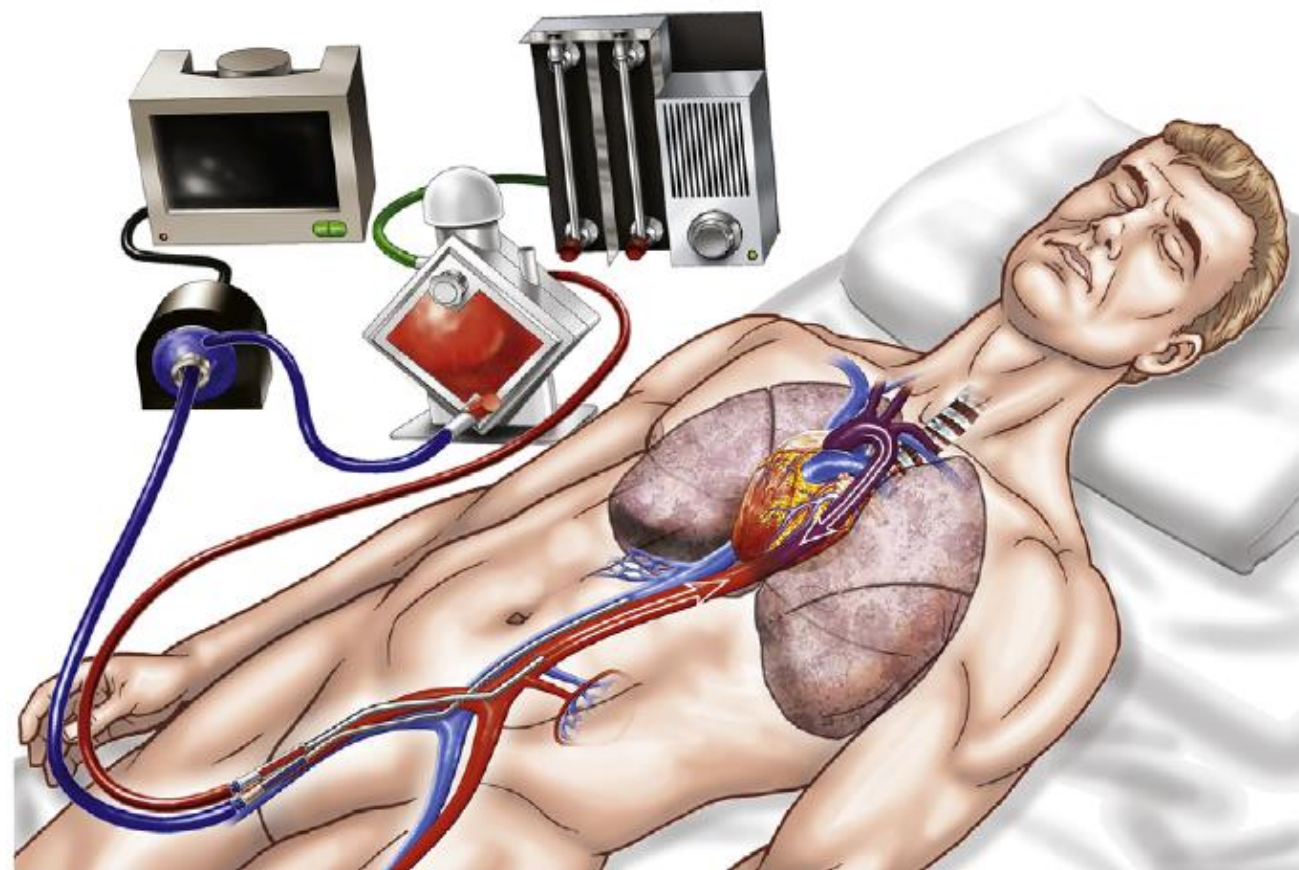
Owner of a healthcare company

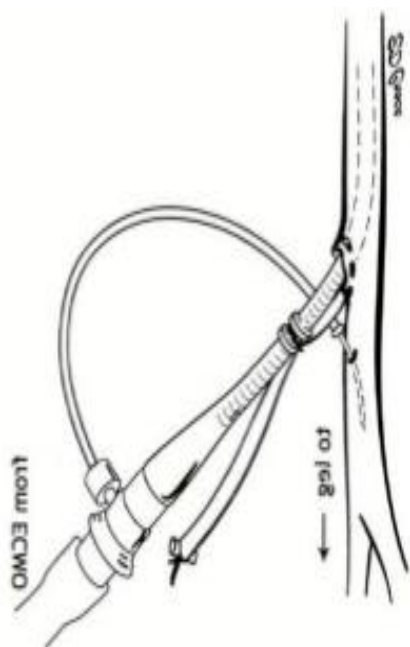
X Other(s) : 3 patents related to arterial ECMO canula (w/ APHP)

I do not have any potential conflict of interest



- ECMO is effective in various circumstances
 - Cardiogenic shock
 - Refractory cardiac arrest
 - Right heart failure 2nd pulmonary disease
 - Intraoperative support of lung transplantation
- The number of VA-ECMO is increasing
 - x 5 between 2012 and 2014 in Germany
 - 3.5/100.000/year
 - 2766 ECMOs in 2016 in France
 - 4.1/100.000/year
 - Out-of-hospital cardiac arrest ?
 - 61/100.000/year...





- The use of peripheral VA-ECMO is still associated with peripheral complications (meta-analysis, n=1866)
 - Limb ischemia 16.9%
 - Fasciotomy 10.3%
 - Amputation 4.7%
 - Infection 30.4%
- Local infections are inconstantly reported (series, n=899)
 - Canulation site 22.3%
 - Requiring revision 9.9%



Pitié Experience, 2014-2016, n=899 VA ECMO

Technique of percutaneous insertion – percutaneous decanulation using Femostop®

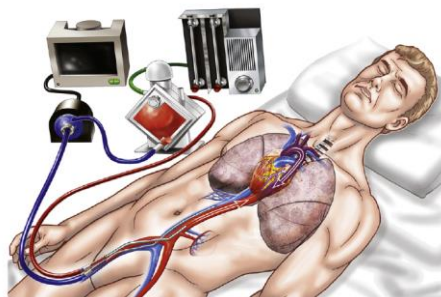
Percutaneous
insertion (15-19F)
w/ reperfusion

ECMO support
Mean 7 days

Percutaneous
decanulation

Manual compression
45 min

Femostop®
3h





Pitié Experience, 2014-2016, n=899 VA ECMO

matching 266 surgical / 266 percutaneous insertion – percutaneous decannulation using Femostop®

	Surgical group n = 266 (%)	Percutaneous group n = 266 (%)	p value	
30-Day overall survival	150 (56.3)	170 (63.8)	0.034	
Cannulation site infection	74 (27.8)	44 (16.5)	0.001	Less groin infections
Infection requiring surgical revision ^a	40 (15.0)	14 (5.3)	< 0.001	
Vascular complications at cannulation ^b	7 (2.6)	10 (3.8)	0.663	
Limb ischemia	33 (12.4)	23 (8.6)	0.347	Comparable limb ischemia
Cannula relocation or removal	25 (9.4)	15 (5.6)	0.258	
Limb fasciotomy	10 (3.8)	6 (2.3)	0.310	
Amputation	2 (0.8)	2 (0.8)	1.000	
Vascular complications after cannula removal	9 (3.4)	39 (14.7)	< 0.001	More revisions for bleeding
Surgical revision for persistent bleeding early after decannulation	4 (1.5)	25 (9.4)	< 0.001	
Surgical revision in the days after decannulation ^c	5 (1.9)	14 (5.3)	0.035	
Lower limb sensory-motor deficit	6 (2.3)	7 (2.6)	0.779	



Pitié Experience, 2014-2016, n=899 VA ECMO

matching 266 surgical / 266 percutaneous insertion – percutaneous decanulation using Femostop®

Factors associated with local infection

Variables	Univariable analysis		Multivariable analysis	
	OR (95% CI)	p value	OR (95% CI)	p value
Percutaneous approach	0.46 (0.32–0.66)	< 0.001	0.40 [0.27–0.59]	< 0.001
Chronic heart failure	1.86 (1.33–2.62)	< 0.001	1.55 [1.08–2.23]	0.018
Duration of VA-ECMO		< 0.001		< 0.001
< 3 days	1		1	
≥ 3 and < 6 days	4.92 (2.50–10.61)		4.25 (1.99–9.1)	
≥ 6 and < 10 days	8.92 (4.59–19.12)		8.14 (3.84–17.25)	
≥ 10 days	11.48 (5.95–24.46)		10.03 (4.77–21.10)	
Reperfusion	10.19 (2.17–181.78)	0.005	–	–
SOFA score	0.95 (0.91–0.98)	0.003	–	NS
VA-ECMO implanted under cardiopulmonary resuscitation	0.45 (0.27–0.78)	0.006	–	NS



Bichat experience, 2011-2017, n=154 VA ECMO for LT

Technique of percutaneous insertion – percutaneous decanulation using Proglide®

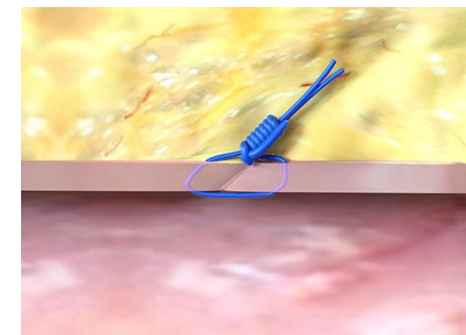
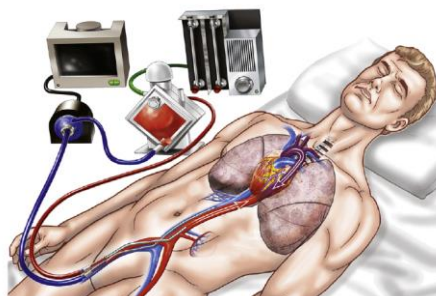
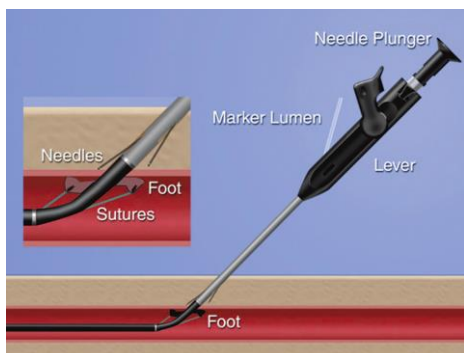
Preclosing of the
femoral artery (PFA)
Proglide® device

Percutaneous
insertion (15-19F)
w/ reperfusion

ECMO support
Median 1 day

Percutaneous
decanulation

Closing of the
femoral artery
Proglide® device





Bichat experience, 2011-2017, n=154 VA ECMO for LT

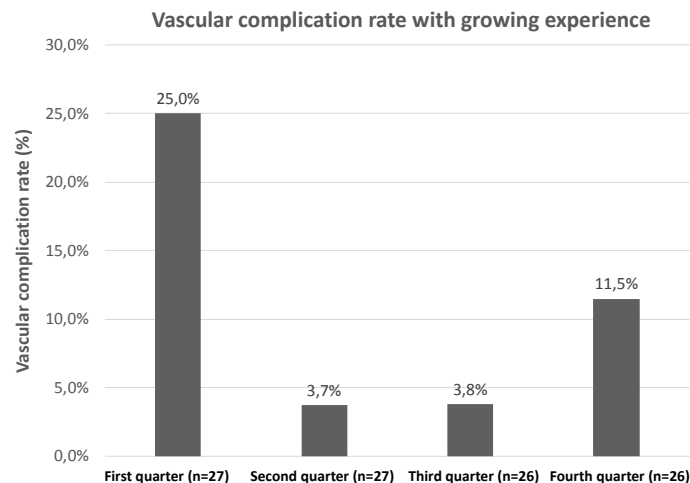
Comparing 48 surgical / 106 percutaneous insertion – percutaneous decanulation using proglide®

	Surgical group n = 48	Percutaneous group n = 106	p-value	
All local infectious complications	19 (39%)	1 (0.9%)	< 0.001	Less groin infections
Groin healing delay	10 (20,8%)	1 (0.9%)	< 0.001	
Groin wound infection	9 (18,9%)	0 (0%)	< 0.001	
Acute limb ischemia	1 (2,1%)	2 (1.8%)	ns	Comparable limb ischemia
Fasciotomy	1 (2,1%)	1 (0.9%)	ns	
Major amputation	0 (0%)	1 (0.9%)	ns	
Revision for bleeding	3 (6.3%)	0	ns	Comparable revisions for bleeding



• Limitations

- Retrospective - single center
- Short duration of ECMO support
- Use of a vascular closing device
- Still vascular complications (11%)



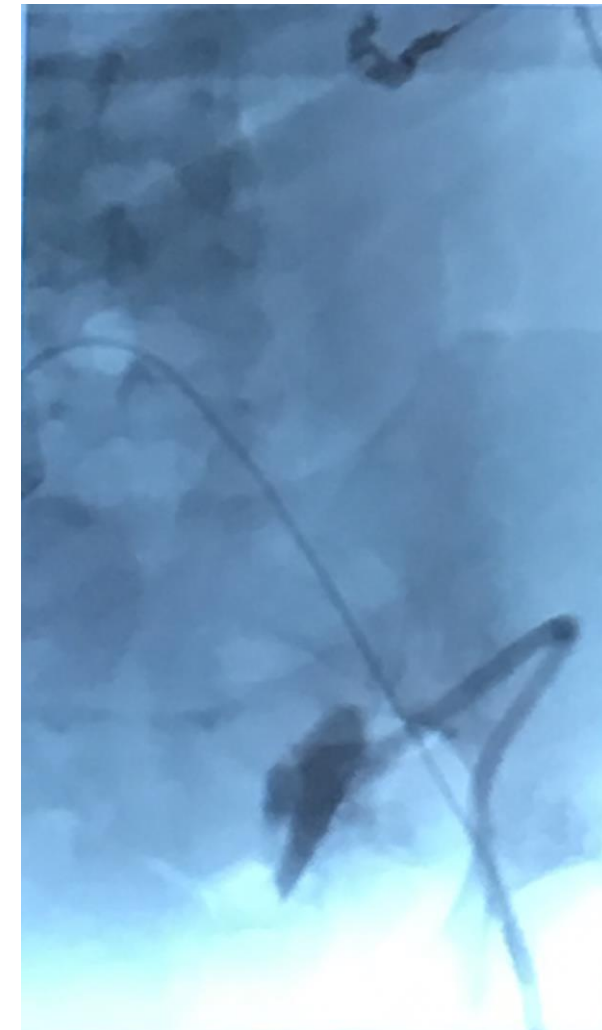
Factors associated with limb ischemia

Variables	Univariable analysis		Multivariable analysis	
	OR (95% CI)	p value	OR (95% CI)	p value
SOFA score	1.11 (1.06–1.17)	< 0.001	1.12 (1.06–1.18)	< 0.001
Peripheral artery disease	2.63 (0.94–6.32)	0.048	–	NS
Reperfusion	0.41 (0.18–1.06)	0.072	–	NS
Chronic heart failure	0.57 (0.35–0.92)	0.022	–	NS
Arterial cannula size	1.08 (0.88–1.29)	0.526	–	–
Ipsilateral arterial/controlateral venous cannulation	1.46 (0.88–2.38)	0.136	–	–
Percutaneous approach	0.83 (0.50–1.34)	0.446	–	–

Danial / Lebreton *Intensive Care Med* 2018

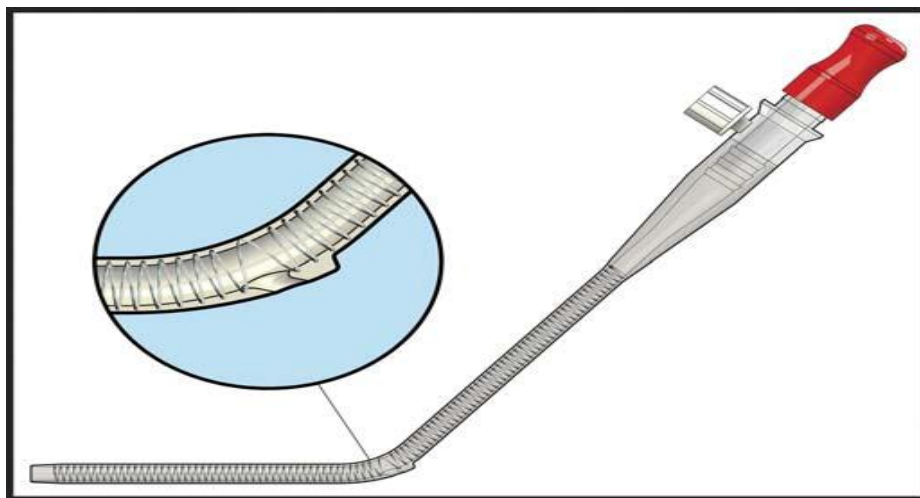
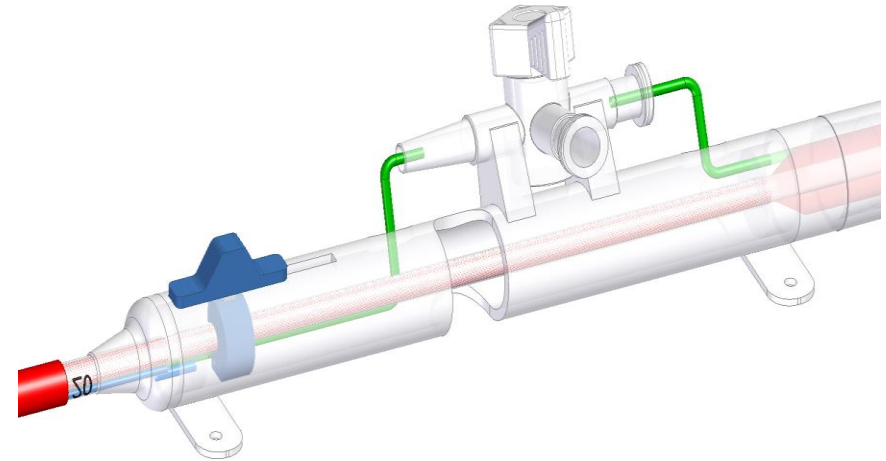
Factors associated with vascular complications

Variables	OR	CI 95	p
Male sex	0.11	0.02–0.26	0.014
Peripheral arterial disease	22.32	3.48–214.11	<0.001
ECMO duration	1.61	1.10–2.47	0.018
Early experience	2.68	0.59–12.36	0.190

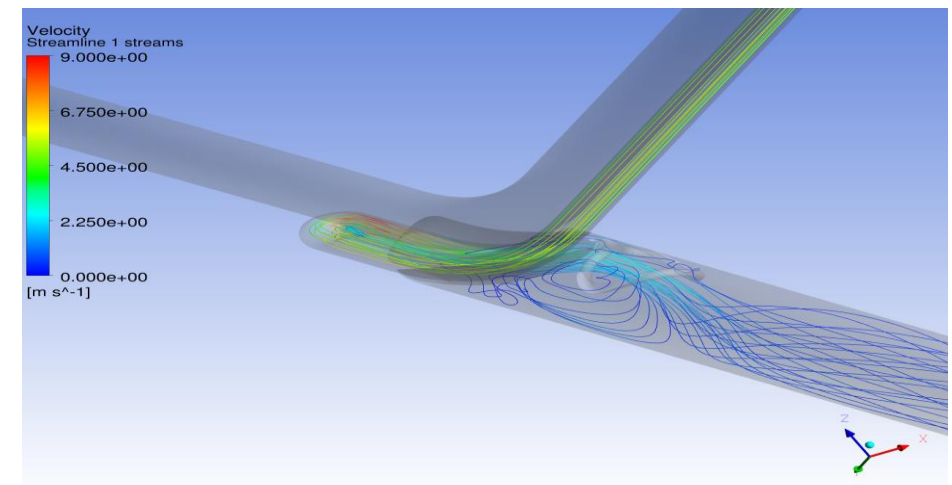
Pellenc / Castier *EJCTS* in press



- Perspectives
 - Better strategies are needed to preserve the blood flow of both superficial and profundis femoral arteries
 - Integrating a distal perfusion catheter in a dual-lumen canula might be a solution given that it can be used percutaneously



Livanova Bi-flow®



Xperf prototype



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- In VA ECMO, percutaneous cannulation is associated with a decreased rate of infection and a comparable rate of limb ischemia as compared with open approach
- Post ECMO manual compression and Femostop® are associated with a 15% rate of revisions to stop bleeding
- Pre ECMO preclosing of the femoral artery and Proglide® are associated with a low rate of revisions to stop bleeding
- In our experience, preclosing of the femoral artery allows total percutaneous VA ECMO in the setting of lung transplantation
- This technique could be applied to other indications for VA-ECMO with the potential to eradicate local infections and surgical revisions for bleeding.
- Better prevention of limb ischemia during VA ECMO is still needed.