

ISMETT

UPMC LIFE
CHANGING
MEDICINE

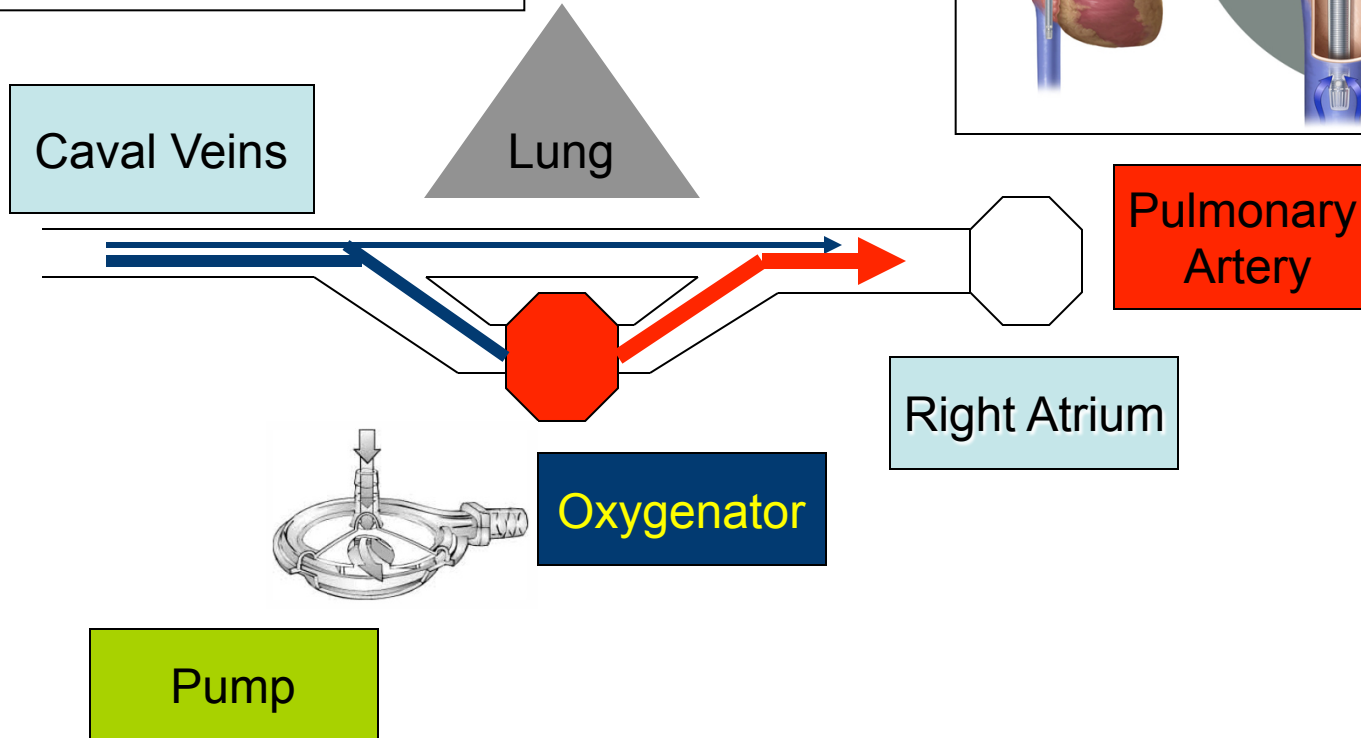
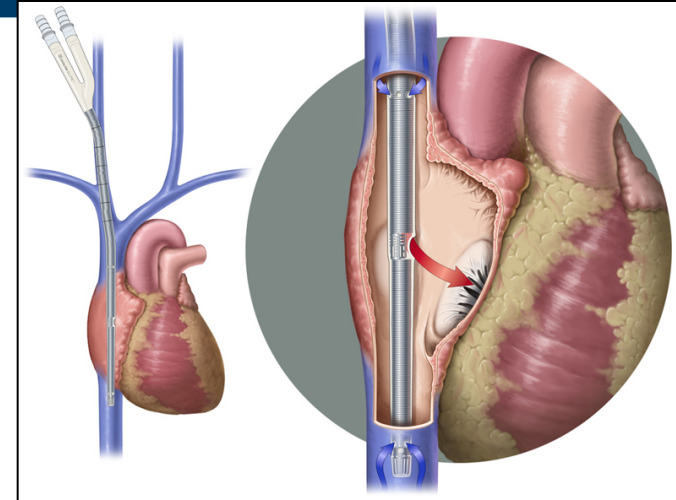
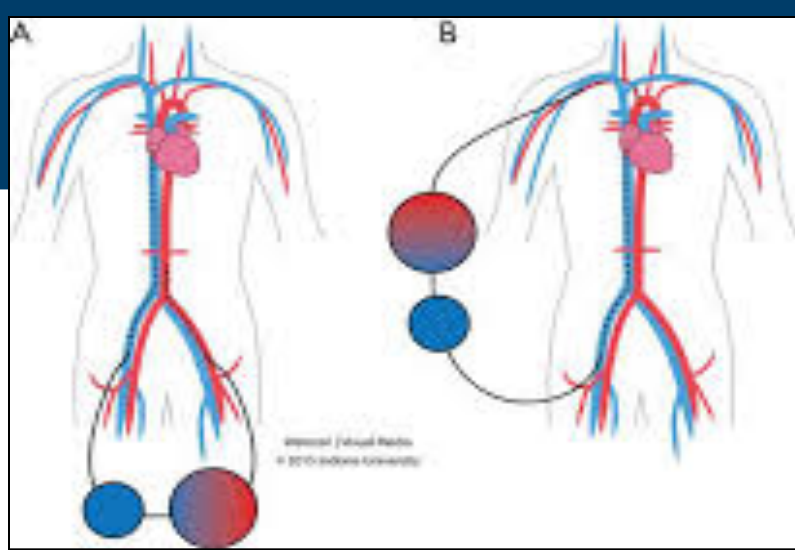
BEYOND THE SLIDES 2015

1st UDINE ECMO WORKSHOP

Single VV cannula management

G- Panarello

Veno-Venous



History

Kendall

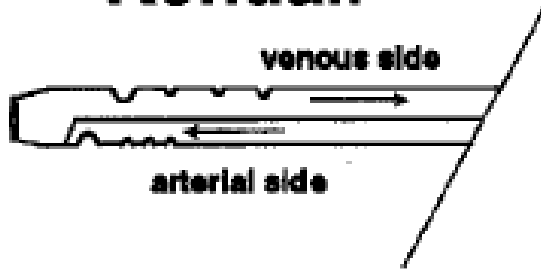


Neonates
Small children

Origen

A

Kendall



14 F

B

OriGen



12, 15, 18 F

Se:8352
Im:1

RACUGLIA, ENRICA, MARIA
Study Date: 1/27/2012
Study Time: 3:47:09 AM
MRN: VIT0000040997

[H]



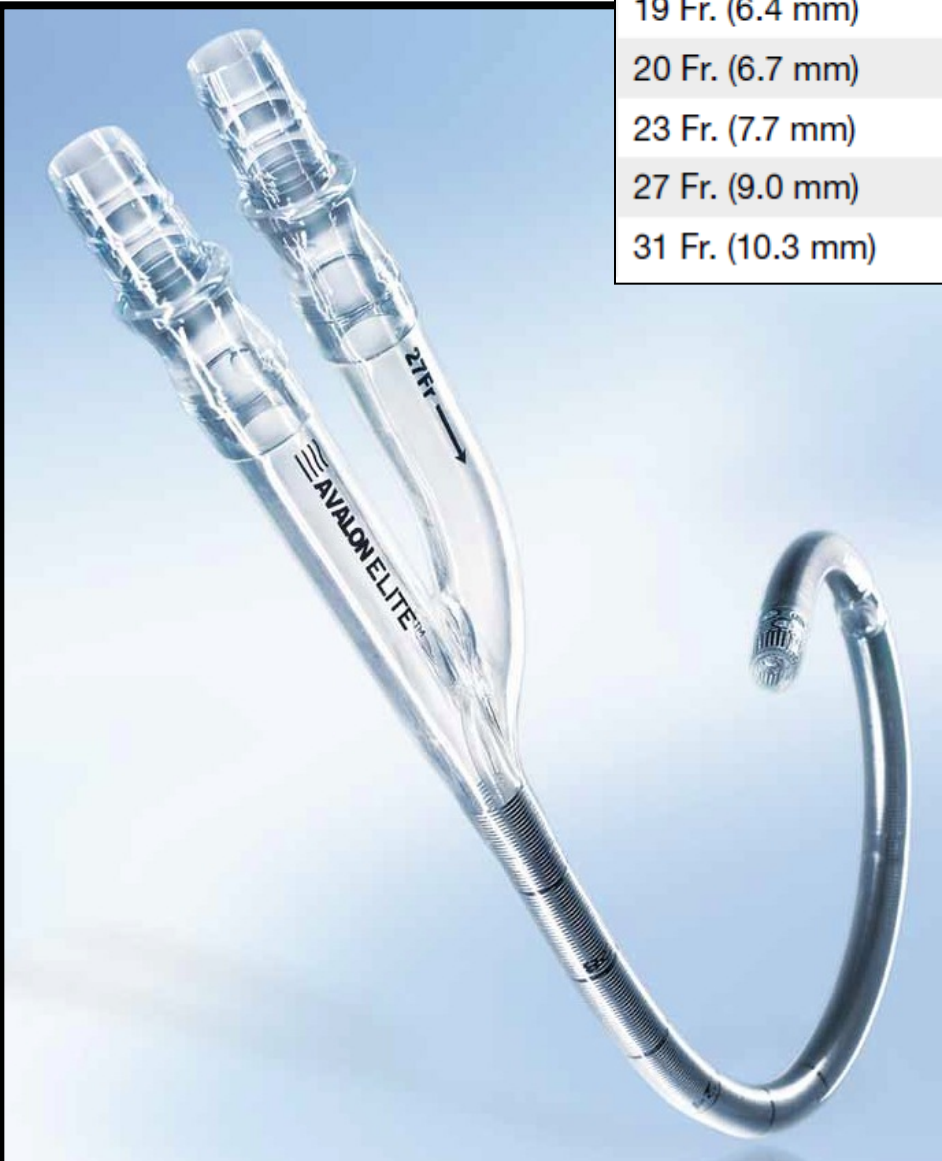
[F]

[R]

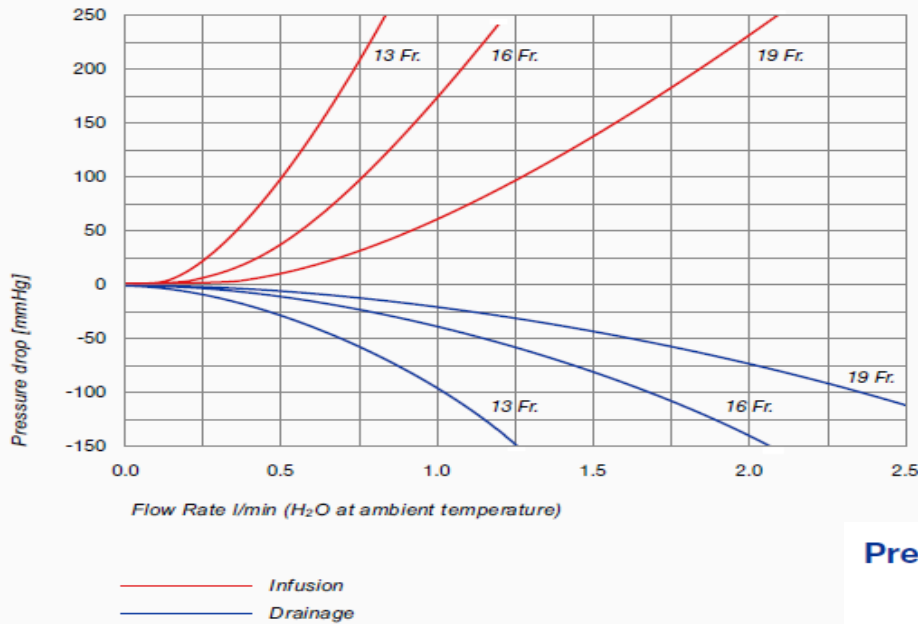
C8192
W16384

- Structural deformation when heated to body temperature
- Easy catheter migration
- Blood flow limitation

Size	Insertable Length	Connector Size
13 Fr. (4.3 mm)	11 cm (4.3")	1/4"
16 Fr. (5.3 mm)	14 cm (5.5")	1/4"
19 Fr. (6.4 mm)	21 cm (8.3")	1/4"
20 Fr. (6.7 mm)	31 cm (12.2")	3/8"
23 Fr. (7.7 mm)	31 cm (12.2")	3/8"
27 Fr. (9.0 mm)	31 cm (12.2")	3/8"
31 Fr. (10.3 mm)	31 cm (12.2")	3/8"



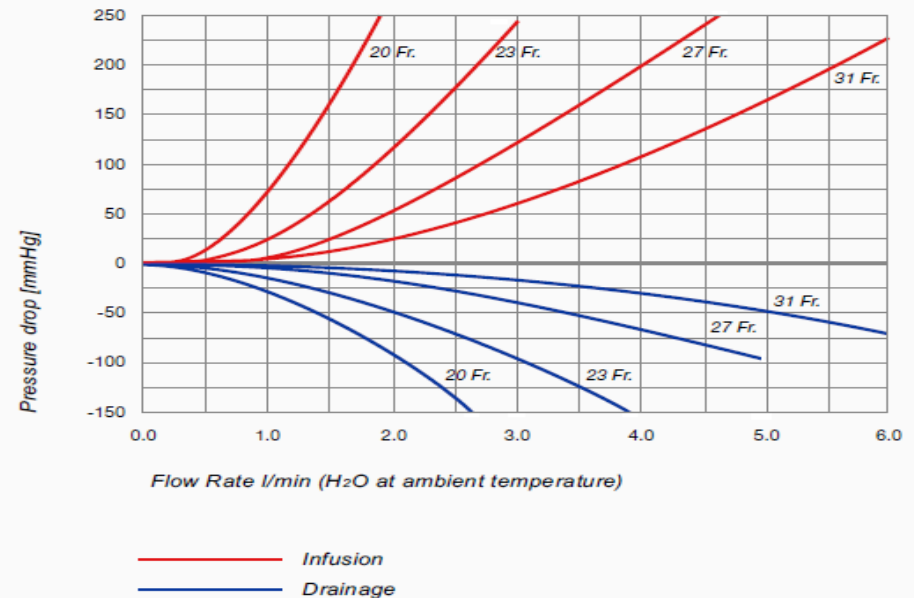
Pressure drop vs. flow 13, 16, 19 Fr.

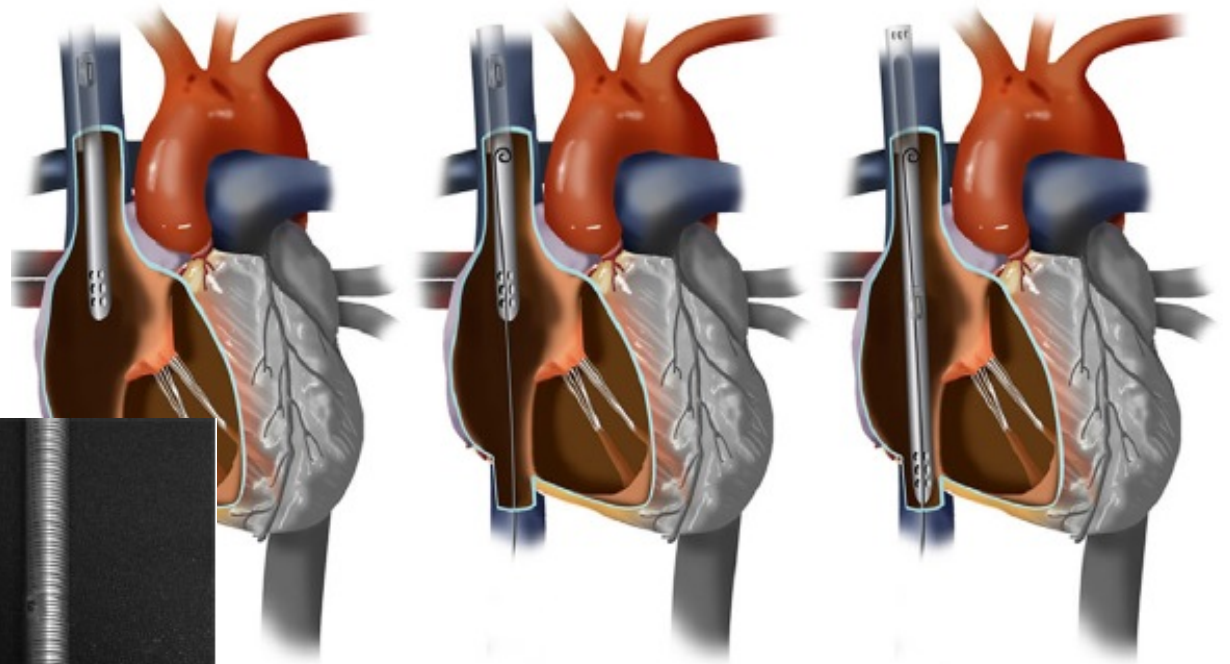


Polyurethane copolymer that combines the biostability of silicone with the strength and durability of polyurethane

Wire reinforced, deformation resistant device

Pressure drop vs. flow 20, 23, 27, 31 Fr.

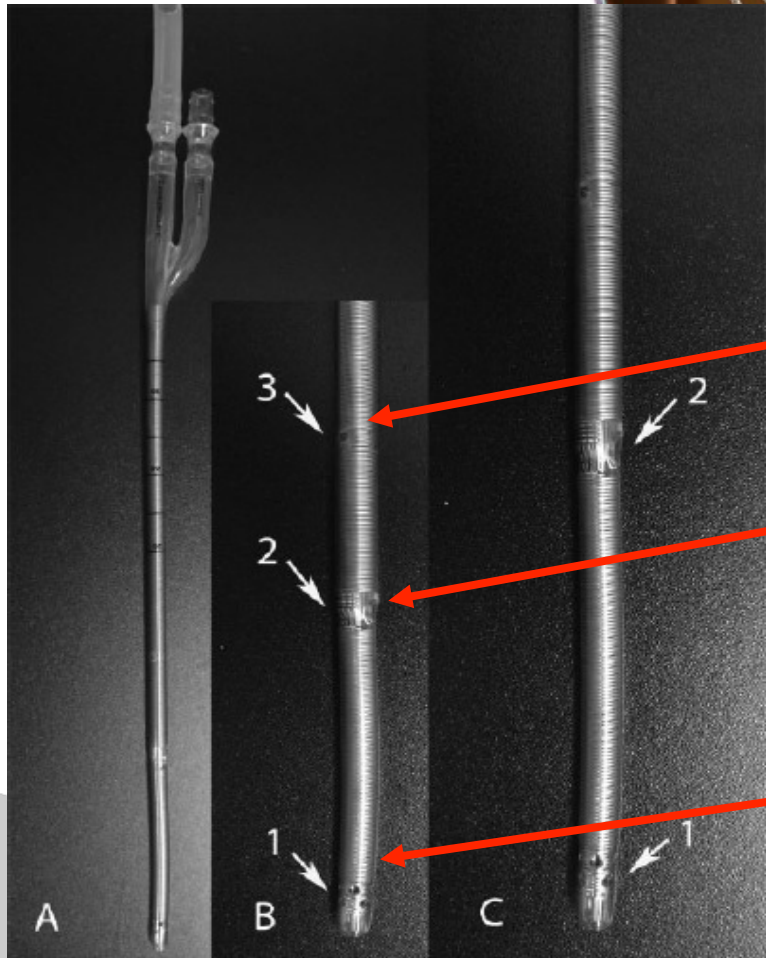




SVC –RA junction

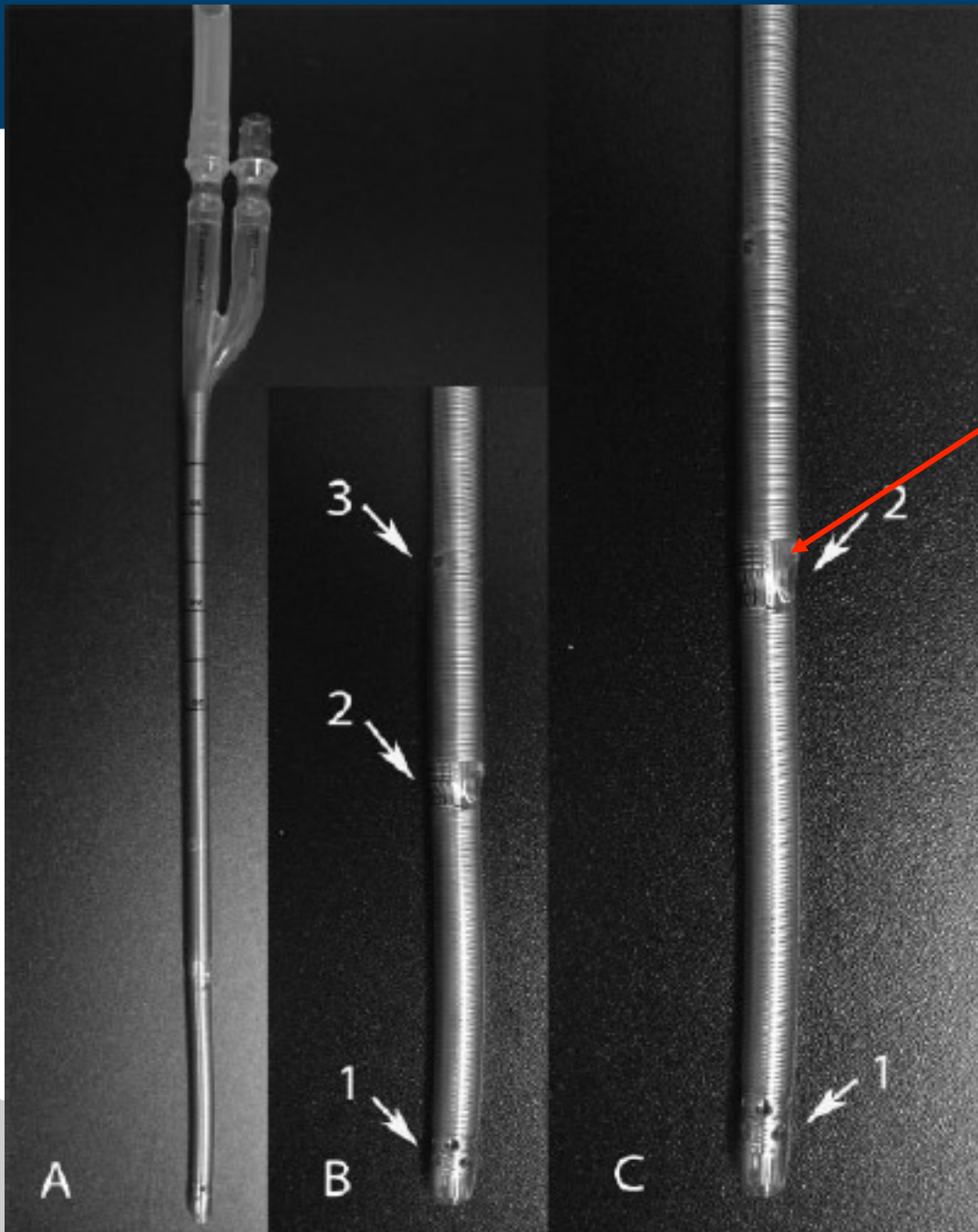
In front of the TV

Inferior to the junction IVC-RA



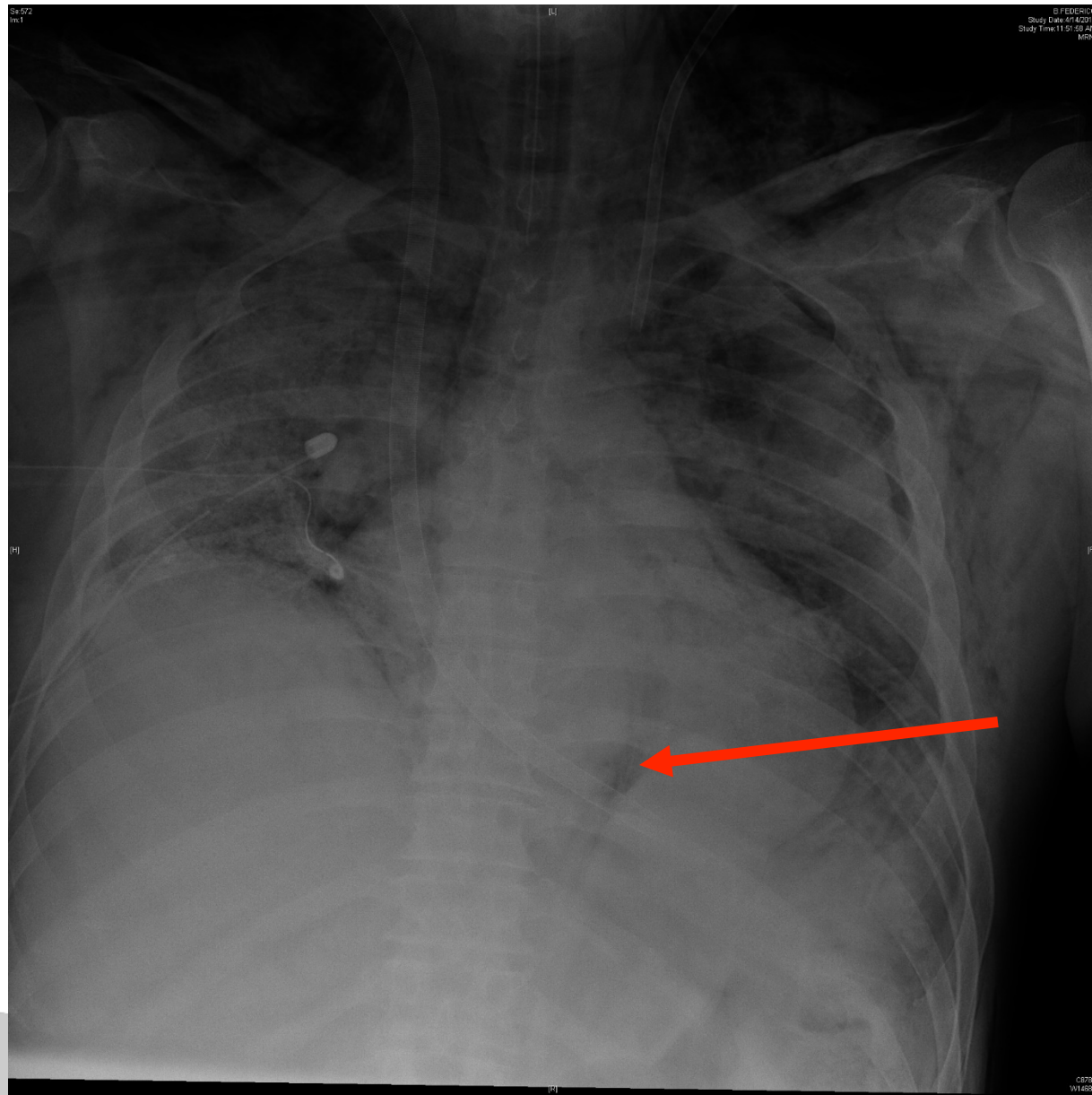
DL Cannula insertion complications

- **Risk of central vein puncture**
- **Risk of heart-surrounding venous structure perforation (Incidence 4-15%) – TEE guided (?)**
- **Cannula malposition**
- **Migration of the cannula (RV, HV)**
- **Loop formation**

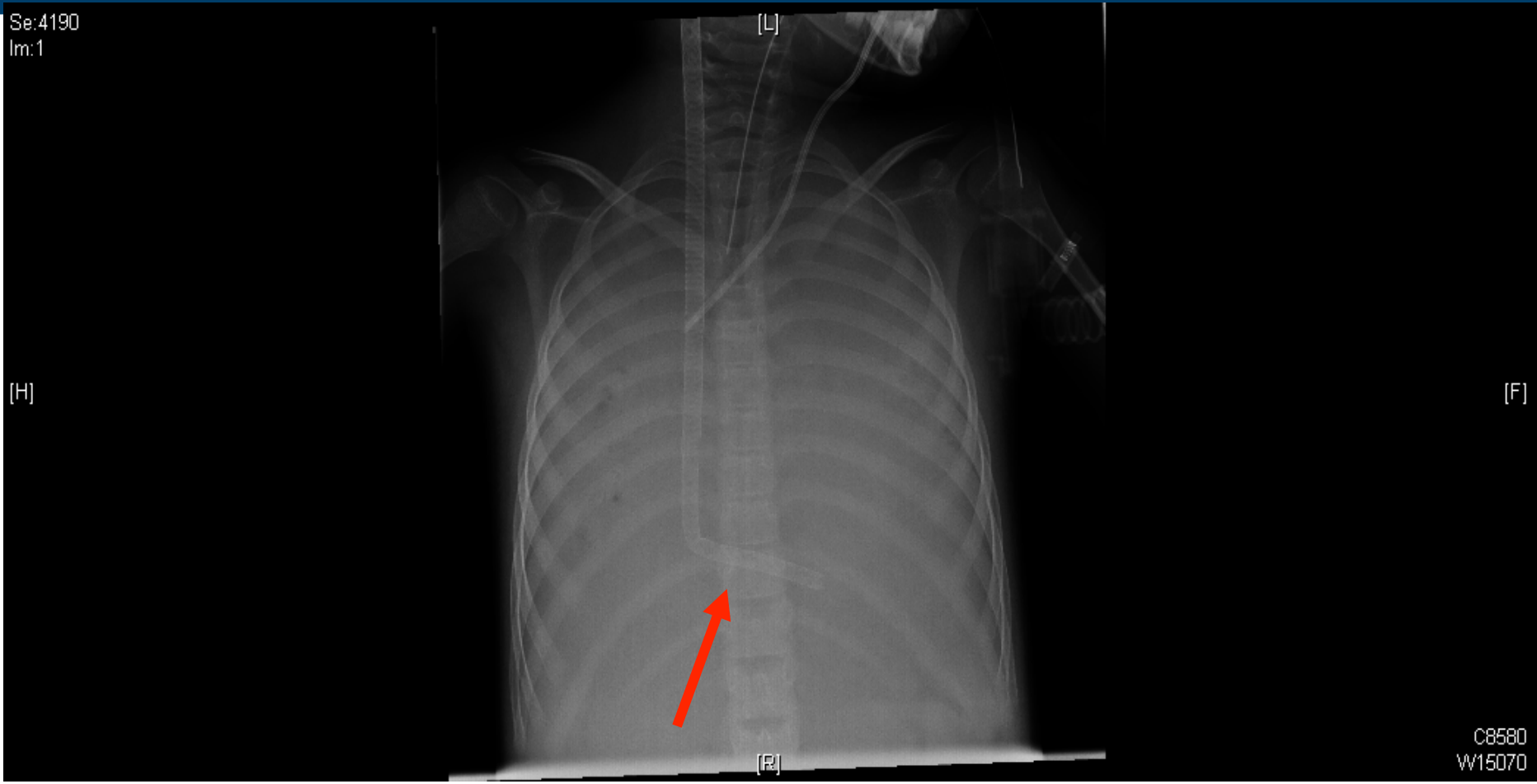


Not wire reinforced acting
as a hinge for the inferior
stiff segment

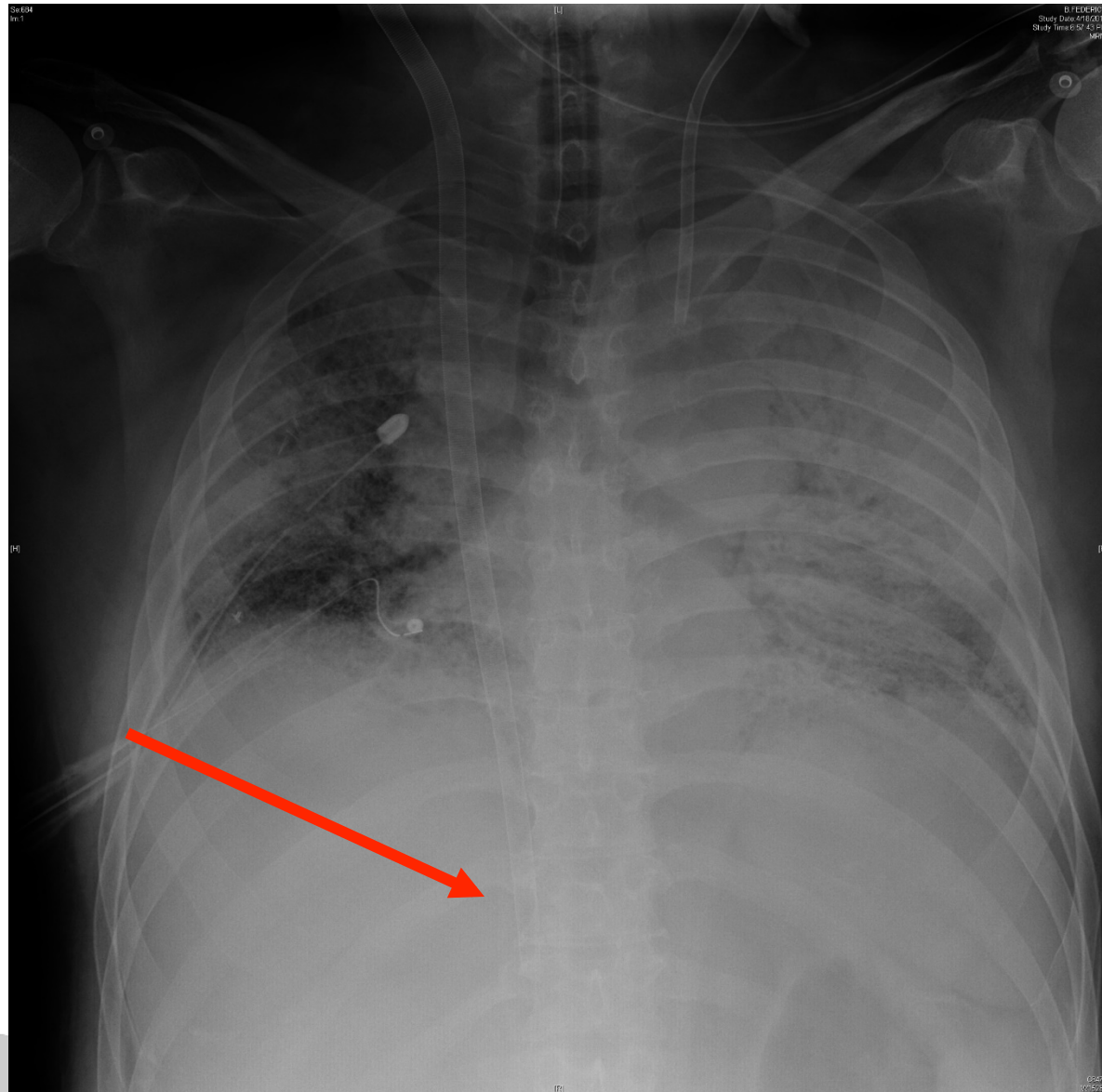
Cannula malpositioning....



Se:4190
Im:1



Bicaval Technique done right !

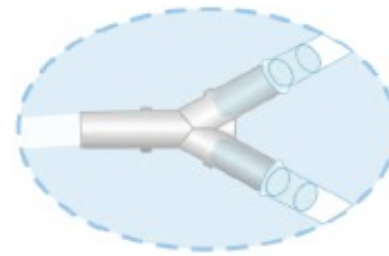


Clinical Indications

- ARDS in pediatric and adult population
- BRIDGE to Lung Transplantation
- Chest trauma

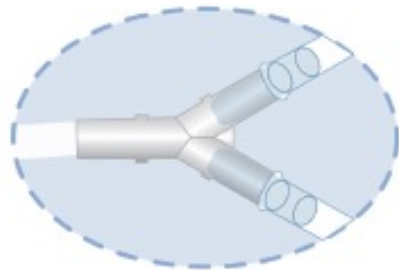
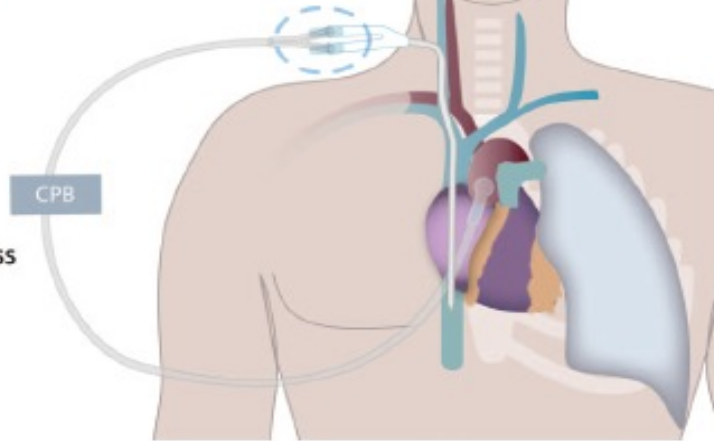
Configurations

- VV ECMO
- CPB
- VA ECMO



Right Internal Jugular Vein with Avalon Catheter

Aortic Cannulation for Cardiopulmonary Bypass



right internal jugular vein with Avalon catheter



right axillary artery graft tunneled through the skin

Pump

Oxygenator

ASAIO Journal 2011

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UPMC LIFE CHANGING MEDICINE

Comparison of the Avalon Dual-Lumen Cannula with Conventional Cannulation Technique for Venovenous Extracorporeal Membrane Oxygenation

Thomas Kuhl^{1,2,*} Guido Michels^{3,*} Roman Pfister³ Stefanie Wendt⁴ Georg Langebartels⁴
Thorsten Wahlers⁴

Conclusion In summary, double-lumen cannulation allows sufficient gas exchange with more effort (material, technical, and physicians' experience) and higher costs but better mobilization possibilities (particularly prone position) and potential avoidance of deep sedation and mechanical ventilation. From the current point of view, the DLC should be reserved for special cases.

Thorac Cardiovasc Surg 2015;63:653–662



TRAUMA

- 50% of traumas are associated with thoracic and/tracheal-bronchial tree injury
- Up to 10% may develop ARDS not responsive to conventional therapy

BLEEDING RISK IF THE MAIN FACTOR LIMITING ECMO IMPLEMENTATION

1. Heparin free ECMO therapy by using heparin coated systems

Muellenbach. J Trauma Acute Care Surg 2012

Author, Publication year	Number of patients	Survival
Anderson 1994	24	17 weaned, 15 discharged
Senunas 1997	14	8 survivors
Michaels 1999	30	17 weaned 15 discharged
Cordell-Smith 2006	28	20 survivors
Huang 2009	9	7 survivors
Art 2010	10	6 survived
Ried 2013	52	79 % survived
Biderman 2013	10	7 survivors
Bonacchi 2013	14	5 survivors
Tseng 2014	9	7 weaned, 3 survived
Wu 2014	20	16 survivors

Evidence for the VV ECMO use in Trauma is not supported by randomised trials

DL Cannula in TRAUMA

FACTORS LIMITING DL CANNULA USE

1. Double lumen is not heparin coated –aPTT controlled heparinization must be implemented
2. Double lumen cannula has a flow limit (upper limit of 4.5-5 L) –need for 31 F cannula

NOT RECOMMENDED IN PATIENTS WITH HIGH RISK OF BLEEDING

DISEASE	AGE	W	H	BMI	BLOOD FLOW
FIBROSI POLMONARE	47	95	177	30	2,9
DEFICIT DI ALFA1ANTITRIPSINA- PHT	52	70	176	23	2,5
FIBROSI POLMONARE	45		180	28	3,5
FIBROSI CISTICA				22	1,4
FIBROSI CISTICA					2,8
FIBROSI CISTICA					3,3
FIBROSI CISTICA					3,1
FIBROSI CISTICA					1,3
FIBROSI CISTICA					0,6
FIBROSI POLMONARE -PHT				28	3,5
FIBROSI CISTICA	34	166	49,5	18	3,4
FIBROSI POLMONARE	59	56	155	23	3.6

Five pts extubated
2 pts had conversion to VA ECMO during Tx
1 pt required additional single cannula placement
2 patients dead while waiting for Tx
1 pt died after Tx

CONCLUSIONS

Veno-venous ECMO

femoral-jugular cannulation

PROs

High blood flow 6–7 L/min possible, No fluoroscopy needed for cannulation, Bedside cannulation possible, Heparin free run possible, Suitable for patients with high risk of bleeding

CONTRA_s

Risk of femoral cannula kinking during mobilization, Less comfortable for patients, More pain medication, eventually sedation necessary

double lumen cannula

PROs

More comfortable for awake patients, Less or no sedation and less pain medication necessary, Fully mobilization, sitting and walking possible

CONTRA_s

Fluoroscopy recommended for cannulation, less risk of malposition, bed-side cannulation with high risk with echocardiography possible, pTT 50–60 s needed, not suitable for bleeding patients, patients with severe brain injury or high bleeding risk patients, maximal blood flow about 5 L/min with 31 F cannula



THANKS