CRESCENT RA

Neonatal and Pediatric VV Cannulae:
Why do we care?

Discontinuation of the OriGen® Dual-Lumen Right Atrial Cannula Decreased Venovenous ECMO Usage in Neonates and Older Children: A Survey of the American Pediatric Surgical Association

Mir Shanaz Hossain [1], Faraz A Khan [2], Darrell L Cass [1], Jason O Robertson [3]

Cardiovascular perforation during placement of an Avalon Elite® Bicaval dual lumen ECMO cannula in a newborn

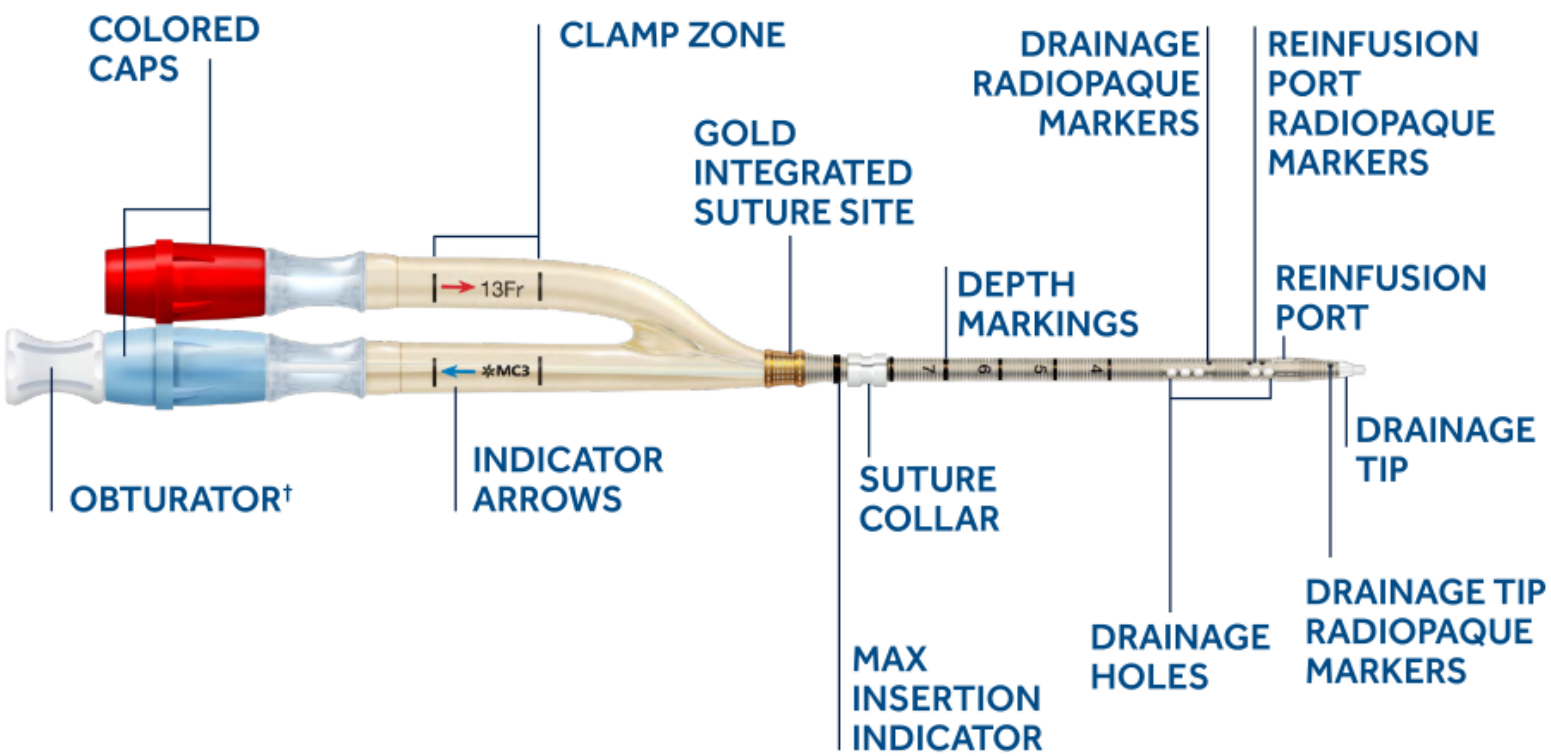
Matias E Czerwonko [1], Maria V Fraga, David J Goldberg, Holly L Hedrick, Pablo Laje

- Prior to the Crescent RA, the only available dual lumen cannula specifically designed for pediatric use was the OriGen Right Atrial (RA) Cannula
  - Pediatric models: 13Fr, 16Fr, and 19Fr
- Origen Reinforced Dual Lumen Cannula discontinued in 2019
  - FDA reports: tubing separation
- Avalon Elite
  - Available in 13Fr, 16Fr and 19Fr
  - History of difficult placement and perforation in pediatric ECLS
- Large impact on utility of VV support in neonates/pediatrics/adolescents
- Hossain et al. (2023) found that discontinuation of OriGen RA yielded:
  - Increased VA ECMO use **Neonates** (17.5% to 37.6%, p=0.002)
  - 33.8% of surveyed surgeons changed practice, utilizing **VA** ECMO when **VV** was indicated
  - 17.8% of surgeons incorporated selective use of **VA ECMO** in pediatrics/adolescents
- ELSO (2023) data on ECLS use for neonatal respiratory failure supports these findings

Crescent RA: Key characteristics

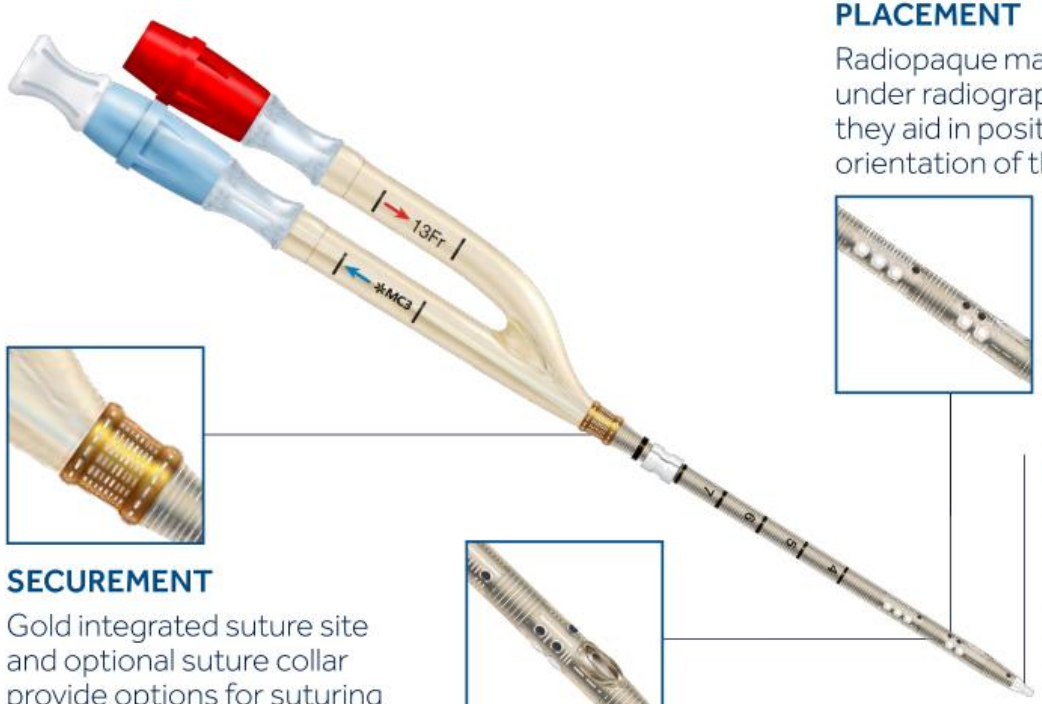
- Dual Lumen: combines both drainage and reinfusion lumens into one cannula
- Design: allows for effective drainage of deoxygenated blood from both the superior vena cava (SVC) and base of right atrium (RA), with reinfusion of oxygenated blood into the RA, towards the tricuspid valve (TV)
- 82% of drainage comes from proximal drainage ports (SVC)
- Tip Placement: The tip of cannula **and** reinfusion port are situated in the RA
  - The reinfusion port is directed towards the patients anterior
  - The downward exit of re-infusion flow directs oxygenated blood towards the tricuspid valve (30 degree angle)
  - Reduces recirculation by maintaining distance between distal drainage port (tip) and reinfusion port

Crescent RA: Cannula Diagram



Code	French size	Insertion length	Connector
70413	13 Fr	8.9 cm	1/4 inch
70415	15 Fr	9.7 cm	1/4 inch
70419	19 Fr	14.5 cm	1/4 inch

Crescent RA: Key Features



PLACEMENT

Radiopaque markers are visible under radiographic imaging — they aid in positioning and axial orientation of the catheter

SECUREMENT

Gold integrated suture site and optional suture collar provide options for suturing along the catheter body — reducing the risk of a suture cutting through the catheter body

FLOW

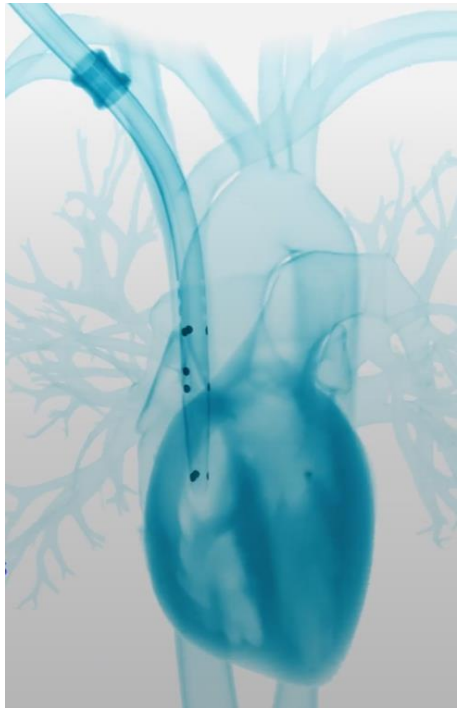
Reinfusion port size, shape, and location designed to optimize flow performance

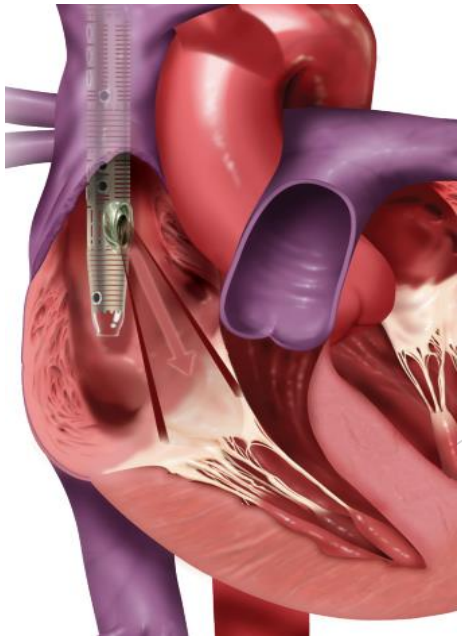
FLEXIBILITY

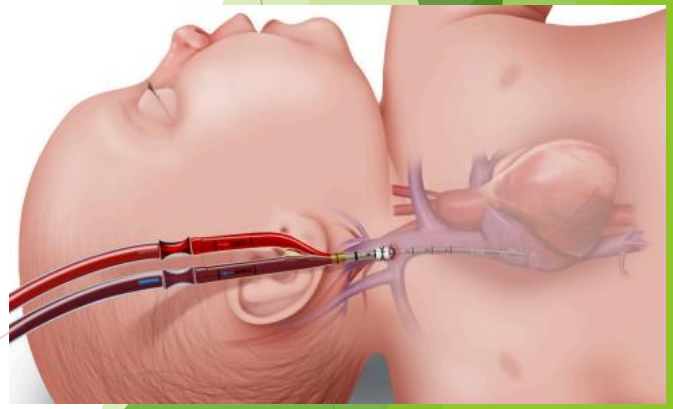
Includes both an introducer (accommodates guidewire) and obturator (blunt tip) to facilitate either a Seldinger or cut down approach

Crescent RA:
Imaging and Placement

- The Crescent RA:
  - Supplied with an introducer and stylet for percutaneous insertion
  - Equipped with obturator for open cut-down technique
- Crescent RA IFU: recommends radiographic imaging during guide wire and cannula insertion (fluoroscopy)
- Radio-opaque (tantalum) markers
  - At drainage and reinfusion ports
  - Serve as reference points to aid in cannula positioning and orientation
- Reinfusion port situated in the right atrium towards:
  - Patients anterior, towards tricuspid valve (TV)
  - Vertical markers to the right of the cannula
- The catheter should be inserted:
  - Red infusion cap facing the patients anterior
  - Catheter size printing/labeling facing away from the patient







Crescent RA Placement: Vascular Access Kits

- Crescent RA
  - 13Fr and 15Fr: Pediatric Arterial/Venous Access Kit w/0.025 in J-tip guidewire
  - 19Fr: Opus Vascular Access Kit w/0.038 in J-tip guidewire
- Facilitates serial dilation for peripheral (percutaneous) cannulation
  - Seldinger technique
- Dilators specifically designed to facilitate smooth insertion and gradual dilation of fascia
- Dilator sizing accommodates for patient anatomy and size
- Flexible tip dilators facilitate tracking along guidewire
- Dilator hubs designed to facilitate handling during insertion/removal
  - Dilator size clearly labeled on dilator hubs
- Compatible with:
  - Crescent dual lumen cannula
  - Mini return/drainage cannula

Use with 13Fr/15Fr Crescent

Pediatric Arterial/Venous

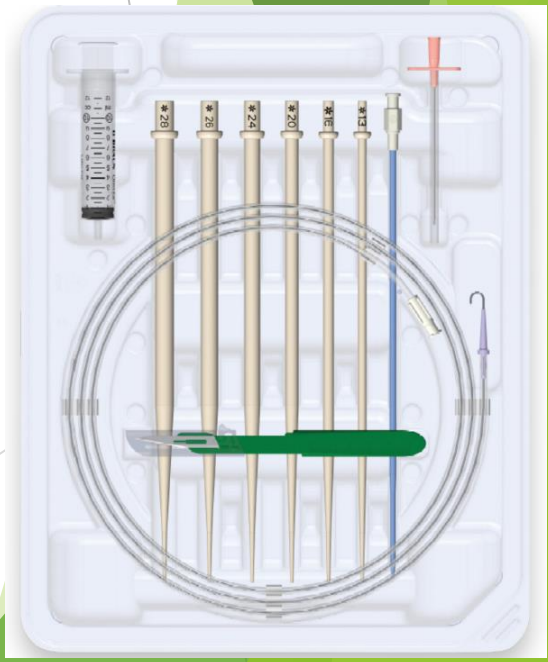
96553

- 0.025 in (0.635 mm) diameter; 60 cm (23.62 in) guidewire
- #11 scalpel blade
- 10 cc syringe
- Stepped vessel dilator, 8 Fr/10 Fr, and 12 Fr/14 Fr
- Seldinger needle, 18 ga (1.02 mm)

Use with 19Fr Crescent

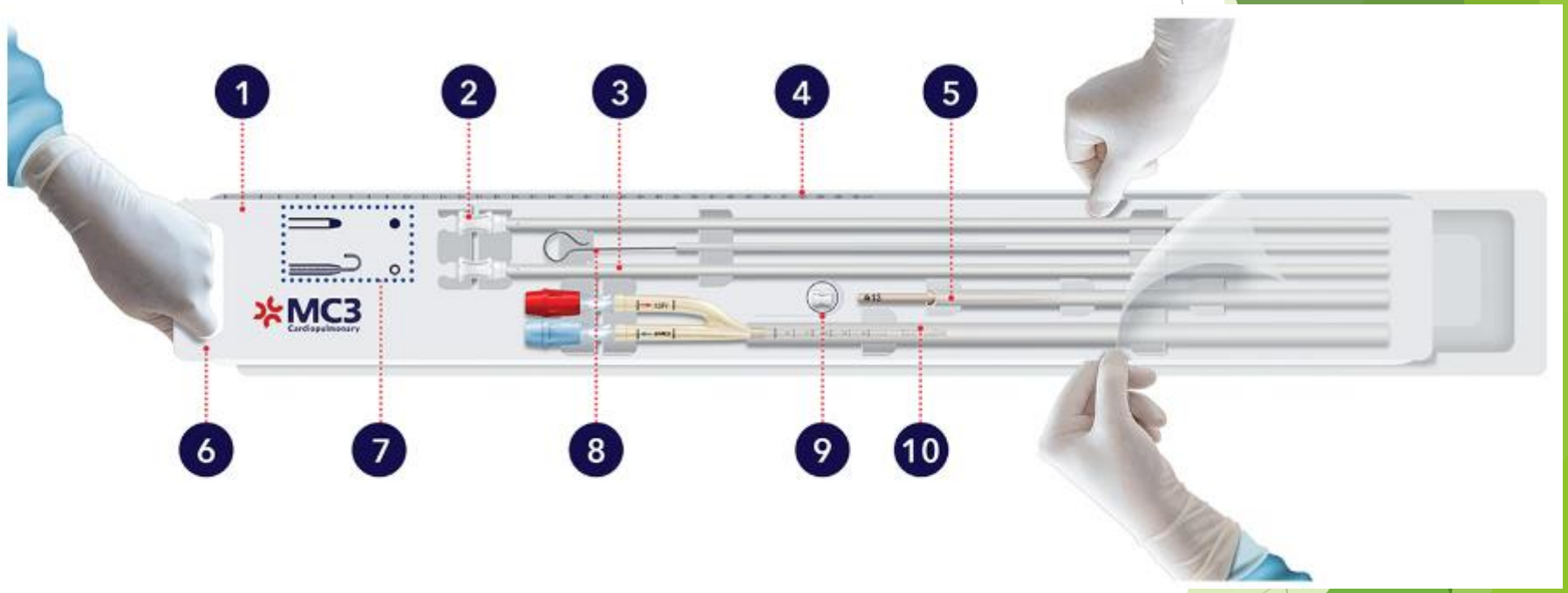
Opus™* Vascular Access Kit 21030†
5 units per box

Stepped vessel dilator, 8/10 Fr, 13 Fr, 16 Fr, 20 Fr, 24 Fr, 26 Fr, 28 Fr
Guidewire, J-tip 0.038 in (0.97 mm) x 71 in (180 cm) with depth mark increments
Scalpel, #11 safety
Needle, 18 gauge
Syringe, 10 cc

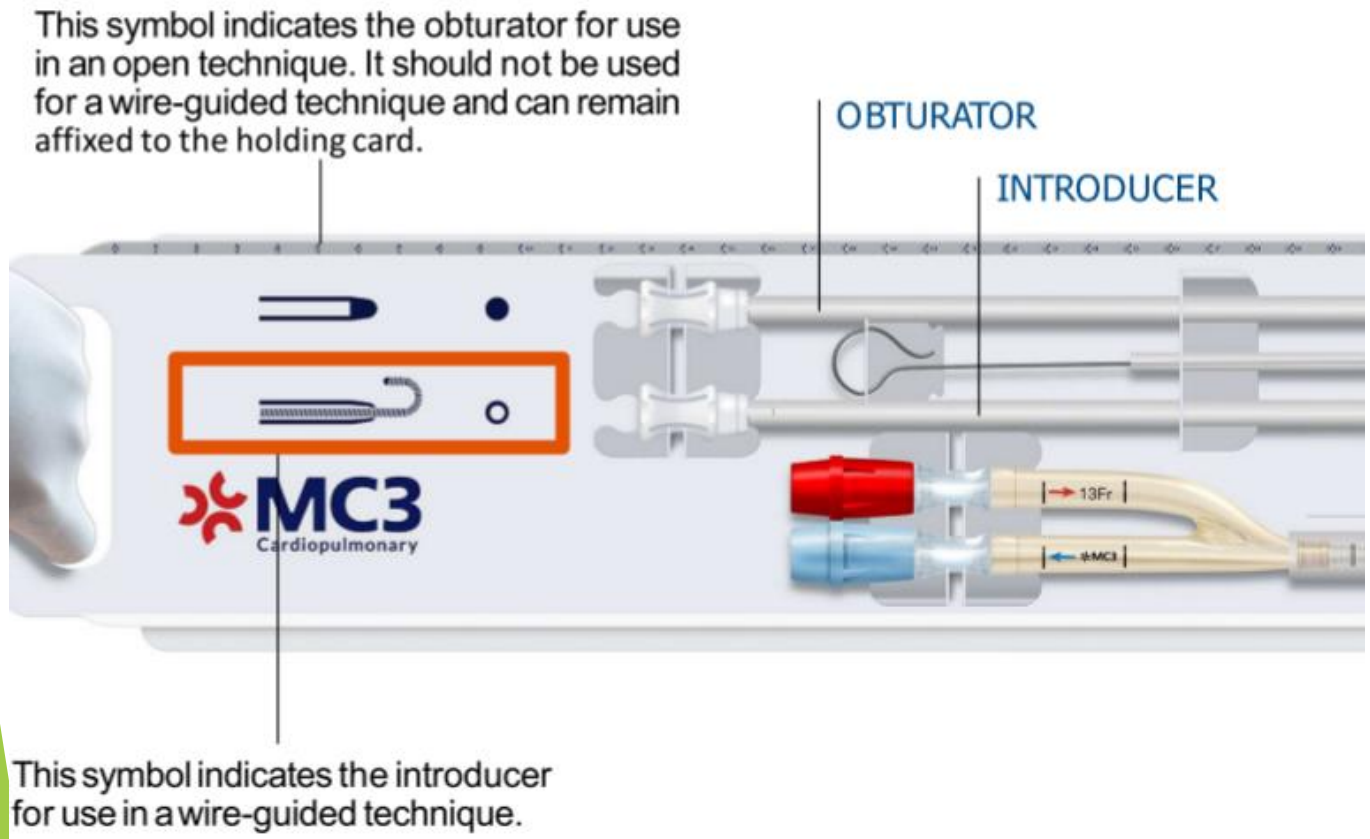


Crescent RA: Packaged Contents

1. Holding card
2. Obturator
3. Introducer
4. Measuring scale
5. Dilator
6. Removal handle
7. Graphic indicating introducer or obturator
8. Stylet
9. Suture collar (optional)
10. Catheter



Crescent RA: Seldinger Technique



- Percutaneous Crescent RA Insertion
  - The introducer, which accommodates a guide wire, should be used:
  - 13Fr and 15Fr: 0.025 in guidewire
  - 19Fr: 0.038 in guidewire should be used
- Crescent RA comes with a matching dilator
  - Matching dilator is the same size as cannula
  - Ensures vessel is dilated to the size of the cannula
    - Example: 13Fr Crescent RA - 13Fr dilator

Catheter Positioning

- Proper placement of Crescent RA is crucial to the performance of the cannula
- The reinfusion port is designed be to directed towards the patients anterior
  - Towards the tricuspid valve

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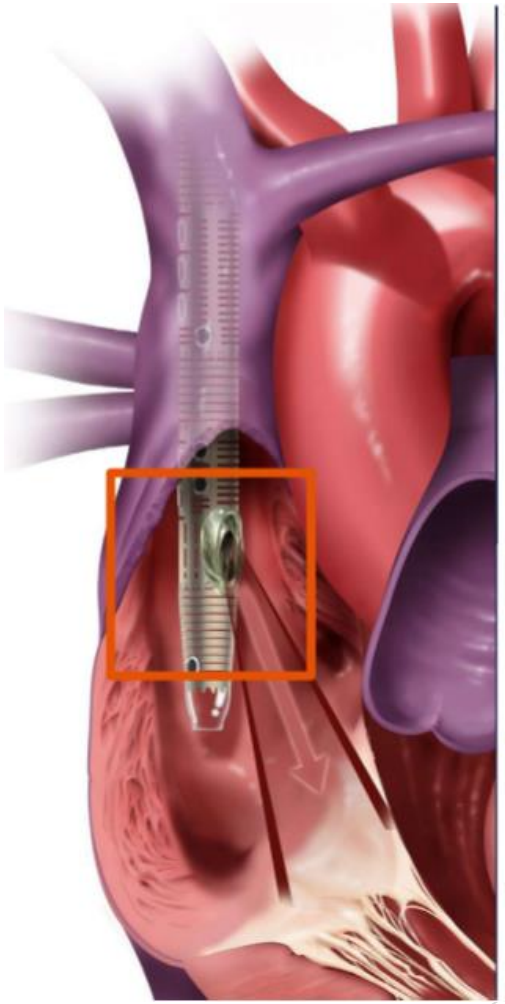
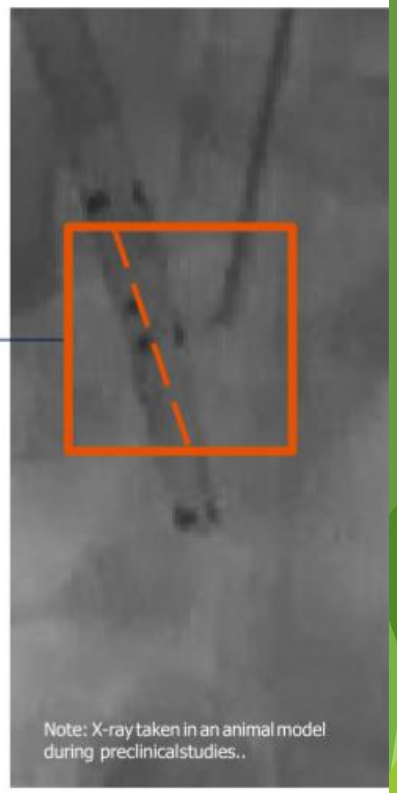
  - Towards the tricuspid valve

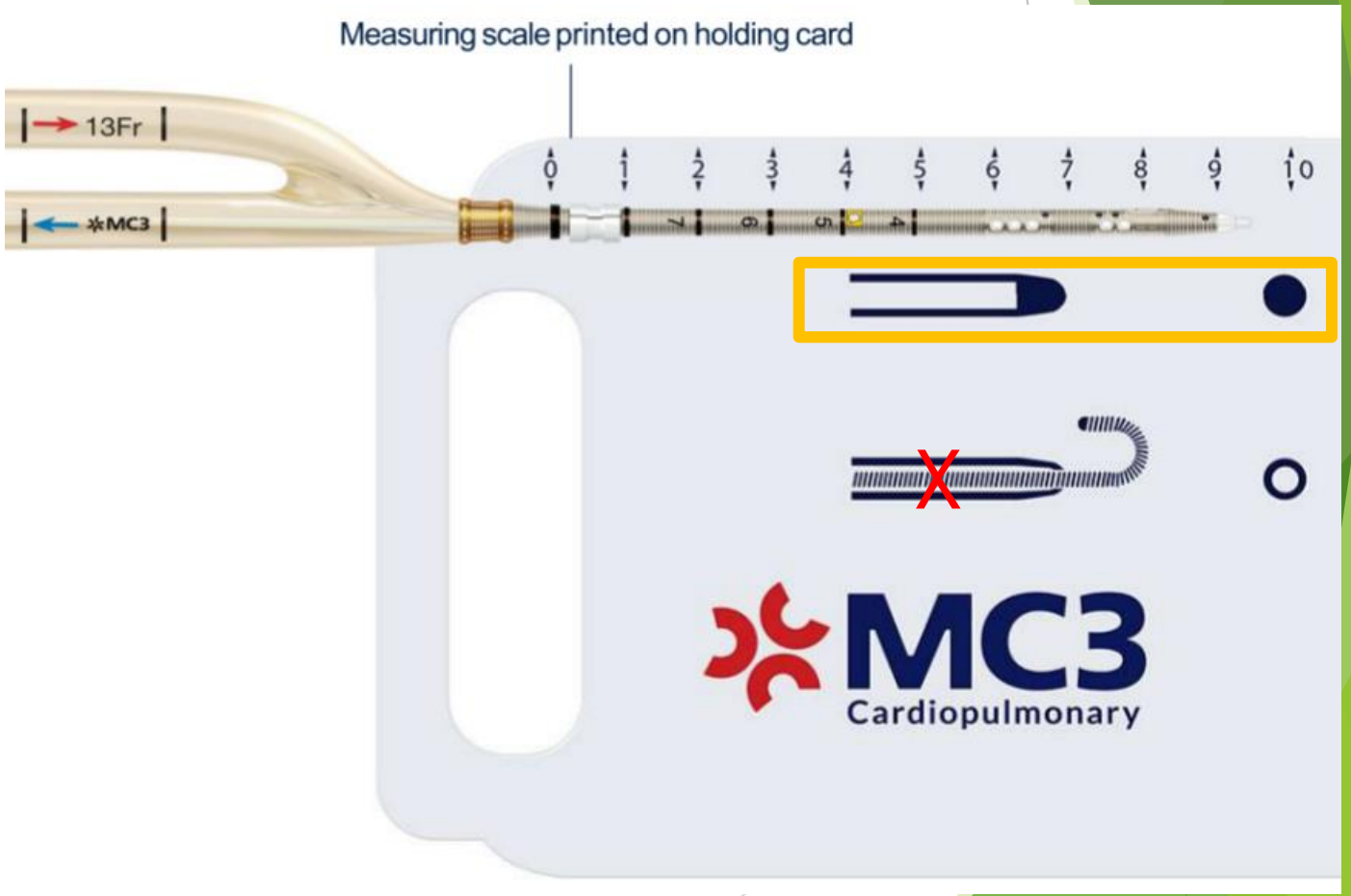
- Tantalum (radiopaque) markers can be used to assess:
  - Cannula position
  - Rotational orientation





Crescent RA Placement: Cut Down

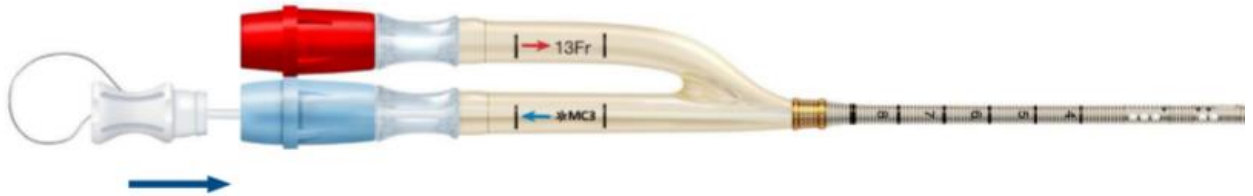
- A measuring scale is printed on the holding card
  - Insertion depth reference
- The included stylet and obturator should be used prior to insertion
  - The introducer and guidewire will not be used



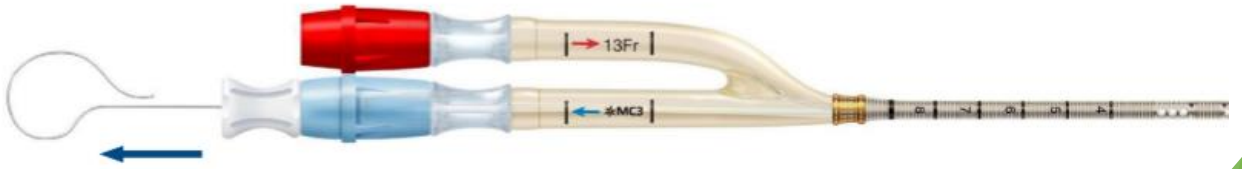
Crescent Cut Down: Cannula Preparation

1 Insert the stylet into the obturator.

2 Insert the obturator with the stylet into the drainage lumen of the catheter and fully seat the obturator hub onto the blue drainage cap of the catheter.



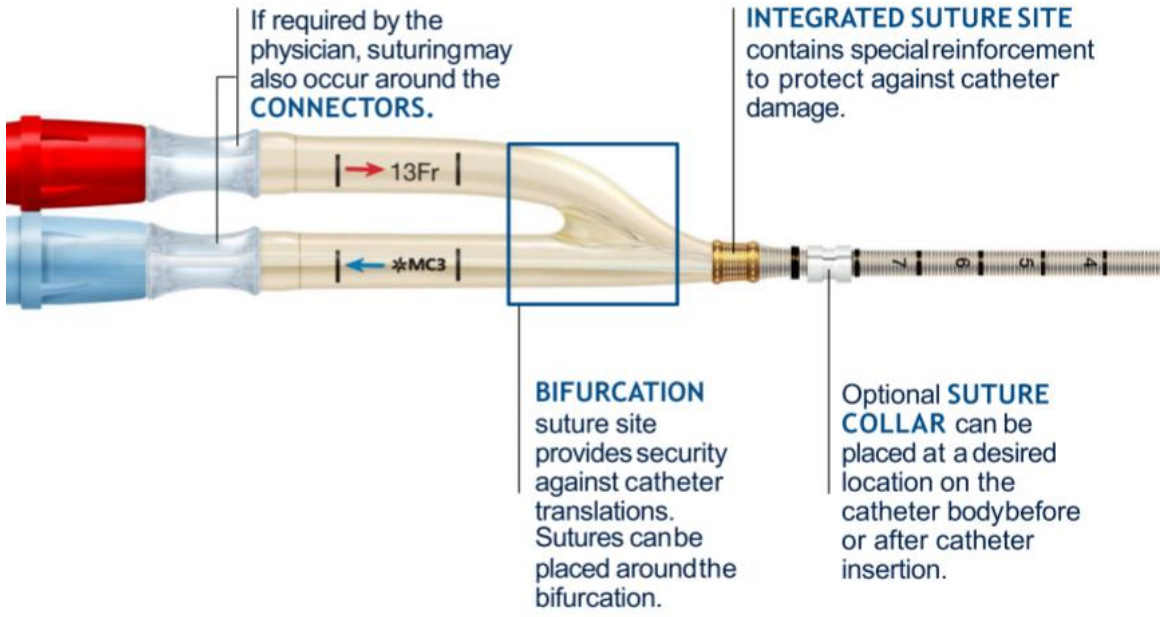
3 Remove stylet from obturator.

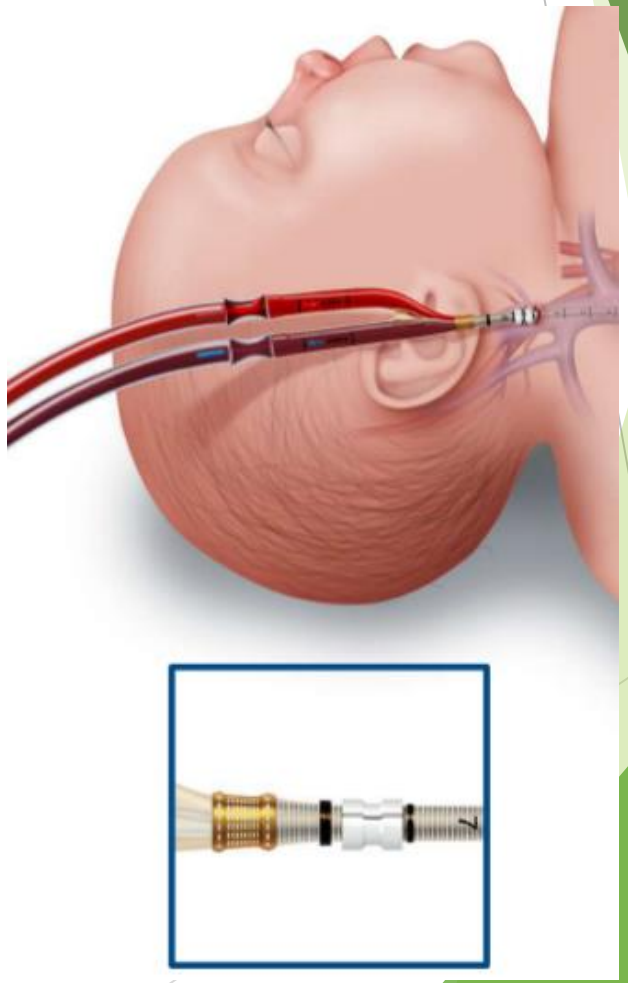


Note: Ensure the caps and hub are fully seated prior to catheter insertion

Device Securement

- Inadequate catheter securement may lead to catheter mechanical failure or dislodgement.
- The suture collar is provided for supplemental securement. It should never be used as the only means of securement.





Crescent RA: Pros and Cons

Pros

- Single site VV support
  - Reduced risk for infection
  - Facilitates mobilization (pediatrics/adolescents)
  - Fem-IJ VV: Groin access limits mobility
  - Less recirculation
- VV support in Neonates and Pediatrics
  - VV support best suited for respiratory failure
  - Reduces selective use of VA ECMO
  - Improved outcomes and fewer complications
  - Eliminates carotid artery access
    - Repair/Ligation of carotid artery
- Designed for Neonates/Pediatrics
  - Fills void left by OriGen RA recall
- Made of Elast-Eon
  - Improved biocompatibility and durability
  - Mimics native vascular endothelium
  - Used in cardiac implantables (valves, pacemakers)
- On indication for ECLS support
  - Continuous/long term VV support
- Radio-opaque (tantalum) markers
  - Aids in placement and orientation of cannula
  - Viewable on X-ray
  - Aids in cannula repositioning

Cons

- Less drainage than dual site (Fem-IJ) VV ECMO
  - Fem-IJ option: only in larger pediatric and adolescent patients
- Imaging required during insertion (fluoroscopy)
  - History of RA/IVC perforation with Dual Lumen Cannula's (i.e., Avalon)
  - Practice change for physicians and surgeons
  - Continued imaging during ECLS support
  - Crescent RA designed to address placement concerns

QUESTIONS