TRANSESOPHAGEAL ECHOCARDIOGRAPHIC TECHNIQUE
TEE GUIDED INSERTION OF MIRCSP™ CANNULA

After completion of the comprehensive intraoperative TEE exam, concentrate on acquiring optimum views of the structures that would assist the surgeon in placing the retrograde cardioplegia cannula. Acquiring the images well in advance of the surgeon requesting TEE guidance ensures that optimum imaging can be obtained in a timely fashion.

The TEE probe is placed in the mid-esophagus, the multiplane array at 0° and the four-chamber view is obtained with the apex of the image at the top of the screen so that basal cardiac structures are at the top of the screen and the apical structures are at the bottom of the screen (Figure 1).

Extreme retroflexion of the probe is occasionally necessary to bring the coronary sinus into view (Figure 2). This maneuver can sometimes be challenging especially if the cardiac motion is rapid and vigorous. Cessation of mechanical ventilation for a brief duration or gentle manual ventilation may allow better views to be obtained.

Slight right or left angulation of the TEE probe tip is sometimes required to view the opening of the coronary sinus into the cavity of the right atrium — and to show the coronary sinus cannula as it is introduced toward the coronary sinus (Figure 3).

The X-plane feature on the TEE allows simultaneous longitudinal and cross-sectional view of the coronary sinus (Figure 4).

The X-plane also assists in confirming proper position of the cannula into the coronary sinus (Figure 5).
Overview
The use of retrograde cardioplegia has become a standard during valvular heart surgery and often is essential for the successful performance of minimally invasive cardiac valve surgery.

Successful cannulation of the coronary sinus for retrograde cardioplegia, in minimally invasive procedures, routinely requires transesophageal echocardiographic (TEE) guidance and a coordinated effort between the operating cardiac surgeon and the cardiac anesthesiologist. Consistent TEE visualization of the coronary sinus is clearly the most critical factor for successful coronary sinus cannulation.

The intent of this monograph is to serve as a brief instructional guide for both the cardiac surgeon and the cardiac anesthesiologist in the placement of the Minimally Invasive Retrograde Coronary Sinus Perfusion (MIRCSP™) Cannula that is specifically designed for minimally invasive valve surgery. This innovative retrograde cardioplegia cannula has both a steerable and deflectable tip that greatly facilitates proper coronary sinus cannulation through a small incision.

Important Safety Information
Additional care and caution may be necessary due to the unique adaptations required for minimally invasive techniques. Extreme caution should be exercised while introducing the cannula into the coronary sinus. Do not force the cannula into the coronary sinus as this may cause vessel damage. Due to limitations of direct visualization during minimally invasive techniques, echocardiographic or fluoroscopic imaging is recommended.
1. Setup is performed following successful femoral cannulation and full heparinization.

2. Place pledgetted 4-0 prolene purse-string suture placed into the mid-body of the right atrium.

3. Keep the MIRCSP Cannula straight and introduce the cannula into the right atrium angling the cannula toward the patient’s left hip.

4. Be attentive to the TEE where the coronary sinus is demonstrated. The tip of the MIRCSP Cannula is now deflected by sliding the handle control toward the coronary sinus.
5. Advance the tip gently into the coronary sinus and slide cannula forward off of the introducer. If using an auto-inflate cannula, as the coronary sinus is engaged and the cannula enters the coronary sinus, the balloon will deform, confirming initial placement.

6. Advance the cannula until the entire balloon is within the coronary sinus. The retrograde cannula position should be confirmed by TEE in the left atrioventricular groove.
## ORDERING INFORMATION

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<tr>
<th>Catalog Code</th>
<th>French Size</th>
<th>Description</th>
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<tbody>
<tr>
<td>94113 TDT</td>
<td>13 Fr</td>
<td>Tip Deflecting Thoracotomy manual-inflate cuff</td>
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<tr>
<td>94533 TDT</td>
<td>13 Fr</td>
<td>Tip Deflecting Thoracotomy auto-inflate cuff</td>
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For more information, contact your local Medtronic Cannula Products Representative.
U.S. Customer Service: (800) 328-1357. Not all products are approved in every geography.

Caution: Federal law (USA) restricts this device to sale or on the order of a physician. For a listing of indications, contraindications, precautions, warnings, and potential adverse events, please refer to the Instructions for Use.