Tips and Trick to A Successful Implantation of LV Lead

Il-Young Oh, MD
Opened right atrium: right lateral view
Sinoatrial (SA) nodal branch
Atrial branch of right
Coronary a.
Right coronary a.
Anterior cardiac v.
Small cardiac v.
Right (acute) marginal branch
of right coronary a.
Interventricular septal branches

Left auricle (cut)
Left coronary a.
Circumflex branch of
left coronary a.
Great cardiac v.
Left (obtuse)
 marginal a.
Anterior interventricular
branch (left anterior
descending) of left coronary a.
Diagonal branch
of anterior interventricular a.

Sinoatrial (SA) nodal branch
Sinoatrial (SA) node
Small cardiac v.
Right coronary a.
Posterior interventricular
branch (posterior descending)
of right coronary a.
Right marginal branch

Netter's correlative imaging [electronic resource] :
cardiothoracic anatomy / volume editor, Michael B.
Gotway ; series editor, Nancy M. Major ;
illustrations by Frank H. Netter ; contributing
illustrators, Kristen Wienandt Marzejon, Carlos
A.G. Machado.
M/56 s/p AVR, MVR
Fluoroscopy after CRT implantation
Three principal tributaries of CS

- Great cardiac vein
  - Anterior Intraventricular vein (before annulus)
  - Coronary sinus (after vein of Marshall)
- Posterolateral vein
- Middle cardiac vein
Coronary sinus and age

F/22 AVNRT 1947002*
F/37 VPBs 2153343*
F/43 AVNRT 1444744*
F/76 AT 1634368*
F/60 AVNRT 1965105*
M/51 AVRT 1933308*
CS recording – Sup. Vs. Inf. approach

Superior approach

Inferior approach

F/43 AVNRT 1039806*
F/44 AVNRT 2397967*
• Inner diameter 7 F
• Outer diameter 9 F
• Inner catheter 50°, 90°
Quartet™ Family of LV Leads

- **Quartet™ 1458Q**
  - Large S-curve
  - 20-30-47 mm

- **Quartet™ 1458QL**
  - Large S-curve
  - 20-47-60 mm

- **Quartet™ 1456Q**
  - Small S-curve
  - 20-30-40 mm

- **Quartet™ 1457Q**
  - Double Bend
  - 20-30-47 mm

**Current**

- Lead body diameter 4.7 F
- Electrode diameter 5.1 F
- Distal tip diameter 4.0 F

- Lead body diameter 4.3 F
- Distal tip diameter 4.0 F
F/79 HF after pacemaker implantation (1 year ago)
• 115° outer catheter
• 90° inner catheter
• Quartet™ 1458Q Large S-curve
ECG after CRT implantation
ECG after CRT implantation
ECG after LV on
- Inner diameter 7.3F
- Outer diameter 8.7F
- Inner catheter 50°, 90°
**BIOTRONIK**

**Smaller veins**

<table>
<thead>
<tr>
<th>4 F Quadripolar</th>
<th>4 F Bipolar</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Sentus ProMRI OTW QP L</strong>&lt;br&gt;2D S-curve</td>
<td><strong>Sentus ProMRI OTW BP L</strong>&lt;br&gt;2D S-curve</td>
</tr>
<tr>
<td><strong>Any position</strong></td>
<td><strong>Any position</strong></td>
</tr>
<tr>
<td><strong>Wedge position</strong></td>
<td><strong>Wedge position</strong></td>
</tr>
</tbody>
</table>

- Tip electrode 4.8 F
- Ring electrode 4.8 F
- Conductor 4.8 F
F/73 HF after pacemaker implantation (15 year ago)
- Multipurpose EP outer catheter
- 90° inner catheter
- 0.038” guidewire
- Sentus ProMRI OTW QP L
ECG after CRT implantation
- Inner diameter 7.8F
- Outer diameter 9.2F
- Inner catheter 90°, 130°
## Boston Scientific

<table>
<thead>
<tr>
<th>TIP CONFIGURATION</th>
<th>MODEL NUMBER</th>
<th>LENGTH (cm)</th>
<th>ELECTRODE SPACING</th>
<th>FIXATION METHOD</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACUITY™ X4 Spiral L</td>
<td>4677 4678</td>
<td>86 95</td>
<td>7.5 mm 7.5 mm 30.5 mm</td>
<td>Dual fixation: 3D Spiral and Tines</td>
</tr>
<tr>
<td>ACUITY™ X4 Spiral S</td>
<td>4674 4675</td>
<td>86 95</td>
<td>7.5 mm 7.5 mm 20.5 mm</td>
<td>Single fixation: Tines</td>
</tr>
<tr>
<td>ACUITY™ X4 Straight</td>
<td>4671 4672</td>
<td>86 95</td>
<td>11 mm 12 mm 12 mm</td>
<td></td>
</tr>
</tbody>
</table>

### Images

**ACUITY™ X4 Spiral L**
- AP venogram shows a posterior lateral vein
- ACUITY X4 Spiral L lead wedged in the lateral vein

**ACUITY™ X4 Spiral S**
- AP venogram shows a lateral vein
- ACUITY X4 Spiral S lead wedged in the lateral vein

**ACUITY™ X4 Straight**
- AP venogram shows a narrow lateral vein
- ACUITY X4 Straight lead wedged in the lateral vein

**5.4 F**

---

---

---

---

---

---

---

---

---

---

---
- Inner diameter 7.2 F
- Outer diameter 9 F
- Inner catheter 130°, 90°
- Lead body diameter 5.3 F
- Electrode diameter 5.1 F
- Distal body diameter 4.0 F
F/35 Coronary venogram
- Complete AV block s/p TVR
Fluoroscopy after LV lead implantation
Chest AP 1 day after implantation

10:33AM

10:12PM
ECG 3 days after implantation
Chest PA 1 month after implantation
ECG 1 month after implantation
EOL 2 years after epicardial pacemaker implantation
Unfavorable cardiac vein anatomy

- Pre-operative multislice computer tomography (MSCT)
- Trasvenous vs. surgical LV lead implantation

Unfavorable anatomy
- Absence of lateral or posterolateral vein
- Angle from CS <60° of lateral vein
- Tortuosity of lateral vein
- Diameter of lateral vein <3 mm
- Diameter of posterolateral vein <3 mm

The pre-operative knowledge of CS main branches anatomy, gained by MSCT, allows the screening of patients with unfavorable anatomic patterns.

Coronary sinus in Cardiac CT (1)

CS venogram, RAO

CRT protocol CT

1: anterior interventricular vein, 2: lateral vein, 3: middle cardiac vein
Coronary sinus in Cardiac CT (2)

CS venogram, RAO

1-3: lateral veins

CRT protocol CT

4: middle cardiac vein

F/75 CRT
Tip for vein puncture and CS cannulation

• Call senior doctor.
• Identify the X-ray markers of the fluoroscopy and use the venogram.
• Change the approach – superior or inferior.
• Change the catheter (lumen) or the shape of catheter.
• Use the proper inner sheath for CS engagement and guiding support
• Remind the change of CS angle according to age.
• Perform pre-CRT cardiac CT and check the anatomy of CS.
Thank you for your attention!!!