Difficulties in Transseptal Access and Puncture

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Transseptal Puncture

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New method
Transseptal left atrial puncture: New technique for the measurement of left atrial pressure in man

John Ross Jr. M.D. *, Eugene Braunwald M.D. *, Andrew G. Morrow M.D. *

John Ross Jr MD, MACC
Transseptal Puncture Evolving Indications

Timeline of the Evolving Indications for Transseptal Catheterization

- 1959: Hemodynamic Assessment
- 1984: Percutaneous Balloon Mitral Valvuloplasty (PBMV)
- 1998: Pulmonary Vein Isolation (PVI)
- 2003: Left Atrial Appendage Occlusion (LAAD)
- 2006: Percutaneous Left Ventricular Assist Device (pLVAD)
- 2012: Transcatheter Mitral Valve Replacement (TMVR)
- 2008: Mitral Valve in Valve (ViVi) Implantation
- 2008: Transcatheter Mitral Valve Repair (TMVr) (MitraClip)
- 2006: Mitral Paravalvular Leak (PVL) Repair

Alkhouli et al. J Am Coll Cardiol Intv 2016
Transseptal Puncture Equipment: The Brockenbrough Needle

ARTICLES
Transseptal Left Heart Catheterization
A Review of 450 Studies and Description of an Improved Technic
EDWIN C. BROCKENBROUGH, EUGENE BRAUNWALD, JOHN ROSS

DOI: https://doi.org/10.1161/01.CIR.25.1.15
Circulation. 1962;25:15-21
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Transseptal Needle
Transseptal Puncture Equipment: Fixed-curve Sheaths and Dilators
Transseptal Puncture Equipment: Steerable Sheaths and Dilators
Needle and Sheath
Transseptal Puncture
Transseptal Puncture
Transseptal Puncture
Transseptal Puncture
Tips and Tricks for a Safe Puncture

- Anatomical markers
- Two distinct jumps
- Pressure Monitoring
- Injection of contrast by fluoroscopy
- Withdrawal of oxygenated blood from the transseptal needle
Navigating Challenging Transseptal Access

Difficulties are just things to overcome, after all.

Ernest Shackleton
Difficulty with Access to the Right Atrium

- Extreme venous tortuosity
- Indwelling inferior vena cava (IVC) filter
- Iliofemoral veins and/or the IVC are
  - patent but have severe stenosis
  - occluded
Difficulty with Engagement of the FO

- Enlarged left or right atrium
- Dilated ascending aorta
- Severe kyphoscoliosis
- Abnormally rotated heart due to ventricular hypertrophy or prior surgery
- Excessive cardiac motion with respiration
RA Dilatation

Large-curved transseptal needle

Forceful torque to middle of IAS

Septal bulge

Giant RA

Small LA Normal LA Giant RA
LA and Aortic Root Dilatation

Slightly more inferior and posterior position
Difficulty with Needle Advancement

- Aneurysmal septum
- Thickened septum
- Prior septal occluder
Aneurysmal Septum

B

Brockenbrough Needle

NRG™ Radiofrequency Needle

Aneurysmic

The RF Transseptal Solution

Alkhoul et al. J Am Coll Cardiol Intv 2016
Aneurysmal Septum

Imaging with either TEE or ICE
Thickened Septum

Fibrotic

Typical

The RF Transseptal Solution
Thickened Septum

SafeSept wire system
Prior Septal Occluder

The PFO occluder provides a handy marker
TEE and ICE
Complications

- Pericardial Effusion Tamponade
- RA and LA needle puncture
- Aortic Puncture/Perforation
- Air Embolism or TIA
- Transient ST Elevation
- Persistent ASD
- Death
Key Messages

➢ TSP is an integral part of the interventional electrophysiology practice

➢ TSP is also an important part of several interventional procedures in structural heart disease

➢ It is a difficult procedure requiring specific expertise

➢ However, when performed properly it is safe and reproducible