GERALD BEATHARD ANNUAL
STATE OF THE ART LECTURE

Optimizing Dialysis Vascular Access
Challenges & Opportunities

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Hemodialysis Access

• Catheters

• Arteriovenous grafts

• Arteriovenous fistulas
Michael Brescia, M.D.
Created first radial-cephalic Arteriovenous fistula in 1964
Arteriovenous Fistulas

- Radiocephalic fistula
- Brachiocephalic fistula
- Perforating vein fistula
- Brachiobasilic fistula
- Transpositions
- Lower extremity fistula
Challenges

• Early failure
• Late failure
• Thrombosis
• Hand ischemia
• Aneurysms and pseudoaneurysms
• Infection
• High output failure
Case Presentation

• 52 year old male with ESRD secondary to GN started on HD with a tunneled dialysis catheter.

• Left forearm AVF created and could not be used for 8 months.

• Suffered from catheter-related sepsis.
Early Arteriovenous Fistula Failure

“Immature Fistula”
Early Fistula Failure

• A fistula that was created successfully fistula and never developed to support dialysis or failed within three months of its use.
What to do with an Immature Fistula?
Requirement for Fistula Adequacy

• Fistula adequacy requires two variables
  – Blood flow
  – Cannulation

*Slide from Gerald Beathard*
<table>
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<th></th>
<th>Yes</th>
<th>No</th>
<th>Chance that AVF was adequate for dialysis</th>
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</thead>
<tbody>
<tr>
<td>Diameter 0.4 cm</td>
<td>X</td>
<td>X</td>
<td>44%</td>
</tr>
<tr>
<td>Blood Flow 500 ml/min</td>
<td></td>
<td>X</td>
<td>43%</td>
</tr>
<tr>
<td>Blood Flow 500 ml/min</td>
<td>X</td>
<td></td>
<td>70%</td>
</tr>
<tr>
<td>Blood Flow 500 ml/min +</td>
<td>X</td>
<td></td>
<td>33%</td>
</tr>
<tr>
<td>Diameter 0.4</td>
<td></td>
<td>X</td>
<td>95%</td>
</tr>
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Robbin et al: Radiology 225:59-64, 2002
Timing of the Changes in Flow and Size?
Normal Fistulae

Early AVF Failure

Causes of Early Fistula Failure

Pre-existing
- Accessory vein
- Arterial stenosis
- Venous stenosis

Acquired
- Venous stenosis
- Arterial Stenosis
JAS Accessory Veins

Radial Artery

Fistula

Juxta-anastomotic stenosis

Anastomosis

Accessory vein

Radial Artery

Fistula

Anastomosis
Early Fistula Failure

• 100 cases of early fistula failure

- Juxta-anastomosis stenosis (JAS)
- Accessory vein stenosis

Inflow Stenosis

- N=223
- AVF: 40%

Most common site was juxta-anastomosis

Historical Perspective
Original paper: Angiography of dialysis access was performed by a renal doctor

BRACHIAL ARTERIOGRAPHY OF THE SURGICALLY CREATED RADIAL ARTERIOVENOUS FISTULA IN PATIENTS UNDERGOING CHRONIC INTERMITTENT HEMODIALYSIS BY VENIPUNCTURE TECHNIQUE*

By BARUCH J. HURWICH, M.D.†
BRONX, NEW YORK

Juxta-Anastomotic Stenosis

Juxta-Anastomotic lesion is not new, it has been there since the creation of an AVF.
Fistula Evaluation

• Ultrasound evaluation
• Physical examination
Role of Physical Examination

- \( n=68 \)
- Physical examination was performed every 1-2 weeks
- \( 24/68 \) (35\%) had early failure
- All were diagnosed within 8 weeks of access creation by physical examination

*Asif et al: Kidney International 67:2399-2407, 2005*
Salvage of Early Failure

- Percutaneous Interventions
- Surgical Interventions
Percutaneous Balloon Angioplasty

Pre

Post
Severely Dysfunctional Fistula

Role of “Sequential Dilatation”
Role of Surgical Intervention:

*Creation of Neo-anastomosis*
Salvage of Early Failure

• Accessory veins

*Percutaneous Interventions (PTA)*
*Surgical Interventions*
Basic Principles for Vein Obliteration

• No downstream stenosis
• There is a definite issue related to accessory vein
  - Stealing too much blood (25% the size of AVF)
  - Cannulation issues
VNH in the Proximal Vein of an AVF

Prabir Roy-Chaudhury
Roberto Vazquez-Padron
Loay Salman
Timmy Lee
Jeff Lawson
and others

Courtesy of Prabir Roy-Chaudhury M.D.
• Michael Allon
• Loay Salman
• Ted Saad
• Eric Chemla
• Pierre Bourquelot
• Loay Salman
• Don Schon
• Kenneth Abreo
• Thomas Vesely
• Danny Patel
• Tushar Vachharajani
• Anil Agarwal
• Brinda Desiraju

• Dheeraj Rajan
• Suren Shenoy
• Ramesh Soundarajan
• Rick Mishler
• Shouwen Wang
• Charmaine Lok
• Louise Moist
• John Ross
• Larry Spergel
• Rajiv Dhamija
• Ram Dukkipati
• Abigail Falk
• Jack Work
Variability