The 22nd Robert W. Binkley Visiting Professor Lecture

Open Large Vein Reconstructions in the Endovascular Era

Peter Gloviczki, MD
Joe M. and Ruth Roberts Professor of Surgery,
Chair, Emeritus, Division of Vascular and Endovascular Surgery,
Mayo Clinic,
Rochester, MN

Deep Vein Thrombosis and Pulmonary Embolism

- Each year 350,000 - 600,000 Americans have DVT/PE
- At least 100,000 deaths are related to DVT/PE
- Many of those who survive have complications
- Problem will worsen as the population ages

Chronic Venous Disease Post-thrombotic Syndrome

- 0.5 to 1 million Americans have venous ulcers
- 2-4 millions have chronic venous insufficiency
- 25 to 40 million have varicose veins

Conflict of Interest

None
Chronic Venous Disease

Valve Incompetence

- 85%
- 15%

Obstruction

Interventions to Treat Venous Obstructions

Open surgery
Endovenous procedures

Interventions to Treat Venous Disease

- Catheter directed Thrombolysis
- Mechanical Thrombectomy
- Filters
- Stents
- Stent-grafts
- Angioplasty
- Embolic-therapy
- Venous Shunts
- Radiofrequency ablations
- Laser Therapy
- Cryotherapy
- Liquid and foam sclerotherapy
- Medical Glue therapy
- Valved Stents
- Venoscopy
- Intravenous Ultrasound
Open Venous Reconstructions

- Femoral – popliteal vein occlusion/trauma
- Saphenous vein bypass
- Saphenous vein – popliteal transposition (May – Husni operation)
- Iliac vein occlusion/stenosis/trauma/tumor
  - Palma procedure
  - In-line bypass (femoro-ilio-caval)
- IVC occlusion/coarctation/trauma/tumor
  - Patch angioplasty
- Cavo-caval or Cavo-atrial bypass
- Nutcracker syndrome
- Renal vein transposition/reconstruction
- Upper extremity av-access
  - LIV bypass
- Axillary-subclavian venous thrombosis
- Subclavian vein patch, bypass
- SVC syndrome
  - LIV – innominate vein – SVC – Right atrial bypass

Chronic Venous Disease

The care of patients with varicose veins and associated chronic venous diseases: Clinical practice guidelines of the Society for Vascular Surgery and the American Venous Forum

- The Society for Vascular Surgery (SVS) and the American Venous Forum (AVF) have developed clinical practice guidelines for the care of patients with varicose veins. These guidelines provide information for all healthcare professionals involved in the diagnosis and management of patients with varicose veins. These guidelines are intended to serve as a resource to assist healthcare professionals in making appropriate clinical decisions in the care of patients with varicose veins. These guidelines are intended to be used in conjunction with other guidelines and clinical experiences.

Stents

A and B images showing stents being used in a medical procedure.
There is a need for open or hybrid venous reconstructions in the endovascular era.
Secondary Patency

70%

Palma Procedure
Factors affecting outcome of open and hybrid reconstructions for nonmalignant obstruction of iliofemoral veins and inferior vena cava

Nitin Garg, MBBS, MPH, *Poor Ganguli, MD* †Karan M. Karthi, MD* ‡Andrew A. Dinman, MD* ‡Harshadi Ramamrutham, MD* ‡Monte Katva, MBBS* ‡Geetanw S. Gotoh\r, MD* ‡and Thomas C. Brown, MD* ‡Research, Illinois

Objectives: To identify factors affecting long-term outcome after open surgical reconstructions (OSR) and hybrid reconstructions (HRx) for chronic nonmalignant obstruction.

Methods: Retrospective review of clinical data of 21 patients with 25 OSR and 13 HRx for chronic obstruction of iliofemoral veins and inferior vena cava. The mean follow-up was 22 months (minimum 6 months).

Results: Thirty patients (26 men, mean age 47 y), 22 had tumors with direct extension, and 3 had thrombosis. Six (22%) had varicose veins, and 27 (76%) had no more than 10% stenosis. Eight patients had major complications, including cerebral embolization, myocardial infarction, and pneumonia. All patients had improved or maintained their functional status. The cumulative patency of 25 Palma grafts was 78% and 78% for 2 years, and the 3-year patency was 49% for OSR and 49% for HRx.

Conclusion: OSR and HRx are effective in the treatment of iliofemoral venous disease and may be preferred to surgical or endovascular procedures. Further studies are needed to evaluate the long-term outcomes of these procedures.
Early results of 64 reconstructions

<table>
<thead>
<tr>
<th></th>
<th>N</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mortality</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Pulmonary embolism</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Deep venous thrombosis</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Early graft thrombosis</td>
<td>13</td>
<td>20</td>
</tr>
<tr>
<td>Surgical revision</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>Endovenous recanalization</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Patency at Discharge</td>
<td>62/64</td>
<td>97</td>
</tr>
<tr>
<td>Wound infection</td>
<td>4</td>
<td>6</td>
</tr>
<tr>
<td>Deep</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Superficial</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Wound hematoma</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Other</td>
<td>2</td>
<td>3</td>
</tr>
</tbody>
</table>

Cumulative Secondary Patency

Time (months)  N  24  48  72  96  120  Cumulative Patency
Femoro-iliaclilio-caval  86%  86%  86%  86%  86%  86%
Palmo vein  76%  76%  76%  76%  76%  76%
Femorocaval  65%  65%  65%  65%  65%  65%

IVC Replacement with PTFE Graft in Patients with Malignant Tumors

Primary Leiomyosarcoma of IVC

Tumor resection + IVC & renal vein replacement with PTFE Graft
Long-Term IVC Graft Patency
n=27

PTFE Graft Patency

<table>
<thead>
<tr>
<th>Graft Type</th>
<th>Patency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Suprarenal</td>
<td>12/13*</td>
</tr>
<tr>
<td>Infrarenal</td>
<td>10/10</td>
</tr>
<tr>
<td>Both</td>
<td>3/4**</td>
</tr>
</tbody>
</table>

* 1 occlusion at 6.3 years
** 1 occlusion at 7.5 months

Open SVC Reconstructions in 42 patients

- Spiral Saphenous Vein
  - n = 22
- Femoral Vein
  - n = 6
- PTFE
  - n = 13
- Iliocaval Allograft
  - n = 1

Open Surgery vs Endovascular

Secondary Patency

<table>
<thead>
<tr>
<th>Years</th>
<th>Number at Risk</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>48</td>
</tr>
<tr>
<td>1</td>
<td>27</td>
</tr>
<tr>
<td>2</td>
<td>21</td>
</tr>
<tr>
<td>3</td>
<td>16</td>
</tr>
<tr>
<td>4</td>
<td>15</td>
</tr>
<tr>
<td>5</td>
<td>12</td>
</tr>
</tbody>
</table>

Patency rate (%)
- Open Surgery: 100%, 96%, 96%
- Endovascular Repair: 88%, 84%, 84%

Patency @ 3 years: p = .2

The Future of Venous Disease

Interventional Radiologists  Plastic surgeons
Interventional Cardiologists  Venous Specialists
Dermatologists  General surgeons
Vascular Medicine Physicians  Vascular Surgeons
General practitioners

The Future of Venous Disease

Interventional Radiologists  Plastic surgeons
Interventional Cardiologists  Open venous reconstructions
Dermatologists  General surgeons
Vascular Medicine Physicians  General practitioners
Vascular Surgeons
Indications for Open Venous Surgery

- If endovenous techniques fail or not possible
- Trauma
- Malignant tumors invading large veins

Open Venous Reconstructions Are Relevant in the Endovascular Era!

Learn them!
Do them!
Teach them!

FINISH

THANK YOU!