Advances in Vascular Surgery

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Introduction

• Vascular Surgery is not the same specialty as before!
Introduction

- Rapid explosion in device technology and bench research leaves our specialty on the forefront of medicine.
- Better public awareness
- Risk factor Modification.
  - Smoking Cessation Programs
  - Lipid Control
  - Diet
  - Exercise
- Early Detection
  - Screening Programs - AAA
Surgeon leads aneurysm screening campaign

Just below the kidneys runs a section of the abdominal aorta, a blood vessel about the size of a small garden hose. It’s a workhorse, delivering blood to the whole lower half of the body. But after 50 or 60 years of use, its walls can weaken, sometimes creating a dangerous bulge known as an aneurysm. If the aneurysm gets too big and too weak, it can rupture.

Huge: “That’s a calamity that most people don’t survive,” says Dr. Robert Zwolak, a vascular surgeon at DMS. “Of those lucky enough to get to the hospital alive, there is a huge emergency surgery,” and about 50% of those who undergo emergency surgery don't survive. Some 15,000 people die each year in the U.S. of ruptured aortic aneurysms.

synthetic tubing is sewn in place of the weak segment. “In concept, it’s incredibly simple,” says Zwolak. But in practice, it’s a “very big operation”; even when done on a nonemergency basis, 3% to 4% of patients don’t survive.

The less-invasive procedure has much better outcomes—just 1% to 2% mortality. It involves only a small incision in an artery in the leg. A device about the diameter of a pen is then fed up into the abdominal aorta. Once in place, the device deploys a stent graft that spans the length of the aneurysm and descends into the iliac arteries. Now, says Zwolak, “more than 50% of [elective AAA surgery] patients at Dartmouth—and I think that's pretty representative of major medical centers across the country—are getting these minimally invasive grafts.”
Carotid Occlusive Disease

Dreaded Risk: Stroke!!!

Carotid Occlusive Disease

Percent 30 Day Stroke, Death + Late Ipsilateral Stroke

4 Randomized Trials
> 12,000 patients
Relative risk reduction:
Symptomatic:
50-69% - 25%
70-99% - 61%
Asymptomatic:
60-99% - 48%
Carotid Occlusive Disease

Better Detection: Carotid Duplex
Carotid Occlusive Disease

Better Detection: CTA
Carotid Occlusive Disease

Better Treatments: Carotid Endarterectomy
Carotid Occlusive Disease

Better Treatments: Carotid Stenting
Carotid Occlusive Disease
Cerebral Protection Devices

- Guidant Accunet
- Cordis AngioGuard
- Medtronic GuardWire
- Boston Scientific FilterWire
Aortic Aneurysm Disease

Dreaded Risk: Rupture!!!
Abdominal Aortic Aneurysm

- 1.7 million people affected
- 50,000 repairs/year
- 190,000 diagnosed/year
- 4:1 Male to Female
- 13th Leading cause of death
Abdominal Aortic Aneurysm: Anticipated Natural History

5 – 6 cm AAA

- **ANNUAL** Rupture risk 11%
- **ANNUAL** Expansion rate 10%
Abdominal Aortic Aneurysm: Anticipated Natural History

UK small aneurysm trial and VA ADAM trial with similar outcomes documenting that aneurysms can be watched safely and survival was not improved with early operation.
Open Aneurysm Surgery

- Durable and Safe
- Greater Blood Loss
- Intensive Care Unit
- Longer hospital Stay
- Longer Recovery
Endovascular Aneurysm Repair

Exclusion of AAA from the circulation

- Device insertion from remote site
- Passed intraluminally under radiologic guidance
- Secured by expandable stent attachment system
Early Results of EVAR

• Early safety and efficacy well established

• Lower mortality and major morbidity

• Other benefits:
  – less blood loss
  – shorter length of stay
  – quicker recovery
Endovascular AAA Repair (EVAR)

Concerns

- Durability
- Long-term outcomes
- Will early benefits be sustained?
Lower Extremity Occlusive Disease

Dreaded Risks: Lifestyle Limitations and Limb Loss!
Lower Extremity Occlusive Disease
Lower Extremity Occlusive Disease

Traditional Therapy: Open Surgery/Bypass
Lower Extremity Occlusive Disease

Endovascular Revolution: Minimally Invasive Therapy

- POBA (plain old balloon angioplasty)
- Cutting balloon angioplasty
- Cryoplasty
- Angioplasty/ Stenting
- Stent grafting
- Excisional atherectomy
- LASER assisted angioplasty
- Remote endarterectomy
- Angiogenesis
- Drug eluting stents
- Biodegradable stents
Lower Extremity Occlusive Disease

Angioplasty/Stenting

TASC D Lesion
Lower Extremity Occlusive Disease

Angioplasty/Stenting

Nitinol Self-Expanding Stent
Lower Extremity Occlusive Disease

Angioplasty/Stenting

Completion Angiogram:
Direct Antegrade Flow
Lower Extremity Occlusive Disease

Atherectomy

Angiogram: Bulky Plaque
Lower Extremity Occlusive Disease

Atherectomy

-Foxhollow Technologies
Lower Extremity Occlusive Disease

Atherectomy

SilverHawk Atherectomy
Lower Extremity Occlusive Disease

Atherectomy

Completion Angiogram:
Bulky Plaque Excised
Lower Extremity Occlusive Disease

SFA Remote Endarterectomy
Lower Extremity Occlusive Disease

SFA Remote Endarterectomy
Lower Extremity Occlusive Disease

SFA Remote Endarterectomy
Lower Extremity Occlusive Disease

SFA Remote Endarterectomy
Lower Extremity Occlusive Disease

Laser Atherectomy

-Spectranetics
Vascular Surgery Bench Research

Therapeutic Angiogenesis for the Treatment of Limb Ischemia

• Growth and proliferation of new blood vessels from existing vascular structures.

• Therapeutic Angiogenesis: promote the growth of new blood vessels for the treatment of disorders of inadequate tissue perfusion.
Vascular Surgery Bench Research

Therapeutic Angiogenesis for the Treatment of Limb Ischemia

Control Vector (2mg/body)  HGF gene therapy (2mg/body)
Thank You