Endovascular Intervention for Infrainguinal Vascular Disease

Elizabeth Nuss
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Overview

- Background: demographics and definitions
- Examine patency rates in percutaneous transluminal angioplasty
- Compare angioplasty to surgical bypass
- Evaluate benefit of adjuvant treatment with angioplasty
- Conclusion
Prevalence and Demographics

- Peripheral Arterial Disease (PAD) affects between 3 and 7% of population
- 1 in 5 patients over 75 years old
- 17% men and 21% women greater than 55yrs have PAD
  - 2-3% men and 1-2% women are symptomatic with intermittent claudication
Why is PAD relevant?

- Powerful indicator of systemic atherosclerosis
- Increased risk of MI and stroke
- 6x greater likelihood of death
Risk Factors

- Smoking
- Diabetes
- Hypertension
- Hypercholesterolemia
Intermittent Claudication

- Pain with walking that abates with rest
- Pain located in calf, buttock or thigh
- Considered lifestyle-limiting when unable to walk more than 200m or inhibits recreation or work
Critical Limb Ischemia

- Ischemic rest pain at base of toes
  - Occurs at night
  - Relieved with dependent positioning

- Tissue Loss
  - Non healing ulcers or gangrene
Limb Salvage

- Intervention, either surgical bypass or endovascular treatment, that prevents amputation being the final outcome
Why is Limb Salvage Important?

- Untreated critical limb ischemia also defined as expected amputation within 6 months of diagnosis.
- 25% of patients die within 1 year of major amputation.
Classification Systems for PVD

- Rutherford classification
  - clinical + objective data
- Fontaine classification
  - clinical data
- TASC classification
TASC classification

Intermittent Claudication

Critical Limb Ischemia
Treatment Options for PVD

- **Endovascular Intervention**
  - PTA
  - PTA + stent
  - Adjuvant treatment

- **Surgical Bypass**
Percutaneous Transluminal Angioplasty (PTA)

- Antegrade puncture of ipsilateral common femoral artery
- Balloon tipped catheter advanced to site of narrowing, balloon inflated to open vessel
Is PTA effective?

- **Bypass surgery gold standard**
  - Patency at 5yrs with vein graft averaging 70-80%

- **Technical success rate of PTA**
  - 90-95%

- **Patency at 5yrs approximately 50%**
Long term outcome study for PTA

- n=173; prospective study over 10 yrs
- Inclusion criteria: claudication determined by inability to walk <200m
- Primary patency 25% at 5yrs, 14% at 10yrs
- Secondary patency 41% at 5yrs, 22% at 10yrs
- 6% development CLI
- 3% amputation rate

PTA effectiveness in CLI

N=993; prospective study

Inclusion criteria: Diabetics with CLI

PTA used as first line revascularization

Rest pain resolved
Ulcers healed in all but 7 pts

Primary patency 89% with 95% CI

Why choose Endovascular treatment?

- Decreased morbidity and mortality
- Cost effective
- Limb salvage rates comparable
Decreased Morbidity and Mortality

- Shorter hospital course
- Fast recovery
- No general or spinal anesthesia needed
- Preserves saphenous vein conduits for future use (extremity or CABG)
Cost Effectiveness

- Hypothetical cohort with chronic femoropopliteal disease
- Comparison of QALE, life time costs and 5yr patency in bypass vs PTA
- For 65 yr old men with claudication and CLI, PTA increased QALE by 2-13 months and decreased lifetime expenditures.

Cost Effectiveness

- ICU post procedure: 4% of surgical pts compared to 0.5% PTA pts
- Hospital stay: 7-10 days for surgical pts compared to 1-2 days for PTA pts
- Mean cost for surgery first strategy lead to 33% higher hospital costs than PTA first strategy

Basil trial. The Lancet; December 2005:1925-34.
Limb Salvage

Basil trial. The Lancet; December 2005:1925-34.
The Achilles Heel of PTA

- Average 5yr patency rates 50% w PTA
- Adjuvant treatment
  - Bare metal stents
  - Nitinol stents
  - Brachytherapy

Stent Placement after PTA

- Systematic stenting of all angioplastied lesions does not change outcome.
- Stenting advantageous when PTA results suboptimal:
  - Greater than 30% stenosis immediately following PTA
  - Dissection of artery following PTA

Nitinol Stents

Brachytherapy

- Restenosis attributed to:
  - Intimal hyperplasia by proliferation of smooth muscle cells and matrix formation
  - Negative remodeling leads to vessel constriction
- Brachytherapy limits restenosis process
Brachytherapy

- N=113, prospective randomized trial
- Restenosis rate 28% in PTA plus brachytherapy group compared to 53% restenosis rate in PTA alone.

12 year experience of PTA vs Bypass Surgery

- 2 hypothesis:
  - Endovascular intervention has increased as the primary treatment for PVD
  - Outcomes have not changed despite the shift in procedure type
- PTA as primary procedure increased by 460%, bypass surgery decreased by 50%
- Patency, continued clinical improvement and limb salvage rates were similar or improved
The End