

1) Disorders of the Arterial System - Dr. Amanj

Anatomy

- Main function of the arteries.
- Sizes; L, M, S. and Arterioles
- Wall composition according to sizes. (more elastic in large ones)

Collaterals

- They are;
- Most organs got it
- Some not, (heart, kidney, retina). End arteries.
- Eg. Subclavian artery
- Time and chronicity

Physiology

Intima as organ? 1%, surface area

- Growth promotion and inhibition
- Vasoconstriction and vasodilation
- Blood cell adherence and nonadherence
- Anticoagulation and procoagulation

Smooth muscle cells

- Major bulk
- Mechanical and structural support
- Proteoglycans

Maintenance of vascular tone

- Nitric oxide (NO), oxygen free radicals, endothelins, angiotensins

Coagulation

- Protein S, factor V, tissue factor, plasminogen activators (and inhibitors)(PAs)(PAIs)

Inflammatory and immunologic response

- The process of cell adherence, cell activation, and cell migration

Vascular wall modeling

- Platelet-derived growth factor (PDGF), and insulin-like growth factor 1 (IGF-1).

Arterial Substitutes

Introduction

- Last 50 years of increased vascular surgery
- In US: 350,000 synthetic, 200,000 autogenous vein/yr

The optimal arterial substitute SHOULD BE:

- Strong, inexpensive, and lasting for the life of the patient;
- Easily and permanently attachable to the host vessel;
- Biocompatible, and nonthrombogenic luminal surface;
- Resist infection;
- Available in appropriate sizes;
- Remain patent without intervention;
- Have viscoelastic properties similar to those of a normal artery.

The optimal arterial substitute SHOULD NOT:

- Leak blood or serous fluid
- Degenerate chemically or physically with time;
- Undergo abnormal proliferative response
- Promote thrombus formation or be a source of emboli
- Occlude when flexed.
- Damage blood components.

Arterial substitute evaluation

- Primary patency
- Secondary patency
- Assisted primary patency, effectiveness of follow up

Allografts

Arterial allografts

- Were the first widely used
- Early results were encouraging
- Viability was not essential for successful grafting
- With ages (few yrs loss of collagen, elastin ...)
- Disappointing long term
- High incidence of complications (abandoned)

Saphenous Vein Allografts

- Human cadavers
- Antigenic; immunologic rejection response
- Cryopreservation alone
- Advances in immunosuppression
- No significant clinical application

Umbilical Vein Allografts

- From human umbilical cords
- Glutaraldehyde, ethanol, polyester mesh tube
- High pressure and nonantigenic
- Patency rates of 70% and 50% at 1 and 5 years
- Degenerative changes, aneurysms, difficult to implant
- No longer

Xenografts

- Unmodified arterial xenografts 1950s
- Prominent immunologic reaction
- Treating bovine carotid arteries
- Modified xenografts 1960s
- Poor long-term patency rates, 40% 3 to 6 years
- Aneurysms occurred in 3% to 6%
- Infection rate of 3% to 7%
- Hemodialysis

Autografts

Arterial Autografts

- Advantages: no infection, flexible, no aneurysm, blood supply
- Disadvantage: short
- CABG
- Radial and internal mammary
- Patency rate. And spasm.
- Internal iliac artery for renal.

Venous Autografts

- Most successful and most clinically used.
- Saphenous vein, cephalic and brachial veins, and superficial femoral and internal jugular veins
- GSV; 70-80 cm, from to, valves, caliber...
- Types; Reverse, and In situ.
- patency of reversed 80-90% at 1 year, 55-86% at 5 years
- reversed vein grafting is applicable to larger numbers of patients,
- Occur; clamp stenosis, valve fibrosis, and narrow anast.

Prosthetic grafts

Textile Grafts

- Concept of :Mesh fabric would result in similar healing
- Woven and knitted.
- Major differences
- Porosity
- Preclotting

Polytetrafluoroethylene (PTFE) Grafts

- Flexible
- All sizes
- For extra anatomical bypass

So grafts' types:

- Allografts
 - Artery
 - Saphenous vein
 - Umbilical vein
- Xenografts
- Autografts
 - Artery
 - Vein
- Prosthetic grafts
 - Textile
 - PTFE

Complications of Prosthetic Grafting

- Anastomotic neointimal hyperplasia
- Graft infection
- Graft failure caused by fiber disruption or stretching
- Perigraft seromas
- Anastomotic false aneurysms