Image guided surgery
Fluoroscopy, CT, Ultrasound, MRI
A subspeciality with significant growth in the last two decades
"Microinvasive rather than minimally invasive"

IR: HiTech in Medicine
- Microinvasive image guided surgery
- Surgery of the 21st century!
- Innovation: drug coated stents (rabamycin, paclitaxol)
- AAA stent grafts
- Targeted cancer therapy: monoclonal Abs, gene therapy
IR: Technology revolution

EVOLUTION OF INTERVENTIONAL RADIOLGOY
- Charles Dotter-1964 successfully dilated femoropopliteal artery with catheters
- Seldinger technique- a revolution!
- Gruntzig-1979 first balloon angioplasty
- Palmaz-1987 stents
- 1997 stent grafts

Dotter it!
DOTTER’S PROVERBIAL LIGHT, CREATIVITY AND COMPASSION

‘CATHETER TRAVERSAL’ THROUGH AN ILIAC OCCLUSION!

This was followed by many cases where he used a guide wire and Teflon catheters to dilate stenosis.

3D MR ANGIOGRAPHY
**Seldinger Technique**

**Stenotic/Occlusive disease: Stents**
- Stents have revolutionized treatment of occlusive disease
- Patency rates in primary branches of aorta: 70-80%
  1yr; restenosis does occur

**IR: Inherent Advantages**
- Minimal tissue disruption
- Usually under regional anesthesia
- Minimal blood loss
- Poor surgical risk pts CAD, COPD
- Decreased post procedural morbidity, decreased hospital LOS
- Significantly shortened recovery times
IR: Blood Conservation

- IR-minimal blood loss <10cc
- Jehovah’s witness
- Natural alliance with advance bloodless programs (ABP)
- High risk patients, coagulopathy

Acute Care: Role of Interventional Radiology

- MEDICAL EMERGENCIES
  - Acute massive pulmonary embolism
  - Acute stroke
  - Acute significant bleeding: GI, trauma, post partum, hemoptysis, epistaxis
  - Catheter based techniques in the right setting can save a life and/or prevent significant clinical sequelae
PORTAL HYPERTENSION: TIPS

TIPS: POST F/U

Role of IR in Emergency Medicine
- Management of Tension Pneumothorax
- Percutaneous management of acute renovascular ischemic disease, mesenteric vascular disease
- Thrombolytic therapy in acute limb ischemia
**Transcatheter Embolization: Materials**
- Autologous clot
- Gelfoam pledgets
- PVA
- Embospheres
- Glue
- Coils
- Onyx

**Post Surgical Bleeding: Embolization**

**Acute Care: Role of Interventional Radiology**

**MEDICAL URGENCIES**
- IVC Filter placement in prevention of PE
- Treatment of Acute massive iliobial DVT
- Treatment of embolic/thrombotic peripheral vascular disease: cold foot, occluded graft
- Acute acalculous cholecystitis, malignant biliary obstruction
- Acute obstructive nephropathy
- Percutaneous management of intraabdominal, thoracic, and other abscesses
- Loculated pleural effusions
**Acute Care: Role of Interventional Radiology**
- Provide Central Venous Access in ICU setting, telemetry-PICCs, Triple lumens, Hohn, Monitoring caths
- ESRD: Temporary and tunelled hemodialysis catheters
- PUS-BUSTERS, CLOTBUSTERS!

**Sub-acute Care: Role of Interventional Radiology**
- Central Venous Access: mid-term, long-term lines: PORTs, Hickmans, Groshongs, Tunelled caths
- Percutaneous CT and Ultrasound guided biopsies
- Management of low back pain: percutaneous vertebroplasty, nerve blocks, facet blocks, epidurals

**IR: HITECH DIAGNOSIS Noninvasive**
**IR: Emerging Role**

- Gynecological therapies: Fibroids, pelvic congestion syndrome, fallopian tube recanalization
- AAA repair with stent grafts
- Spine: Vertebroplasty for acute compression fractures

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**UTERINE FIBROIDS**

- Symptoms based on location in uterus
- Bleeding, pelvic pain, cramping, mass effect, dysuria & dyspareunia

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**UAE: PRE/POST EMBO**

- Before and after UAE: fibroid embolization
UAE: CLINICAL RESULTS

- Menorrhagia: 92%
- Mass effect: 85%
- Dysmenorrhea: 88%
- Future pregnancy not an absolute contraindication
- Recurrence: <1%
- Infection: 1-2%
- Ovarian failure: 1-4%

DVT: cath directed lysis

- Temporary IVC filter
  - Jugular or Femoral approach for placement
  - FDA approved (permanent or up to two weeks for removal)
  - Must be removed from jugular approach
Venous Hypertension
- Valves damaged
- Fibrointimal changes
- Varicosities, ulcers, hyperpigmentation, swelling, phleghmasia

Ambulatory Venous Hypertension

Osteoporotic Compression Fractures
Percutaneous Kyphoplasty

Compression Fracture: Vertebroplasty

Deformity alone leads to serious health consequences

The highest standard of non-surgical management does not prevent deformity, leading to:
- Future fracture
- Impaired health
- Loss of physical function
- Loss of QOL
Biomechanics of the Spine

Fusion Does Alter Load Transfer because the Least Stiff Component (the disc) has been stiffened.

Functional Spine Unit (FSU)

Literature Reports that Deformity Correction is Important

- Deformity
- Debilitation
- Disability
- Depression
- Death

PVD: TREATMENT

Peripheral Vascular Disease

Treatment: Surgical Intervention

- Bypass grafts
- Amputation
Restenosis - Interventionalist's nightmare

- Early occlusion: acute thrombosis
- 2-6 mth: neointimal hyperplasia
- 1-2 yr: progression of disease
- Assisted Patency: PTA, IVBrachytherapy, DRUG COATED STENTS!

Case Study
- 19 yr old Male, 3 day old symptoms secondary to trauma one year prior.
- Clot: 10 cm in right subclavian vein
- Reteplase (rPA) - 0.5 u/hr for 4 hours, then 0.25 u/hr
- Complete resolution of clot confirmed by angiography at 23.5 hours.
- Critical stenosis resolved by cutting balloon and PTA

Excellent result – no residual clot and brisk venous flow
Case Study - Post-Lysis / Final

Complete Lysis: Valves and Vessel

IR: EMERGING ROLE IN CANCER THERAPY
- Precision image guided targeted therapy: Angio, CT, US, CT, MRI guidance
- Placement of catheters for chemotherapy/longstanding IV support: Chestports, armports, Groshongs, Hickmans, PICCs, Plasmapheresis
- Liver-chemoembolization, RF ablation, acetic acid, alcohol therapy
- Relieving malignant obstructions-biliary, nephroureteral, tracheal, esophageal, colonic
Liver Metastases: RF ablation

Liver Mets.: pre/post Chemoembolization

ACUTE DVT: Failure of routine anticoagulation
- Clot dissolution only 14-20% with std heparin therapy
- Clot propagation not at all guaranteed
- PE – 33-50% pts.
- Chronic sequelae of Venous hypertension: 25-70%
Ac DVT: Rationale for Lytic & Adjunct therapy
- Clot dissolution & preservation of valve function
- Decrease PE
- Decrease recurrence
- Prevent chronic venous hypertension

ENDOVASCULAR STENT GRAFTS
- AAA: AneuRx (Medtronic AVE), Encure (Guidant), Excluder (Gore)
- Suprarenal/mid aorta-Talent
- Thoracic-Gore device, shelf design
- Thoraco-abdominal: experimental

AAA: AneuRx Stent Graft
CONCLUSION: IR

- Rapid recovery period with minimal tissue disruption with faster healing
- Despite minimally invasive procedure clinical outcome comparable to open surgery
- Risks and complications are less compared to open procedures
- THANK YOU FOR YOUR ATTENTION!