HKL VASCULAR ANASTOMOSIS WORKSHOP 2012
BASICS OF VASCULAR ANASTOMOSIS

INSTITUTE FOR MEDICAL RESEARCH
28th June 2012

Vascular Unit, Department of Surgery
Hospital Kuala Lumpur

Aesculap Academy

Persatuan Perubatan Pascasiswa Pascasiswa
Hospital Kuala Lumpur
Introduction

- Vascular reconstruction
  - No compromise
  - No second chance
  - No delays
  - No temporary measures
  - Immediate results – technical success
Objectives

- Exposure to principles of vascular surgery & anastomotic techniques
- Hands on experience on:
  - Handling of instruments
  - Handling of sutures, vascular grafts and blood vessels
- Live dissection
  - Dissection of major blood vessels
  - Proximal and distal control
  - Perform live anastomosis
  - Assess technical success
Principles of Vascular Anastomosis

Suture Techniques
Tissue Handling
Vessel Control
Principles of vascular suturing

- Appropriate sutures
  - Double ended, monofilament sutures
  - Appropriate size
  - Appropriate needle type, size, curve
- Never handle suture-thread with instruments
- Appropriate instruments
  - Enable better handling of sutures
  - Avoid damage to instruments
B. Braun range of Sutures

Absorbable Materials

- Natural
  - Monofilament
    - Short term
      - Catgut Plain
    - Mid Term
      - Catgut Chromic
    - Long Term
      - Monoplus
    - Extra
      - Long Term
        - MonoMax
  - Synthetic
    - Monofilament
    - Braided
      - Short Term
        - Monosyn Quick
      - Mid Term
        - Monosyn
      - Safil Quick
    - Mid Term
      - Safil Novosyn

Non Absorbable Materials

- Natural
  - Braided
    - Twisted
      - Silkam
      - Linatrix
    - Dafilon
      - Premilene
      - Steelex
  - Synthetic
    - Monofilament
    - Braided
      - Premicron

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<thead>
<tr>
<th></th>
<th>50% tensile strength</th>
<th>Mass absorption</th>
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<tbody>
<tr>
<td>Short term</td>
<td>5-10 days</td>
<td>42 days</td>
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<tr>
<td>Mid term</td>
<td>14-21 days</td>
<td>60-90 days</td>
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<tr>
<td>Long term</td>
<td>28-40 days</td>
<td>180-210 days</td>
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<tr>
<td>Extra Long</td>
<td>90 days</td>
<td>13 months</td>
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Principles of vascular suturing

- In – out manner
  - On the arterial side
    - End-graft to side-artery anastomosis
  - Distal end
    - End-end anastomosis

![Diagram showing correct and incorrect suturing methods](image)
Principles of vascular suturing

- Hold needle at its mid body
  - Pierce the artery at $90^\circ$ to vessel wall
  - Less force to pierce vessel – calcified wall
Holding the needle

RIGHT

WRONG

Aesculap. All it takes to operate.
Principles of vascular suturing

• Needle point of entry - perpendicular to vessel surface

• Direction of pull of suture – perpendicular to vessel surface
Holding the needle

**RIGHT**

When penetrating the tissues, always hold the needle tip at an angle of 90° to the tissue's surface. This will ensure the optimal hold of the tissues being sutured.
Principles of vascular suturing

- Minimise handling of the arterial intimal layer
- Hold the arterial wall by the adventitia
- Do not grip the whole thickness of the artery
- Use of appropriate instruments – non traumatic forceps
Vessel Control

- Never suture on pulsating vessels
  - Poor vision
  - Expansion of suture holes

- Length of vessel dissected
  - Enough space for anastomosis
  - Adequate space for placement of clamps

- Appropriate clamp according to vessels size
Vessel Control

- Applying loops around the vessels
Vessel Control

- Applying loops, followed by clamps
Clamping on calcified vessels

- Ant-post clamping
  - Break in calcified plaque
  - Distal embolisation
  - Ineffective clamping/control
- Side clamping
Terminology

HEEL

TOE
The Workshop

Groups
Workshop Layout
Instruments
# HKL Vascular Surgery Workshop

28 June 2012, IMR

Hands-on Practical Session : Grouping

<table>
<thead>
<tr>
<th>Dr Ngoo Kay Seong</th>
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<td>Philippine Heart Center</td>
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<td>Hospital Universiti Sains Malaysia</td>
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<td>Siriraj Hospital</td>
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<th>Dr Mohd Hisyam Sidek</th>
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<td>Hospital Kuala Terengganu</td>
<td>University Malaya Medical Centre</td>
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Workshop Layout

- **Bench-work**
  10.00 am – 1-00 pm (3 hours)
  - Arteriotomy
    - Transverse & Longitudinal
  - Arteriotomy closure
    - Interrupted, Continuous & Patch
  - Basic anastomosis
    - End to side & End to end
    - Parachute & Tie down

- **Live Dissection**
  2.00 pm – 5.00 pm (3 hours)
  - Dissection of vessels
  - Proximal and distal control
  - Anastomosis
Instruments

- 1 Castroviejo micro needle holder
- 1 DeBakey arterial clamp
- 1 Potts 60° scissors
- 1 DeBakey atraumatic dissecting tissue forceps
- 1 Suture board
- 1 Hegar-Mayo needle holder
- 2 Halsted mosquito forceps (straight)
- 2 Halsted mosquito forceps (curved)
- 1 McIndoe dissecting forceps
- 1 toothed tissue forceps
- 1 Mayo scissors (straight)
- 1 Mayo scissors (curved)
- 1 Metzenbaum scissors
- 1 Balfour self-retaining abdominal retractor
- 2 scalpel handles (No.3 & 4)
- Bovine carotids, grafts, vascular patch and sutures
- Live “patients”
DeBakey atraumatic forceps
Castroviejo
DeBakey clamps
Pott’s scissors
Bench Work

Arteriotomy
Arteriotomy closure
Anastomosis
Arteriotomy

- Stab incision with size 11 scalpel blade
- Extend incision with Pott’s scissors
Arteriotomy

- Longitudinal
  - Most commonly practiced
  - Easily extended
  - Conversion into anastomosis
  - Stricture upon closure
    - Patch closure

- Transverse
  - Minimise stricture
  - Limited application
  - Not suitable for bypass
Arteriotomy closure

- Primary closure
  - Large, medium sized arteries (7 – 8 mm)
  - Interrupted
  - Continuous
  - Run suture towards you

- Patch closure
  - Small sized arteries (<6 mm)
  - Vein patch
  - PTFE
Patch closure

- Tie down
  - Limited working space
  - Vein patch
- Parachute
  - Ample working space
- Start at corner away from you
- Work towards yourself
- Tie knot on the side
End - side anastomosis

- Parachute
  - Start from the heel
  - 2 or 3 sutures on closer side
  - Then do side away from you
    - Don’t struggle doing it later
    - Inspect suture line from inside
  - Go around the toe
  - Tie knot on the side closer to you in the middle

- Anchor (Tie-down)
  - Heel to toe
  - Tie knot on the side
End – side anastomosis

- Completing anastomosis
- Tie down on the side
End - end anastomosis

- Straight
- Large, good sized vessel
  - Anterior, then flip over
    - Interposition vein graft
  - Posterior, then anterior
    - Primary anastomosis
- Out-in on proximal end
- In-out on distal end
End to end anastomosis

- Beveled
- Small sized vessels
- Toe – heel; heel – toe

- Unequal diameters
Live Dissection

Canine Aortic Dissection

Aorto-biiliac anastamosis
Subject preparation

- “Patient under”
- Instrument dish
- Diathermy return pad
- Drape around proposed laparotomy site
Laparotomy

- Midline incision
- Rectus
- Peritoneum
- Abdominal self-retainers
Trouble shooting

- Distended bladder
Dissection of the aorta
Dissection of the aorta

- Loop the aorta in preparation for clamping
Anatomy of canine aorta
Aortic cross-clamp

- Systemic heparin – intra-arterial
- 1,000 unit
- Before clamping
- Proximal and distal
  - Horizontal to occlude lumbar vessels
- Arteriotomy – size 11 blade
Arteriotomy

- Extend arteriotomy with Pott’s scissors
End-side anastomosis

- Placing sutures
- Parachute the graft
Completion of anastomosis

- Release clamps
- Check anastomosis
  - Suture hole bleeding
  - Pulsating graft
  - Pulsating vessel (aorta) distal to anastomosis
- Remember: No bleeding –
  - Sound anastomosis
  - Thrombosed graft
BENCHWORK EXERCISE

- Arteriotomy – Simple closure, interrupted
- Arteriotomy – Patch closure, continuous
- End-Side – Parachute
- End-Side – Tie down
- End-End – Beveled, continuous

LIVE DISECTION

- Aortic dissection
- Proximal & Distal clamps
- End graft-side aorta – proximal anastomosis
- End graft-side aorta – distal anastomosis