Evaluation and Treatment of Suspected Retroperitoneal Bleeds

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Disclosures

• Cook Medical - Training Site
• Gore - Consultancy
• Medtronic - Training Site

• No conflict of interest related to this presentation
Retroperitoneal Bleed

- **Retroperitoneal bleed** is an **infrequent** but **serious complication** of transfemoral-access catheterization procedure

- **Etiologies:**
  - Trauma – blunt or penetrating injury
  - Spontaneous bleed – on anticoagulation therapy
  - **Iatrogenic** – Procedural (Catheterization) related ≈ 0.1-0.9%
Retroperitoneal Bleed

- Survival of the patient often depends on rapid & accurate diagnosis and appropriate management

Mortality ≈7% Trimarchi, S. et al JACC 2010

- Bleeding usually insiduous and unrecognized initially.
  - **Immediate** death due to shock and rapid exsanguination
  - **Die later** due to complications of compartment syndrome
‘Diagnosis comes to the prepared mind’

- Diagnosis is often delayed if the clinician is unaware of the condition
Retroperitoneal Bleed: Diagnosis

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  - Diagnosis is often delayed if the clinician is unaware of the condition
  - Clinical presentation is varied and most of the time vague
Retroperitoneal Bleed: Diagnosis

• ‘Diagnosis comes to the prepared mind’
  - Diagnosis is often delayed if the clinician is unaware of the condition
  - Clinical presentation is varied and most of the time vague
  - No obvious clinical stigmata that is helpful in clinching the diagnosis

NOT clinically useful

Grey-Turner’s sign

Cullen’s sign
Retroperitoneal Bleed: Diagnosis

- ‘Diagnosis comes to the prepared mind’
  - Diagnosis is often delayed if the clinician is unaware of the condition
  - Clinical presentation is varied and most of the time vague
  - No obvious clinical stigmata that is helpful in clinching the diagnosis
  - **Hemodynamic instability** ➔ Hypotension + tachycardia (unless on beta-blocker) that transiently improves with IVF predictive
Hypotension post-cath

- **Hypotension**: SBP < 90 mm Hg
  
  SBP <30 mm Hg than baseline

- **Most common cause**:  
  - Vagal episode – groin puncture site pain +/- compression + back pain

- **Treatment**  
  - Saline infusion
  - Atropine sulfate IV
  - Pain management
Hypotension post-cath

- **Other causes** - *quickly considered & ruled-out*
  - Myocardial ischemia
  - Myocardial infarction
  - Pericardial effusion → Cardiac tamponade
  - Valvular
Hypotension post-cath

- **Other causes** - *quickly considered & ruled-out*
  - Myocardial ischemia
  - Myocardial infarction
  - Pericardial effusion → Cardiac tamponade
  - Valvular

- **Hemodynamic instability** post-cath (Dxtic or Interventional) procedure
  - Think of bleeding, BLEEDing, **BLEEDING** !!!
    - Access site – hematoma
    - Retroperitoneal bleed
Cath-related RP Bleed: Etiology

- **Access-related**
  - ‘High’ sticks – above inguinal ligament (above inferior epigastric artery)
  - ‘Through & through’ needle stick

- **Guidewire/sheath/catheter related**
  - ‘Blind’ advancement of guidewire into side-branches
  - Vessel disruption/avulsion
Suspected RP Bleed: ??Standard of care

• **Institution driven**

• **Is an imaging study necessary?**
  - CT scan of the abdomen and pelvis
Patients who are 'stable', RP bleed volume quantified by CT scan does not contribute to prognosis.


- Single center
- 93 RP bleed in 20,904 PCI patients (0.45%)
- Mortality rate = 7.5% (4.3% due to RP bleed)
Suspected RP Bleed: ??Standard of care

- Institution driven

- Is an imaging study necessary?
  - CT scan of the abdomen and pelvis

- NO

- Diagnosis made, ??then; NOT predictive → does not change course of management
Suspected RP Bleed: ??Standard of care

- **Institution driven**
- **Is an imaging study necessary?**
  - CT scan of the abdomen and pelvis
- **Management**
  - *Traditionally,* Monitor in ICU closely
    - Follow Hgb/Hct and Transfuse prn
  - “Wait and see” if hemodynamically stable
  - else ??surgery or ??angio suite
Suspected RP Bleed: ??Standard of care

- **Institution driven**

- **Is an imaging study necessary?**
  - CT scan of the abdomen and pelvis

- **Management**

- **Con:** Need to D/C anti-coagulation & anti-platelet therapy → high risk for thrombotic events

  - Bleeding systematically amplify the localized hemostatic response, in the presence of deficiency of endogenous antithrombotic pathways
  - Physiologic response to anemia might increase the release of prothrombotic factors, i.e. erythropoietin, causing platelet activation and inducing PAI-I
  - RBC transfusion might increase platelet reactivity and the release of PAI-I
RP Bleed: Management algorithm

- When **RP bleed is suspected** ..... 
  1. Volume resuscitation – Normal saline 
  2. Serial Hgb/Hct 
  3. STBB + PRBC for transfusion 
  4. If patient remains hemodynamically unstable 
     - Intervention: Surgical vs Endovascular
RP Bleed:

- Management algorithm
- ‘Low threshold’ to bring back to the angio suite if unstable

![Post Femoral Intervention Hematoma Algorithm](image)
Suspected RP Bleed: What to do?

- Low threshold to bring patient back to cath lab
- **Factors:**
  - Review femoral angiogram
  - Location of arteriotomy
  - Use of VCD is not devoid of complication
Suspected RP Bleed: What to do?

- Low threshold to bring patient back to cath lab

Factors:
- Review femoral angiogram
- Location of arteriotomy
- Use of VCD is not devoid of complications

Arteriotomy site vis-a-vis
- Inguinal ligament
- Inferior epigastric A.
- Lateral circumflex A.
Suspected RP Bleed: What to do?

• Low threshold to bring patient back to cath lab

• **Factors:**
  - Review femoral angiogram
    - Location of arteriotomy
    - Use of VCD is not devoid of complication
  - Hemodynamic compromise
  - Post PCI/PEI - anti-coagulation, anti-platelet Therapy
  - Patient - Age, BMI/obesity, bleeding diathesis
• **Conservative Medical Tx**
  - Standard of care?? – Transfuse prn

• **Percutaneous endovascular intervention**

• **Vascular surgery**
  - After angiographic documentation of bleeding site
RP Bleed

- **Conservative Medical Tx**
  - Standard of care?? – Transfuse prn
  - **STOP anti-platelet Tx**

- **Percutaneous endovascular intervention**
  - **NO need to D/C anti-platelet Tx**

- **Vascular surgery**
  - After angiographic documentation of bleeding site
  - **STOP anti-platelet Tx**
Free extravasation into pelvic cavity from perforated inferior epigastric artery
RP Bleed: Endovascular management

- Selective cannulation of perforated artery using a 5F Berenstein catheter

- Cook 6F Ansel-1 cross-over sheath
Mgt of RP Bleed: Thrombin blood-patch

- Strategy:
  - Advanced 0.018” support catheter over 0.014” guidewire into perforated track
  - Injected thrombin-blood patch into track
  - 1.5-mm balloon catheter inflated across the ‘ostium’ x 10 mins
Mgt of RP Bleed: Thrombin blood-patch

6F Ansel-1 cross-over sheath

Cannulation of perforation track using a 5F Berenstein catheter

Advancement of 0.018” Support catheter into track or vessel

Autologous thrombin-blood patch
→ 2-3 ml of patient’s blood admixed with 1,000-2,000 of Thrombin

Inject thrombin-blood patch into track
Mgt of RP Bleed: Thrombin blood-patch

6F Ansel-1 cross-over sheath

Cannulation of perforation track using a 5F Berenstein catheter

Advancement of 0.018" Support catheter into track or vessel

‘Occlusive’ balloon across the ‘ostium’ of perforation track

Complete obliteration of flow through perforation track – Inferior Epigastric A.
RP Bleed: Free vessel wall ‘disruption’

Free extravasation into pelvic cavity from ‘high-stick’
RP Bleed: Free vessel wall ‘disruption’

- **Strategy:**
  - Exclude perforation
  - Use of ePTFE-covered stent
  - 9F Raabe sheath – cross-over
  - 0.018” guidewire into distal SFA
RP Bleed: Endovascular management

ePTFE-covered Nitinol self-expanding stent 9.0/50-mm
RP Bleed: Successful ‘Exclusion’
RP Bleed: Endovascular Mgt Strategy

- **Perforated side branch**
  - Perforated side branch - guidewire-related

- **Vessel wall ‘disruption’**
  - ‘High’ stick, sheath size>vessel, POBA/device
RP Bleed: Endovascular Mgt Strategy

- **Perforated side branch**
  - Perforated side branch - guidewire-related
  - **Occlude**: Embolization - Thrombin-blood-patch, coils, liquid agents, gel-foam, particles, etc.

- **Vessel wall ‘disruption’**
  - ‘High’ stick, sheath size > vessel, POBA/device
  - **Exclude**: ePTFE-‘covered’ stent
RP Bleed: PEI as primary Tx approach

- PEI in 24, manual compression in 1
- Anti-platelet Tx NOT discontinued
- ALL discharged home alive

- Hypotension duration = 39 ± 54 minutes
  Hgb = 11.7 ± 1.9 → 7.9 ± 1.7 g/dl
  Hct = 36.3 ± 24.6%

- PRBC transfused: 2.8 ± 3.3 units
RP Bleed: Conclusion

- Retroperitoneal bleed, a life-threatening transfemoral access complication, happens infrequently but needs to be recognized early and treated promptly.

- Catheter-based Percutaneous Endovascular Intervention should be considered ‘early’ in the management of retroperitoneal bleeds.

- If treated inappropriately, mortality of patients with retroperitoneal bleed remains high.
Thank You
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