Dealing with Retroperitoneal Bleeds Interventionally

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Disclosures

Speaker’s Bureau:
• Cardinal Health

Honorarium:
• Cook Medical - Training site
• Medtronic Medical - Training
• Terumo Medical

Consultant:
• Gore Medical

There is no conflict of interest related to this presentation.
Retroperitoneal Bleed (RP Bleed)

• Retroperitoneal bleed is an infrequent but catastrophic complication of transfemoral-access catheterization procedure

• Causes:
  ➢ Trauma – blunt or penetrating injury
  ➢ Spontaneous bleed – on anticoagulation therapy
  ➢ Iatrogenic – Procedural (Catheterization) related
    \( \approx 0.1 \text{ to } 3.0\% \)
# ACC-NCDR: PCI complication rates

<table>
<thead>
<tr>
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<th>2005 Q1-Q2</th>
<th>2009 Q1-Q2</th>
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<tbody>
<tr>
<td></td>
<td>(n = 92,534)</td>
<td>(n = 144,989)</td>
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<tr>
<td><strong>ACS - RP Bleed</strong></td>
<td>0.33 %</td>
<td>0.42 %</td>
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<tr>
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<td>(n = 50,532)</td>
<td>(n = 79,892)</td>
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<tr>
<td><strong>Non-ACS - RP Bleed</strong></td>
<td>0.25 %</td>
<td>0.17 %</td>
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Retroperitoneal Bleed (RP Bleed)

• Survival of the patient often depends on rapid & accurate diagnosis and appropriate & prompt delivery of therapy.

  \[
  \text{Mortality} \approx 7\% \quad \text{Trimarchi, S. et. al. JACC 2010.}
  \]

• Bleeding usually insiduous and unrecognized initially.
  
  ➢ **Immediate** death due to shock and rapid exsanguination
  
  ➢ **Die later** due to complications of compartment syndrome
Patient CS: Right & Left Heart Cath

• 53 year old AAF with CAD, ICM, admitted for worsening dyspnea and complaint of angina.

  ➢ 8:43 am - Right & Left heart cath performed with vascular access via the right groin - manual compression applied for hemostasis.

  ➢ 11:00 am - ‘Rapid response’ for hypotension’. Patient is “cold and clammy” and complains of right groin pain.
Hypotension post-cath:

• Hemodynamic compromise post-catheterization procedure (Diagnostic or Interventional)

➢ Think of bleeding, BLEEding, **BLEEDING !!!**

➢ Absence of groin hematoma does not rule-out **retroperitoneal (RP) bleed**
‘Diagnosis comes to the prepared mind’

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

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  - Clinical presentation is varied and most of the time vague
RP 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.
RP 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** (unless on beta-blocker) that is very predictive

  ➢ Other causes quickly ruled-out
  ➢ Think of **BLEEDING !!!**
    ❖ Access site – hematoma
    ❖ Retroperitoneal bleed
Cath Related RP Bleed: Etiologies

• **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
Cath Related RP Bleed: Etiologies

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- WHC experience = 43% of RP bleed
Cath Related RP Bleed: Management

- **Institution driven** – main driving force

- **Is an imaging study necessary?**
  - CT scan of the abdomen and pelvis
RP Bleed: CT scan volumetric analysis

- Single center
- 93 RP bleed in 20,904 PCI patients (0.45%)  
- Mortality rate = 7.5% (4.3% due to RP bleed)

Injection volume = 1580.3 cc

Patients who are ‘stable’, RP bleed volume quantified by CT scan does not contribute to prognosis.

Cath Related RP Bleed: Management

• 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
Cath Related RP Bleed: Management

• Institution driven

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

• Definitive 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 after cath: 7-year, single-center

• Retrospective review:
  ➢ 26,487 cardiac cath patients; January 2005 to November 2011
  ➢ **RP bleed = 48 patients (0.18%)**
    [PCI = 70.9%. Shock = 39.6%. Blood transfusion = 50%]

• Outcome:
  ➢ Mgt: Conservative = **79.2%**, Endo = 14.6%, Surgery = 6.2%
  ➢ **Death from RP Bleed = 2 (4.2%)**

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: Endovascular *or* surgical
RP Bleed: Algorithm

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

• **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
RP Bleed: Management algorithm

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RP Bleed: Management

Free extravasation into pelvic cavity from perforated inferior epigastric artery
RP Bleed: Management

Free extravasation into pelvic cavity from perforated inferior epigastric artery

Treatment Options:

• Surgery
  ➢ ‘Open’ repair

• Percutaneously
  ➢ Exclude
    - ‘covered’ stent
  ➢ Occlude
    - embolization
Cook 6F Ansel-1 cross-over sheath

Selective cannulation of perforated artery using a 5F Berenstein catheter
RP Bleed: Management

• **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
Cannulation of perforation track using a 5F Berenstein catheter

- Advancement of 0.018” Support catheter into track or vessel

- Inject thrombin-blood patch into track

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

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.

RP Bleed: Management

Complete termination of flow through perforation track – Inferior Epigastric A.
Patient CS: Right & Left Heart Cath

- **12:08 pm** – Patient on cath table
- **12:18 pm** – Left femoral arterial access obtained and performance of aortogram
- **12:39 pm** – Thrombin-blood patch injected with successful hemostasis

- Fluid resuscitation followed by 3 units of PRBC blood transfusion
  \[Hgb = 11.2 \rightarrow 9.2 \text{ g/dl}\]
- No untoward complications after the procedure. No ICU.
RP Bleed: Management

  - 25 patients with RPH
  - Age: 69 ± 14 years
  - Sex: Male = 13, Female = 12
  - 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
  - PEI in 24, manual compression in 1
  - Anti-platelet Tx NOT discontinued
  - ALL discharged home alive
RP Bleed: Management strategy

- **Perforated side branch**
  - Perforated side branch - guidewire-related, etc.

- **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: Management strategy

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RP Bleed: An ounce of prevention

• Use micropuncture technique to gain arterial access.
   **Ultrasound guidance in large-bore access**

• Before upsizing from the micropuncture sheath, perform angiography of arteriotomy site
  ➢ Take angio of CFA – Ipsilateral 30-40°
  ➢ Note vessel morphology
RP Bleed: An ounce of prevention

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  **Ultrasound guidance in large-bore access**

- Before upsizing from the micropuncture sheath, perform angiography of arteriotomy site
  - Take angio of CFA – Ipsilateral 30-40°
  - Note vessel morphology
  - **If location not ‘ideal’**
    - pull out & re-access
RP Bleed: Standard of Care

• If retroperitoneal bleed is suspected, the most effective response is to return to the lab for contralateral access and identification of the bleeding site.

2012 ACCF/SCAI Expert Consensus

• Abdominal non-contrast CT scan
  ➢ Definitive in assessing the presence of RP bleed – when there is no sense of urgency or hemodynamic compromise
  ➢ Does not change management, does not affect outcome
In summary

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

• If treated inappropriately, mortality of patients with RP bleed remains high.

• Catheter-based Percutaneous Endovascular Intervention should be considered early in the management of retroperitoneal bleeds.
Thank you. Have a Good Day!

On the road to Mount Everest
Yamdro Yumtso Lake
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