Hemostasis Methods Used In Cardiac Patients Post Percutaneous Coronary Intervention

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**Purpose**
- To identify which hemostasis method is preferred for use during percutaneous coronary intervention to reduce risks for vascular complications
- To identify if arterial closure devices are superior to manual compression in reducing complications

**PICOT Question**
In cardiac patients post femoral sheath removal, how does manual compression compared to an assisted closure device affect the risk for vascular complications over a 24-hour period?

**Summary of Problem**
- Complications such as hematoma, bleeding, infection, hypotension, pseudoneumothorax, lead to patient injury
- Manual compression requires intense physical exertion for 15-20 minutes
- Increased hospital length of stay and costs, morbidity and mortality (Merriweather & Sulzbach-Hoke, 2012)
- 25% of total costs were associated with PCI complications (Jacobson, Long, McMurtry, Naessens, & Rihal, 2007)

**Search Strategy**
- Databases: CINAHL and PubMed
- Search Terms: vascular closure devices, manual compression, femoral artery, sheath removal and arterial closure device

**Inclusion Criteria:**
- Published in English, within the last 10 years, human subjects, clinical trials, systematic reviews, full text

**Exclusion Criteria:** Not published in English, younger than 18 years old, animals

**Results:** 10 results yielding 6 RCTs, 1 Meta-Analysis, 1 Comparative (Cohort) Study, 1 Descriptive Correlation Study, 1 Retrospective (Case Control) Review

**Table of Evidence**

<table>
<thead>
<tr>
<th>Citation</th>
<th>Summary</th>
<th>Melnyk &amp; Fineout-Overholt’s Hierarchy of Evidence</th>
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</thead>
<tbody>
<tr>
<td>Allen et al. (2011)</td>
<td>Comparison (Cohort) Study. ACDs after PCI had lower incidence of major bleeding compared to MC</td>
<td>Level III</td>
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<tr>
<td>Behan et al. (2007)</td>
<td>RCT: AS has shorter time to mobilization, less bruising, and no increased risk for vascular complications</td>
<td>Level II</td>
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<tr>
<td>Duling et al. (2008)</td>
<td>RCT: ACDS are superior to MC in terms of patient comfort, ambulation, and risk for vascular complication</td>
<td>Level II</td>
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<tr>
<td>Goswami et al. (2015)</td>
<td>RCT: BW in adjunct with MC has lower rates of complications and can significantly reduce TTH and TTA</td>
<td>Level II</td>
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<tr>
<td>Hamner et al. (2006)</td>
<td>Descriptive Correlational Study. Previous use of ACD is strongest predictor of vascular complications</td>
<td>Level V</td>
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<td>Holm et al. (2014)</td>
<td>RCT: FS ACD is associated with significantly fewer hematomas compared to MC</td>
<td>Level II</td>
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<tr>
<td>Martin et al. (2008)</td>
<td>RCT: AS is associated with shorter TTA and TTH compared to MC. Major vascular complications were NS among the methods.</td>
<td>Level II</td>
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<tr>
<td>Schulz-Schupke et al. (2014)</td>
<td>RCT: ACDS are non-inferior to MC in terms of vascular access-site complications</td>
<td>Level II</td>
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<tr>
<td>Smilowitz et al. (2012)</td>
<td>Retrospective Review (Case Control Study). No consensus that ACDs safety is superior to MC</td>
<td>Level V</td>
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<tr>
<td>Jiang et al. (2015)</td>
<td>Meta-Analysis. Newer ACDs show improvement in device design, safety and show significantly decreased rates of vascular adverse events</td>
<td>Level I</td>
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</table>

**Legend:** ACD-Arterial Closure Device, AS-Angioguide, BW-Boomerang Wire, FS-FemoSeal, MC-Manual Compression, NS-NonSignificant, PCI-Percutaneous Coronary Intervention, RCT-Randomized Control Trial, TTA-Time to Ambulation, TTH-Time to Hemostasis

**Melnyk & Fineout-Overholt’s Hierarchy of Evidence**
- Level I: Systematic Reviews & Meta-Analysis
- Level II: RCTs
- Level III: Controlled Cohort Studies
- Level IV: Uncontrolled Cohort Studies
- Level V: Case Studies and Case Series, Qualitative & Descriptive Studies, EBP Implementation & QI Projects
- Level VI: Expert Opinion

**EBP Model - ACE Star**

1. Discovery
2. Evaluation
3. Translation
4. Integration
5. Refreeze

**(Stevens, 2012)**

**Components of Change**
- Stakeholders: Cardiac patients undergoing PCI, RNs, NPs, Cardiovascular Surgeons, Interventional Cardiologists, Vascular Surgeons
- Facilitators: Physician Champion (educated and experienced in the devices)
- Barriers: Physicians preference and experience using devices

**EBP Evaluation**
- **Formative**
  - Track each patient’s recovery and/or complications using a designated “green” checklist weekly
- **Summative**
  - # of days in hospital
  - # of complications over a 6 month period determined at follow up appointment with Cardiologist
  - # of patients with vascular device satisfied with their recovery based on Care Card scores
    - Rated 1-5 (1 unsatisfied, 5 satisfied)

**Practice Implications**
- Decrease post PCI complications
- Decrease hospital length of stay
- Decrease hospital cost
- Decrease staffing for nurses
- Decrease time to ambulation

**Recommendation for Practice Change**
- Consistent findings from quality evidence were associated with reduced risks and vascular complications with the use of arterial closure devices versus manual compression
- Evidence supports “strong” recommendation for change (Guyatt et al., 2008)
- Utilize vascular devices during all diagnostic and elective percutaneous coronary intervention (PCI)

**References**
- Refer to handout
<table>
<thead>
<tr>
<th>Hemostasis Method:</th>
<th>Anticoagulation:</th>
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<tr>
<td><strong>Time to Hemostasis:</strong></td>
<td><strong>Time to Ambulation:</strong></td>
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<tr>
<td></td>
<td>6 hours</td>
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<tr>
<td>Bleeding, oozing at site</td>
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<td>Retroperitoneal Hematoma</td>
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<td>Pseudoaneurysm</td>
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<td>Infection</td>
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<td>Time of Discharge</td>
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