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Integrative Research Review: Comparison of Vascular Closure Devices to Manual Compression in Decreasing Postoperative Complications

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Purpose:

Vascular closure devices (VCDs) were developed in the 1990s to shorten the time to hemostasis and decrease time to ambulation for patients following femoral arterial intervention. VCDs allow closure of the artery using a variety of methods including sutures, collagen-plugs, and metallic clips. These devices were introduced into clinical practice with the goal of improving patient safety. VCDs were created and designed to overcome the traditional problems associated with manual compression. According to Hackl et al. (2015), VCDs act as an alternative to manual compression with the goal of early mobilization and decreasing access site complications. What remains however, is a scientific gap surrounding the comparative safety and efficacy of VCDs to manual compression (Schulz-Schupke et al., 2014). This purpose of this review is to answer the controversial question of how VCDs compare to manual compression in decreasing postoperative complications in the hospital setting following femoral arterial access.

Methods:

This study was conducted using the Integrative Research Review (IRR) methodology. A search was completed using five of the major literature databases: Cochrane Library, Medline Complete, Cinahl Plus, PubMed, and Health Source: Nursing/Academic Edition. Keywords used in the search were, “vascular closure device” and “manual compression” and “complications”. Inclusion criteria for this study was limited to studies published in English and topics related to VCD safety and complication reduction. Exclusion criteria included small, brand-specific trials, disease-specific studies, and topics unrelated to VCD safety and complication reduction. Search criteria was limited for all databases to the years of 2012-2017.

Results:

A total of 53 studies were located and seven studies were found by performing bibliographical mining. All studies were critically appraised using appraisal guidelines, evaluative checklists, and PRISMA Statement guidelines. Of the 53 studies identified, 19 were duplicates, 34 were excluded, and 12 met study inclusion criteria. Of the 12 studies included in the final review, four were considered level one, four were level two, and four were level four.

Conclusion:

Overall, the IRR findings resulted in mixed conclusions. A neutral result was reported across all four meta-analyses included. The meta-analyses in the IRR showed favor to manual compression, as there was no clear delineation on the benefit of VCD use (Robertson et al., 2016). The meta-analyses also reported no apparent safety concerns regarding the use of VCDs. Literature from the four randomized control trials (RCTs) universally reported that VCD use is just as safe as manual compression. The majority of RCTs reported no difference in complication rates between VCD use and manual compression. Current literature from the four cohort studies reported there was no favor for one type of VCD. It has been established through the current literature that VCDs are safe for use in the appropriate patient population. According to Smilowitz et al. (2012), there is enough clinically meaningful data to support a decrease in vascular complications with routine use.
Title:
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Keywords:
Complications, Manual compression and Vascular closure device

References:


**Abstract Summary:**

Vascular Closure Devices (VCDs) are used internationally and were created to overcome traditional problems associated with manual compression. These devices act as an alternative to manual compression with the goal of decreasing access site complications. The safety and efficacy of VCDs continues to remain controversial, as research is limited.

**Content Outline:**

I. Background and Significance of Vascular Closure Devices
   
   A. History of vascular closure device use in femoral arterial intervention
   B. Development of vascular closure devices as an alternative to manual compression
   C. Safety and efficacy of vascular closure devices

II. Methodology

   A. Approach

      1. Integrative Research Review (IRR) methodology

   B. Systematic literature search

      1. Keywords

         a) "vascular closure device" and "manual compression" and "complications"

      2. Inclusion criteria

         a) Studies published in English

         b) Topics related to vascular closure device safety and complication reduction

      3. Exclusion criteria
a) Small, brand-specific studies

b) Disease-specific studies

c) Topics unrelated to vascular closure device safety and complication reduction

4. Databases searched

a) Cochrane Library, Medline Complete, Cinahl Plus, PubMed, Health Source: Nursing/Academic Edition

5. Years searched

a) 2012-2017

b) Additional bibliographic mining performed

III. Results

A. Critical appraisal

1. Appraisal guidelines, evaluative checklists, PRISMA Statement guidelines

B. Level of evidence

1. 53 total studies were located, seven located with bibliographical mining

2. 12 total studies used in this IRR

   a) Four, level one; four, level two; four, level four

C. Synthesis of findings

1. Vascular closure device use is just as safe as manual compression

2. Vascular closure devices are safe for use in the appropriate patient population

3. Enough clinically meaningful data exists to support a decrease in vascular complications with routine use

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**Author Summary:** Nichole Janca graduated with her Associate's Degree in Nursing in 2009 from Angelo State University in San Angelo, Texas. In 2013, she received her Bachelor's Degree in Nursing from Lubbock Christian University in Lubbock, Texas. Nichole is currently a graduate student at Lubbock Christian University, pursuing a Master's Degree in Nursing. Nichole is presently a bedside nurse in the Cardiac Outpatient Services Unit at University Medical Center in Lubbock, Texas.