

REVIEW

Temporary Abdominal Closure After Abdominal Aortic Aneurysm Repair: A Systematic Review of Contemporary Observational Studies

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WHAT THIS PAPER ADDS

Open abdomen therapy after abdominal aortic aneurysm repair is sometimes necessary to save lives. When the patient's physiological condition permits, delayed primary fascial closure should be performed rapidly to minimize the risk of large ventral hernias, intestinal fistulas, and graft infection. The seven identified observational studies evaluating different temporary abdominal closure (TAC) methods were all small and non-randomized. The vacuum assisted wound closure with the mesh mediated fascial traction method achieved a high fascial closure rate without planned ventral hernia even after long-term open abdomen therapy. There is a need for randomized controlled trials to determine the most safe and efficient TAC method.

Objectives: The aim of this paper was to review the literature on temporary abdominal closure (TAC) after abdominal aortic aneurysm (AAA) repair.

Methods: This was a systematic review of observational studies. A PubMed, EMBASE and Cochrane search from 2007 to July 2015 was performed combining the Medical Subject Headings “aortic aneurysm” and “temporary abdominal closure”, “delayed abdominal closure”, “open abdomen”, “abdominal compartment syndrome”, “negative pressure wound therapy”, or “vacuum assisted wound closure”.

Results: Seven original studies were found. The methods used for TAC were the vacuum pack system with ($n = 1$) or without ($n = 2$) mesh bridge, vacuum assisted wound closure (VAWC; $n = 1$) and the VAWC with mesh mediated fascial traction (VACM; $n = 3$). The number of patients included varied from four to 30. Three studies were exclusively after open repair, one after endovascular aneurysm repair, and three were mixed series. The frequency of ruptured AAA varied from 60% to 100%. The primary fascial closure rate varied from 79% to 100%. The median time to closure of the open abdomen was 10.5 and 17 days in two prospective studies with a fascial closure rate of 100% and 96%, respectively; the inclusion criterion was an anticipated open abdomen therapy time ≥ 5 days using the VACM method. The graft infection rate was 0% in three studies. No patient with long-term open abdomen therapy with the VACM in the three studies was left with a planned ventral hernia. The in hospital survival rate varied from 46% to 80%.

Conclusions: A high fascial closure rate without planned ventral hernia is possible to achieve with VACM, even after long-term open abdomen therapy. There are, however, few publications reporting specific results of open abdomen treatment after AAA repair, and there is a need for randomized controlled trials to determine the most efficient and safe TAC method during open abdomen treatment after AAA repair.

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INTRODUCTION

It has become clear that open abdomen treatment is necessary to save lives in many trauma and non-trauma surgical conditions.¹ The strongest indication for initiation of open abdomen therapy is the development of abdominal compartment syndrome (ACS). The proportion of patients who develop ACS after open and endovascular aneurysm

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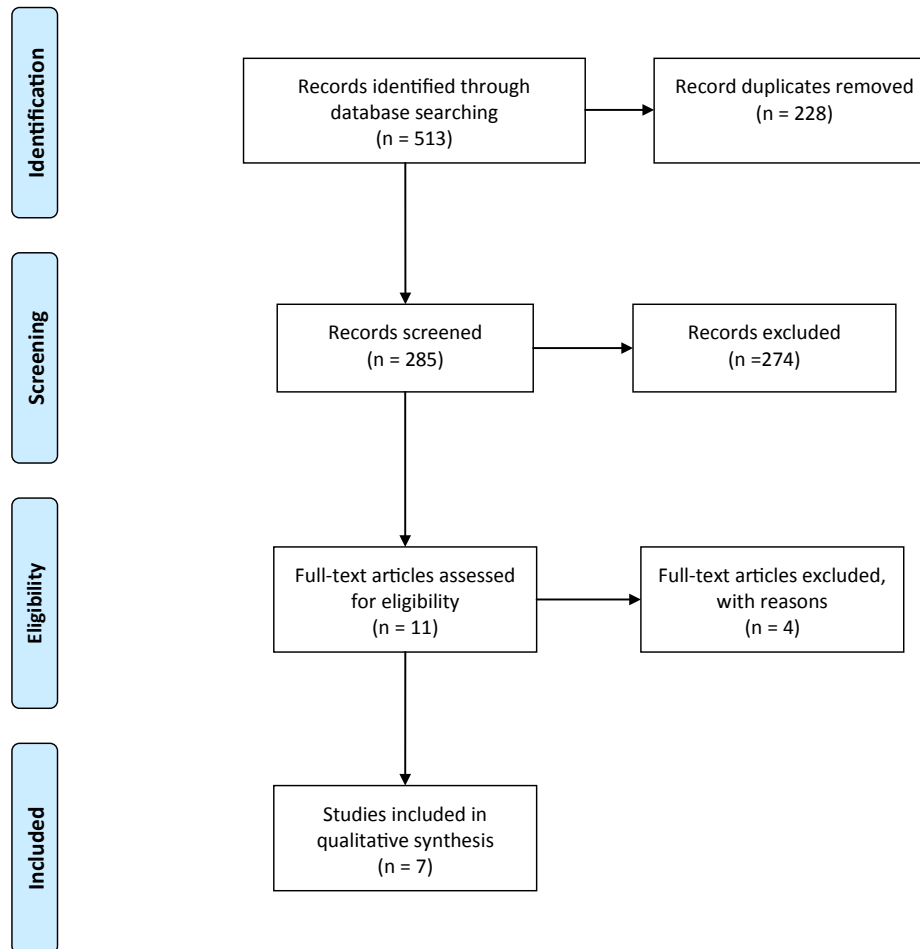


Figure 1. PRISMA flow chart of the systematic review.

repair of ruptured abdominal aortic aneurysm (AAA) has been reported to be around 30%² and 20%,^{2,3} respectively. If identified early, intra-abdominal hypertension and ACS can be managed conservatively with epidural analgesia, neuromuscular blockade, and diuretics; if identified late or when the intra-abdominal pressure reaches 30 mmHg, decompression laparotomy is necessary.⁴ Of note, these elderly patients with AAA often have co-existent comorbidities and compromised physiological functions such as cardiac, pulmonary, and renal insufficiency,⁵ leading to a relative therapeutic resistance to reduce the fluid overload. Thus, the duration of open abdomen therapy is often prolonged before abdominal closure is possible. It is therefore very important to have a durable dressing system that minimizes the risk of further complications and facilitates complete fascial closure. The temporary abdominal closure (TAC) dressing should ideally cover the intra-abdominal contents in a way to maintain a physiological environment as close to normal as possible. It should prevent evisceration, adhesions between the bowel and the abdominal wall, and protect the bowel wall from damage; it should remove excess wound fluids, bacteria, and debris in an active way, and be easy to use and facilitate subsequent abdominal closure. Several different TAC methods⁶ have been described: skin only closure, Bogota bag, meshes, sheets,

zippers, slide fasteners, sandwich technique, Wittman patch, retention sutures, vacuum pack, and vacuum assisted wound closure (VAWC), without or with mesh mediated fascial traction.⁷ This review focuses on the contemporary results of the reported TAC methods used after repair of aortic aneurysm.

METHODS

A systematic literature search was performed in PubMed, EMBASE and Cochrane Library from 2007 to July 21, 2015, combining the Medical Subject Headings “aortic aneurysm” and “temporary abdominal closure”, “delayed abdominal closure”, “open abdomen”, “abdominal compartment syndrome”, “negative pressure wound therapy” or “vacuum assisted wound closure”. The review was performed according to the PRISMA statement (www.prisma-statement.org). Selecting studies and data abstraction were performed independently by two authors (SA and MB). After exclusion of duplicates from the three database sources, screening and exclusion based on titles and abstracts were performed. Reviews, editorials, commentaries, abstracts without full text articles, case series fewer than five patients with aortic aneurysm, irrelevant articles, articles not on patients with aortic aneurysm, articles not in English or Spanish language, and duplication of the same population

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