

# Does the Application of Negative Suction to the Chest Drains Increase the Rate of Mediastinal Bleeding After Coronary Artery Bypass Graft?

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## Abstract

**Objective:** There is controversy whether the institution of negative suction for cases of Coronary Artery Bypass Surgery (CABG) affects the rate of Mediastinal bleeding.

**Methods:** Consecutive cases of CABG were studied according whether negative suction was applied (Group A) or not (Group B) from October 2003 till May 2004. The 24 hour blood loss, mortality rates, re-opening for bleeding and post-operative pericardial effusions were analyzed.

**Results:** 281 consecutive cases of CABG alone or in combination with other procedures were studied. Negative suction was applied in 78 cases (28%). Male-to-female ratio was 3.2:1. Pure CABG was done in 92% of the cases. Concomitant procedures included Mitral valve repair and replacement and Aortic valve replacement. Re-do surgery was performed in 16 cases (5.6%). Left Internal Thoracic Artery (LITA) was utilized in 81%. Average blood loss in group A was 870±270 ml and group B 630±215 ml giving a P value <0.05. Re-opening for bleeding occurred in 10 cases in group A (12.8%) and 9 cases in group B (4.4%) with a P value >0.05. There were 11 deaths overall (3.9%) 4 in group A (5.1%) and 7 in group B (3.4%). Pure CABG had 7 deaths from a total of 258 cases; a mortality rate of (2.7%). Pericardial effusion occurred in 2 cases in group A (2.5%) and 9 in group B (4.4%) giving a P value > 0.05.

**Conclusion:** Despite the limitation of not being a randomized study, nonetheless, it shows that negative suction applied to the chest drains after CABG increase Mediastinal drainage but had no effect on re-opening rates, pericardial effusion and overall mortality.

**Keywords:** CABG, Negative suction and re-opening for bleeding.

*(J Med J 2008; Vol. 42 (1): 9- 12)*

Received

July 20, 2006

Accepted

January 17, 2008

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## Introduction

There is controversy whether the institution of negative suction for cases of Coronary Artery Bypass Surgery (CABG) affects the rate of

Mediastinal bleeding. It has largely been based on non-scientific principles whether to use negative suction of 20 cm of water (H<sub>2</sub>O) or not.

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This paper helps to answer this question. A Pubmed and Medline searches revealed no study that addresses this question.

**Methods**

Consecutive cases of CABG were studied according to the rule whether negative suction was applied (Group A) or not (Group B) from October 2003 till May 2004. Chest tube drainage over the first 24 hours post op, the mortality rates, re-opening for bleeding and post-operative pericardial effusions were analyzed. Table (1) shows the cases performed in each group.

**Table (1).**

<i>Operation</i>	<i>Group A</i> <i>(Negative Suction)</i>	<i>Group B</i>
<b>CABG</b>	69	189
<b>CABG+MV</b>	8	11
<b>Repair</b>		
<b>CABG+MVR</b>	1	2
<b>CABG+AVR</b>	0	1
<b>Total</b>	78(28%)	203(72%)

*CABG: Coronary Artery Bypass Grafting; MV Repair: Mitral Valve Repair; MVR: Mitral Valve Replacement; AVR: Aortic Valve Replacement.*

**Results**

281 consecutive cases of CABG alone or in combination with other procedures were studied. Negative suction was applied in 78 cases (28%). Male-to-female ratio was 3.2:1. Pure CABG was done in 258 cases (92%). Concomitant procedures included Mitral valve repair and replacement and Aortic valve replacement. Re-do surgery was performed in 16 cases (5.6%). Left internal thoracic artery (LITA) was utilized in 81%. Average blood loss in group A was 870±270 ml and group B 630±215 ml giving a P value<0.05. Overall Reopening rate is 19 cases (6.7%). Re-opening for bleeding occurred in 10 cases in group A (12.8%) and 9 cases in group B (4.4%) with a P value >0.05. There were 11 deaths overall (3.9%); 4 in group A (5.1%) and 7 in group B (3.4%). Pure CABG had 7 deaths from a total of 258 cases; giving first time coronary mortality rate of (2.7%).

Pericardial effusion occurred in 2 cases in group A (2.5%) and 9 in group B (4.4%) with a P value > 0.05. Table (2) illustrates the results.

**Table (2).**

	<i>Group A</i>	<i>Group B</i>	<i>P Value</i>
<b>Blood Loss</b> <small>(ml) mean± standard deviation</small>	870±270	630±215	P<0.05
<b>Re-Opening</b>	10(12.8%)	9(4.4%)	P>0.05
<b>Pericardial Effusion</b>	2(2.5%)	9(4.4%)	P>0.05
<b>Mortality</b>	4(5.1%)	7(3.4%)	P>0.05

**Discussion**

Drainage of the pleura and mediastinum after cardiac surgery is usually achieved with plastic drains. <sup>1</sup> Due to the nature of coronary artery bypass surgery there is a great potential for bleeding post operatively. Negative suction applied to the chest drains to facilitate their drainage capacity and prevent the drains from clotting off. Clotting off the drains can lead to hemodynamic instability, cardiac tamponade, closure of grafts and development of pericardial effusions. <sup>2-5</sup>

Pericardial effusion frequently occurs after cardiac operation. Despite its high incidence, the etiological process of postoperative pericardial effusion remains unclear. Residual blood or thrombus has often been suggested as a possible cause, implying that the occurrence of pericardial effusion could be related to the effectiveness of postoperative thoracic drainage. <sup>3</sup> This possible relationship, however, has never been studied. <sup>3</sup>

The problem of pericardial and pleural effusion after coronary artery bypass surgery (CABG) has been addressed by several investigators. <sup>4-6</sup> Abramov and colleagues looked at the timing of chest tube removal after CABG and found that early removal of chest drains was safe and improves post-operative outcomes and decreases the need for post-operative analgesia and does not result in significant residual effusions. <sup>6</sup>

Others found that prolonging the duration of thoracic drainage by 24 hours often increases total chest tube output considerably but does not affect the incidence of postoperative pericardial effusion.<sup>3</sup> Payne and colleagues found that residual effusions can be decreased by the use of a supplemental pleural drain.<sup>7</sup> They concluded that keeping the supplemental pleural drain for several days reduces the incidence of symptomatic pleural effusions.<sup>7</sup>

There was no paper on pub med or Medline searches that specifically looked at the effect of negative suction on drainage post coronary artery surgery or the effect on residual pericardial and pleural effusions.

Our study demonstrated an increase in total drainage with the use of negative suction but there were no effects on the rates of re-opening for bleeding; development of pericardial effusion and on overall mortality.

It can be seen from our data that the rates of residual effusions were higher in the control group but this did not make any statistical significance. Although there were more re-openings in the negative suction group, this also did not make statistical significance.

## **Conclusion**

Despite the limitation of not being a randomized study, nonetheless our study shows that negative suction applied to the chest drains after CABG increase Mediastinal drainage but had no effect on re-opening rates and overall mortality.

## **Acknowledgement**

We wish to thank all the nurses on the intensive care unit of the Queen Alia Heart Institute (QAHI), King Hussein Medical center, Amman, Jordan, whose help made this study possible.

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## هل استخدام نظام الشفط العكسي للأنابيب الصدرية بعد عمليات تطعيم الشرايين التاجية يزيد من معدلات إعادة فتح الصدر؟

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### الملخص

**الهدف:** تحدف الورقة الى دراسة اذا كان استخدام نظام الشفط العكسي للأنابيب الصدرية بعد عمليات تطعيم الشرايين التاجية يزيد من معدلات إعادة فتح الصدر، إذ أن هناك جدلاً في هذا الموضوع.

**الطريقة:** سلسلة من مرضى تطعيم الشرايين التاجية قسموا الى مجموعتين من حيث استخدام نظام الشفط العكسي للأنابيب الصدرية (مجموعة أ) أو عدمه (مجموعة ب) بين تشرين الأول 2003 وأيار 2004، ودرست معدلات الوفيات، نسبة إعادة فتح الصدر ومعدلات الاستسقاء التاموري.

**النتائج:** 281 من مرضى تطعيم الشرايين التاجية سواء كان لوحده أو بالإضافة الى عمليات اخرى مثل اصلاح او تبديل الصمام التاجي او استبدال الصمام الاهري قسموا الى مجموعتين من حيث استخدام نظام الشفط العكسي للأنابيب الصدرية او عدمه. مجموعة الشفط العكسي احتوت على 78 مريضاً بنسبة رجال الى نساء 1:2، 3 استخدام الشريان الصدري الداخلي الايسر كان بنسبة 81% معدل نزيف المجموعة الاولى  $270 \pm 870$  سم مكعب والمجموعة الثانية. معدلات إعادة فتح الصدر كانت 10 في المجموعة الاولى و 9 في المجموعة الثانية، 11 وفاة حصلت 4 في المجموعة الاولى و 7 في المجموعة الثانية، معدلات الوفيات في حالات تطعيم الشرايين التاجية البحتة كانت بنسبة 2.7% ومعدلات الاستسقاء التاموري 2 في المجموعة الاولى ، 9 في المجموعة الثانية.

**الختام:** استخدام نظام الشفط العكسي للأنابيب الصدرية يزيد من كميات النزف الدموي ولكن لا تأثير على معدلات الوفيات ونسبة إعادة فتح الصدر ومعدلات الاستسقاء التاموري.

**الكلمات الدالة:** الشفط العكسي للأنابيب الصدرية، تطعيم الشرايين التاجية، إعادة فتح الصدر.