Original Research Article

DOI: http://dx.doi.org/10.18203/2349-2902.isj20192383

Do we need more than one mediastinal drain in cardiac surgery?

Dhananjay Bansal¹*, Soumya Guha¹, Ashish Sharma², Anubhav Gupta³, Narender Singh Jhajhria¹, Palash Aiyer¹, Vijay Grover¹, Vijay Kumar Gupta¹

Received: 23 March 2019 Accepted: 04 May 2019

*Correspondence: Dr. Dhananjay Bansal,

Di. Dilalianjay Balisal,

E-mail: dr.djbansal@gmail.com

Copyright: © the author(s), publisher and licensee Medip Academy. This is an open-access article distributed under the terms of the Creative Commons Attribution Non-Commercial License, which permits unrestricted non-commercial use, distribution, and reproduction in any medium, provided the original work is properly cited.

ABSTRACT

Background: Placement of mediastinal drains after cardiac surgery is standard of care. However, there is no consensus over the number of drains to be placed. Is there any advantage of multiple drains over a single drain? This question formed the premise of this study.

Methods: All consecutive patients operated between 2014 and 2015 were included. Those with pleural drains were excluded. Patients had either a single drain in the pericardial cavity or had two drains, one in the pericardial and the other in retrostenal area. A total of 244 patients were included in the study group.

Results: Out of 244 patients, 122 had single drain and 122 had 2 mediastinal drains. The mean age was 24.38±17.08 (Age range 6 months to 66 years) and male: female ratio was 1.5:1. There was no statistically significant difference in single drain vs double drain group in terms of the number of days of drainage (1.65 vs 1.55, p 0.325), time to mobilize (36.57 vs 35.23 hours, p=0.684), ICU stay (2.62 vs 2.63 days, p=0.96)and re-exploration (5.7%, vs 9.8%, p=0.34). However, patients with two mediastinal drains had higher requirement of analgesia (p=0.004).

Conclusions: The use of two mediastinal drains does not confer any advantage over a single mediastinal drain after cardiac surgery in assessing or controlling bleed or recovery. However, the post-operative pain is significantly higher with use of two mediastinal drains.

Keywords: Cardiac surgery, Mediastinal drain, Post-operative

INTRODUCTION

It has become standard practice in cardiac surgery to place chest tubes in both retrosternal and retrocardiac positions to allow drainage of serosanguineous fluids from the mediastinum.¹ Chest tubes help assess bleed and prevent tamponade in the immediate postoperative period.² Adequate drainage is also important as residual pericardial collections can be a trigger for postoperative atrial fibrillation.³ However, multiple chest tubes can be a source of discomfort for patients and may affect early

ambulation. In this study we have tried to question the need for 2 chest drains as opposed to a single mediastinal tube by discussing our results in 244 patients.

METHODS

A total of 244 consecutive patients undergoing open heart surgery under hypothermic CPB between january 2014 and march 2015 at PGIMER Dr R.M.L Hospital, New Delhi, were included in the study. The patients were prospectively randomised by closed envelope technique

¹Department of Cardiothoracic and Vascular Surgery, Post Graduate Institute of Medical Education and Research, Dr. RML Hospital, New Delhi, India

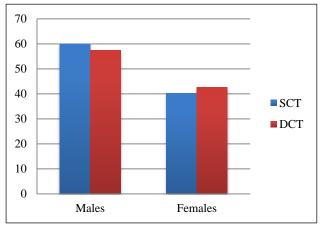
²Department of Cardiothoracic and Vascular Surgery, Venkateshwar Hospital, New Delhi, India

³Department of Cardiothoracic and Vascular Surgery, Vardhaman Mahavir Medical College, Safdarjung Hospital, New Delhi, India

to either receiving a single mediastinal drain in the retrocardiac position (SCT group) or 2 mediastinal drains, one each in retrosternal and retrocardiac positions (DCT group) prior to chest closure. There were 122 patients in each group. The same type of chest tube and drainage system was used in all patients whether it was placed in retro-sternal space or in pericardial cavity. Those with known coagulopathies and pleural drains were excluded from the study. Perioperative INR, ACT, heparin dose, protamine reversal, blood and product transfusions were standardised for both groups as per established hospital protocols. Pearson's chi square test, student t- test, Mann-Whitney test and Fisher's exact test were used in statistical analysis. The variables compared were - (a)reexploration rates, (b) time to ambulation, (c)time to removal of drainage tube(s), (d) length of ICU stay and (e) pain and analgesia requirement.

RESULTS

The two groups were demographically comparable and included both pediatric and adult patients with mean ages of 25-26 years. The sex distribution was also similar with 59.8% males and 40.2% females in the SCT group versus 57.4% males and 42.6% females cases in the DCT group (Figure 1). In SCT group, 36% were children (34% cyanotic, 66% acyanotic) whereas, 32% in DCT group were children (25% cyanotic and 75% acyanotic) (Table 1).



SCT- Single chest drain, DCT- Double chest drain.

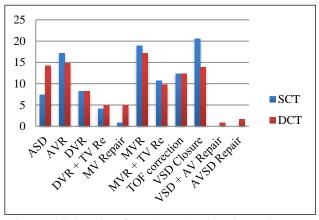
Figure 1: Sex distribution in the two groups.

Table 1: Pediatric population among single (SCT) and double (DCT) drain groups.

Diagnosis	Number in SCT	Number in DCT
Cyanotic congenital heart disease	15	10
Acyanotic congenital heart disease	29	30
Total	44	40

Cardiac procedures in both groups were performed under hypothermic cardiopulmonary bypass via median sternotomy and included surgeries for cyanotic/acyanotic congenital heart diseases and valve replacements/repairs for rheumatic pathologies.

The procedures done in SCT group were as follows: Atrial septal defect closure (7.4%), aortic valve replacement (17.2%), double valve replacement (8.2%), double valve replacement with tricuspid repair (4.1%), mitral valve repair (0.8%), mitral valve replacement (18.9%), mitral valve replacement with tricuspid repair (10.7%), intra-cardiac repair for tetralogy of fallot (12.3%), ventricular septal defect closure (20.5%) (Figure 2). The procedures done in DCT group were as follows: Atrial septal defect closure (14.2%), aortic valve replacement (14.8%), double valve replacement (8.2%), double valve replacement with tricuspid repair (4.9%), mitral valve repair (4.9%), mitral valve replacement (17.2%), mitral valve replacement with tricuspid repair (9.8%), intra-cardiac repair for tetralogy of fallot (12.3%), ventricular septal defect closure (13.9%), ventricular septal defect closure with aortic valve replacement (0.8%), atrioventricular septal repair (1.6%) (Figure 2).



ASD- Atrial Septal Defect, AVR- Aortic valve replacement, DVR- Double valve replacement, TVRe- Tricuspid valve repair, MV- Mitral valve, MVR- Mitral valve replacement, TOF-Tetrology of Fallots, VSD- Ventricular septal defect, AV-Aortic Valve, AVSD- Atrioventricular septal defect. SCT-single Chest Drain, DCT- Double chest drain.

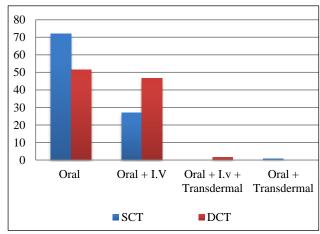
Figure 2: Surgical procedures in both groups.

The re exploration rates were comparable at 5.7% in SCT group versus 9.8% in DCT group (p value 0.34, Fisher's exact test; Table 2). There was no significant difference in time to ambulation between the 2 groups. The mean time to ambulation was 36.57 hrs in SCT group versus 35.23 hrs in the DCT group (p value 0.684, student t-test; Table 2). The mean time to removal of drain tube(s) was similar in both groups at 1.65 days in SCT group versus 1.55 days in DCT group (p value 0.325, student t-test. The mean ICU stay was 2.62 days in SCT group and 2.63 days in DCT group with no significant difference among the two groups (p value 0.96, student t-test; Table 2).

Those in DCT group required more postoperative analgesia than those in SCT group (p value 0.004, Pearson's Chi Square turst; Figure 3).

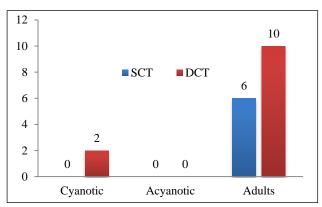
Table 2: Comparison of different variables in two groups.

Categories	SCT	DCT	P value
Drainage	1.65 days	1.55 days	0.325
Time to ambulation	36.57 hrs	35.23 hrs	0.684
ICU stay	2.62 days	2.63 days	0.96
Re-exploration rate	5.7%	9.8%	0.34
Oral analgesia	72.1%	51.6%	0.004
Oral + transdermal analgesia	0.8%	0%	
Oral + IV analgesia	27%	46.7%	
Oral + transdermal +IV analgesia	0%	1.6%	



I.V- intravenous. SCT- Single chest drain, DCT- Double chest drain.

Figure 3: Post-extubation analgesia requirement.



SCT- Single chest drain, DCT- Double chest drain.

Figure 4: Mortality data in both groups.

Six adult patients (4.9%) died in SCT group, while 12 patients (9.8%) died in DCT group of which 2 were cyanotic children and 10 were adults (Figure 4). All deaths in both groups were attributable to postoperative low cardiac output syndrome or sepsis with multiorgan dysfunction. There were no instances of cardiac tamponade or exsanguinations.

DISCUSSION

There is no clear consensus in literature about the ideal number of chest tubes to be used in a given patient after cardiac surgery. This choice is usually guided by individual preference, institutional experience and policies. The usual practice in our centre has been to place an anterior tube in retro-sternal space and a second posterior tube in the retrocardiac recess.

In this study we have tried to analyze whether a single mediastinal drain is sufficient for pericardial drainage instead of the two drains being used thus far and whether multiple mediastinal drains offer any advantage over a single mediastinal drain. Traditionally posterior pericardial drainage is considered beneficial after cardiac surgery as it helps prevent postoperative tamponade/pericardial effusions which can negatively impact patient survival. This along with our institutional experience led us to place the chest tube in posterior pericardial space when single chest tube insertion was begun.

In our study, single chest drain was inserted in 47% of the males, 50% of the females and 53% of children in the study population. There were no statistically significant differences in the time to chest tube removal, time to ambulation, length of ICU stay or re-exploration rate between the single and double chest tube groups. However, it was noted that patients with 2 chest drains had higher requirement of parenteral analgesia (p=0.004) in the early postoperative period. There was also requirement of transdermal patches in addition to oral and intravenous (IV) analgesia in 1.6% of patients in the double chest tube group. The mortality in our double drain group was almost double that of the single drain group (9.8 % in DCT vs 4.9% in SCT). This could be because of potentially sicker patient population in the DCT group as none of the deaths in either group could be attributed to cardiac tamponade. A larger sample size or matching by Euroscore might have helped eliminate this apparent difference in mortality.

Hence we infer from our study (Table 2) that having 2 mediastinal drains does not provide any advantage with respect to reduction in re-exploration rates, perioperative mortality, early mobilization and reduced hospital stay over the use of a single mediastinal drain. This corroborates with the findings of Légaré et al.⁶ We also noted that having more than 1 mediastinal drain was a source of increased postoperative pain leading to higher analgesia requirement.

CONCLUSION

Our study shows that in our institution, use of more than a single chest drain conferred no overall benefit compared to single chest drain insertion after cardiac surgery in terms of limiting the risk of returning to the operating room for bleeding or tamponade, shortening ICU stay or time to mobilization. Furthermore, it is seen that multiple chest drains can result in severe postoperative pain and discomfort. Hence, we advocate the use of single pericardial drainage tube in patients undergoing open heart surgery. However, bigger study groups and more RCTs are required for a more solid conclusion.

Funding: No funding sources Conflict of interest: None declared

Ethical approval: The study was approved by the

Institutional Ethics Committee

REFERENCES

- 1. Ege T, Tatli E, Canbaz S, Cikirikcioglu M, Sunar H, Ozalp B, et al. The importance of intrapericardial drain selection in cardiac surgery. Chest. 2004:126:1559-62.
- 2. Shalli S, Saeed D, Fukamachi K, Gillinov AM, Cohn WE, Perrault LP, et al. Chest tube selection in

- cardiac and thoracic surgery: a survey of chest tuberelated complications and their management. J Card Surg. 2009;24:503-9.
- 3. Arsenault KA, Yusuf AM, Crystal E, Healey JS, Morillo CA, Nair GM, et al. Interventions for preventing post-operative atrial fibrillation in patients undergoing heart surgery. Cochrane Database Syst Rev. 2013;CD003611.
- Gozdek M, Pawliszak W, Hagner W, Zalewski P, Kowalewski J, Paparella D. Systematic review and meta-analysis of randomized controlled trials assessing safety and efficacy of posterior pericardial drainage in patients undergoing heart surgery. The J Thoracic Cardiovas Surg. 2017;153(4):865-75.
- 5. Conti Vincent R. Draining the posterior pericardial space: Pericardiotomy versus just another tube. J Thoracic Cardiovas Surg. 2017;153:876-7.
- 6. Le J, Légaré JF, Buth KJ, Hirsch GM. Does more than a single chest tube for mediastinal drainage affect outcomes after cardiac surgery? J Can Surgery. 2015;58:2:100-6.

Cite this article as: Bansal D, Guha S, Sharma A, Gupta A, Jhajhria NS, Aiyer P, et al. Do we need more than one mediastinal drain in cardiac surgery? Int Surg J 2019;6:2150-3.