

## EDITORIAL

# It only hurts when I breathe

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Cardiac surgery is performed in 16 centres in the Netherlands. Chest tube placement is a routine part of this type of surgery. For valve operations, the pleura is usually not opened so there will be a mediastinal and pericardial drain. The mediastinal drain lies in front of the heart (and the pericardium if closed) whilst the pericardial drain is positioned under the diaphragmatic surface of the heart. In patients undergoing coronary artery bypass surgery the pleura may have been opened for harvesting the internal mammary artery (usually on the left side) and a drain will be left behind; if both internal mammary arteries are used bilateral pleural drains will be inserted. The pleural drain is often curved and placed towards the left base in order to drain fluid. The chest tubes are used to drain the mediastinal and pleural spaces of fluid, to prevent incomplete expansion of the lung and to monitor blood loss postoperatively, thereby preventing cardiac tamponade and pleural effusion.

Local guidelines exist but differ enormously. There is no prevailing guideline, for example from the cardiothoracic society, stating when and how to remove these chest tubes.<sup>[1]</sup> Early removal might be beneficial for reducing pain, easier mobilisation of the patient and better ventilation and coughing. The risk is fluid retention with a subsequent risk of chest tube replacement, especially after using the left internal mammary artery. Leaving the chest tubes in situ for an extended period of time might even lead to increased production due to mechanical irritation to the heart and the pericardium. Many centres remove the chest tubes the morning of the first postoperative day if the output is low.

In this issue of the Netherlands Journal of Critical Care, Hendriks et al. describe a single-centre retrospective observational study in 8900 consecutive patients after cardiac surgery assessing the frequency of post pull pneumothorax.<sup>[2]</sup> In their centre the chest tubes were removed by the nursing staff if there was less than 20 ml drainage for two consecutive hours and no visible air leak.

All chest tubes were removed at the end of inspiration, while the patient was asked to perform a Valsalva manoeuvre. Chest X-rays were performed in all patients on the first postoperative day, but follow-up chest X-ray was not routinely obtained after chest tube removal. Patients were clinically monitored and a chest X-ray was only performed in patients with respiratory symptoms. In 21 patients a pneumothorax occurred after chest tube removal; 18 right-sided and two left-sided and one bilateral. Re-insertion of a chest tube was needed in 16 patients.

The incidence of postoperative pneumothorax of 1.4% and post pull pneumothorax of 0.2% is low. However, the true incidence in this study might be underestimated due to the retrospective design and the fact that a chest X-ray was not performed routinely after removal. In the patients who suffered a post pull pneumothorax the chest tubes were removed in the ICU in 95% of cases, significantly more often than for patients who did not develop a post pull pneumothorax (52%). Also the median time to removal was significantly shorter (24 vs. 48 hours). This resulted in a trend toward a longer hospital stay.

In a group of 307 patients who underwent coronary artery bypass graft surgery it was shown that early extracting (< 24 hours) of chest tubes when there was no significant drainage led to pain reduction and higher oxygen saturation levels; it did not increase the risk of creation of pleural effusion and pericardial effusion.<sup>[3]</sup> However, in a group of 782 patients after cardiac surgery it was shown that very early removal of all chest tubes around midnight on the day of surgery was associated with an increased risk of postoperative pleural or pericardial effusions requiring invasive treatment.<sup>[4]</sup> In this group there was no mention of the incidence of post pull pneumothorax.

We stated earlier that the true incidence of post pull pneumothorax might be underestimated due to the lack of routine follow-up with a chest X-ray, but we do not want to suggest that routine chest X-ray should be implemented. A

study from the Netherlands clearly showed that elimination of daily routine chest X-ray in post-cardiothoracic surgery patients led to a decrease of the total number of chest X-rays obtained per patient per day in the intensive care unit without increasing the number of urgent chest X-ray orders in the post-intensive care unit ward.<sup>[5]</sup> This routine was supported by another Dutch study which showed that partial elimination of routine chest X-ray in the first 24 hours after cardiac surgery seems possible for the majority of patients. The chest X-ray after drain removal was deemed clinically not indicated in 100 of the 108 cases, and showed no abnormalities that led to an intervention.<sup>[6]</sup>

The low incidence of post pull pneumothorax supports omitting a routine chest X-ray. We support a conservative approach where clinical symptoms will guide the clinician to order a chest X-ray, or even to perform pulmonary ultrasound. For all patients after routine cardiac surgery an approach in which chest tubes are removed the day following surgery when cumulative drainage is, for example, less than 100 ml for three hours seems justified. Very early removal might not be beneficial, especially for patients on triple anticoagulation and after a previous cardiac tamponade one could consider leaving

the chest tubes in a bit longer. Earlier removal may, however, be considered for patients who respond to the question if they have pain with 'only if I breathe'.

#### Disclosures

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