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The Redax® Coaxial Drain in pulmonary lobectomy: a study of efficacy

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Abstract

Background. Pleural drainage is required after pulmonary lobectomy to evacuate air-leak and fluid. We compared the performance of the new Redax® Coaxial Drain (CD) with a standard chest tube (CT) in terms of fluid and air-leak evacuation.

Figure 1 - Smart Coaxial Drain

Methods. During the period between 1st August 2016 and 25th January 2017, fifty-two (52) patients receiving a 24 Fr CD under water-seal after pulmonary lobectomy through open surgery or VATS were matched with onehundred-four (104) patients receiving a 24 Fr CT. Fluid evacuation and post-operative day 0 (POD0) fluid evacuation rate, air-leak rate, tension pneumothorax or increasing subcutaneous emphysema, tube occlusion at removal, VAS score at rest and during cough, chest drain duration, pleural fluid accumulation or residual pleural cavity after tube removal, post-operative morbidity and mortality rate were recorded and compared between the two groups.

Results. No differences were recorded in post-operative morbidity and mortality rates (See Table 1). Fluid drainage rates on POD0 were significantly higher in CD group (730% vs 48%; p=0.004); air-leak occurrence was similar in both groups and no differences were recorded in terms of tension pneumothorax or increasing subcutaneous emphysema rates; VAS score was lower for CD when compared with CT and it reached significant difference in the subgroups of patients operated on by VATS; no cases of occlusion at removal were recorded in CD patients.

Mean fluid evacuation was higher for Group A patients (Coaxial Drain Group), though not significant, whereas the rate of drained fluid at POD0/total drained fluid was significantly higher for Group A patients. The highest amount of fluid drainage without occlusion for Group A patients was 1650 ml in 12 hours.

At POD1 chest X-ray, pneumothorax rate is slightly lower in Group A, and the same group has a significantly lower pleural fluid retention rate. Mean chest drain duration was slightly lower for group A patients (5.2 days vs 5.5 days).
We registered no cases of tube occlusion by clots in Group A, whereas in Group B, 6/104 patients showed occlusion of the chest tube at the removal.

Table 1. Post-operative characteristics and variable analysis

	Group A (n=52)	Group B (n=104)	p=value
Duration of surgery	155±60.5	164±58	.271
Complication rate	17%	19%	.945
Sputum retention	3.8%	4.8%	.9
Atelectasis	1.9%	2.8%	.838
PO mortality	0	0.9%	.785
Mean PO fluid evacuation ± SD (ml)	775.3±602.8	659.2±504	.207
Rate POD0 fluid evacuated/total	73%	48%	.004
PO air-leak rate	36%	34%	.945
Mean PO air-leak duration ± SD (hours)	37.5±63.11	40.3±58	.783
PO tension pneumothorax rate	0	0	.98
PO increasing subcutaneous emphysema	1.9%	3.8%	.878
POD1 chest x-ray			
Pneumothorax rate	27%	33%	.562
Pleural fluid retention rate	9.6%	26.2%	.028
Mean PO drain duration ± SD (days)	4.15±2.47	4.5±3.2	.490
Chest drain occlusion rate at removal	0	5.8%	.183
Mean PO VAS score			
POD1 at rest	3.7±1.7	4.0±1.9	.338
POD2 at rest	2.8±1.6	3.1±2.1	.366
POD1 during cough	4.6±2.1	5.4±2.3	.627
POD2 during cough	3.7±1.9	4.2±2.2	.164
Mean POD1 VAS score at rest (thoracot.)	4.2±2.1	4.8±2.3	.11
Mean POD1 VAS score at rest (VATS)	2.3±1.4	3.5±2.2	.001
Mean POD1 VAS score during cough (thoracot.)	3.9±1.9	3.7±2.0	.13
Mean POD1 VAS score during cough (VATS)	2.1±1.6	3.1±1.9	.001
Mean hospital stay ± SD (days)	5.2±3.7	5.5±3.8	.640
Chest x-ray after tube removal			
Residual pleural cavity rate	15%	25%	.221
Pleural fluid retention rate	5.7%	20.2%	.033

Group A: patients receiving 24 Fr Redax Coaxial Drain; Group B: patients receiving 24 Fr standard chest tube; PO: post-operative; POD0: post-operative day 0; POD1: post-operative day 1; POD2: post-operative day 2; SD: standard deviation; VAS: visual analog scale; VATS: video-assisted thoracic surgery.

Conclusions. Redax® Coaxial Drain is safe and efficient in air-leak and fluid evacuation; due to its design and constituting material it is superior to standard chest tubes in terms of fluid evacuation rate and patient post-operative comfort.

Redax® Coaxial Drain was never found to be occluded by thrombus or fibrin clots at removal whereas 5.8% of cases occurred in the group of the standard chest drain; its material and tube design are demonstrated efficient to prevent tube occlusion even when a large amount of fluid had to be expelled.

The flexible and soft material of the new drain seemed to be responsible of a lower mean VAS score reported during the entire chest drain permanence when compared to standard. The Redax® Coaxial Drain has been demonstrated safe and effective in draining the pleural cavity after pulmonary lobectomy. Further randomized studies are needed to confirm the above conclusions.

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