

TITLE: IMMUNOLOGICAL AND HORMONAL RESPONSES TO LUNG SURGERY DURING ONE-LUNG VENTILATION
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During lung surgery pulmonary function may be impaired following collapse and surgical trauma of the lung. Tumor necrosis factor (TNF α), interleukin-1 (IL-1 α), and interleukin-6 (IL-6) are cytokines mainly produced by activated macrophages. They exert multiple functions on many different cell types, i.e. natural killer (NK) cells, a subpopulation of lymphocytes, which play an important role as a primitive first line of defense against tumor cells and virus infected cells.

To examine the immunological response to lung surgery during one-lung ventilation (OLV) the plasma levels of TNF α , IL-1 α , IL-6, and NK cell activity were measured in 10 patients with malignant lung tumors. The endocrine response was measured as changes in plasma epinephrine and norepinephrine, and serum cortisol. The study was approved by the Regional Ethical Committee on Human Research and informed consent was obtained from each patient.

Patients were anesthetized with a balanced anesthesia combined with thoracic epidural anesthesia. Plasma cytokine levels were measured by ELISA,

plasma catecholamines by a single isotope derivate assay, serum cortisol by a competitive protein binding technique, and NK cell activity was tested in a 6-h ⁵¹Cr-release assay against K562 target cells. The results were analysed by a one-way analysis of variance (Friedman's test for related samples).

Compared with preoperative values a significant increase in NK cell activity was found during OLV. Postoperatively, the activity was significantly reduced 2 hours after skin closure and remained reduced for at least 1 day. Five days after operation the activity had returned to preoperative value. Maximal leucocytosis and lymphopenia was measured 2 and 6 hours after operation. The plasma catecholamines showed a significant increase during OLV, followed by a gradual return to control values in the postoperative period.

Very high plasma TNF α concentrations (>22 ng/ml) were measured in 9 of 10 patients during and after surgery. In 6 of 10 patients concentrations still exceeded 22 ng/ml on the 5th postoperative day. No patients had detectable IL-1 α plasma levels. Plasma IL-6 increased in all patients within 2-6 hours after skin closure. Maximum plasma IL-6 was found five days after operation (range 115-860 pg/ml).

The marked elevations of TNF α plasma concentration and NK cell activity in relation to OLV suggest that lung surgery is a potent stimulator of the alveolar macrophages and confirm that epinephrine enhance NK cell activity.

TITLE: ADEQUACY OF THE SWAN-GANZ CATHETER FOR CALCULATION OF PULMONARY CAPILLARY PRESSURE AFTER ARTERIAL OCCLUSION.

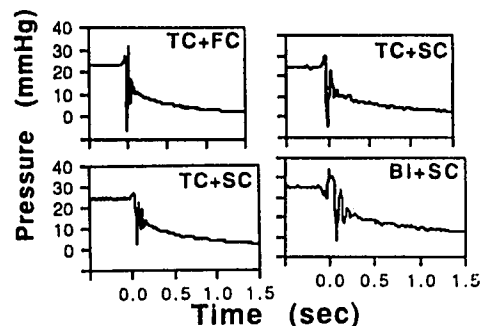
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Pulmonary arterial pressure tracings after Swan-Ganz balloon inflation have been analyzed to derive pulmonary capillary pressures (Pcap) using the arterial occlusion concept (1). Methods of analysis, however, have been debated because of the limitations associated with the relatively slow balloon inflation and the slow frequency response of the catheter. To investigate the importance of these limitations an isolated dog lobe preparation was perfused at constant pressure, with blood from a reservoir. Pulmonary arterial pressure was recorded with two catheters using identical transducers; a fast catheter (FC; 30cm long with a 15g bore) and a slow catheter (SC; 7F Swan-Ganz). Arterial occlusions were accomplished either by rapid tube clamping (TC) or by balloon inflation (BI) inside the tube, while recording pressures from the FC and SC. High fidelity pressure data were stored in a computer for off line analysis. Post occlusion pressures between 0.2 and 1.5s were fitted to an exponential and extrapolated to the instant of occlusion. The results indicate that arterial tracings from an FC following TC is not significantly different from a tracing recorded with an SC following BI (Fig.1). The mean slope of

exponential decay (S; mmHg/sec) and arterial occlusion pressure (Pao; mmHg) from five animals were not significantly different by ANOVA whether TC, BI, FC, or SC were used (Table 1).

	TC+FC	TC+SC	BI+FC	BI+SC
S	0.98±0.04	1.03±0.05	0.96±0.04	0.97±0.05
Pao	8.4±0.9.2	9.6±0.7	8.9±0.3	10.1±0.4



We conclude that balloon inflation speed and frequency response of the 7F Swan-Ganz catheter are adequate to provide reliable tracings for analysis of post arterial occlusions. It is likely, however, that in intact conditions the precision of the arterial occlusion may be limited by: the pulsatile nature of pulmonary blood flow, whether the balloon is inflated during systole or diastole, and the distensibility of the vessel wall. (1) Amer.Rev.Resp.Dis. 140:217-224, 1989.