Cytokines Interleukin 5 and GM-CSF in the BAL Fluid of Lung Transplant Patients

To the Editor:

Our previous study in CHEST (November 1997) demonstrated that there are detectable and increased levels of cytotoxic eosinophil cationic protein (ECP) in the BAL fluid of lung transplant patients with acute allograft rejection, bacterial infection, or cytomegalovirus disease, compared with well, disease-free lung transplant recipients. One possible mechanism of the activation of eosinophils during lung allograft rejection may involve the induction of ECP release under cytokine control. Two of the most potent secretagogues of eosinophils, interleukin 5 (IL-5) and granulocyte-macrophage colony-stimulating factor (GM-CSF), were hypothesized to be involved in the release of ECP.

To study this novel hypothesis, frozen aliquots of BAL fluid from the patient group studied were subsequently analyzed in duplicate for the presence of IL-5 and GM-CSF, by enzyme-linked immunosorbent assay (R&D Systems; Minneapolis). The mean levels of these cytokines were then correlated with the ECP levels previously measured. Of the 50 samples studied from 38 different patients, only one BAL sample demonstrated detectable IL-5, with a level of 14.5 pg/mL. This patient had an elevated BAL ECP level of 166 μg/L and mild rejection. Five of the 50 BAL samples were from five individual patients with detectable GM-CSF (2.0 to 31.9 pg/mL). Overall, the levels of BAL IL-5 and GM-CSF did not correlate with the presence of histologic evidence of allograft rejection or ECP level.

Although IL-5 and GM-CSF are produced by T lymphocytes and promote eosinophil activation, recruitment, maturation, and proliferation, based on these findings, they do not seem to be prominent in the process leading to ECP release among the patients studied. Studies on liver allograft rejection, in contrast, suggest that the local production of IL-5 may account for the presence of eosinophils and contribute to pathogenesis. Other lymphocyte-derived eosinophil chemoattractants, such as RANTES, chemokine MCP-3, and IL-3, may be responsible for the presence of ECP in the airway lavage fluid of patients with acute lung allograft rejection. Further studies are needed to investigate the cellular mechanisms of eosinophil activation in lung allograft rejection.

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REFERENCES

Harmonic Scalpel Prevents Tracheotomy Fires

To the Editor:

A recent article on “Fires in the Operating Room” by Yale D. Podnos and Russell A. Williams has again drawn attention to the risk of fire during tracheotomy surgery. In one reported case, a fire occurred when electrocautery was used to enter the trachea. Presumably, the high pressure stream of oxygen passing over the hot electrocautery tip and the hot, charred tissue were responsible for initiating the fire. We have heard anecdotal reports of other similar occurrences in the last few years. In the past, we ourselves experienced episodes in which fat tissue on the hot Bovie tip has ignited briefly.

For the last 2 years, we have been using the harmonic scalpel for cricothyroidotomies and tracheotomies in order to prevent fire. The harmonic scalpel consists of a large, freestanding generator and a hand piece and blade that are manipulated by the surgeon. The hand piece contains a transducer system, which uses piezoelectric crystals. Power from the generator pulses the crystals and causes mechanical vibration at 55,000 cycles/s. This, in turn, is transferred to the blade, which is applied to the patient’s tissues. The blade moves 0.1 mm with each cycle. The tip of the blade is shaped like a hook, and the outer side of the hook causes coagulation when the flat side is applied. The inner, sharper aspect of the hook is used for cutting.

In a comparison study, Markovicz and colleagues reported that bipolar electrosurgery produced 10 times greater tissue damage than ultrasonic energy. Their study showed that the harmonic scalpels only produced 1 mm of thermal damage and 3 mm of microscopic damage. We have found during minimally invasive coronary artery bypass surgery that the harmonic scalpel is superior to electrocautery. There was less than a 1°C rise in temperature in the area of the internal thoracic artery when the harmonic scalpel was used for dissection in close proximity to the artery. Our experience has been similar during tracheotomies and cricothyroidotomies. The harmonic scalpel causes marks on the plastic endotracheal tube, but it does not cause ignition, and there is no risk of fire during cauterization of the tracheotomy stoma in the presence of a high concentration of oxygen in the atmosphere. In some experiments we did, we were able to cut into the endotracheal tube with a harmonic scalpel without causing it to burn. This was done after the endotracheal tube had been removed from the patient.

The harmonic scalpel does not rely on the flow of electrical current through the patient, so there is no risk of improper grounding. In addition, there is no electrical interference with pacemakers and no risk of transmitting the electrical signal inadvertently to the heart. We have also observed no interference with ultrasound visualization of cardiac function. There is a complete absence of interference with monitors. Electocardiogram, BP tracing, and pulse oximetry are not affected during the use of the harmonic scalpel. This is particularly useful in tracheotomy patients, who are commonly sick and need close monitoring.

In the future, we feel the harmonic scalpel ought to become the instrument of choice for tracheotomies and cricothyroidotomies because the risk of fire hazard is prevented.

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