

ANESTHESIOLOGY

■ Standard Wire-reinforced and Silicone-tipped Endotracheal Tube Designs Compared for Ease of Intubation. Greer *et al.* (page 729)

The passage of standard-design endotracheal tubes over fiberoptic endoscopes is often difficult because of the bevel impinging on laryngeal structures. Greer *et al.* compared the ease with which tubes with different tip designs could be passed into the trachea. They compared two types of endotracheal tubes: a polyethylene wire-reinforced tube with standard bevel and a wire-reinforced tube with a flexible silicone tip and hemispherical bevel. (This is the same tube provided with the Intubating Laryngeal Mask Airway; Intavent, Maidenhead, Berkshire, United Kingdom). The team recruited 30 adult patients scheduled to undergo elective surgery. After anesthetizing patients with propofol and fentanyl followed by atracurium, investigators passed the selected endotracheal tube over the fiberscope, advanced fiberscopes through the patient's glottis, and left the tip of the tube above the vocal cords. Then, the fiberscope, tube, and patient's face were covered with a green towel. A blinded investigator entered the room and passed the tube into the patient's trachea. After the investigator left the room, the tube and fiberscope were removed. Patients underwent manual ventilation for a brief period to ensure maintenance of adequate oxygen, and then, the maneuver was repeated with the second type of tube. Tubes were oriented on the fiberscopes so that the bevel of the tube faced left. An observer graded the difficulty of intubation using a three-point scale.

The silicone-tipped tubes were passed without difficulty in 27 cases; minimal manipulation was required in 3 cases. With the wire-reinforced tubes, a 90° counterclockwise rotation was required in 8 cases, and in another 8 cases, the difficulty of intubation required more than one maneuver, including external laryngeal manipulation or movement of the head. The investigators conclude that the silicone-tipped tube with a hemispherical bevel confers a clinical advantage over the more rigid-tipped, standard bevel tubes during fiberoptic intubation.

■ Inflammatory and Tissue Injury Responses to Cardiopulmonary Bypass in Children. Chew *et al.* (page 745)

To assess inflammatory response and resulting tissue injury after pediatric cardiopulmonary bypass (CPB), Chew *et al.* collected blood samples up to 48 h postop-

eratively from 13 children aged less than 12 months who were scheduled to undergo surgery with CPB for the repair of various congenital heart defects. Anesthesia was induced with halothane or ketamine and maintained with fentanyl and pancuronium. Furosemide (1 mg/kg) and methylprednisolone (30 mg/kg) were added to the pump prime. Dopamine or dobutamine was administered to all children from the beginning of rewarming. Modified ultrafiltration was performed after cessation of CPB. Average clamp and CPB times were 47.2 ± 26.9 and 93.8 ± 35.5 min, respectively.

At baseline and regular intervals thereafter until 48 h after surgery, blood samples were obtained. Concentration cytokines (interleukin [IL]-6, IL-1 β , IL-1ra, tumor necrosis factor α), neutrophil elastase, complement split products (C3d, C4d), and coagulation system activation and tissue injury markers were measured later.

The authors noticed a clear-cut but widely variable cytokine response. Proinflammatory cytokine concentrations (IL-1 β , tumor necrosis factor α , IL-6) were increased at baseline, but only IL-6 increased further, and then only after surgery. In contrast, antiinflammatory cytokines (IL-10, IL-1 α) increased markedly. CPB activated the coagulation system, and a late release of C-reactive protein also was noted. Indicators of tissue injury, such as creatine kinase and lactate dehydrogenase concentrations, increased early during the perioperative period; lactate dehydrogenase did not return to baseline values even at 48 h postoperatively. Modified ultrafiltration had little impact on cytokine concentrations.

Although this work is entirely descriptive, it shows that neonates and infants can mount a cytokine response to CPB and surgery. However, the response was complex, suggesting some imbalances between inflammatory and antiinflammatory compounds. Further work will be needed to link these observations with clinical outcome or other markers of tissue injury. The balance of proinflammatory and antiinflammatory response may be key in determining the extent of tissue injury as well as clinical outcome, the investigators note.

■ Transfusion Algorithm Reduces Use of Allogeneic Nonerythrocyte Components. Nuttall *et al.* (page 773)

Among 836 enrolled adult patients who had elective cardiac surgery necessitating cardiopulmonary bypass, abnormal bleeding developed in 92 (11%). In a random-

ized trial, Nuttall *et al.* compared the impact of different allogeneic transfusion practices in these 92 patients.

After the diagnosis of abnormal bleeding was made, patients were assigned randomly to one of two groups. In the control group, decisions for transfusion of blood components (platelets, fresh frozen plasma, or cryoprecipitate) were left to the discretion of the individual anesthesiologists, with or without guidance from laboratory tests. Transfusion therapy in the protocol group was guided by an algorithm based on coagulation tests. Allogeneic platelets were administered if the platelet count was less than 102,000/ μ l or the maximum amplitude of the thromboelastogram was less than 48 mm. Fresh frozen plasma was transfused if the prothrombin time was greater than 16.6 s or the activated partial thromboplastin time was greater than 57 s. Cryoprecipitate was transfused if fibrinogen was less than 144 mg/dl.

Results showed that patients in the transfusion algorithm group received less allogeneic fresh frozen plasma in the operating room after cardiopulmonary bypass than did the patients in the control group. Platelet transfusions were also less frequent in the protocol group, and these patients experienced less blood loss in the intensive care unit. Patients in the control group also had a significantly greater incidence of surgical reoperation of the mediastinum for bleeding (11.8% *vs.* 0%). Although the authors recommend a multicenter study to address institutional variances in transfusion practices, they believe that use of an algorithm based on similar measurements could improve transfusion decisions.

■ Effects of Preservatives in Propofol. Brown *et al.* (page 851)

A new formulation of propofol with metabisulfite preservative has been introduced. Because metabisulfite has

been shown to cause airway narrowing in asthmatic individuals, Brown *et al.* designed a study to test the effects of propofol with and without metabisulfite on bronchoconstriction in sheep. In seven animals, anesthesia was induced with intramuscular ketamine and maintained with pentobarbital, and then the animals underwent mechanical ventilation. After a 30-min recovery period, baseline airways resistance (R_{aw}) was measured. Then, R_{aw} was measured during vagal nerve stimulation, at recovery after 2 or 3 min, and after a methacholine challenge. Allowing another 3–5 min for recovery to baseline R_{aw} levels, the investigators administered propofol with and without metabisulfite, lidocaine (5 mg/ml), or metabisulfite alone (0.125 mg/ml) into the bronchial artery, in random order, at a rate of 0.06, 0.2, and 0.6 ml/min. Allowing 10 min after each infusion, the authors then repeated R_{aw} measurements before and after vagal nerve stimulation and methacholine challenges. The R_{aw} at baseline (before challenges) was not significantly different among the four drugs. Both lidocaine and propofol without metabisulfite caused a dose-dependent attenuation of vagal nerve stimulation-induced bronchoconstriction. Propofol with metabisulfite had no effect on vagal nerve stimulation-induced bronchoconstriction or on response to the infusion of methacholine. Because of the similarity of the airway response to the vagal nerve stimulation- and methacholine-induced bronchoconstriction during metabisulfite infusion, the authors' results suggest that metabisulfite affects both neural and direct airway smooth muscle-induced bronchoconstriction. This preservative used in propofol can have an effect on the ability of propofol to attenuate bronchoconstriction.

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