

PRESIDENT'S ADDRESS



SPA President Robert Crone, M.D. introduced the 1989 SPA Annual Meeting and co-chaired the morning session.

By Robert K. Crone, M.D.

There are several important developments that have occurred within the Society over the past year that I would like to report to you.

First, our membership in three short years now exceeds 700 anesthesiologists, and we are continuing to grow. The continued focus of our Society is education for both full-time as well as part-time practitioners of anesthesiology for infants and children. Both our newsletter as well as the annual meeting are designed to help us achieve this very important goal. The newsletter, under Drs. Randall Wetzel's and Roger Moore's watchful editorial eye, has been an outstanding success. The "Ask the Experts" column has focused on timely and controversial topics of importance to the practicing anesthesiologist. The "Literature Review" also provides an excellent and timely way for the busy clinician to keep up on what might be important to his/her pediatric practice. On behalf of the Society's membership, I would like to thank Drs. Wetzel, Moore and James Viney for their time and expertise in making this such an outstanding publication. In addition, I would like to thank Nellcor, Inc. for the steadfast

financial support which makes this publication possible.

Our other important educational activity this year was also a resounding success: the Third Annual Meeting of SPA held on October 13, 1989 was attended by more than 300 members and guests. The morning scientific program, including Dr. Richard Traystman's keynote lecture on the Physiologic Basis and Consequences of CPR, elevated our already consistent tradition of academic excellence to new heights.

The afternoon clinical sessions moderated by Drs. David Steward, Frederic Berry and Aubrey Maze were timely, controversial, educational and fun. I would like to publicly thank all those speakers, moderators and organizers who helped make this such an outstanding educational event. I also would like to thank Organon, Inc., Anaquest, Astra Pharmaceuticals and the Cook Company for their generous financial support of our meeting. The overall critique of the day's events by those attending was consistently laudatory, and the clear consensus is to continue with the same format for next year's meeting to be held on Thursday, October 18, 1990 in Las Vegas. I hope that you will be able to come and participate in what is now a tradition of educational excellence as well as a memorable gastronomic experience.

The last item of importance that I would like to share with you is our achievement of official status within the American Society of Anesthesiologists. At the ASA's meeting on Wednesday, October 18, 1989, a motion was approved to grant SPA a seat in the House of Delegates. In anticipation of this important event, your SPA Board of Directors voted and approved a proposal that the President of the SPA will serve as the delegate to the ASA House of Delegates, and the SPA President-Elect will serve as the alternate delegate. This means that Dr. Aubrey Maze will serve as your first delegate to the ASA House of Delegates next October.

On a personal note, as your Society's President over the past year, it has been a great pleasure to watch SPA develop and mature into an important institution within the field of anesthesiology. The membership's interest and enthusiasm for improving the quality of anesthetic care for infants and children have been personally gratifying and inspirational. Over the coming year, I look forward to working with you in making SPA as strong and effective a professional society as possible. To that end, I would appreciate any suggestions you might have as to how we might best achieve our goal of improving the practice of anesthesia for infants and children through education. □

ANNUAL MEETING SUMMARY

Morning Session

By Randall C. Wetzel, M.D.

The Third Annual Society for Pediatric Anesthesia Meeting was held in New Orleans on October 13, 1989 and built on the success of the previous two years. As in previous years, all expectations were exceeded. More than 300 SPA members attended, with nearly 100 "surprise" on-site registrants.

Following a continental breakfast, which gave old friends a time to meet, Robert

Crone, M.D., President of SPA, and Aubrey Maze, M.B., Vice-President of SPA, hosted a splendid morning session. This year as last, following a now established format, the day-long program started with a morning scientific symposium presented by recognized international authorities. This year's keynote theme was cardiopulmonary resuscitation. It was followed by a stimulating afternoon symposium on clinical controversies in pediatric anesthesia.

(Continued on page 2)

SPA Contents

Presidential Address	1
<i>Robert K. Crone, M.D.</i>	
Annual Meeting Summary ...	1
<i>Randall C. Wetzel, M.D.</i> <i>and Roger Moore, M.D.</i>	
Annual Meeting Supporters ...	6
Commentary	7
<i>John J. Downes, Jr., M.D.</i>	
Nominations Open	8
Literature Review	9
<i>Randall C. Wetzel, M.D.</i> <i>and James Viney, M.D.</i>	
Ask The Experts	10
<i>A. Michael Broennle, M.D.</i>	

The information presented in the SPA Newsletter has been obtained by the Editors. Validity of opinions presented, drug dosages, accuracy and completeness of content are not guaranteed by SPA.

Editors:

Randall Wetzel, M.D.
The Johns Hopkins
Hospital
Baltimore, MD
(301) 955-7612

Roger Moore, M.D.
Deborah Heart and
Lung Center
Moorestown, NJ
(609) 893-6611

Dues and Costs

Membership dues for the Society for Pediatric Anesthesia are \$100 per fiscal year. The costs of the SPA Annual Meeting (guest speaker stipends, meeting place expenses, and food) are underwritten by membership dues and by generous contributions from corporate donations and sponsors.

For more information or an application for membership, interested physicians should write to:

THE SOCIETY FOR
PEDIATRIC ANESTHESIA
515 Busse Highway
Park Ridge, IL 60068-3189

Help Wanted for Projects

The Officers and Board of Directors are interested in the continuing involvement of the Society's membership. Members interested in running for office or participating in the SPA Newsletter are encouraged to write to the Society for Pediatric Anesthesia in care of the Park Ridge, Illinois office. We hope to continue to expand the Newsletter with features, articles and commentaries on issues that may be of interest to our membership.

ANNUAL MEETING

(Continued from page 1)

When Elisha came into the house, behold the lad was dead and laid on his bed - so he entered and shut the door behind them both and prayed to the Lord. And he went up and lay upon the child and put his mouth upon his mouth and his eyes upon his eyes and his hands upon his hands: and he stretched himself upon the child; and the flesh of the child waxed warm. Then he returned and walked in the house to and fro; and went up and stretched himself upon him: and the child sneezed seven times and the child opened his eyes.

II Kings 5:33-35

Thus, opened the meeting's morning of science, practical application and bible study as **Russ Raphaely, M.D.**, Professor of Pediatrics and Anesthesiology at Children's Hospital of Philadelphia, began his history of cardiopulmonary resuscitation in children, reminding us that the prophet Elisha performed the first recorded resuscitation. It was a child. Dr. Raphaely's lively and informative historical perspective of outcomes in CPR in children served as an excellent introduction to the morning session, which focused on advances in our understanding of cardiopulmonary resuscitation and the sequelae of hypoxic ischemic injury. The remainder of Dr. Raphaely's history included the notorious Dutch fumigation technique of resuscitating the dead and the famous "barrel roll" popular in the 19th century. Cardiac massage began to be recognized as part of resuscitative techniques in the early half of the 20th century; however, it wasn't until the '50s that Kouwenhoven's report on closed-chest cardiac compression and Elam and Saffer's work at Johns Hopkins Hospital of mouth-to-mouth resuscitation that the techniques of cardiopulmonary resuscitation became available for the lay person and were taken up by the American Red Cross. As we all know, in recent years, these standard techniques have been revised, and almost every aspect of cardiopulmonary resuscitation is being re-examined.

Richard Traystman, M.D., Professor of Anesthesiology at Johns Hopkins Hospital in Baltimore, was the keynote speaker for the morning symposium. Dr. Raphaely's background discussion set the stage for this in-depth and timely review of the physiologic basis of CPR and cerebral blood flow. Dr. Traystman began by pointing out to us the fate of Poor Dinsmore who, Larson reminds us, published but perished anyway. Perhaps this was meant to serve as a general comment on our present practice



Richard Traystman, M.D., keynote speaker of the 1989 SPA Annual Meeting, discussed the latest aspects of CPR and neuroresuscitation.

of CPR. Dr. Traystman's enlightening and lucid review of the complex mechanisms that regulate cerebral blood flow, including the physiology of the mechanisms of autoregulation, reminds us again to focus on cerebral blood flow during CPR. An exhaustive comparison of classic CPR to simultaneous compression ventilation CPR (SCV-CPR), both with and without epinephrine, was presented. It was clear that at least in animal models, SCV-CPR, which assumes the thoracic pump mechanism was more successful than classic CPR. These newer techniques showed improved cerebral as well as myocardial blood flow. The importance of maintaining cerebral perfusion pressure and thus intracerebral arterial blood flow to match cerebral metabolic rate for oxygen uptake (CMRO₂) was also emphasized. This keynote address provided an up-to-the-minute summary of the state of CPR research in general, and the physiologic principles that underlie it, forming a sound scientific foundation for the other morning presentations.

Charles Schleien, M.D., also from Johns Hopkins Hospital, presented interesting new information concerning infant models of cerebral blood flow and metabolism during CPR. Dr. Schleien demonstrated the importance of studying infant models of CPR to specifically understand resuscitation of infants and children. Differing thoracic configurations determine the relationship between how much direct cardiac compression versus thoracic pump mechanisms contribute to blood flow during CPR. He also pointed out that the understanding of pediatric chest configurations has led to recent changes in the recommendations for hand position in pediatric CPR. The preferred site of compression in infants is now one-finger breadth below the intramammary line in the midline; in the child,

the heel of the compressing hand is placed one-finger breadth above the junction of the sternum and the rib cage. Other questions that may have developmental impact are the effects of pressor agents, the integrity of the blood-brain barrier and the relationship between cerebral perfusion pressure and cerebral blood flow in infants.

Dr. Schleien also discussed the pros and cons of the use of epinephrine versus phenylephrine during CPR. Beta-agonist properties of epinephrine could increase CMRO₂. Potentially, peripheral vascular pooling and relative hypovolemia during CPR also could be caused by this beta-agonism. On the basis of this, one might suspect that phenylephrine would be a better drug for ensuring arterial tone and increasing cerebral perfusion pressure during CPR. As it happens, neither epinephrine nor phenylephrine appears to have a deleterious role on CMRO₂, and Dr. Schleien concluded that epinephrine was still the agent of choice. There also is some tantalizing evidence that we are using too little epinephrine during our resuscitations and that doses as much as 10 times greater than those currently used during CPR may well be beneficial, at least in infant resuscitation models.

Another question addressed by Dr. Schleien was that of the integrity of the blood-brain barrier during CPR. Dr. Schleien presented convincing evidence that there appeared to be no breakdown in the ability of the blood-brain barrier to restrict macromolecules and fluid for up to four hours following CPR. Large pressure swings caused by thoracic compression, with sudden surges in cerebral perfusion pressure, might be expected to lead to breakdown of the blood-brain barrier and increase vascular permeability. It is well recognized that intracranial pressure in-

creases with intrathoracic pressure, and Dr. Schleien mentioned that these sudden increases in ICP might well buffer the effects of a sudden change in intrathoracic pressure, preventing a large surge in cerebral perfusion pressure and decreasing the likelihood of disruption of the blood-brain barrier. These fascinating mechanisms and many others were clearly presented in both a relevant and exciting manner by Dr. Schleien.

Following a brief coffee break, **Charles Rice, M.D.**, Professor and Vice-Chairman of the Department of Surgery at the University of Washington in Seattle, took a somewhat different focus than the previous two speakers by discussing the role of the white blood cell in the pathophysiology of ischemic injury. The relevance of his talk was to multiple organ failure, which so frequently follows cardiopulmonary resuscitation. It was Dr. Rice's supposition that the neutrophil played a pivotal role, just as it has been shown to play in other conditions where multi-organ system failure occurs. The neutrophil is a key mediator of endothelial cell and other tissue injury associated with shock and multi-organ system failure. Dr. Rice delineated how the activated neutrophil caused damage by the release of oxygen-derived free radicals, lipoxygenase and cyclooxygenase products and activated chemoattractants that all play a potential role in the post-arrest, ischemic situation.

In experimental models, the role of the neutrophil has been demonstrated by neutrophil depletion or using nonspecific anti-inflammatory agents, and although this device has been of some interest, it has not been completely successful. A newer approach, outlined by Dr. Rice, relies on the fact that neutrophils must adhere to intravascular endothelial cells at a critically early stage in order to lead to tissue damage. This binding between neutrophils and endothelial cells allows a "protective microenvironment," allowing neutrophil oxidants and proteases to attack the subendothelial matrix. This binding by the adhesion of neutrophils to endothelial cells protects these mediators from protease inhibitors and free radical scavengers. Many investigators have concluded that if this "protective microenvironment" cannot form, then the neutrophil mediated damage may not occur. As it happens, a glycoprotein complex on the leukocyte membrane mediates adhesiveness, and it has been possible to isolate and produce monoclonal antibodies (designated 60.3), which bind to one of the polypeptides (CD 18), thus blocking neutrophil aggregation and adherence to the endothelium.

Dr. Rice reviewed how pretreatment with this anti CD 18 monoclonal antibody (Mab 60.3) has proved remarkably effective in preventing microvascular injury, neutrophil migration and lung injury by blocking

neutrophil adherence. Dr. Rice reported that in rabbits, pretreatment with Mab 60.3 improved survival following ischemic injury (7/7 survived), compared to the control group in which only 2/7 survived for five days. In a follow-up study, Mab 60.3 was administered during resuscitation, and the same results were obtained. These data indicate that the majority of injury resulted from reperfusion and not ischemia, and that this reperfusion injury could be prevented with a clinically relevant agent. Dr. Rice clearly demonstrated that tissue and organ damage occurs with reperfusion following ischemia. He left us with some hope that therapy which can be administered at the time of resuscitation in the form of immunologic specific neutrophil binding inhibitors could possibly improve outcome.

The morning session was concluded by a practical session presented by **Jeff Morray, M.D.**, Associate Professor at the University of Washington, in which he reviewed the current basic life support recommendations for pediatric CPR. Newer recommendations incorporate data from experimental investigations similar to those presented earlier in the morning. The newer recommendation in children is that the initial breaths be two prolonged, 1½-second breaths, rather than the previous four short breaths, to prevent barotrauma and ensure a more homogeneous ventilation in children before cardiac compressions are started. Dr. Morray also lucidly discussed emergent vascular access in children, reviewing recent changes in the recommendation for sites. The once forbidden femoral venous access site has again regained popularity for the rapidity with which large vessel central venous access can be obtained. Intraosseous routes of intravascular access in the emergent situation also were discussed. Intraosseous vascular access can be used for rapid volume infusion as well as drug administration. As a final resort, we were reminded of the potential use for endotracheal drug administration for epinephrine, atropine, lidocaine, isoproterenol and naloxone.

Dr. Morray delineated the debate over the use of sodium bicarbonate during CPR and pointed out that the new Advanced Cardiac Life Support manual has lowered the recommended dosage guidelines. Bicarbonate should only be given at the discretion of the "team leader." In addition, bretylium has now become the second choice for ventricular tachycardia following lidocaine, thus replacing procainamide. Dr. Morray ended his morning's review with conclusions about outcomes in pediatric resuscitation. We were reminded that the outcome appears to be worse in children compared to adults, that respiratory arrest has a much better outcome than cardiac

(Continued on page 4)



Charles Schleien, M.D. responds to one of the numerous questions following his exposition on pediatric CPR.

ANNUAL MEETING

(Continued from page 3)

arrest, that inpatients fare better than outpatients, and that children who arrest as outpatients are virtually unresuscitatable. A prompt, urgent response is necessary to ensure survival.

This practical conclusion to the morning's exciting sessions that reviewed the area of pediatric resuscitation left members with the satisfied feeling of being completely up-to-date in this area. Hope for improved outcomes based on sound scientific research in pediatrically relevant CPR models, as described by Drs. Traystman and Schleien, will hopefully in the near future go some way in improving the outcome of pediatric resuscitation.

Following the presentations, a lively discussion chaired by Dr. Crone ensued. Dr. Crone asked the general question, "How soon would the scientific information presented this morning change our guidelines for pediatric CPR?" Dr. Traystman replied saying that our practical approach to resuscitation in children still has to be guided by what we can do as CPR providers, as opposed to what we know we ought to do theoretically. Members were advised that clinically useful CPR techniques would continue to evolve in the future. In response to a question directed to Dr. Rice, he pointed out that he thought that the Mab 60.3, given for up to 18 hours after the ischemic injury, would still prove of some benefit and may indeed have some application in preventing Adult Respiratory Distress Syndrome (ARDS). Another question from the floor concerned the use of extracorporeal membrane oxygenation (ECMO), and a lively discussion ensued among the panel members concerning the use of ECMO as a resuscitation procedure within the hospital. Many members lingered in the lecture hall to discuss the morning presentation while the rest of the membership, expecting as in previous years a gargantuan banquet, repaired to the dining hall.

The luncheon following the morning meetings was outstanding. The officers of SPA again managed to organize a "grand banquet" for the delectation of Society members and to fortify them for the oncoming onslaught of controversy in the afternoon. A large selection of entrees and salads was available, but the "piece de resistances" were the fantastic Salmon Wellington and the superbly cooked jambon et beouf. The time allocated for the luncheon allowed members of the Society ample time to discuss the morning sessions, prepare for the afternoon sessions, meet friends and kibitz. Coffee and sumptuous desserts were enjoyed prior to reconvening for the afternoon sessions.



David Steward, M.D. chaired a stimulating afternoon session.

Afternoon Session

By Roger Moore, M.D.

The Society for Pediatric Anesthesia Program Committee outdid itself in the afternoon session by providing the audience with an opportunity to participate in three major controversies in pediatric anesthesia.

Preoperative Fasting - Postoperative Vomiting

The first controversy concerned the use of preoperative fasting and the problem of postoperative vomiting. David Steward, M.D. from British Columbia Children's Hospital, moderated the session and started off with a historic review of NPO orders. In 1856, Dr. Snow allowed oral intake of food and fluids up to the time of surgery, though a "light breakfast" was suggested. More recent recommendations vary, ranging from the intake of clear fluids from two hours up to eight hours prior to surgical intervention. By emphasizing that *no good* evidence exists for how long a child should be kept NPO before surgery, Dr. Steward prepared the attendees for the following speakers.

Lynn M. Broadman, M.D. from Children's National Medical Center in Washington, D.C. followed with a discussion of "Metoclopramide - Is It An Effective Antiemetic?" The short answer to his presentation was: Yes! Intravenous metoclopramide is an effective antiemetic with an onset of action within one to three minutes and a duration of action of one and one-half to two hours. It can be used prophylactically, preoperatively, and repeated if needed in the recovery room at a dosage of 0.15 mg/kg.

Metoclopramide's effects are due to increased gastric emptying, decreased lower esophageal sphincter tone and a central antiemetic action. No dystonia, sedation or protracted vomiting was observed at this dose. By using metoclopramide, vomiting in strabismus surgery children was reduced from 59% to 37%.

Eugene Betts, M.D. from Children's Hospital of Philadelphia then presented "Droperidol - Does It Work?" In a study using 75 ug/kg of droperidol intravenously (max 1.25 mg) following induction of anesthesia, vomiting was reduced from 55% to 27% in outpatients. On the surface, it seemed as if the droperidol had caused a major reduction in vomiting; however, if these children were followed into the postoperative period at home, there was no difference between the group that received droperidol and those that did not.

Jerrold Lerman, M.D. from the Hospital for Sick Children then gave his views on "Preoperative Fasting - Does It Matter?" He indicated that surgeons view preoperative fasting as a torture the anesthesiologists have devised to get cases cancelled, and that children see it as a way of postponing surgery. The medical literature tells us that following the ingestion of milk, the stomach is empty within two to three hours, with formula it takes four hours, and following clear fluids it takes one and one-half hours. Dr. Lerman's overall conclusion, which he emphasized was controversial, was that clear fluids may be given up to two hours before elective surgery in healthy children without increasing the risk or severity of pneumonia from aspiration.

Frederic Berry, M.D. from the University of Virginia concluded this session by answering the question, "Do You Need PO Fluids Before Discharge From Day Surgery?" In his usual engaging manner, he pointed out that discharge criteria for pediatric patients from day surgery units often include that they be able to walk and be able to drink. In his view, this is ridiculous since motion in the postanesthetic patient frequently leads to vomiting, especially when the stomach is filled with fluids. In his opinion, children over 2 years of age should not be given fluids in the recovery room unless they are *hungry* (not thirsty); and for children less than 2 years old, no sooner than three to four hours postoperatively. The discharge criteria that he uses for children are: 1) the child is comfortable and back to consciousness, and 2) the parents are ready to take the child home. In 10 years, Dr. Berry has not had any admissions from his ambulatory unit for protracted vomiting, in spite of about 20% of the patients vomiting on the way home and another 20% vomiting that night. He also points out that there is great variability between different studies in defining nausea

and vomiting and variability in the type of surgery producing postoperative nausea and vomiting (strabismus surgery seems to be the worst, around 60%).

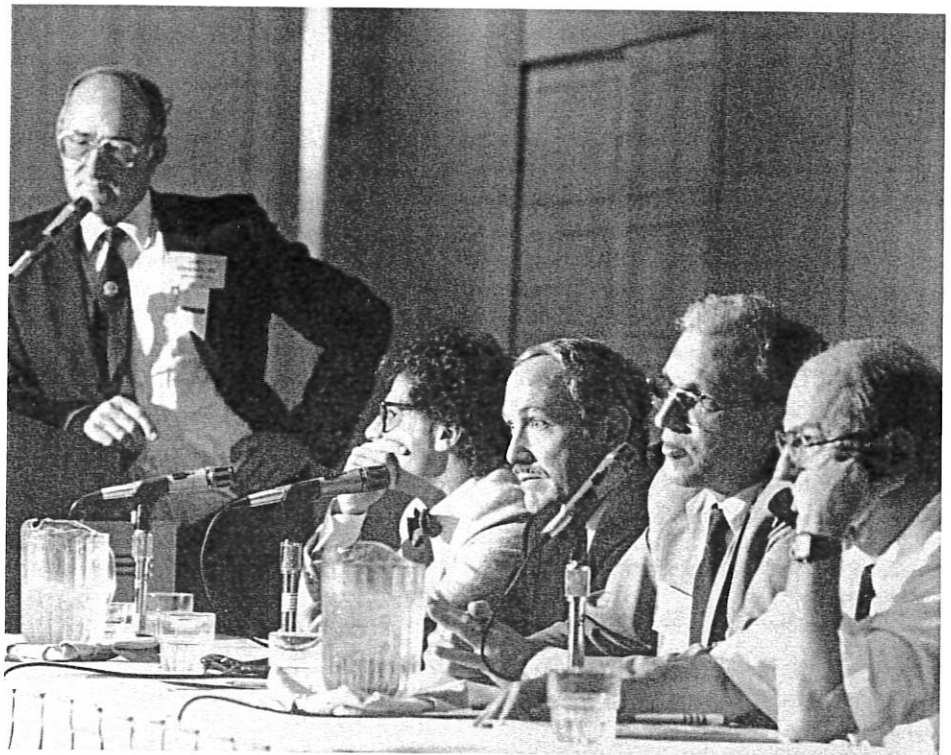
Following the session, a lively panel discussion ensued emphasizing the different practitioners' approaches to different problems. Notable quotes were by Dr. Steward who stated, "Vomiting postoperatively is an unclean situation," and Dr. Broadman who stated, in reference to Dr. Lerman's work, "His clear liquid data is pretty solid." A tantalizing piece of information revealed in the panel discussion was that early studies using Propofol in the outpatient setting may decrease the incidence of vomiting to nearly zero.

Transfusion Therapy

The second area of controversy discussed was "Transfusion Therapy," moderated by **Frederic Berry, M.D.** from the University of Virginia. **Mark A. Rockoff, M.D.** from Boston Children's Hospital started the session with a discussion of "When To Transfuse - How Low Can You Go?" He discussed the previous use of the 1970's rule of 10/30 -- that a hemoglobin of 10 g% or a hematocrit of 30% was needed prior to inducing anesthesia. This view was changed in 1988, and the general recommendation now is that a hemoglobin of 7 g% or a hematocrit of 21% in otherwise healthy patients is acceptable. He emphasized the importance of the heart as the first target organ showing the effects of a decreased oxygen-carrying capacity. His overall conclusion was that the acceptable level of preoperative anemia has to be individualized. In some situations, hemoglobins of 7 g% or lower might be acceptable, while in other patients a hemoglobin of 12 g% might not be adequate.

Peter Rothstein, M.D. from Babies Hospital in New York then discussed "Radiating Blood Products For Newborns - Is It Necessary?" With transfusion therapy, the rare occurrence of graft versus host disease is a recognized complication for immunologically compromised patients. This occurs when donor T-cells responding to antigens in the patient produce a graft versus host reaction that can lead to death in from days to weeks following a transfusion. The whole problem can be eliminated by irradiating the blood with 1,500 rads. This level of radiation doesn't cause any adverse effects on red blood cell functions but does destroy the white cells. The overall conclusion was that unless a Di-George's Syndrome or some other cellular immunologic compromise is suspected in the newborn, routine irradiation of blood to kill white cells is not required.

Eric Furman, M.D. from Cook-Fort Worth Children's Medical Center punctuated his discussion on "Hemodilution - Is It Worth It?" with a delightful collection of



Distinguished panelists, seated from left, Drs. Jerry Lerman, Lynn Broadman, Gene Betts and Fritz Berry contributed to the afternoon discussion on preoperative fasting and postoperative vomiting, moderated by Dr. David Steward.

homemade, artistic slides. He emphasized the value of hemodilution for decreasing the need for intraoperative blood replacement and blood product exposure in children. Information on the replacement of each ml of removed blood with 3 ml of Ringer's lactated and other necessary modalities to ensure the safety of this technique was presented. Particularly pointed out were the avoidance of nitrous oxide and the benefits of adequate monitoring, concomitant hypothermia and careful postoperative evaluation of the patient's ventilation.

M. Ramez Salem, M.D. from Illinois Masonic Medical Center followed this with a discussion of "Hypotensive Anesthesia - Does It Help?" He stated that hypotensive anesthesia was a highly effective mechanism for reducing blood loss. He emphasized the importance of positioning the patient with table tilt in order to help decrease the blood pressure. Inhalational agents, such as halothane, and peripheral dilators also were effective. Occasionally tachyphylaxis to hypotensive anesthesia could occur, in which case beta-adrenergic blocking agents, especially labatolol, can be helpful. One key to successful use of hypotensive anesthesia in children is control of the heart rate.

The final speaker was **Charles Cote, M.D.** from Boston Children's Hospital discussing "Fresh Frozen Plasma - Is It Necessary?" Dr. Cote initially started his talk by asking the question, "Is blood the

gift of life or an undated death certificate?" This question stems from the fact that blood donors with negative Elisa tests for the AIDS virus may actually be carriers at a rate of 1 per 150,000. He pointed out that fresh frozen plasma can carry the AIDS virus as well as other viruses. The only indications for the use of fresh frozen plasma are hemophilia or clotting factor deficiency. He pointed out that a significant decrease in clotting factors occurs only when blood loss exceeds 1.5 to 2 blood volume exchanges.

During the panel discussion, the consensus seemed to be that for an otherwise healthy 3-month-old infant with a hematocrit of 25% requiring inguinal hernia repair surgery, preoperative transfusion was not required. Dr. Cote warned that with the recent increased use of whole blood from pre-donation, the risks of hyperkalemia following rapid transfusion should be re-emphasized. From the audience, some interesting information concerning "T-antigen" was obtained. Evidently in infants with the presence of T-antigen, only washed red blood cells should be used since, otherwise, massive hemolysis can occur. Dr. Berry ended the panel discussion on a light note by pointing out that the development of cow blood for transfusion at Harvard University may do away with many of these problems.

(Continued on page 6)

ANNUAL MEETING

(Continued from page 5)

Pain Management Techniques

The last session under controversies in pediatric anesthesia was titled "Pain Management Techniques - How Do You Do It In Children?" This was moderated by **Aubrey Maze, M.B.** from Valley Anesthesia Associates in Arizona and President-Elect of the Society and began with a discussion of "Spinal Anesthesia" by **Navil Sethna, M.D.** from Boston Children's Hospital. He indicated that spinal anesthesia in infants can effectively be used, especially for children with a history of apnea, bronchopulmonary dysplasia or a postconception age of less than 60 weeks. He uses a 25-gauge, 1-inch short-bevel



SPA Vice-President Aubrey Maze, M.B. co-directed the morning session.

stellate spinal needle in infants or a 22-gauge, 1½-inch, short-bevel needle for the older child. A hyperbaric solution of 0.5% tetracaine at a dose of 0.08 to 1.0 mg/kg mixed with epinephrine is used. The level of anesthesia was assessed using a train-of-four muscle stimulator. The duration of surgical anesthesia using this technique can be as long as two hours.

Elliot Krane, M.D. from Children's Hospital and Medical Center in Seattle then discussed the use of "Caudal Anesthesia For Infants And Children." He emphasized the need for good premedication prior to performance of the block and pointed out that 90% of caudals that fail are due to placing the needle in *too caudal* of a position. When inserting the needle, a definite "pop" can be felt when going through the sacrococcygeal ligament. His "keep it simple, stupid" method of determining the amount of anesthesia to use is 1

ml/kg to obtain a T-4 level and 0.5 ml/kg to obtain a T-10 level. He usually uses 0.25% bupivacaine or 1% to 2% lidocaine. He emphasized the importance of using a test dose containing epinephrine prior to injection of the full dose. Also, monitoring the patient with oximetry when sent back to the floor is necessary.

Myron Yaster, M.D., past President of the Society, from Johns Hopkins University then followed with a discussion of the "Use Of Nerve Stimulator For Brachial Plexus Blocks." During this excellent presentation, a step-by-step approach to the brachial plexus block was presented. He indicated the impossibility of eliciting paresthesias in children due to the already high decibel level induced in the child by just seeing a needle. Because of this, he has incorporated a peripheral nerve stimulator for locating the brachial plexus in anesthetized children. Any stimulator having a low output setting can be used. When using the nerve stimulator, an easy way to remember electrode attachment is the Negative pole of the electrode attaches to the stimulating Needle, while the positive electrode goes to the skin. Once the location of the plexus is found and a test dose of local anesthetic is provided, a solution of 0.25% bupivacaine is used with 1 to 200,000 epinephrine.

William McIlvaine, M.D. from Children's Hospital in Denver then discussed "Intraleural Analgesia In Children." He stated that the technique of intrapleural instillation of local anesthesia can be used for surgical procedures occurring anywhere from the pubis to the top of the sternum. A catheter is placed high in the chest cavity so that local anesthesia can trickle down the pleural space. The patient should be spontaneously breathing when the catheter is inserted between the fourth or fifth rib. Then, 0.5 ml/kg of 0.5% bupivacaine is instilled into the intrapleural space over 10 minutes slowly. Continuous infusions of bupivacaine also can be used.

Donald Tyler M.D. from Children's Hospital Medical Center in Seattle completed this session with a discussion of "Patient Controlled Analgesia In Children." He commonly uses PCA in children 11 years or older with normal intelligence, but



SPA past President, Myron Yaster, M.D. detailed the secrets behind the use of a nerve stimulator in performing nerve blocks in anesthetized children.

it can be used in very bright children as young as 5 years of age. The choice of opioid really doesn't seem to matter, but interestingly a patient who doesn't tolerate one opioid may do quite well with the substitution of a different opioid. With morphine, 15 ug/kg is used per dose with an eight-minute lockout interval and a four-hour limit of 250 ug/kg. This dosage can be raised if the patient is awake and still in pain. Good nursing care is essential, and a firm rule is that no other concomitant drugs be given, especially anxiolytics. Another absolute "no-no" is for any other person to press the patient's button.

The value the audience placed in these three pediatric sessions was proven by the packed house at the 5:00 p.m. closing time. Most of the attending members stayed to the last minute, in spite of the seductive draw of Bourbon Street. We all left feeling we had learned a great deal and our time had been well spent. In addition, having the advantage of receiving a written syllabus from each presenter, which outlined dosages, approaches and essential references, will help all of us to incorporate what we learned into our practices. A great round of congratulations should be offered to each of the speakers and moderators for a truly excellent job well done! □

ANNUAL MEETING SUPPORTERS

The Society for Pediatric Anesthesia, on behalf of its members, wishes to thank the following companies for their support of SPA's Third Annual Meeting on October 13, 1989 in New Orleans.

ANAQUEST
NELLCOR, INC.
ORGANON, INC.
ASTRA PHARMACEUTICALS
THE COOK COMPANY

COMMENTARY

The Health Care Crisis for Children in the U.S.A.

By John J. Downes, Jr., M.D.
The Children's Hospital of Philadelphia and
the University of Pennsylvania

Americans do not like to consider, let alone accept the fact, that 13 million (22%) of our infants and children through age 21 years live in poverty, and only one-half of them are covered by Medicaid.¹ Nearly 50% of all black children and over 33% of Hispanic children live in homes with annual incomes below the federal poverty line (\$10,500 for a family of three).¹ The more progressive states, such as Alaska and California, provide Medicaid benefits to families only when their annual income sinks below 80% of the federal level, i.e. \$8,400 for the family of three; whereas some states, such as Texas, will not allow for Medicaid eligibility until the family income decreases to 25% of that level, i.e. \$2,625 per annum for the family of three. This is not to say that all is well in California or Alaska, but certainly gross discrepancies exist between the states in the application of federal funds and the matching state dollars to poor families, including pregnant mothers and their infants and children. Both the U.S. House and Senate voted favorably for the Mandatory Medicaid Improvement Act of 1989, which requires all states to provide Medicaid and other entitlements to families with incomes up to 100% of the federal poverty level if there is a pregnant mother or infant under age 3 in the family, and up to 80% of the federal poverty level for all other families. Unfortunately, this legislation is wrapped up with a group of controversial bills in the joint Senate-House reconciliation budget proposal awaiting the President's signature and may get sacrificed eventually to cut the budget deficit impact of the final law (personal communication, Children's Defense Fund, 1989).

This economic and social impoverishment, and the denial to many of their basic health care through Medicaid or other programs, cause enormous suffering, disease and early childhood death.² The appalling increase in drug abuse fueled by the "crack" cocaine epidemic has severely aggravated the plight of many inner city poor families, enhanced the spread of sexually transmitted diseases and AIDS, and added thousands of prematurely born, im-

paired newborns to the total of impoverished and ill children in this country.^{3, 4}

How have we dealt with the problem of our children living in poverty over the past 30 years? Data from studies conducted by both public and private agencies clearly establish that these conditions have prevailed, indeed worsened, throughout this past decade.^{1, 5} In 1960, 25% of children lived in families with incomes below the federal poverty level. By 1974, this had decreased to 14% of children and continued to decline slightly until 1982, after which it rose steadily to 22% by 1987 and represented 13 million children. Our nation essentially has wiped out the gains of the previous 15 to 20 years in improving the conditions

"... the neglect of the physical, developmental and mental health of millions of future citizens constitutes the major health care crisis facing our nation."

under which the lowest economic strata of this society spend their formative years. Among the industrialized democracies of the world, only the United States has gone backward in this regard.

In addition to the families who fall below the federal poverty level, another stratum of socio-economic deprivation exists and has grown rapidly since 1980. Families in this stratum have total incomes up to twice the poverty level and have been labeled the "near-poor" or "working poor" since more than two-thirds of the adults have jobs of some kind or are self-employed. These jobs tend to consist of one or two part-time positions in the service industry, low-level construction or transportation work, or seasonal farm labor. These individuals and many who are self-employed with marginal incomes usually

have no health insurance for themselves or their children, but earn far too much to qualify for Medicaid, which demands that the family becomes "impoverished" according to the state's definition of income limit. By 1988, the total number of uninsured reached 37 million, of whom more than 25% were children (nearly 10 million). These children get sporadic health care, usually only when seriously ill, and pregnant mothers frequently receive little or no prenatal care with all of the devastating consequences for the infant.

In my opinion, therefore, the neglect of the physical, developmental and mental health of millions of future citizens constitutes the major health care crisis facing our nation. Many concerned and responsible leaders and organizations have called these issues to the attention of legislators, foundations, health insurance providers, major corporate executives and health care organizations. They have sought legislative reform and helped initiate innovative local and regional programs utilizing available resources with funds from government, philanthropic foundations and local industry. Although some of these programs already are proving effective, they constitute only a small start; the bulk of the advocacy, program design and planning, and actual rendering of solutions remains to be done.

Among the leaders in child health advocacy have been the American Academy of Pediatrics (AAP) and, more recently, the American Medical Association (AMA) with its "Health Policy Agenda for the American People."^{6, 7} Although organized medicine finally has spoken out as an advocate for the poor, physicians have been held in contempt by many for their lack of concern for ensuring the distribution of health care to all citizens. Dr. Alain Enthoven, Professor of Management in the Stanford University School of Business and an authority on health care systems and financing, states, "Organized medicine (i.e. AMA) focused its efforts on the right of doctors to make a good living, not on structuring the health

(Continued on page 8)

COMMENTARY

(Continued from page 7)

care system for quality and efficiency." 8 Like most experts dealing with these issues, he is only partially correct; he fails to acknowledge the efforts of several medical organizations, including the AAP, to improve the care nationwide for the patients who would be served by their members.

The American Academy of Pediatrics, to which many of us belong, has been an effective and vocal advocate in Congress and through its state chapters in various legislatures in seeking to remove the barriers to care for poor infants and children. This effort is summarized in an excellent special report entitled "Barriers to Care" (July, 1989) that was sent to all active AAP members and is available from the Academy. In Philadelphia, the AAP and the office of Maternal and Child Health of the U.S. Public Health Service as of October 30, 1989 have jointly provided a five-year grant of \$341,000 to the Pennsylvania Caring Program for Children. The grant will pay for the education of health professionals and parents in special therapies for disabled children, and ensure that children without proper health insurance coverage get the services they need through other resources of the Caring Program.

What role, beyond that of a concerned citizen, can we as pediatric anesthesiologists play in addressing this health care crisis? What qualifies us to speak out and offer our counsel? Most of us care for the children of the poor and working-poor in our hospitals every day. We are, through our roles as clinicians and educators, involved in the care of hundreds of thousands of children annually who come from all socio-economic strata and racial and ethnic backgrounds found in the United States. Among our membership, we have internationally recognized experts on various aspects of child health care. We indeed are a body of subspecialists dedicated to and expert in the care of infants and children, and we observe frequently the impact of poverty on the health of children.

I therefore urge the members of this Society to consider the following: 1) to become more informed about childhood poverty and its impact on the individual child's survival, growth, development and future potential; 2) to inform their medical and nursing colleagues, their families and friends, and their own legislators of their concern for the health of all children and what actions they think eventually will benefit the children in need; and, 3) to think about what we as a subspecialty organization should do to advocate effectively for the improvement of health care for children

Sources of Current Advocacy Information:

American Academy of Pediatrics
141 Northwest Point Road
P.O. Box 927
Elk Grove Village, Illinois 60007
(708) 228-5005
(800) 433-9016

The Children's Defense Fund
122 C Street, N.W.
Washington, D.C. 20001
(202) 628-8787

in this nation, and transmit those thoughts to the Society President and the Board of Directors.

As recognized specialists in the care of children, we can speak with authority and experience to other medical organizations, to state and federal legislators, to government health officials, and to insurance industry executives. We can inform them about the scope and severity of childhood poverty and its detrimental health effects, and offer them a plan of action. We also can serve as effective advocates for private and governmental programs and legislation that we think will help remedy these conditions over the next decade.

A Minneapolis pediatrician summarized our duty quite clearly when he stated recently, "We as pediatricians must continue to advocate and demonstrate for the needs of this nation's children. We must not allow the fiscal difficulties of this country to be alleviated by the continued impoverishment of our children." 9 My personal experience indicates that when physicians speak as advocates for children, important and powerful people will listen and will act favorably in the long run far more often than we would ever expect. We can be highly effective. We first need to make the commitment, then decide on a course of action, remain flexible and persevere throughout the next decade and into the next century until the task is done.

References

1. Wise PH, Meyers A: Poverty and child health. *Pediatr Clin No Amer* 35:1169-1186, 1988
2. Parker S, Greer S, Zuckerman B: Double jeopardy: the impact of poverty on early child development. *Pediatr Clin No Amer* 35:1227-1240, 1988
3. Chasnoff IJ, et al.: Temporal patterns of cocaine use in pregnancy. *JAMA* 261:1741-1744, 1989
4. Silverman S: Interaction of drug abusing mother, fetus, types of drugs examined in numerous studies. *Medical News and Perspectives. JAMA* 261:1689-1694, 1989
5. Miller CA: Infant mortality in the U.S. *Scientific American* 253:31-37, 1985
6. Thorpe KE, Siegel JE, Dailey T: Including the poor: the fiscal impacts of Medicaid expansion. *JAMA* 261:1003-1007, 1989
7. Tallon JR: A health policy agenda proposal for including the poor. *JAMA* 261:1044, 1989 (editorial)
8. Enthoven A: A 'cost conscious' medical system. Article in *The New York Times* July 13, 1989
9. Oberg CN: Pediatrics and poverty. *Pediatrics* 79:567-569, 1987 (commentary) □

NOMINATIONS OPEN

SPA will hold its biennial elections in October, 1990 for the offices of Vice-President, Secretary, Treasurer and three Board of Directors positions. Active members of the Society may submit the names of prospective candidates for consideration to the Nominating Committee prior to April 20, 1990. When submitting the name(s), include the candidate's address and/or affiliation, telephone number (if known), and the office for which you are submitting the individual's name. Send your recommendations to:

CHARLES H. LOCKHART, M.D.
Department of Anesthesia
Children's Hospital
1056 E. 19th Avenue
Denver, Colorado 80218
Attn: Nominating Committee

The Nominating Committee will make its final report to the Board of Directors at the Spring Meeting on April 29, 1990 in conjunction with the AAP Annual Meeting in Seattle, Washington. □

LITERATURE REVIEW

By Randall C. Wetzel, M.D., and James Viney, M.D.

The following literature reviews have been selected from various issues of *Anaesthesia*, *Anesthesiology*, the *British Journal of Anaesthesia*, the *Journal of Pediatrics* and the *New England Journal of Medicine*.

Anesthetic considerations for Beckwith-Wiedmann Syndrome

Anesthesiology 70:711-712, 1989
Gurkowski and Rasch

This case report presents the common airway, cardiac and endocrine problems encountered with Beckwith-Wiedmann syndrome and makes sensible suggestions for management.

Postoperative apnea in a full-term infant

Anesthesiology 70:879-880, 1989
Noseworthy, Duran and Khine

This is a case report of postoperative apnea six hours after a two-hour procedure in a term infant with bladder exstrophy but no other defects. It follows a case report of postoperative apnea in a term infant reported by Tetzlaff et al., *Anesthesiology* 69:426-428, 1988. This case report was of surgery performed on the first day of life; the Tetzlaff report concerned a 21-day-old term infant for cataract surgery also without other anomalies who had apnea postoperatively and 24 hours later in the ophthalmology clinic.

Comment: As these authors point out, it is possible that apnea postoperatively may indicate a potential for SIDS in term infants. It is unusual to perform outpatient surgeries on newborns, but not inconceivable. Perhaps we need to consider this possible risk when considering outpatient surgery in newborns.

Postoperative apnea after caudal anesthesia in an ex-premature infant

Anesthesiology 71:613-615, 1989
Watcha, Thach and Gunter

This article by Watcha, Thach and Gunter reports a 4-month-old infant (42 weeks post-conception) who weighs 3.9 kg and was born at 27 weeks gestational age, with a past history of apneas and bradycardias. No apneas or bradycardias had occurred for two months prior to the performance of the caudal anesthetic. Caudal anesthesia was provided with bupivacaine and absolutely no sedation was given pre-, intra- or post-operatively. The child underwent bilateral inguinal herniorrhaphy.

In the immediate postoperative period, the child had no cardiorespiratory instability and recovered nicely. He was discharged to the floor. Twelve hours following surgery, he had what appeared to be an obstructive apnea with increased intercostal retractions followed by cyanosis and apnea. At that time, no pulse was felt and CPR was instituted. The child was eventually resuscitated.

Comment: It had to happen. This appears to be the first report of neonatal apnea in a child who received no parenteral or inhalational analgesics, anesthetics or sedatives. It appears that the stress of surgery despite caudal anesthetic and postoperative pain were associated with this infant's apnea. Curiously, this apnea appeared to be an obstructive apnea. The interesting point is whether regional anesthesia in premature infants less than 44 weeks of gestational age will decrease the incidence of postoperative apnea. This report must at least sensitize us to the fact that it will not. It appears prudent to monitor neonates, especially prematures, postoperatively for 24 hours regardless of anesthetic technique.

High-dose caffeine suppresses postoperative apnea in former preterm infants

Anesthesiology 71:347-349, 1989
Wellborn et al.

These investigators from the Children's National Medical Center randomly assigned ex-prematures (all greater than 44 weeks postconceptual age) undergoing inguinal hernia repair to receive caffeine 10 mg/kg IV after induction or placebo. All patients received inhalational anesthesia and neuromuscular blockade with no barbiturates or opioids being used. The control group had significantly more prolonged postoperative apnea, periodic breathing and more episodes with a postoperative $\text{SaO}_2 < 90$. The treated group had none of these problems. This dose of caffeine resulted in a serum concentration within the recommended therapeutic range.

Comment: Theophylline treats neonatal apnea, as we all know; but would you send them home?

Oral transmucosal fentanyl citrate premedication in children

Anesthesia and Analgesia 69:28-34, 1989
Streisand et al.

The effects of oral transmucosal fentanyl citrate premedication on preoperative behavioral response and gastric volume and acidity in children

Anesthesia and Analgesia 69:328-335, 1989
Stanley et al.

Comparison of oral transmucosal fentanyl citrate and an oral solution of meperidine, diazepam and atropine for premedication in children

Anesthesiology 70:616-621, 1989
Nelson et al.

Preanesthetic medication in children: A comparison of oral transmucosal fentanyl citrate versus placebo

Anesthesiology 71:374-377, 1989
Field et al.

Comment: There has been a rash of articles looking at a variety of ways that a child may be premedicated for surgery. Dr. Wetzel likes to refer to these as orifice studies; that is, one picks the orifice of his choice and applies a drug with hope of adequate premedication. The variety of orifices is only surpassed by the number of drugs that have been looked at. We don't have space to include all of these studies, although most of them are of interest. Lack of inclusion here certainly doesn't indicate that they shouldn't be included, and our apologies to our readership if the orifice of their choice wasn't included in the selection for this newsletter. These were four recent articles looking at oral transcutaneous fentanyl lollipops as a preop sedative in children. My understanding is there are some more in the pipeline.

The Streisand article was a dosing article. It established that a hungry child will indeed suck on a lollipop (44 of 47); that if the lollipop contains fentanyl, the child will show signs of sedation within 30 minutes if 5-10 mcg/kg or greater are used, and within 15 minutes if 10-15 mcg/kg or greater are used; that fentanyl is a respiratory depressant, and three of 11 patients getting 20-25 mcg/kg had oxygen saturations less than 89% (which resolved with prompting to breathe), and two patients getting 15 mcg/kg or greater needed naloxone postoperatively. They suggest a dose of 15-20 mcg/kg. All groups had an incidence of postoperative vomiting of 50-

(Continued on page 10)

LITERATURE REVIEW

(Continued from page 9)

83%; however, many of these patients (30 of 44) were having strabismus surgery or ENT surgery, and pruritus will cause 90% to rub their noses.

Stanley et al. looked at sedation and at gastric effects of 15-20 mcg/kg of fentanyl versus placebo lollipops and no premedication. Fentanyl provided a more sedate child than placebo or no premed, and there was no statistically significant difference in gastric pH, but volume was increased a small but statistically significant amount in the lollipop groups. Recovery room vomiting occurred equally between all groups, approximately 20%. After discharge from recovery, very few patients vomited, 0 to 6% in the different groups.

Nelson et al. compared no premedication with an oral solution of meperidine 1.5 mg/kg, diazepam 0.2 mg/kg and atropine 0.02 mg/kg and fentanyl lollipops with 15-20 mcg/kg. Patients were randomly assigned, but the evaluations preop and during induction were not blinded, whereas the

recovery times and emergence were blinded to evaluation. Sedation was produced by both oral regimes relative to no premedication. One patient in the fentanyl group needed prompting to breathe for a saturation of 89%. Fewer patients getting fentanyl needed narcotics in the recovery room, but this wasn't statistically significant. The incidence of vomiting overall was lowest with the meperidine, diazepam, atropine group and statistically different from the fentanyl group (5% versus 41%); the no-premed group had an intermediate incidence of vomiting of 26% which was not statistically significantly different than either other group. One patient in the fentanyl group had an episode of decreased pulmonary compliance after intubation. Recovery times were not statistically different, but there was a great range in operative time.

These three studies were all from the same institution: The University of Utah. The Field et al. article was from Stanford. It looked randomly and double-blindedly at fentanyl lollipops (15-20 mcg/kg) and placebo

lollipops. No patient had SaO₂ of less than 95% (perhaps a difference between this study and the Utah studies is that the elevation at Stanford is about 50 feet above sea level; whereas the University of Utah is around 4500 feet above sea level). Thirty minutes after induction, the children getting fentanyl were indeed sedate relative to placebo, and there were no differences in length of recovery room stay (they use the trendier PACU term in their article). The incidence of side effects overall was greater in the fentanyl group, centering around pruritus (severe enough to cause one patient to be agitated) and vomiting. The placebo group had more airway obstruction and secretions.

Regional anesthesia in children

(review article)

Anesthesia and Analgesia 68:654-672, 1989
Dalens

Dr. Dalens reviews some of the general considerations of the pediatric population with regard to administering regional anesthesia. In terms of anatomy and pharma-

ASK THE EXPERTS

Editor's Note: Members of the Society who have questions concerning pediatric anesthesia problems may submit such questions to the Society for Pediatric Anesthesia.

QUESTION: What is the etiology, signs and treatment of post intubation croup? (from Dr. Hari B. Ponnuru, Beaumont, Texas)

ANSWER: from A. Michael Broennle, M.D. Senior Anesthesiologist, Children's Hospital of Philadelphia, and Associate Professor of Anesthesia, University of Pennsylvania

Postintubation croup is a condition of upper airway obstruction occasionally observed following removal of endotracheal tubes from children. Since most children at risk are extubated at the end of an anesthetic, anesthesiologists who treat children must be familiar with its presentation, diagnosis and treatment.

The pathology of postintubation croup is presumed to be edema in the laryngeal area. The edema could involve either the subglottic region, probably at the level of the cricoid cartilage, and/or the supraglottic region. I think the location is subglottic, but I am not aware of definitive evidence that this is true.

In a prospective evaluation of the factors associated with postintubation croup, Koka et al. reported an incidence of 1% in children under 17 years of age, defining croup as the postanesthetic occurrence of hoarseness, stridor and/or retraction ob-

served in the recovery area.¹ They cited other reports where the incidence ranged from 1.6 to 6%. Factors associated with an increased incidence of croup included age (from 1 to 4 years), trauma and duration of intubation over one hour. Traumatic factors included multiple attempts at intubation, tight-fitting tracheal tubes (no air leak around the tube appreciated at a static airway pressure of 25 cm of water), coughing on the tracheal tube, repositioning of the patient while intubated, and surgery in the head and neck region. I am impressed that most parents of children who have developed postintubation croup report the child has previously had infectious croup, or laryngotracheobronchitis (LTB); this suggests that some susceptible children get a greater degree of upper airway edema in response to a variety of noxious stimuli, such as viral infections, and the trauma associated with translaryngeal intubation. I often warn parents of young children with a history of LTB that their child may have a croupy cough postoperatively. In these children, I am careful to avoid forcing a tight endotracheal tube through the subglottic space. I frequently use an endotracheal tube in these children 0.5 mm smaller than the formula of Lee ($[16 + \text{age in years}] / 4 = \text{mm internal diameter of the endotracheal tube}$).²

Mild postintubation croup is indicated by hoarseness and a raspy or stridorous cough in children without other apparent airway obstruction. This is treated by cool-

mist humidification of the inspired air. Children with respiratory distress, manifested by stridor at rest and/or retractions are treated with inhalation of racemic epinephrine (r-epi) administered by a nebulizer, e.g. nebulizer with tee adaptor (Salter Labs). Intermittent positive pressure breathing (IPPB) was initially advocated for r-epi administration, but subsequent experience suggests nebulization alone is effective.³ The child is allowed to sit up with his back against the thorax of the administrator, and the aerosol (0.5 ml of 2% r-epi added to 3 ml of distilled water) is administered through a t-piece attached to a loosely fitted face mask. The oxygen flow through the nebulizer is adjusted to deliver a visible mist. After a transient period of agitation, children typically fall asleep. Treatment should last at least 10, preferably 15 minutes. While there is often a relapse an hour or more after nebulized r-epi is used to treat LTB, most children with postintubation croup need only one treatment.

Children with postintubation croup need to be observed in the hospital until the croup has resolved, which ordinarily means an overnight stay. The level of monitoring should be appropriate to the degree of distress. Fortunately, most affected children develop postintubation croup within one to two hours of extubation. Rarely, croup may not appear for up to 12 hours after extubation, so parents of outpatient children must have a way to contact the anesthesiologist.

cology, he presents contraindications and complications and presents sections on upper and lower extremity blocks, caudals, epidurals, spinals, intercostal nerve blocks, ilioinguinal and penile nerve blocks.

Comment: This review nicely complements Drs. Yaster's and Maxwell's review in *Anesthesiology* 70:324-328, 1989 on the same topic. Alternatively, if you read only one of these two journals, then take your pick.

Survival of infants with persistent pulmonary hypertension without extracorporeal membrane oxygenation

Pediatrics 84:1-6, 1989

Dworetz et al.

Dr. Dworetz and her colleagues at Yale did a retrospective analysis of infants with persistent pulmonary hypertension who met criteria published by Bartlett et al. and Short et al. for inclusion in ECMO. They looked at two time periods, 1980 to 1981 and 1986 to 1988. In the earlier time period, hyperventilation was the mainstay of their therapy and survival was in the 17%

Only three of 80 children with postintubation croup in Koka's series required treatment with r-epi.¹ In recent experience at the Children's Hospital of Philadelphia (CHOP), the incidence of postintubation croup requiring humidification after transfer from the postanesthesia care unit has been approximately 1% of patients.⁴ Over the past five years, one child has been admitted for postintubation croup from the ambulatory surgery unit at CHOP.⁴

For historical completeness, steroids and helium have been suggested in the treatment of postintubation croup.^{5, 6}

References:

1. Koka BV, Jeon IS, Andre JM, MacKay I, Smith RM: Postintubation croup in children. *Anes Analg* 56:501-505, 1977.
2. Lee KW: Personal communication.
3. Jordan WS, Graves CL, Elwyn RA: New therapy for postintubation laryngeal edema and trachietis in children. *J Amer Med Assoc* 212:585-588, 1970.
4. Keon TP: Personal communication.
5. Deming MV, Oech SR: Steroid and antihistaminic therapy for post-intubation subglottic edema in infants and children. *Anesthesiology* 22:933-936, 1961.
6. Duncan PG: Efficacy of helium-oxygen mixtures in the management of severe viral and post-intubation croup. *Canad Anaesthe Soc J* 26:206-212, 1979. □

range as predicted by Bartlett and Short. The later time period had a 89% survival rate. During the later time period, the therapeutic goals were a PaO₂ of 60-80, a PaCO₂ between 35 and 45, and a pH between 7.45 and 7.5 achieved with bicarbonate infusion. Fluid management, the use of vasopressors and tolazoline, was aided by the use of frequent echocardiographic exams looking at contractility.

Comment: What one can conclude is that the survival of sick infants with persistent pulmonary hypertension is better in the later group. This may or may not be related to changes in ventilator management. They suggest that it would be worthwhile to randomly compare less aggressive ventilator management and ECMO with regard to survival. This provides an interesting contrast to the recent indignation expressed by the New York Times at Boston Children's Hospital randomized study, where they exclaimed that not treating some children with ECMO was of dubious ethical value.

Intraoperative hypoxemic spells in tetralogy of Fallot: An echocardiographic analysis of diagnosis and treatment

Anesthesia and Analgesia 68:815-819, 1989
Greeley et al.

These investigators used a sterile epicardial color flow doppler intraoperatively to demonstrate right-to-left shunting and resolution of shunting after appropriate therapy.

Comment: It has been postulated that "tet" spells and the reversal thereof is due to the balance of shunting across the VSD; it is nice to see pretty pictures depicting this. To use this technology takes the money to buy the equipment, a surgeon who will apply it and practice on multiple patients to acquire familiarity with what one is seeing unless you have a cardiologist who will sit with you in the OR.

A prospective randomized double-blind study to evaluate the effect of dexamethasone in acute laryngotracheitis

J Pediatrics 115:323-329, 1989

Super et al.

Accompanying Editorial: Corticosteroids in croup: A chink in the ivory tower

J Pediatrics 115:256-257, 1989

Smith

Dr. Super's group at Case Western Reserve looked at 0.6 mg/kg of dexamethasone versus placebo in a random double-blind manner and found a statistically significant improvement in croup score at 12 and 24 hours and in the number of racemic epinephrine treatments given, but not in length of hospitalization. The study

excluded those without clinical and radiological evidence of croup.

Comment: As the authors point out, it will take larger studies to define if there is an increased risk of pneumonia in those treated with dexamethasone and to establish what happens to oxygenation. Perhaps, at last, there is some justification for the ubiquitous use of steroids for all sorts of stridor, including post-extubation stridor.

Brain tumors in children

J Pediatrics 114:511-519, 1989

Kadota et al.

This review article presents the medical aspects of diagnosis, therapy and outcome for one of the commonest forms of childhood cancer.

Oxygen saturation during induction with isoflurane or halothane in unpremedicated children

Anaesthesia 43:927-929, 1988

Phillips, Brimacombe and Simpson

This study looked at the time of induction and incidence of complications in unpremedicated children randomly assigned to isoflurane or halothane mask inductions by junior anaesthetists. Halothane was associated with significantly fewer airway complications including laryngospasm, coughing, and SaO₂ less than 85%. Mean induction time was 2.5 minutes less with halothane.

Comment: Halothane wins again!

Controversial issues in cardiopulmonary resuscitation

Anesthesiology 71:133-149, 1989

Schleien, Berkowitz, Traystman and Rogers

If you were unable to attend the SPA meeting in New Orleans, this article is a chance to read about many of the issues raised by Drs. Schleien, Traystman and Morray with regard to the mechanism of action of CPR, the efficacy of adrenergic drugs, Ca⁺⁺ and bicarbonate. The changes in the current AHA guidelines and what may change in the future are discussed.

Pharmacokinetics of intravenous dantrolene in children

Anesthesiology 70:625-629, 1989

Lerman, McLeod and Strong

An intravenous dose of dantrolene 2.4 mg/kg was infused over 10 minutes. The mean time for the serum dantrolene concentration to decrease from a 1-minute post infusion peak of 6 mcg/ml to 3.0 mcg/ml was 6.5 hours. The pharmacokinetic data are similar to adult data, and theoretical and clinical data suggest a 2.4 mg/kg load followed at 6 hours by an additional 1.2 mg/kg should keep the serum concentration in the desired range for 16 hours.

(Continued on page 12)



Society for Pediatric Anesthesia

515 Busse Highway
Park Ridge, IL 60068-3189

BULK RATE
U.S. POSTAGE
PAID
North Suburban, IL
Permit No. 97

Officers

President:

Robert K. Crone, M.D.
Children's Hospital & Medical Center
Seattle, WA

Vice-President:

Aubrey Maze, M.B.
Valley Anesthesia Associates
Phoenix, AZ

Secretary:

Charles H. Lockhart, M.D.
Children's Hospital
Denver, CO

Treasurer:

William J. Greeley, M.D.
Duke University Medical Center
Durham, NC

Board of Directors

Milton H. Alper, M.D.
Children's Hospital
Boston, MA

Barbara W. Brandom, M.D.
Children's Hospital of Pittsburgh
Pittsburgh, PA

John J. Downes, Jr., M.D.
Children's Hospital of Philadelphia
Philadelphia, PA

Theodore W. Striker, M.D.
Children's Hospital Medical Center
Cincinnati, OH

Frederic A. Berry, Jr., M.D.
Health Services Center
Charlottesville, VA

James H. Diaz, M.D.
Ochsner Clinic
New Orleans, LA

Steven C. Hall, M.D.
Children's Memorial Hospital
Chicago, IL

Myron Yaster, M.D.
Johns Hopkins University
Baltimore, MD

LITERATURE REVIEW

(Continued from page 11)

Vecuronium by continuous infusion for neuromuscular blockade in infants and children

Crit Care Med 17:989-992, 1989
Eldadah and Newth

This paper reports the results of a study in 12 children between the ages of a few days to 13 years with mixed diagnoses, including congenital heart disease, croup, trauma and ARDS, who were treated with vecuronium either as a repeated bolus or as a continuous infusion. They discovered that both the repeated boluses and continuous infusions were clinically effective and that there were no hemodynamic differences in these two techniques. Of interest, however, was that the total amount of vecuronium used was significantly lower in the continuous infusion method ($0.79 \pm .44$ mg/kg 12 hrs) when compared to that for hourly boluses ($1.34 \pm .4$ mg/kg 12 hrs). They also noticed continuous infusion greatly decreased the amount of nursing time required for preparing and dosing the vecuronium.

Comment: This report documents the dosage regime for continuous infusion of

vecuronium. This may occasionally be of value when the vagolytic effects of pancuronium are not required or cause unacceptable tachycardia. Although this report by Eldadah and Newth documents its use in the Pediatric Intensive Care Unit, I see no reason why similar dosing and control would not be useful in the OR.

The dose response of caudal morphine in children

Anesthesiology 71:48-52, 1989
Krane, Tyler and Jacobson

The authors compared duration of action and side effects in three doses of caudal morphine: 0.033 mg/kg, 0.067 mg/kg and 0.1 mg/kg. The children ranged from 1 to 8 years, and the study was limited to patients having operations below the diaphragm. The duration of analgesia was longest with the 0.1 dose with a mean of 13 hours as opposed to 10 hours for both other doses. The incidence of vomiting was greatest after the first doses and decreased with subsequent doses; it was similar between groups. Pruritus occurred from 22% to 57% and was not different between groups; five of 26 children needed naloxone to relieve it but did not lose their analgesia after the naloxone. One child who received 0.1

mg/kg had delayed respiratory depression. One child experienced dysphoria. They recommended starting at 0.033 mg/kg and increasing if necessary. They monitor more respiratory depression with hourly assessments of arousability for 24 hours after dosing.

Comparison of oral and intramuscular preanesthetic medication for pediatric inpatient surgery

Anesthesiology 71:8-10, 1989
Nicholson et al.

This study looked at oral meperidine 3 mg/kg plus pentobarbital 4 mg/kg versus IM morphine .1 mg/kg and pentobarbital 4 mg/kg in terms of effectiveness as a preop sedative. All children received IM atropine .02 mg/kg, and the premeds being studied were administered in a random double-blind fashion. The drugs were given 60-90 minutes preop. The oral group was significantly more drowsy in the holding area and more cooperative at the time of induction. The oral premed was given in an orange-flavored suspension. □