INTERFACE

SOCIETY FOR TECHNOLOGY IN ANESTHESIA

11512 ALLECINGIE PARKWAY • RICHMOND, VA 23235 • (804) 378-4959 • (804) 379-1386 FAX

OCTOBER 1993 • VOLUME 4 • NO. 4

ASA '93 Events

Annual Dinner Meeting

October 10, 1993
6:00 pm
Featuring
Commander C.M. Wood,
USN (ret.)
"Nuclear Submarines: Twenty-Five Years and Beyond"
701 Pennsylvania Avenue Restaurant

Limited number of tickets available at the door

Breakfast Panel

October 11, 1993
7:30 am
J. W. Marriott Hotel

Tickets available at ASA registration desk

Committee/Board Meetings

October 10, 1993

10:00 am – 12:00 noon
STA Section for Education Meeting

12:00 noon – 2:00 pm
STA National Anesthesia Database Committee Meeting

2:00 pm – 5:00 pm
STA Board of Directors Meeting

All meetings at J.W. Marriott Hotel
1331 Pennsylvania Avenue, NW
Washington, DC

President's Message

Jerry M. Calkins, PhD, MD

The ASA Annual Meeting is upon us and STA is once again sponsoring a dinner and breakfast panel. I encourage you to attend these events which are, thanks to the efforts of Alan (Grog) Grogono, always well-planned, informative and enjoyable. These events are an especially nice opportunity for STA members to meet in person at an otherwise busy meeting. The annual meeting in Orlando is also around the corner and an exceptional program is planned. STA is extremely indebted to Nik Gravenstein, Sr., and his committee for the January event.

Committee Activities

The STA committees continue to expand the scope of activities as well as the number of members involved in these activities. The Committee for Education has been reorganized into the Section for Education. This section is comprised of four committees. The Committee for Education of Practicing Physicians is chaired by Jim Philip, the Committee for Education of Non-Physicians is headed by Wes Frazier, the Committee for the Annual Meeting is lead by Nik Gravenstein, Sr., and the Committee for STA Activities at the ASA Annual Meeting is directed by Alan Grogono. Julian Goldman chairs the Committee for Membership and Promotions and, along with several other enthusiastic STA members, works to promote STA, encourage and attract new members while at the same time retaining the current membership, and promote foreign and domestic membership.

All STA members are encouraged to become active in committee activities. The chairpeople are always pleased to have additional support and encourage any member with an interest in their committee to write, call or approach them at the annual meeting.

Budget Priorities

As many of you are aware, STA has been operating at a significant deficit over the last few years. This was acceptable in the past when programs were necessary to build the society, but the time has come for careful fiscal management. Recent activities by the Board and our corporate friends are helping to improve the budget crunch.

The Board is continuing its efforts to establish a stable budget for the balance of this year and 1994. Our goal is to reduce the 1994 budget by at least another 10%. The expenses for STA have been divided into six areas/cost

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INSIDE THIS ISSUE:

Japan Society of Anesthesiology Adopts Anesthesia Monitoring Standard

Naosuke Sugai, PhD, MD
Tokyo, Japan

On April 21, 1993, the Japan Society of Anesthesiology published the first standard of monitoring during anesthesia to be accepted in Japan.[1] This standard applies to all anesthetic procedures regardless of whether the procedure involves general or regional anesthesia. The new standard emphasizes that anesthesia safety requires not only proper training of anesthesiologists, but also monitoring standards based upon recent developments in medical care and related sciences. The standard is composed of items which are applicable at the present time and also emphasizes the importance of proper judgment by the anesthesiologist.

The Standard Preface:

In order to assure patient safety during anesthesia the Japan Society of Anesthesiology recommends that the following standard of monitoring be adopted. This standard is applicable when general, epidural, or spinal anesthesia is administered.

Standard of Monitoring during Anesthesia:

- The patient under anesthesia should be watched closely by a doctor of medicine responsible for the anesthesia who is with the patient.
- Check the oxygenation of the patient by checking the color of the skin, mucous membrane, blood, etc. A pulse oximeter should be applied.
- Check the ventilation of the patient by observing the movement of the thorax as well as the breathing bag and by listening to breath sounds. The use of a capnometer is desirable. It is also desirable to employ tidal volume monitoring.
- Check the circulation by monitoring the heart sounds, by palpating the pulse, or by checking the arterial wave form or pulse wave. Electrocardiogram should be monitored. Check blood pressure every five minutes in principle, and more frequently if necessary. Invasive blood pressure monitoring is performed when it is necessary.
- Body temperature should be monitored.
- Neuromuscular blockage should be monitored if necessary.

(When an anesthetic machine is used, follow the guidelines for the use of an anesthetic machine issued previously by JSA).

Reference:
1. Japan Society of Anesthesiology: Standard of Monitoring for Anesthesia Safety. Masui (Jpn J Anesthesiol) 42:943,1993

(Translation by N. Sugai.) ◆

Plan Now To Attend!

1994 STA Annual Meeting

"Learning About Technology—Technology for Learning"

Walt Disney World Dolphin Hotel • Orlando, Florida

January 26–29, 1994

Preliminary program on page 45

Integration Drives New Anesthesia Machine Standard

Stanley Weitzner, MD
Chair, ASTM Committee F-29 on Anesthesia and Respiratory Equipment

Z-79 is a phrase that is often associated in anesthesiologists' minds with standards for safety of anesthesia equipment. This alphanumeric designation refers to the first ANSI (American National Standards Institute) committee to develop an anesthesia machine standard. The successor to subcommittee Z-79 works within the American Society of Testing and Materials (ASTM) as committee F-29 (Anesthesia and Respiratory Equipment) and maintains a working liaison with the ASA. The most current Standard for Anesthesia Gas Machine—"ASTM F1161"—was approved in 1988, and superseded the old 1979 ANSI Standard. That 1988 standard was coordinated with a standard published approximately a year later on anesthesia breathing systems.

> ***... the addition of new equipment should be facilitated from the point of view of integration, performance, and safety ...***

Approval by the ASA of practice guidelines for monitoring during anesthesia, and the introduction of electronics and microprocessors into medical devices has brought new technologies and monitors into our practice. The proliferation of these devices (e.g. NIBP, record keepers, gas analyzers, prioritized alarms with central monitoring, infusion controllers for intravenous anesthetic techniques etc.) led the members of subcommittee F29 to consider a new anesthesia gas machine standard. The rapid entry of data collection and information transfer devices (peripheral to the anesthesia gas machine and not offered by anesthesia gas machine manufacturers), reinforced the need for a standard to describe minimum performance as well as safety, and to assure compatibility with the anesthesia gas machine.

This new standard will have to accommodate existing equipment to the greatest extent possible, as well as guide the development of new models that will be the latest in electronically-controlled fully integrated anesthesia workstations.

To begin work on this new standard, subcommittee F29.01.01 on Anesthesia Workstations was activated in the fall of 1992, and will have met three times for a total of six days by the end of August 1993, with "writing groups" working between meetings. Aside from its professional representatives (anesthesiologists and nurse anesthetists), it has 18 industrial members whose products include anesthesia gas machines, cardiovascular and respiratory gas monitors, information transfer systems, electronic infusion controllers, and anesthesia record keepers.

Unless the committee decides differently, the intent of the new standard will be to cover all of the major components and operating modules of a traditional anesthesia gas machine (e.g., vaporizer, flow meter, etc.) as well as other equipment related to delivering anesthesia care like volume monitors, ventilators, breathing systems, prioritized alarms, guidelines for accommodation to data collection and information transfer, anesthesia record keeping, and two-way control of electronic infusers for intravenous anesthetic agents. This standard obviously will build upon other already existing standards in areas such as gas scavenging, pulse oximetry, capnometry, and gas analysis.

If the standard is properly written, and users and manufacturers follow it, equipment manufactured according to the 1988 ASTM Standard should not be made obsolete. As a matter of fact, the addition of new add-on equipment should be facilitated from the point of view of integration, performance, and safety for the patient and anesthetist.

I expect that a standard could be completed and approved by 1996. (ASTM requires a three-step ballot process with resolution of all comments received by the committee). The benefits of the voluntary consensus standard process will be enjoyed (as previous experience with all standards development has demonstrated) well before final approval as the debate and information exchange — i.e., "education" — that occurs among committee participants during the standards writing efforts, is disseminated to other members of our profession and associated industries. ◆

Who's Who At the STA National Office

STA is professionally managed by The Phenix Corporation. Listed below are the individuals who are available to assist you. If you have any questions or concerns, please contact the National Office at (804) 378-4959, FAX (804) 379-1386.

Kim Roberts, CPA, Executive Director–Kim is the primary liaison between STA and The Phenix Corporation. She is ultimately responsible to STA for all Phenix activities. She has a broad awareness and understanding of STA activities. There are many specialists within The Phenix Corporation that will handle specific projects for STA; however, Kim will be familiar with the project, or can direct you accordingly.

Jerry Wilhoit, CAE, Associate Executive Director–Jerry also has an intricate knowledge of STA. He is familiar with many of the day to day affairs of the association and is an excellent resource to call with STA questions or needs.

Cherie Warfield, Director of Marketing–Cherie oversees all meetings and membership marketing. She also coordinates all printed material distributed on behalf of STA. This includes the printing of the meeting programs, the membership brochure, membership campaigns and surveys. If you are considering the production of a publication, or want to discuss some marketing ideas, contact Cherie.

Lorraine Hoff, Design Manager–Lorraine is responsible for the design and layout of STA publications. She also works directly with the newsletter editor on the design and coordination of the STA newsletter, *Interface*.

Kevin Johns, Director of Conventions–Kevin manages all aspects of annual meetings, regional meetings and board meetings including menu selection, hotel negotiations, audio-visual, room setups, ground and air transportation and social activities. Any special requests you have for a meeting should be addressed to Kevin.

Debra Price, RN, Industry Liaison/Exhibit Manager–Deb works extensively with industry, marketing STA. She seeks funding for STA conferences and other requested projects. Contact Deb if you need funding for a Board approved project, or if you have a lead or potential supporter. Deb also manages all exhibit functions including service contractors selection, hall layout, prospectus development, and exhibit sales for STA's Annual Meetings.

Brenda Jones, Accounting Coordinator–Brenda develops the STA operating statements and oversees the fiscal affairs of the society. She pays the bills and collects the revenues. If you have any questions on the status of an expense report, call Brenda.

Misty Sutherland, Membership Services Coordinator–Misty oversees the processing of all STA membership applications, dues and meeting registrations. If you have questions on the status of any of these items, contact Misty.

Sharon Kite, Administrative Coordinator–Sharon is Kim's administrative assistant. She coordinates the word processing of most STA correspondence. If you need clerical assistance with a project, Sharon is a great resource.

Marcia Borton, Production Department Manager–Marcia oversees all distribution and copying. If you need supplies i.e. letterhead, envelopes, etc., or a mail list, call Marcia.

Felicia Meijia, Receptionist–Felicia answers the telephone and handles general information requests.

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President's Message

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international members and $40 for students, residents, and members of the Society for Anesthesia Technicians and Technologists.

A dues statement will be forthcoming in the near future. On the dues invoice, an option to contribute to the Sustaining Fund will be available. By promptly paying your dues of $225 and adding your contribution of at least $25, our current financial situation will rapidly improve.

I look forward to seeing all of you at the upcoming events at ASA and in Orlando. ◆

ASA Highlights STA

STA was recently highlighted in the ASA Newsletter (Volume 57, Number 8, pp. 10–11) with an article written by **Jerry M. Calkins, MD, PhD**, STA President.

A number of articles related to technology were also featured. Authors included **Jan Ehrenwerth, MD**, STA Treasurer, **Alan W. Grogano, MD**, STA Activities at ASA Committee Chair, **David M. Gaba, MD**, STA Board of Directors Member, **Jeffrey M. Feldman, MD**, STA Newsletter Editor, and **James B. Eisenkraft, MD**, STA Activities at ASA Committee Member. ◆

Help Wanted

Enthusiastic STA members to become involved with innovative newsletter publishing. The editors of *Interface* are in need of assistance to develop additional articles and explore the many topics of interest to STA members. Do you feel you have something to say about the role of technology in the practice of anesthesiology? Are you someone who likes to focus on controversial issues? For more information about the role you might play in publishing Interface please refer to the second page of any issue for the editor's address. ◆

Update on the American Society of Anesthesia Technicians and Technologists (ASATT)

Although many members of the STA are very familiar with ASATT, the organization has grown considerably since its inception. A brief review and update of the organization, its objectives, and/or the role of its members on the anesthesia care team is therefore timely.

ASATT was officially organized in 1989 and has rapidly grown to a current membership of over 1,000. The membership spans a considerable skill level including many members who have recognized skills and/or degrees in other areas such as biomedical engineering, respiratory therapy, and nursing. Within the last few years, the ASA has given considerable recognition to ASATT, helping to support ASATT's annual meeting as a satellite to the ASA's October meeting. The founding of the ASATT was preceded by the birth of several state and regional organizations especially in the pacific northwest. Furthermore, there were several meetings supported by the American Association of Medical Instrumentation (AAMI) where anesthesiologists, medical/clinical engineers, and several anesthesia technicians and technologists (ATTs) shared ideas and motivation which helped to crystallize the need for and structure of ASATT. Also, representatives of STA were asked to participate early on in organizational meetings (along side representatives from the ASA and AANA).

The formalization of the ASATT group stems from several factors:

- The explosive growth of anesthesia technology in the last 15-20 years.
- The increasing concern for patient safety (which is presumably related in part to the quantity and quality of technological support personnel).
- The perceived need by anesthesia technicians and technologists (ATTs) for professional identity.
- A similar perceived need by the employers of ATTs (e.g., anesthesiologists, hospital administrators, etc.) — to identify appropriate skill levels and to standardize training, job descriptions, etc.
- Concern by ATTs and their employers that there be professional recognition by regulatory bodies (e.g., JCAHO, HCFA, etc.)—similar to that for other support personnel in radiology, pathology, respiratory therapy, etc.
- A platform from which to seek recognition/support of the ASA.
- A charter and focus for future growth and development of recruitment, education, and quality assurance mechanisms which can assure the public and the anesthesia care team of a sufficient number and quality of support personnel as the amount and complexity of anesthesia technology increases over the coming years.

Activities to date of ASATT have included multiple salary and job description surveys, three 1-3 day annual meetings including review and tutorial sessions, and other state and regional activities related to education in the area of monitoring and anesthesia machines. There are also several active state and regional organizations which are related to the national group. ASATT maintains different membership categories and seeks to include anesthesiologists and engineers. Information about membership can be obtained from:

John Spaulding
Executive Director of ASATT
1-800-352-3575. ◆

- W.T. Frazier

UPCOMING EVENTS

SCAMC 17

October 31–November 3, 1993
Symposium on Computer Applications in Medical Care
Sheraton Washington Hotel
Washington, DC
Info:
AMIA
4915 St. Elmo Avenue, Suite 302
Bethesda, MD 20814
(301) 657-1291, FAX (301) 657-1296

JSTAIC

November 20, 1993
The Japanese Society for Technology in Anesthesia and Intensive Care
11th Annual Meeting
Info:
Dr. Hidemaro Mori
Department of Anesthesiology
Kanazawa Medical University
1-1 Uchinadacho
Kawakitagun, Ishikawaken 920-02
Japan
0762-86-2211
0762-86-3475, FAX

STA '94

January 27–29, 1994
Society for Technology in Anesthesia
Learning About Technology—Technology for Learning,
(Co-sponsored by the Society for Education in Anesthesia and the Anesthesia Patient Safety Foundation)
Walt Disney World Dolphin Hotel
Orlando, FL
Info:
Kim Roberts
Executive Director
STA
11512 Allecingie Parkway
Richmond, VA 23235,
(804) 378-4959, FAX (804) 379-1386

The Industrial Perspective
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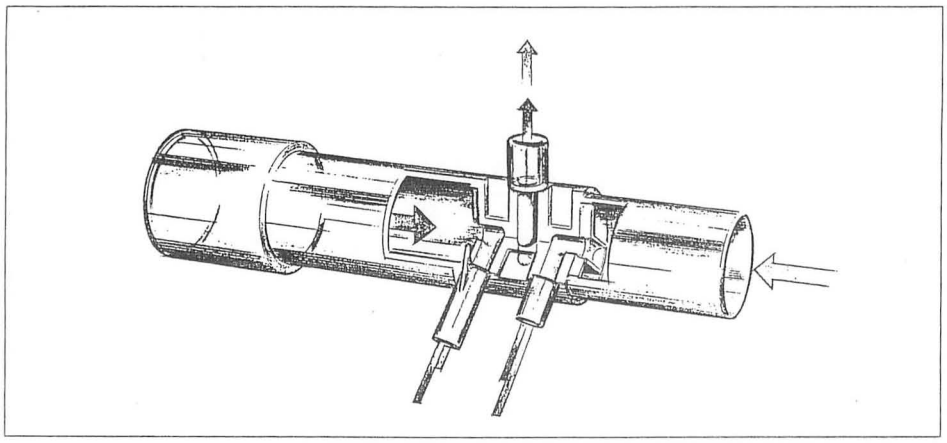

Airway Sensor

limitations. Humidity and mucus in the breathing circuit can significantly impair performance. These devices also introduce undesirable side-effects such as increased dead space and resistance. Accuracy is compromised when spirometers are not located at the airway. These shortcomings of existing technology stimulated the development of side-stream spirometry.

New Transducer Required

A solution for continuous, accurate, pressure and flow monitoring required developing a transducer that could measure patient values at the airway. An airway adapter was developed combining an orifice located in the lumen of the adapter with a pitot tube on either side of the orifice for pressure measurement (Figure). During ventilation, each breath produces a pressure differential across the orifice in the adapter. As the flow through the orifice increases, so does the magnitude of the pressure differential. Tubing attached to the pitot tubes, transfers the pressure changes to the monitor where they are measured and used to display pressure-volume loops. Flow is then calculated and utilized to determine inspired and expired volume and to create the real-time flow-volume loops. A complete description of the transducer can be found in Meriläinen et. al. (1993).[1]

A number of technical challenges remained before the transducer could fulfill basic clinical expectations. The signal output of the transducer was non-linear with flow and also dependent upon the gas density, viscosity, and temperature. Accurate flow measurement therefore required computations to linearize the signal and to compensate for dependency on gas properties. Since the transducer would be part of a microcomputer driven multigas monitor which simultaneously measures gas composition and pressure, real time compensations for gas density and viscosity were possible. Compensation for temperature and humidity conditions is based upon estimates of typical conditions.

An important challenge was to determine the degree of accuracy that could be achieved. From very early in the project it was evident the device would not be as accurate as pulmonary function test equipment commonly used in pulmonary function labs. Furthermore, the transducer is less sensitive at lower flow rates, an important limitation especially for monitoring pediatric patients.

Clinical Needs Determine Accuracy

Requirements for improvement of transducer accuracy had to be balanced against the clinical needs and development costs. Early clinical trials indicated that a number of clinically important conditions could be detected without a high degree of accuracy. These conditions included unintentional one lung intubation or obstructed endotracheal tube, auto PEEP, bronchospasm, and different types of circuit leaks. Even though the accuracy of tidal volume measurements was not yet optimum for the pediatric market, clinicians judged it to be acceptable and valuable for routine use in the operating room.

At the time of initial release, the device was recommended for adult and large pediatric patients weighing more than 20 kg. The specified tidal volume accuracy was +/- 10%. Improvements in transducer accuracy have continued however. Compensations were improved along with hardware and software refinements. FDA 510(k) approval is now pending for a second transducer having a tidal volume accuracy of +/- 6% and targeted for small pediatric patients weighing as little as 3 kg.

Product development is a dynamic process. It requires continual integration of clinical needs, engineering resources, technical constraints, and business concerns to bring useful products to market. Resolving these interests sometimes results in intermediate results that require additional time to meet a target market. Cooperation from clinicians has been vital to the successful introduction of this product and will no doubt be just as important to further development.

1 Meriläinen, P., Hanninen, H., and Tuomaala, L. A Novel Sensor for Routine Continuous Spirometry of Intubated Patients, *Journal of Clinical Monitoring* (in press). ◆

1994 STA Annual Meeting

"Learning About Technology—Technology for Learning"

January 26–29, 1994

Walt Disney World Dolphin Hotel• Orlando, Florida

co-sponsored by the Society for Education in Anesthesia and the Anesthesia Patient Safety Foundation

Preliminary Program

Wednesday, January 26, 1994

6:00 pm – 9:00 pm
Reception and Registration

Thursday, January 27, 1994

7:00 am – 8:00 am
Morning Coffee with Exhibits

8:00 am – 8:15 am
Opening Remarks

8:15 am – 10:15 am
Panel 1—SEA
"How Can Technology Help Us To Learn?"
Moderators:
Michael L. Good, MD and
T. Philip Malan, Jr., MD, PhD

10:15 am – 10:45 am
Coffee Break with Exhibits

10:45 am – 12:00 noon
Posters and Papers

12:00 noon – 1:00 pm
Lunch on your own

1:00 pm – 4:00 pm
Working Groups:
1. Anesthesia machine
2. Ventilators
3. Vaporizors
4. Infusion Pumps
5. Heating Devices
6. Electrocautery

4:00 pm – 4:15 pm
Break with Exhibits

Friday, January 28, 1994

7:00 am – 8:00 am
Morning Coffee with Exhibits

8:00 am – 10:15 am
Panel 2—STA
"What Should We Know About Technology?"
Moderators:
Robert T. Chilcoat, PhD and
Wesley T. Frazier, MD

10:15 am – 10:45 am
Coffee Break with Exhibits

10:45 am – 12:00 noon
Posters and Papers

12:00 noon – 1:00 pm
Lunch on your own

1:00 pm – 3:45 pm
Working Groups:
1. ECG
2. Non-invasive pressure
3. Invasive pressure
4. Output
5. TEE
6. EEG
7. CEP
8. Gases
9. SpO2
10. ABG

3:45 pm – 4:00 pm
Break with Exhibits

7:00 pm
STA Dinner
Speaker: Allen K. Ream, MD

Saturday, January 29, 1994

7:00 am – 8:00 am
Morning Coffee with Exhibits

8:00 am – 10:15 am
Panel 3—APSF
"What Should Be Done about the Deficiencies in our Current Education in Technology?
Moderators:
Frances Rhoton, PhD and
E. S. Siker, MD

10:15 am – 10:45 am
Coffee Break with Exhibits

10:45 am – 12:00 noon
Reports from Working Groups

12:00 noon – 1:00 pm
Lunch on your own

1:00 pm – 4:00 pm
Reports from Working Groups

4:00 pm – 5:00 pm
Review and Summary

Experience the Simulators

The meeting will include on-going hands-on sessions where participants will be able to experience the current state-of-the-art of simulation in anesthesia.

The Clinical Perspective

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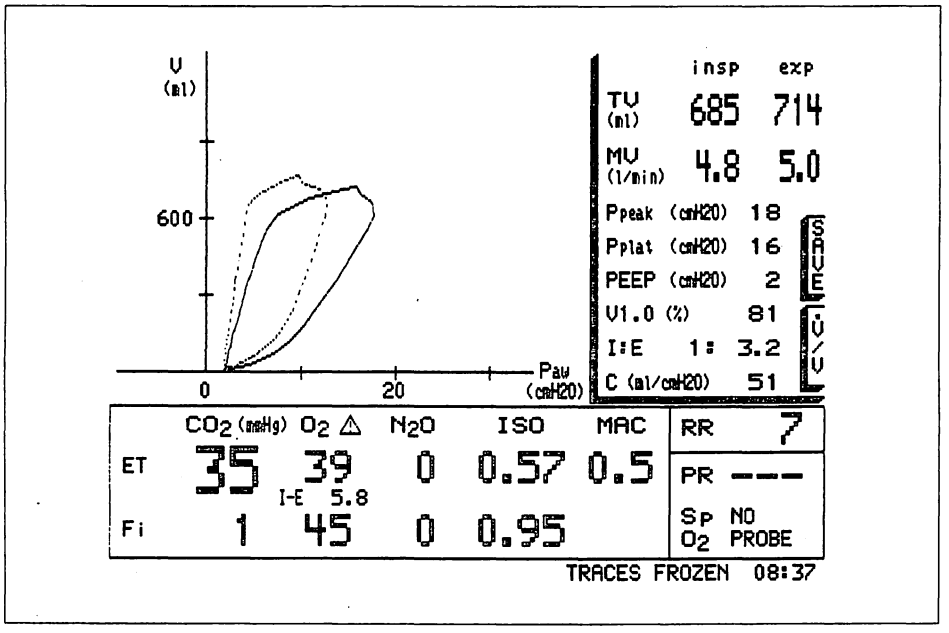

The pressure/volume curve (solid line) during laparoscopy with CO_2 insufflation is compared to the curve before insufflation (interrupted line). Compliance (C) decreased from 105 to 51 ml/cm H_2O.

bronchospasm, while patterns of mixed or primarily inspiratory flow limitation suggest an extrathoracic problem such as upper airway obstruction. Pressure volume curves readily identify compliance changes due to pulmonary parenchymal and/or chest wall problems; for example, from abdominal CO_2 insufflation as shown in the Figure.

Clinical Indications

The most obvious clinical applications for side-stream spirometry lie in the management of patients who are at risk for intraoperative respiratory problems. These include problems arising from thoracic surgical procedures such as lobectomy or pneumonectomy, pulmonary thromboendarterectomy, as well as lengthy or complex cardiac surgical procedures. For example, dynamic compliance is improved following sternotomy, apparently as a consequence of increased lung volume. After chest closure, however, compliance is often significantly lower than the baseline measured before sternotomy. These changes are especially pronounced in patients who are obese or who have pre-existing obstructive lung disease.

Even more dramatic reductions in lung compliance are seen with one-lung ventilation, especially when there is obstruction of an upper lobe bronchus in the ventilated lung. For example, a one-cm movement of the double-lumen endotracheal tube can raise or lower compliance by 40%, along with substantial increases/decreases in oxygen delivery. Thus changes in compliance may be used to identify dislocation of a double-lumen endotracheal tube on a breath-to-breath basis.

Other applications of side-stream spirometry include monitoring the effects of intra-abdominal CO_2 insufflation for laparoscopic surgery, providing evidence of either improving or deteriorating levels of gas trapping from different ventilatory modes in patients with severe COPD, and showing the need for, or efficacy of, bronchodilator therapy. In the latter application, the patient's response to bronchodilatory therapy may well be the information critical to determining whether postoperative mechanical ventilatory support will be needed.

Current Assessment

The clinical value of the on-line flow volume monitor is directly related to the physician's ability to understand changes in pulmonary mechanics under complex conditions. The monitor does not, in and of itself, come with a quick refresher course on pulmonary mechanics. Nor is there an on-line computer which provides the differential diagnosis of an abnormal flow/volume curve. In addition, our clinical data base is still very limited. Considerable experience will be required for clinicians to develop confidence interpreting the data provided by this continuous, real-time window of pulmonary function.

In summary, I believe that on-line side-stream spirometry during anesthesia has much to offer but is still in its infancy. Considerable clinical experience and study are needed before the overall significance and efficacy is generally appreciated. For now, however, side-stream spirometry shows promise for assisting clinicians at the bedside with the difficult problems of treating patients with moderate to severe lung disease. ◆

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