Кардиохирургия испытывает стабильную эволюцию и быстрое развитие с момента входа в практику в 1950-х гг. искусственного кровообращения, в 1960-х гг. искусственных клапанов сердца и т.д. В то же время прогресс в анестезиологическом обеспечении, послеоперационном ведении, понижении физиологии ИК, гипотермии, остановке кровообращения дают возможность хирургам оперировать все более мощные пороки и патологии.

Усиленная анестезиологическая, хирургическая программа, способная обеспечить надежное и высококачественное лечение обычной сердечной патологии наряду со сложными вмешательствами, такими как операции на корне Ао, сложные комбинированные ВПС, пересадка сердца, требует высокоспециализированной, преданной своему делу команды. Авторы рассматривают разные аспекты развития и совершенствования кардиоанестезиологической регрессии на опыте Hospital of the University of Pennsylvania. Каждая из подцелей и общая цель ведет к главному — улучшению качества заботы о пациенте.

Current Practice in Cardiac Anesthesia: Challenges and Opportunities

Stuart J. Weiss, M.D., Ph..D.; Dmitri V. Guvakov, M.D.; Albert T. Cheung, M.D.

Hospital of the University of Pennsylvania

The field of cardiac surgery has experienced, and continues to experience exponential growth following the clinical introduction of cardiopulmonary bypass in the 1950's for the repair of congenital heart defects. This advance was followed by the development of prosthetic heart valves in the 1960's and later by refinements in the techniques for coronary artery bypass grafting for treating patients with ischemic heart disease. At the same time, advances in the anesthetic and perioperative management of patients subjected to the physiologic consequences of cardiopulmonary bypass, deliberate hypothermia, circulatory arrest, and mechanical ventilatory support, have enabled surgeons to perform operations of greater complexity in patients with more advanced stages of disease. The successful cardiac surgical and anesthesia program that is capable of performing routine procedures in addition to complex congenital heart operations, valve repair, major aortic reconstruction, and transplantation requires a specialized facility staffed by a dedicated multidisciplinary team. As a consequence, cardiac surgery programs have become high profile operations that utilize extensive hospital, technical, and economic resources.

Accompanying the advances in medical care, technology, and pharmaceuticals, the escalating cost of health care in the United States within the last two decades has consumed progressively a greater proportion of national expenditures. The newly imposed economic pressure has subjected expensive procedures such as cardiac surgery to closer scrutiny by the financial institutions that reimburse cost. In an effort to contain costs and improve efficiency without compromising patient care, the federal government, insurance companies, and health maintenance organizations that provide reimbursement for cardiac surgery have attempted to identify and direct patients to institutions that provide cost-effective services with superior clinical outcomes. These designated «Centers of Excellence» serve as models that set the standards for comparison between competing centers performing similar procedures.

In reaction, medical centers had to implement mechanisms to identify, develop, and foster patterns of «best practices» and provide objective data to support their ability to deliver cost-effective care with clinical outcomes that are comparable or exceed current expectations. The strategy employed at the University of Pennsylvania for cardiac surgery and anesthesia was to develop protocol-based care plans called «clinical pathways» that try to incorporate the «best practices» that have been developed for the routine management of patients undergoing heart surgery. These clinical pathways were designed to achieve designated benchmarks or standards that gauge both the quality and economic outcome of the care delivered. Examples of benchmarks that gauge the quality of care are mortality rates, incidence of perioperative myocardial infarction, and frequency of wound infections. Examples of economic benchmarks include length of hospital stay, resource utilization, and number of laboratory tests performed. Benchmarks can be set based on executive decisions, expert opinions, prospective analysis from clinical databases, or evidence from studies that have been published in the medical literature.

The development of a clinical pathway for cardiac operations also provided a format for data collection to

monitor important outcome variables. The intent of clinical data collection was to identify both problematic areas and areas of exceptional performance. This information can then be used to further refine the clinical care protocol. The role of the anesthesiologist in the development and implementation of the clinical pathway for cardiac operations was an important one. For at least in the United States, the most expensive aspects of patient care that utilizes the greatest number of hospital resources take place in the operating rooms and intensive care units. The development of efficient and cost-effective care impacts on the clinical, educational and research missions of the medical center. The following discussion will address each of these areas as they pertain to the practice of cardiac anesthesia.

Clinical Care

Preoperative evaluation and testing are performed preferably as outpatient procedures. The objective of this trend to admit the cardiac surgical patient on the day of operation was to decrease the cost of hospitalization. To prevent unexpected delays in the operating room schedule, an admissions evaluation clinic directed by an anesthesiologist was established to ensure that preoperative evaluation, informed consent, laboratory testing, and risk assessment was complete and all pertinent information was available at the time of the procedure. The preoperative visit was also designed for patient education to prepare them for what to expect so that they could assist in the management of their disease and participate in rehabilitation immediately after operation.

The anesthetic should be designed to permit recovery and discontinuation of mechanical ventilatory support based on the medical condition of the patient rather than the anesthetic drugs or techniques that were employed. Although the judicious use of inhaled anesthetics, muscle relaxants, and narcotics can be used to accomplish this objective, some clinicians advocate the use of more expensive, short-acting anesthetic drugs such as propofol that can be titrated to effect and facilitate rapid emergence upon discontinuation [1]. The routine use of expensive drugs must be justified and are often restricted to patients who will potentially benefit the most. For example, the use of the antifibrinolytic agent, aprotinin, was justified for use in re-operations because it decreased blood loss, the number of blood transfusions, and the incidence of re-exploration for bleeding [2]. Similarly, the routine use of forced-air warming units during the perioperative period to prevent hypothermia may decrease the risk of infections, bleeding, respiratory insufficiency, and cardiac complications [3]. The task of monitoring drug use, determining the choice of drugs available on the hospital formulary, and setting guidelines for appropriate drug use is the purpose of the Pharmacy and Therapeutics Committee that consists of hospital administrators, pharmacists, and clinicians.

Not all technical advances may be cost-effective or improve clinical outcomes. Pulmonary artery catheters with the capacity to monitor cardiac output or mixed venous oxygen saturation have been routinely used in cardiac anesthesia, but others have questioned whether its routine use in intensive care units provided information that was useful for patient care and justified its added cost and risks [5]. The increased use of intraoperative transesophageal echocardiography (TEE) has been justified because of its ability to provide real-time high-resolution imaging of cardiac structures and blood flow during operations. The advantages of being able to immediately assess global and regional ventricular function, the success of revascularization, repair of a congenital defect, valve replacement, valve repair, or the presence of residual intracardiac air at the time of operation using TEE became quickly evident to surgeons and anesthesiologists [5].

New approaches to established operations, such as minimally invasive direct coronary artery bypass (MIDCAB) and port-access mitral valve replacement or CABG (Heartport, Inc, Redwood City, CA, USA), are being evaluated to determine whether comparable or improved clinical outcomes can be achieved before they are routinely adopted into clinical practice. These newer cardiac surgical procedures are often more demanding on the anesthesia and surgical care team. MIDCAB procedures were designed to avoid cardiopulmonary bypass, but require coronary artery anastamosis to be performed on the heart while it is beating. Port-access procedures emphasizes small incisions and techniques for percutaneous cardiopulmonary bypass.

As with the recovery from anesthesia, the duration of time a patient spends in the intensive care unit and hospital after operation should be dictated by the medical condition of the patient and their ability to achieve the clinical criteria for discharge. Postoperative complications such as atrial fibrillation [6], neurologic injuries [7], and surgical wound infections [3], that prolong hospitalization and increase the total cost associated with cardiac operations remain problematic and need further attention.

Education

Guidelines for best clinical practices cannot be developed, implemented, or monitored without the endorsement and cooperation of the hospital staff. Education on a multidisciplinary level and collaboration between departments provides the best means for ensuring that a consistent level of quality care is being provided. The full range of knowledge and skills required to be an effective cardiac anesthesiologist and intensivist has prompted many anesthesiologists to seek specialized training. Fellowship programs in cardiac anesthesia, echocardiography, pain management, and critical care medicine are available to individuals who have completed their anesthesia residency training and wish to acquire expertise in a subspecialty area. Completion of the fellowship training program makes them eligible to obtain credentials in that area.

Essential components of the educational program include ready access to the current medical literature and a regular schedule of clinical conferences. Participation in regional, national, and international conferences and symposiums provides access to the clinical experiences at other medical centers. Case presentations and discussion provide a critical review of the medical literature on specific topics pertinent to the management of cardiac surgical patients that can form the basis for the adoption of evidence-based medical practices and can generate consensus opinions on controversial practices.

The current emphasis of medical self-assessment has changed from «quality assurance» to «quality improvement». It is believed that improvement in medical management is best accomplished by correcting ineffective or inefficient programs rather than individual shortcomings.

The concept of «quality improvement» is directed at evaluating how policies and procedures affect the performance of a group as a whole to improve the overall result, rather than focusing on isolated events.

Research

The term «practice of medicine» implies that our methods are imperfect and that there exists opportunities for improvement. The ultimate goal of basic science and clinical research is to generate solutions to problems that can be applied directly to benefit patients. The conduct of clinical trials for testing new drugs and medical devices and granting approval for marketing is regulated by The United States Food and Drug Administration. The approval of new drugs or devices requires the demonstration of clinical efficacy for the stated medical indications and an acceptable safety profile in properly designed and conducted trials. Recently, there has been an increased emphasis on the acquisition of data that demonstrate efficacy based on clinical and economic outcomes such as improved survival, decreased morbidity, reduced cost of medical care, or enhanced physical activity.

An active program in basic and clinical research serves also to compliment educational programs, attract and retain outstanding medical faculty and students, and provides the infrastructure to collect reliable clinical data that can be used to monitor the performance and quality of medical services. For example, the impact of implementing a protocol-based care plan for coronary artery bypass grafting on hospital costs and mortality rates can be readily determined from the database. Data collection also permits the ability to assess the effectiveness of subsequent refinements to the original protocol thereby providing a mechanism for incorporating only those modifications that result in improved outcomes.

In the Russian-United States Cooperative Study on Perfusionless Deep Hypothermic Circulatory Arrest for Open Chamber Cardiac Operations, the objective was to compare the safety and advantages of the technique of perfusionless deep hypothermic circulatory arrest, that was refined at the Novosibirsk Institute of Circulatory Pathology, to the conventional technique of cardiopulmonary bypass for the routine repair of non-cyanotic congenital heart defects. By adhering to a standardized clinical study protocol, patient selection criteria, a randomization scheme, longitudinal follow-up patient assessments, and careful prospective data collection, it will be possible to determine whether one of the techniques offers distinct clinical advantages.

Conclusion

The changing aspects of health care demand that hospitals involved in complex procedures such as cardiovascular surgery in high risk patients demonstrate clinical excellence and the ability to deliver cost effective care. The responsibility for carrying out this mandate requires the concerted effort of all hospital departments, and in turn benefits patients and the institution as a whole. Strategies to implement quality improvement and document its impact on clinical care requires programs to promote the clinical, educational, and research missions of the institution.

References

1. Cheng D.C.H., Karski J., Peniston C., et al: Early tracheal extubation after coronary artery bypass graft surgery reduces costs and improves resource use: A prospective, randomized, controlled trial. Anesthesiology 1996; 85: 1300-1310.

2. Dubowski W.B., Murkin J.M.: A risk-benefit assessment of aprotinin in cardiac surgical procedures: Drug Safety 1998; 18: 21-41.

3. Kurz A., Sessler D.L., Lenhardt R.: Perioperative normothermia to reduce the incidence of surgical –wound infection and shorten hospitalization. N Engl J Med 1996; 335: 1209-1215.

4. Connors A.F.J., Speroff T., Dawson N.V., et al: The effectiveness of right heart catheterization in the initial care of critically ill patients. JAMA 1996; 276: 889-897.

5.Thys D.M., Abel M., Bollen B.A., et al: Practice guidelines for perioperative transesophageal echocardiography: A report by the American Society of Anesthesiologists and the Society of Cardiovascular Anesthesiologists Task Force on Tracheoesophgeal Echocardiography. Anesthesiology 1996; 84: 986-1006.

6. Mathew J.P., Parks R., Savino J.S., et al: Atrial fibrillation following coronary artery bypass graft surgery. JAMA 1996; 276: 300-306.

7. Roach G.W., Kanchuger M., Mangano C.M., et al: Adverse cerebral outcome after coronary bypass surgery. N Engl J Med 1996; 335: 1857-1863.