

## Chapter 23

# Invited Commentary



Jerry G. Reves

Practice of surgery and anesthesiology has changed immensely over time. I can best comment on the field of anesthesiology from my vantage point as a cardiac anesthesiologist, but obviously, I have admired the progress and development of all anesthesiology during my professional time in the field since 1969.

I became a cardiac anesthesiologist because of my interest in the cardiovascular system and the ability to rapidly alter it with acute pharmacologic intervention during surgery. This preoccupation with cardiac surgery and anesthesia began in 1965 with my pharmacology research as a medical student and continues till today. Over this near half-century, we have witnessed great changes and improvements in the operative care of patients which merit commentary.

Of the many things that have changed over time, none is greater than patient selection and operative procedure. In early cardiac anesthesiology practice, virtually all patients had congenital heart disease or acquired valvular disease. The most morbid cardiovascular disease, coronary artery disease, was not amenable to the surgical approach until the latter half of the past century. At the same time, the age of the adult population with the disease has been steadily increasing. I recall the days when we were doing our initial investigations into the anesthetic effects of patients undergoing coronary bypass surgery and the average age was almost always 55 years. Today, the average age is much higher for patients undergoing coronary artery bypass surgery than in the past. Reasons for this include less smoking among patients, multiple available drugs such as statins that prevent cardiac events, and greater variety of nonsurgical medical interventions that delay surgery.

Older patients present a variety of problems to cardiac anesthesiologists. For example, as patients age, there is increased sensitivity to the central nervous system drugs that

anesthesiologists use for sedation, sleep, analgesia, and anesthesia. Awareness of this is critical in prevention of “overdosing” the patients that results in unwanted hemodynamic problems and prolonged somnolence after surgery. There is no question that the tissue of older patients is not the same as younger patients, and this leads to surgical hemostasis issues that can be challenging for the anesthesiologist as well as surgeon. The entire coagulation system is also less functional as patients age, again raising management problems around coagulation for the anesthesiologist and surgeon. Although no organs function in the very old as they do in the young patient, the lungs and liver seem to be resilient to the aging process, and this is important in the all important areas of oxygenation and drug metabolism, respectively. However, renal function tends to decline, and some of the drugs administered by the anesthesiologist depend on good renal clearance including some muscle relaxants and some of the antiarrhythmic medications. Awareness of these potential problems can avoid postoperative complications.

The greatest organ of concern to the cardiac anesthesiologist caring for elderly patient is the brain. All central nervous system complications are increased with age. These complications vary in severity from temporary confusion to proven susceptibility to cognitive impairment that can prohibit patients from returning to preoperative functional levels. Stroke is the most profound and dreaded of the neurologic consequences of cardiac surgery. The causes of neurologic adverse events are still largely unknown but probably are a combination of compromised cerebral vascular perfusion, emboli from the aorta, air and other debris when the heart or aorta are opened, thrombi from the atria in patients with atrial fibrillation, and many other possible causes. It is devastating to anesthesiologist, surgeon, family, and patient when a surgery patient is never quite the same after the procedure, especially when the heart or aorta has been “fixed.”

Despite the risks with cardiac surgery and the additional risk that age confers on these patients, the results over the years have steadily improved even as we have cared for older and more complicated patients. This is a result of many innovations and improvements. The first of these is the education

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of the cardiac anesthesiologist. Many of the anesthesiologists today who practice cardiac anesthesia have had formal education and a fellowship. There are journals, textbooks, and a whole new field of cardiac anesthesiology that has emerged over the past 30 years. Evidence-based knowledge guides the cardiac anesthesiologist today. The many drugs used today by anesthesiologists are better than years ago, and the anesthesiologist has an array of compounds to tailor to the needs of the patient. Technology is vastly improved as well. Monitoring allows the anesthesiologist to assess the patient on virtually a beat-to-beat basis and to look at the heart's function with echocardiography. The anesthesiologist now is diagnostician of the heart's anatomy and physiology, as well as pharmacology. The development of better pump oxygenators and many other life-assist devices has made it

possible to get through surgery for patients who would not have been able to in the past. Finally, a major development, in my experience, was the introduction of myocardial protection with cardioplegia in the 1970s. This permitted prolonged periods of safe heart stoppage to allow the surgeon to perform a more perfect operation. We are still searching for other organ protective strategies.

Cardiac surgery has vastly improved as has cardiac anesthesiology over the past half-century. The two disciplines are complementary approaches to improve patient outcomes even in the very old. The same is true for all of our many surgical fields. Neither the surgeon nor the anesthesiologist can justifiably claim to have improved surgery for the patient alone; it has been a marvelous team effort unmatched in all medicine.