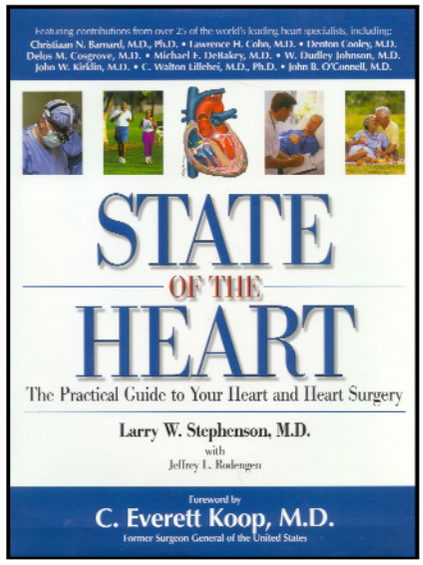

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As techniques in heart surgery improve, it is possible to operate on older victims of heart disease. This raises new questions for both the patient and the family.

CHAPTER FOURTEEN

HEART SURGERY IN THE ELDERLY

AMERICA IS GROWING OLDER. According to data compiled in the 1980 census, 43 percent of all Americans alive then were expected to live to be eighty-eighty years old. In 1990, 7.4 million Americans — 3 percent of the population — were eighty years of age or older. In 2010, the corresponding estimate is that 4.3 percent, or 12 million, Americans will be eighty years old.

Heart disease is relatively more common among the elderly. By the age of seventy years, clinically diagnosed coronary artery disease is present in approximately 15 percent of men and 9 percent of women. Likewise, hypertension affects as much as 50 percent of the population by age seventy. Among octogenarians, approximately 40 percent of the population has cardiovascular disease; 18 percent to 20 percent of those people have coronary artery disease.

Reports in the medical literature vary as to the cut-off age for being classified as elderly. One report from Israel titled "Heart Valve Replacement in Elderly Patients" published in the medical journal *Geriatrics* as recently as 1970 included all patients more than forty-five years of age! As heart surgery has advanced, however, age limits for performing heart surgery have been rolled back. In 1978, I coauthored a medical article published in the heart journal *Circulation* titled "Surgery Using Cardiopulmonary Bypass in the Elderly." At that time, our experience was with eighty-nine patients seventy years of age or older. To my knowledge, this was the first article to specifically deal with heart surgery in patients who were seventy years of age or older. Now it is likely that at least a third of the patients who undergo coronary artery bypass graft surgery are age sixty-five to seventy years or older.

As the age limit continued to advance, I coauthored an article published in *The New England Journal of Medicine* in 1988 entitled "Open Heart Surgery in the Octogenarian." In that article we again reviewed our results at the Hospital of the University of Pennsylvania, but this time examining one hundred consecutive patients who were eighty years of age or older. I believe this was one of the first two or three medical articles to specifically address heart surgery in those older patients. At that time the oldest patient operated on in our group was ninety-seven years old. When I did the follow-up evaluation, our ninety-seven-year-old

lady was age 102. She was in good spirits and doing well.

I subsequently operated on another ninety-seven-year-old woman who had already had her heart valve dilated with a balloon catheter and had been on a mechanical ventilator two or three times because of episodes of severe shortness of breath. I replaced one heart valve, performed a coronary bypass, and installed a pacemaker. She became somewhat of a celebrity in the local news at hospital discharge.

Common sense dictates discretion when recommending major surgery in octogenarians. The aging process reduces the reserves of all organs. For example, these patients are more prone to develop strokes, kidney failure, and pneumonia after major operations. Some vital organs might lack sufficient reserve to absorb the stresses of major surgery. Moreover, these persons, having most of their lives behind them, may lack both the will and the incentive to endure the physical and mental exhaustion associated with major surgery. Generally, octogenarians do not seek open heart surgery; it is forced upon them by the onset or progression of cardiac disease. Operations become the best of the unattractive options.

The chances of complications after major surgery increase with age, particularly beyond age seventy-five years. There are, however, a considerable number of elderly patients with good minds who are limited only by their heart disease. I personally have observed a number of these elderly patients who were almost bedridden and after a relatively simple, straightforward heart operation were able to return to an active and fulfilling life, including in some cases mowing their own lawns, shopping, and so forth.

It is my opinion, however, that elderly patients should not be pushed into heart surgery, by either their family or their physician. As already pointed out, some patients age eighty years or more feel they have lived their life and will not choose to undergo a major heart operation under any circumstances. I believe their wishes should be respected. When some elderly patients are pushed into these operations by family or physicians, they sometimes lack the will to fight and to help the physicians and nurses get them through the surgery and postoperative recovery. Lacking the will and not doing what is necessary to recover make it more difficult and frustrating for the patient, the physicians, the nurses, and especially the family.

So what is the age limit at which one would not recommend performing a heart operation? The answer to that question varies. I believe most surgeons feel that patients should have a good mind and not be bedridden or incapacitated from diseases other than their heart problem. The likelihood that heart surgery can be performed to get the patients back on their feet is worth considering, regardless of age. The other factor that needs to be considered is that even though two patients may have been born on January 1, 1915, one person, in health and general attitude, could seem more like sixty-five years of age whereas the other may be more like one hundred years of age. The chronological and physiological ages of elderly patients can vary greatly. This, too, has to be considered by physicians when they consider whether to recommend heart surgery.

In some countries where the government controls health care, there have been official or unofficial age limits mandating who can and who cannot have heart surgery. This of course involves sensitive ethical and economic issues. Some countries can afford to offer expensive operations to elderly patients at high risk. Is there a level of risk that precludes operation? And if so, who will decide what it is? Is it ethical to refuse to perform high-risk operations when the alternatives

have higher risks? Are surgeons justified in exercising preoperative selection criteria without including the patient in the decision-making process? Can patients demand operations? These and other questions deserve open discussion both within and outside the medical community.

On the basis of the heart surgery results published in the medical literature, surgical intervention can be a reasonable therapeutic option in elderly patients with advanced cardiac disease in whom alternative approaches have failed or are not feasible. Nonetheless, the risk of death and other complications is somewhat higher in these patients.

Although there is no particular medical reason to set an age limit for patients undergoing heart transplantation, there is in fact an age limit set by most heart transplant centers of about age sixty-five years or less. This age limit is arbitrary and not related to patient characteristics but rather to the scarcity of heart donors. The feeling is that younger patients who have more of their life ahead of them should receive the heart transplant.

Coronary Artery Disease and Viagra

As male patients get older, the chance of developing coronary disease increases. The incidence of **erectile dysfunction** or impotence also increases with aging. Recently, a new medication called Viagra has become available to treat erectile dysfunction. Although effective, it should not be used with certain heart medications. Those of us who specialize in heart disease receive many questions regarding Viagra and sometimes questions on other treatment options for impotence from patients who shouldn't take Viagra. I have therefore asked my colleague, Dr. Chipriya B. Dhabuwala, who specializes in impotence and is a professor of urology at Wayne State University, to discuss Viagra as it relates to heart medication and to also discuss other treatment options available for erectile dysfunction.

Erectile Dysfunction, Viagra, and Heart Disease

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Impotence, or erectile dysfunction, is the inability to achieve or maintain an erection for sexual intercourse. The incidence of erectile dysfunction increases with age. It is estimated that 20 to 30 million men suffer from erectile dysfunction in the United States.

Mechanism of Erection

Erection is a complex process that begins with impulses of sexual arousal at the brain centers of sexual excitement. The impulses travel along nerves from the brain to the penis, where they cause secretion of a substance called nitric oxide. Nitric oxide sends signals that cause dilatation of blood vessels and increase blood flow to the penis. It is estimated that during the early stages of erection, the blood flow in the penis increases 2,000 percent to 4,000 percent. This increase in blood flow, along with the relaxation of the smooth muscles of the penis, causes the penis to increase in length and diameter (engorgement). The veins that normally drain the blood away from the penis are closed during erection. Any disturbance in the whole chain of events can contribute to erectile dysfunction.

Erectile Dysfunction: Also referred to as impotence. The inability to achieve or maintain an erection for sexual intercourse.

Causes of Erectile Dysfunction

The incidence of erectile dysfunction increases with age. Hardening of the arteries and blockage within the arteries is the most common cause of erection problems. Very often, blockage of the arteries of the penis occurs with blockage of the coro-

nary arteries of the heart. In many individuals, the erection problem is followed a few years later by coronary artery disease and even heart attack. Blockage of the terminal aorta **(Leriche's syndrome)**, internal iliac arteries, or internal pudendal arteries by the atherosclerotic process can also lead to erectile dysfunction.

Leriche's Syndrome: Involves blockages of the lower aorta as well as the arteries in the pelvis coming off the aorta, including the iliac arteries. It is characterized by claudication, which is pain, aching, and tiredness of the legs and buttocks. It is associated with erectile dysfunction.

There are many other reasons for erectile dysfunction. People with diabetes are at increased risk of developing erection problems. Several studies suggest that almost half the people suffering from diabetes develop erectile dysfunction. High blood pressure can lead to progressive thickening of the arteries of the penis and is associated with erection problems. Smoking cigarettes, excessive use of alcohol, and abuse of substances such as marijuana and cocaine are also associated with erection problems. Automobile and motorcycle accidents causing fracture of the pelvis can very often interrupt the blood supply or the nerve supply of the penis, leading to erection problems.

Guanosine Monophosphate (Cyclic GMP): A chemical neuromediator that helps to transmit messages through the nervous system.

Other causes of erectile dysfunction include surgeries for cancer of the rectum or prostate cancer, which can damage the nerves that register sexual excitement. Certain medications used for treating high blood pressure, diseases of the nervous system such as multiple sclerosis and spinal cord injury, and even radiation therapy for prostate cancer can also lead to erectile dysfunction.

In younger individuals without any risk factors such as diabetes, high blood pressure, and cigarette smoking, the cause of erectile dysfunction is often psychological.

About 5 percent to 10 percent of men with erection problems have low levels of male hormones. Many men can be effectively treated with male hormones.

Medical Treatment of Erectile Dysfunction

Treatment of erectile dysfunction very often depends upon the cause of erectile dysfunction. A person with hormone deficiency will respond best to hormone replacement. Erectile dysfunction due to the use of medications may respond to a change in the medications. Very often, replacing one medication with another may resolve erectile problems.

Viagra, a Pill that Helps Men with Erectile Dysfunction

Viagra, which is also called sildenafil, has provided a breakthrough in the oral treatment of erectile dysfunction. An erection normally occurs with the relaxation of the smooth muscles of the cavernous sinuses and an increase in blood flow to the penis. Nitric oxide produced in response to erotic stimuli acts through a secondary system involving cyclic GMP. This cyclic **guanosine monophosphate**, or GMP, relaxes the smooth muscles, which increases blood flow and penile erection. The human body naturally inactivates cyclic GMP. Viagra prevents this local inactivation of cyclic GMP, thereby enhancing the erection.

In clinical trials, Viagra-related improvement in erections occurred in 70 percent to 90 percent of patients. The pill is taken one hour before sexual activity. It is effective in enhancing penile erection in a wide variety of patients with erectile dysfunction.

Viagra and Heart Patients

The side effects reported with Viagra are usually mild to moderate in nature. These include a flushing sensation, indigestion, nasal congestion, some alteration in vision, diarrhea, and headache. Viagra should not be used by men with coronary artery disease who are taking medicine containing nitrates. Nitrates are found in many prescription medicines used to treat chest pain, or angina, due to coronary artery disease. These medicines include nitroglycerin sprays, ointments, pastes, or tablets that are swallowed, chewed, or dissolved in the mouth. Nitrodur, Imdur, and

Ismo are a few popular ones. If you are not sure whether any of your medications contain nitrates, or if you do not understand what nitrates are, consult your doctor or pharmacist.

Taking Viagra and nitrates can be dangerous. It can lead to a sudden decrease in blood pressure, dizziness, or even death.

Similarly, patients taking medicines to treat high blood pressure and patients who have had heart attacks should check with their doctors before using Viagra.

Some medicines like erythromycin and cimetidine can affect the metabolism of Viagra. Liver problems, kidney problems, or even old age can also affect the way Viagra is handled by the human body. One should never experiment with Viagra by borrowing a pill from a friend. It must always be used under medical supervision after an adequate history assessment and physical examination.

Penile Injection Therapy

Besides Viagra, there are numerous other options for treating erectile dysfunction that are proven and have been used for some time. Medications such as papaverine and prostaglandin, for example, dilate blood vessels, increasing the blood flow and dilating the smooth muscles of the penis. These medications are best administered by a direct injection into the side of the penis using a very fine needle. After the injection, patients experience increase in the blood flow and an erection within fifteen to thirty minutes.

Vacuum Devices

Vacuum devices are another treatment option. They consist of three common components: a plastic cylinder, a vacuum pump, and a constriction ring. The quality of erection produced by the vacuum device, however, is inferior to that of a normal erection. Numbness or a cold sensation of the penis occurs in nearly 75 percent of patients. This can be quite uncomfortable. The tight rubber band used to maintain erection also leads to altered feelings of orgasm and may cause a blood clot to form under the skin. Similarly, tiny purplish spots may appear under the skin from microscopic hemorrhages.

Surgical Treatment

There are three different types of surgical treatments available:

1. implantation of a penile prosthesis,
2. vein ligation for venous incompetence, and
3. vascular surgery for arterial blood flow abnormality.

Penile Prosthetic Implants

Semirigid Prosthesis

The surgical implantation of this semirigid device is simple. With this type of device, the penis is rigid all the time. However, during sexual activity it is possible to adjust the angle so the penis is at a right angle to the body. After sexual activity, the penis can be bent downwards.

Inflatable Penile Prosthesis

Unlike the semirigid prosthesis, with which the penis is rigid all the time, the inflatable penile prosthesis induces an erection at will. The three-piece inflatable penile prosthesis is one type of these devices. It produces an excellent and cosmetically attractive penile erection.

The inflatable cylinders are placed into the corpora cavernosa, and the pump is placed in the scrotum. The reservoir of fluid is implanted inside the pelvis. Very often, the entire operation can be performed through a one-inch incision on the scrotum. The hospital stay is usually less than twenty-four hours.

Postoperative Complications

The incidence of mechanical malfunction of the prosthesis has decreased

greatly during the last several years because of better manufacturing methods and better materials. The vast majority of patients can expect trouble-free functioning of the implant for eight to ten years. If the implant develops any malfunction, such as fluid leakage, the whole implant or the leaking part can be replaced.

Another possible complication of penile implant surgery is infection. This occurs in 3 percent to 5 percent of patients. The prosthesis is usually removed to allow the infection to be controlled and is replaced at some other time. Other complications such as erosion and persistent pain are rare. Some patients complain of reduced penile length.

Patient and Partner Satisfaction

There is very high patient and partner satisfaction with the quality of erection and sex life after penile prosthesis placement. Penile prosthesis placement, when performed correctly, does not alter sensation during sexual intercourse, nor does it interfere with ejaculation or fertility.

Surgery for Venous Incompetence

Venous ligation surgery, or tying off veins that drain blood from the penis so the blood drains more slowly, was designed to improve penile erection. The outcome of this surgical intervention has been very poor.

In many cases, erectile dysfunction, whether caused by heart disease or not, can be treated successfully and allow patients and their partners to return to a normal sex life.

Surgical Arterial Revascularization

Obstruction of penile blood flow can occur as a result of atherosclerosis in the terminal aorta, such as in Leriche's syndrome, which can produce erectile dysfunction. Similarly, obstruction of the internal iliac or internal pudendal arteries in the pelvis also leads to erectile dysfunction. Vascular disease occurring in the arteries of the penis as a result of diabetes or high blood pressure can also lead to erectile dysfunction. Arterial revascularization surgery in the aorta and iliac arteries may eliminate the original obstruction and lead to improved erectile function.

An alternative form of revascularization such as bypass surgery in the penis has been tried. Unfortunately, the long-term results of this type of bypass surgery are disappointing. Very careful patient selection combined with good surgical technique can sometimes lead to successful results.