

July 2000 Press Releases

New Recommendations Issued for Diagnosing Ventilator-Associated Pneumonia

For Immediate Release

"Evidenced-Based Assessment of Diagnostic Tests for Ventilator-Associated Pneumonia: Report of the Clinical Practice Guideline Panel"

Chair: Ronald Grossman, MD, FCCP

CHEST 2000; 118:177S-212S

The American College of Chest Physicians (ACCP) has issued new recommendations to assist physicians in the diagnosis of a serious and often fatal condition, ventilator-associated pneumonia.

The report assesses a number of diagnostic tools, procedures, and approaches. It includes a diagnostic algorithm to guide physicians through a series of steps in order to reach a basis for efficacious and focused treatment. It was published as a recent supplement to CHEST, the peer-reviewed journal of the ACCP.

Difficult to diagnose, ventilator-associated pneumonia (VAP) is a common disorder among patients in intensive care units (ICU) and long-term care facilities. It is associated with complications of intubation (insertion of a breathing tube into the mouth, nose, or trachea) and mechanical ventilator support. Depending on the population studied, the prevalence of VAP may range from as low as 6 per 100 patients (6%) to 52 per 100 patients (52%). Early-onset VAP occurs during the first 4 days of mechanical ventilation and often is caused by *Streptococcus pneumoniae*, *Haemophilus influenzae*, or *Moraxella catarrhalis*. Each day the patient receives endotracheal intubation and mechanical ventilation, the crude rate of VAP increases by 1 to 3% and the risk of death increases twofold to 10-fold.

The new report, entitled "Evidence-Based Assessment of Diagnostic Tests for Ventilator-Associated Pneumonia," was prepared by the ACCP's Clinical Practice Guideline Panel. Prior to the issuance of the panel report, there were few recommendations to guide physicians.

This, according to Ronald F. Grossman, M.D., FCCP, the panel Chair, was largely due to concerns over diagnostic accuracy, reproducibility of results, diagnostic thresholds, nonstandardized methodology, and lack of data on clinical outcome.

The panel conducted an exhaustive literature search and solicited expert input. Studies were analyzed on the basis of scientific rigor and the applicability of findings outside the study settings.

The synthesis of the results of the studies provided the basis for developing recommendations. Recommendations were given a grade weight based on the scientific depth and merit. For example, an "A" was given to a recommendation based on direct scientific evidence. A "C" was given to a recommendation that was based on expert opinion alone.

The panel cautioned against undue reliance on radiologic diagnosis. "Chest radiographs," it said, "are not a reliable diagnostic tool, as there is only marginal reproducibility of the findings obtained from two readers." It also noted that the precise role of invasive testing in diagnosing VAP is controversial. It said that clinicians are increasingly turning to the protected specimen brush (PSB) and bronchoscopic BAL as two such invasive techniques. The report said more studies are needed to determine the quality of these techniques even though both have been in use for several years.

As part of its conclusions, the report said that an associated pneumonia should be suspected in patients receiving mechanical ventilatory support if two or more of the following clinical features are present: temperature of  $>38^{\circ}\text{C}$  ( $>100.4^{\circ}\text{F}$ ) or  $<36^{\circ}\text{C}$  ( $<96.8^{\circ}\text{F}$ ); leukopenia (an abnormal decrease in white blood cells) or leukocytosis (an abnormal increase in the number of circulating white blood cells); purulent tracheal secretions; and decreased Pao<sub>2</sub> (partial pressure of oxygen in arterial blood). In the absence of such findings, the report said, no further investigations are required, and observation will suffice. If two or more of the stated abnormalities are present, a chest radiograph should be evaluated, according to the report. If the findings from it are normal, other causes of the abnormal clinical features should be investigated. If the radiograph shows alveolar infiltrates or an air bronchogram sign, or if the findings have worsened, the panel recommends two options, one involving quantitative testing and the other empirical treatment and nonquantitative testing as outlined in the algorithm.

Despite the literature search and the intensive analysis, more research was seen as crucial by the panel. "Substantial gaps exist in the scientific knowledge of all of these (diagnostic) techniques," said Dr. Grossman. "The best example," he added, "is the lack of data from chest radiographs. Because many diagnostic techniques have not been standardized, reported data on sensitivity and specificity vary, and it is difficult to compare results between medical centers. We recommend formal outcome research with randomized controlled trials to assess various diagnostic and management strategies. This approach," he said, "would provide the opportunity to evaluate economic outcomes using cost-benefit, cost-effectiveness, and cost-utility analyses."

CHEST is published by the American College of Chest Physicians, which represents 15,000 members who provide clinical, respiratory, and cardiothoracic patient care in the U.S. and throughout the world.

Dr. Grossman can be reached by phone at (416) 586-5168 or by email at [ronaldf.grossman@utoronto.ca](mailto:ronaldf.grossman@utoronto.ca).

July 2000 Press Releases

## Inadequate Antimicrobial Treatment of Bloodstream Infections Leads to Significant Mortality Rate in Intensive Care Units

For release: July 13, 2000

"The Influence of Inadequate Antimicrobial Treatment of Bloodstream Infections on Patient Outcomes in the ICU Setting"

Emad H. Ibrahim, MD; Glenda Sherman, RN; Suzanne Ward, RN; Victoria J. Frazer, MD; and Marin H. Kollef, MD, FCCP

CHEST 2000; 118:146-155

[Abstract](#) [Full text](#)

A two-year study conducted at an urban teaching hospital's medical and surgical intensive care units showed that 147 persons (almost 30 percent) of 492 critically ill patients who had a bloodstream infection received inadequate antimicrobial therapy, with 91 of those individuals (about 62 percent) dying. This research, according to the authors, demonstrated a significant direct association between the administration of inadequate antimicrobial treatment for pathogens and associated rates of hospital mortality.

During the July 1997 to July 1999 study at Barnes Jewish Hospital's intensive care units in St. Louis, Missouri, the death rate for the 345 critically ill patients with bloodstream infections who received adequate antimicrobial therapy was slightly over 28 percent.

Writing in the July issue of CHEST, the monthly peer-reviewed journal of the American College of Chest Physicians, Marin H. Kollef, M.D., FCCP, Pulmonary and Critical Care Division, Washington University School of Medicine, St. Louis, Missouri, along with four colleagues, said that their data suggest efforts should be made to reduce the administration of inadequate antimicrobial treatment to hospitalized patients with bloodstream infections, especially in those infected with antibiotic-resistant bacteria and *Candida* species. *Candida* is a yeastlike fungus that only rarely invades the bloodstream.

Of the 492 patients studied, 193 (slightly over 39 percent) had a community-acquired bloodstream infection, 291 (slightly over 59 percent) had hospital-acquired bacteremia or presence of bacteria in the blood, and 8 patients had a community-acquired infection first followed by a hospital-acquired one.

"Patients with a hospital-acquired bloodstream infection were statistically more likely to receive inadequate antimicrobial treatment compared to patients with a community-acquired bloodstream infection," said Dr. Kollef.

According to the authors, the risk factors for the administration of inadequate antibiotic treatment appeared to share common characteristics: the presence of an antibiotic-resistant pathogen such as a *Candida* species, or having had therapy predisposing to the

development of an antibiotic-resistant infection, such as either prior antibiotic treatment or prolonged central vein catheterization.

Dr. Kollef noted that predicting the presence of an antibiotic-resistant bloodstream infection can be difficult. However, he said that prior antibiotic exposure, prolonged hospitalization, and the presence of invasive devices have all been associated with its occurrence.

The article notes the staggering overall national costs of antimicrobial resistance, with some estimates ranging as high as \$30 billion annually for the control and treatment of such infections.

To balance the competing issues of providing adequate antimicrobial treatment to potentially infected patients against the risk of unnecessary antibiotic treatment, the researchers suggest the early administration of a broad spectrum antimicrobial treatment to high-risk patients with suspected bloodstream infections. This approach should be followed by the rapid tailoring of the antimicrobial regimen, or its discontinuance, based on culture results and the patient's clinical course.

CHEST is published by the American College of Chest Physicians, which represents 15,000 members who provide clinical, respiratory, and cardiothoracic patient care in the U.S. and throughout the world.

Dr. Kollef can be reached by phone at (314) 454-8764 or by fax at (314) 454-5571. His email address is [kollefm@msnotes.wustl.edu](mailto:kollefm@msnotes.wustl.edu).

July 2000 Press Releases

Was the Composer of Brahms' Lullaby the Victim of a Sleep Disorder?

For release: July 13, 2000

"Brahms' Lullaby Revisited: Did the Composer Have Obstructive Sleep Apnea?"

Mitchell L. Margolis, MD, FCCP

CHEST 2000; 118:210-213

Full text

The hypothesis that the composer of one of the world's best known lullabies suffered from a common sleep disorder was advanced today in a special article in the July issue of CHEST, the peer-reviewed journal of the American College of Chest Physicians.

Johannes Brahms had a mixture of symptoms, behaviors, and risk factors that are associated with obstructive sleep apnea (OSA), a condition unknown to the physician of his day, according to Mitchell L. Margolis, MD, FCCP.

Sleep apnea is the most common sleep disorder which affects as many as 20 million Americans. Conditions associated with sleep apnea include sudden interruption of breathing, heavy snoring, sleep deprivation, and excessive daytime sleepiness. The cost to society due to the loss of productivity, industrial accidents and medical bills is estimated to be over \$60 billion each year. The consequences range from annoying to life-threatening and include personality changes, sexual dysfunction, and falling asleep at work, on the phone or while driving. Many of these characteristics, Dr. Margolis notes, can be found in the personal history of Johannes Brahms.

Brahms (1833-1897) is believed to have died of pancreatic cancer. Since he never married, there is no documentation by a spouse of habitual snoring. However, a traveling companion, baritone George Henschel, refers to the composer's habit of snoring and how it once drove him from the room they shared, since staying there "would mean death to any hope of sleep on my part."

Dr. Margolis points out that in his later years, the then portly Brahms frequently snoozed in the afternoon in the cafes of Vienna becoming a familiar sight for gawking tourists. By the time he reached his sixties, Brahms was known to fall asleep at the table or theater box. In addition to the symptoms of snoring and apparent sleep deprivation, Dr. Margolis notes some physical characteristics of the composer, particularly obesity, adds to the hypothesis that he suffered from sleep apnea. While slender as a youth, Brahms became too stout for his fur coat by the age of 35. In addition, his neck size became larger and larger. "His neck size doubtlessly contributed to his aversion to neckties of any kind," Dr. Margolis said, and from age 50 onward, Brahms wore the collar-less shirt of a hunter." The author added that increased upper-body obesity, as reflected by neck circumference, is a particularly good predictor of OSA.

Brahm's alcohol consumption is also cited as suggestive of OSA. In his later years, he became a fixture at various pubs and taverns. Alcohol is recognized as a common and important exacerbating factor in OSA .

Brahms has been quoted as saying: "If there is anyone here I have not offended, I apologize." Whether true or apocryphal, that quote reflects the composer's prickly personality, according to Dr. Margolis. "Irritability and depression are typical of the personality changes that may accompany the sleep disorder. Thus, it is tempting to hypothesize that the composer's intermittent bouts of depression and notorious irascibility could in part relate to chronic sleep fragmentation and/or nocturnal hypoxemia (a deficiency of oxygen in the blood)," he said.

A detailed reading of the literature, Dr. Margolis pointed out, reveals near-classic descriptions of the most characteristic symptoms of the disorder: loud snoring and daytime hypersomnolence (excessive drowsiness). He added: "The composer's eventual physical attributes also correspond to those of a typical OSA patient, particularly his obesity and thick neck. Extensive lifelong alcohol consumption comprises a likely and familiar exacerbating factor."

Dr. Margolis said: "I conclude that the hypothesis that Johannes Brahms suffered from OSA is tenable, and that OSA could help explain some important aspects of his life and personality. One wonders if the disorder contributed to lifelong alienation from friends and marriage, thereby indirectly nurturing his determined devotion to the creation of his immortal music."

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Dr. Margolis can be reached by phone at (215) 823-5807 or by fax at (215) 823-7813 or by email at [Mitchell.Margolis@med.va.gov](mailto:Mitchell.Margolis@med.va.gov).

August 2000 Press Releases

Study Shows Standard Test for Sleep Apnea Does Not Detect Condition in Many Patients

For release: August 15, 2000

"Mild to Moderate Sleep Respiratory Events: One Negative Night May Not Be Enough"

Olivier Le Bon, MD; Guy Hoffmann, PhD; Juan Tecco, MD; et al

CHEST 2000; 118:353-259

Abstract Full text

Testing for two nights in a sleep center rather than the standard one night avoids false-negative results and misdiagnoses connected with sleep apnea syndrome, according to a study published in the August issue of CHEST.

Writing in the peer-reviewed journal of the American College of Chest Physicians, Olivier Le Bon, M.D., from the Brugmann Hospital Sleep Unit, Brussels, Belgium, along with six associates, studied 243 patients admitted to the unit between 1992 and 1998 to determine whether they had sleep apnea-hypopnea syndrome. Apnea occurs when tissues at the back of the throat periodically collapse, causing blockage, and forcing the sleeper to gasp for air. Rarely does it cause the victim to awaken. In this study, all individuals tested suffered from excessive daytime sleepiness, fatigue, snoring, or a description by a bed partner of sleep interruption.

In the United States, sleep apnea affects an estimated 18 to 25 million persons, with less than 1 million being aware of their problem. For victims, daytime sleepiness can be so profound that it affects business and social life. Sometimes sufferers fall asleep at the wheel, causing motor vehicle accidents. The costs to society from loss of productivity, industrial and personal accidents, plus medical bills, is estimated to be over \$60 billion per year. Once detected, sleep apnea can be treated with continuous positive airway pressure (CPAP), as well as other therapies.

"This study proves it is worth performing two consecutive sleep test sessions or at least a second one when the results of testing on the first night are negative in all patients admitted for apnea detection," commented Dr. Le Bon.

The researchers defined an episode of apnea as greater than 80 percent reduction in airflow (almost total breathing cessation) for at least 10 seconds during sleep. A hypopneic episode was defined as a 50 to 80 percent reduction of airflow accompanied either by a reduction in oxygen saturation of more than 3 percent or by arousal from sleep. To determine respiratory events, the investigators made polysomnography recordings on each of two nights. A reading of more than 20 events per hour on the apnea-hypopnea index (AHI) was considered sleep apnea syndrome.

In the study, 101 patients had an AHI of more than 20 events per hour. Of these individuals, 74 tried nasal continuous positive airway pressure (nCPAP) on night two. These persons were not part of the night two comparative data to determine the value of a second test. A subgroup of 169 patients who did not use an nCPAP device constituted the comparison group of night one versus night two.

During night two, 62 patients shifted up to a plus 20 AHI score, almost twice the 32 whose scores dropped on the second night. The scientists said this finding "underscores the larger proportion of subjects having more severe sleep events in night two."

"The comparison between night one and night two recordings," said Dr. Le Bon, "indicates a clear classic first-night effect (on night one) as shown by a shorter sleep period and less total sleep time, worse sleep efficiency, longer sleep onset latency, more wake time after sleep onset, a higher awakening index, less rapid eye movement sleep time, and longer rapid eye movement sleep latency."

Previous studies have concluded that one night of recording should suffice for diagnosis. The American Thoracic Society Consensus Conference on Cardio-Pulmonary Sleep Studies noted that "a single polysomnogram is sufficient to exclude clinically important sleep apnea." The authors said that most sleep laboratories follow the policy of recording only one night, and many capture only the first few hours of sleep.

According to Dr. Le Bon, in considering the disability associated with sleep apnea/hypopnea syndrome, as well as its global cost to society, doctors must not miss the diagnosis.

"Our study confirms that an important number of patients presented false-negative results on night one, which turned out to be more frequent among severe cases," he said. "This underscores the need for a second test recording when the results of night one are negative."

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Dr. Le Bon can be reached by phone at 322 477- 2554 or by email at [lebono@ulb.ac.b](mailto:lebono@ulb.ac.b)

August 2000 Press Releases

Deception Rate Reported at 30% Among Clinical Trial Patients

For release: August 15, 2000

"Unpredictability of Deception in Compliance With Physician-Prescribed Bronchodilator Inhaler Use in a Clinical Trial"

Michael S. Simmons; Mitchell A. Nides, PhD; Cynthia S. Rand, PhD; et al  
CHEST 2000; 118:290-295

Abstract Full text

Researchers at two universities found that 30% of volunteer patients in a clinical trial reported that they took their medication when they did not, raising questions about the accuracy of the study conclusions.

The new report was published in the August issue of CHEST, the peer-reviewed journal of the American College of Chest Physicians (ACCP).

One hundred and one patients were studied at Johns Hopkins University (JHU) and the University of California at Los Angeles (UCLA). They were a subset of the large, multi-centered Lung Health Study, a major clinical trial involving over 5,000 participants which was designed to evaluate the effect of intensive smoking cessation counseling, and regular use of an inhaled bronchodilator on the progression of chronic obstructive pulmonary disease (COPD). Metered-dose inhalers (MDIs) were used to deliver this medication. With each patient visit, the MDI canisters would be weighed to determine the total amount of medication that had been dispensed since the last visit and whether that correlated with the self-report given by the volunteer patient.

Earlier studies reported that a number of clinical trial patients using MDIs engaged in a deceptive practice called "dumping," whereby individuals would remove or discharge all the medication from the MDI canister so when it was weighed at the next patient visit, it would suggest that the patient had been taking medication as instructed.

In the JHU/UCLA study, researchers used electronic medication monitors-Nebulizer Chronolog (NC)-- in an attempt to detect the deceptive practice. The NC records the date and time of each actuation of an attached MDI. The goal of the study was to analyze data obtained over one year of NC use in the Lung Health Study in an attempt to determine what characteristics, if any, might predict "dumping" behavior in clinical trial participants. Two hundred and forty-one participants at both centers received an inhaler with an attached NC. One hundred and one of these patients (56 at JHU and 45 at UCLA) were not informed of the date/ time detection capabilities of the NC. They were told that

the NC would be monitoring the total amount of medication used instead of each dose. These participants, who were followed for a year, were instructed to take two puffs of the MDI three times a day.

At the end of the study period, 30 of the 101 (29.7%) were found to be guilty of at least one canister dumping which researchers described as "an unexpectedly large and disturbing figure." By contrast, among 135 other patients who were aware of the function of the NC, only one participant had an episode of canister dumping during the year-long study. In analyzing the characteristics of those who dumped canisters against those who did not, researchers could not find any statistically significant differences in such categories as age, race, gender, education, amount of cigarette use, etc.

Clinical trials are regarded as one of the most reliable forms of research, and many practice guidelines for clinicians are often based on trial results. The JHU/UCLA researchers noted that conclusions drawn from the results of clinical trials are generally based on the assumption that the prescribed study medication has been taken according to the protocol. "This assumption," they added, "can be violated to varying degrees, possibly leading to inappropriate conclusions."

Speaking for his colleagues, Michael Simmons of the UCLA School of Medicine, said: "Our data suggest that dumping behavior meant to deceive study personnel cannot be predicted or detected readily based on data generally available in clinical trials, unless electronic monitors are used to gather data on actual medication use patterns." He added: "It is important, therefore, to use electronic monitoring in clinical trials where practicable, or to consider the possible effects on duplicitous behavior on study outcomes when such detailed information on medication use cannot be obtained."

CHEST is published by the American College of Chest Physicians (ACCP) which represents 15,000 members who provide clinical, respiratory, and cardiothoracic patient care in the U.S. and throughout the world.

Mr. Simmons can be reached by phone at 310 206-4463 or by email at [msimm@ucla.edu](mailto:msimm@ucla.edu)

September 2000 Press Releases

Simple Pulmonary Test Can Predict Overall Long-term Survival

For release: September 12, 2000

"Pulmonary Function Is a Long-term Predictor of Mortality in the General Population: 29-Year Follow-up of the Buffalo Health Study"

Holger J. Schunemann, MD, PhD; Joan Dorn, PhD; Brydon J. B. Grant, MD, FCCP; et al  
CHEST 2000; 118:656-664

Abstract Full text

A new study showing that a simple pulmonary function test can predict overall long-term survival rates in both men and women appears in the September issue of CHEST.

Writing in the monthly peer-reviewed scientific journal of the American College of Chest Physicians, Holger J. Schunemann, M.D., M.S., Department of Social and Preventive Medicine, School of Medicine and Biomedical Sciences, State University of New York at Buffalo, in association with four colleagues, studied survival rates based on a standard pulmonary function test called forced expiratory volume in one second (FEV1), expressed as a percent of predicted normal. The lung function test was performed on a randomly selected sample of 554 men and 641 women in 1960 - 1961 during the Buffalo Health Study, which was designed originally to investigate factors related to hypertension and pulmonary function. The participants were ages 20 to 89 years at baseline. Records were analyzed to determine whether they were living or dead, as well as to determine the cause of the recorded death. No previous study had reported an association between lower levels of pulmonary function and all-cause mortality for a follow-up period of 29 years.

In their research, the investigators sought to determine the time span over which pulmonary function remained a significant predictor of mortality. They performed sequential survival analysis among the participants who had minimal survival times of 5, 10, 15, 20, and 25 years after enrollment in the study.

"In females involved in this study," said Dr. Schunemann, "pulmonary function was a predictor of all-cause mortality for a period longer than 25 years. In male participants, pulmonary function lost its predictive value after 20 years."

When FEV1 scores were divided into five different levels of percent predicted values, participants in the lowest quintile experienced significantly higher all-cause mortality than did those in the highest 20 percent. The hazard risk ratio in the lowest quintile of the pulmonary function test for death from ischemic heart disease was over 2 to 1 for men and almost that level for women as compared to others in the highest quintiles. .

During the entire follow-up period, 54.5 percent of the men and 43.4 percent of the women died. According to the investigators, both genders died predominately from cardiovascular disease (53.5 percent), with ischemic heart disease (39 percent in men and 28 percent in women), in particular, representing the predominant cause of death. Respiratory disease was found to be the underlying cause of death in 9.6 percent of the men and 3.6 percent of the women.

The analyses were adjusted for significant risk factors for heart disease, including body mass index, systolic blood pressure, gender, education, and smoking status. The researchers point out, however, they had no information on another significant risk factor, serum cholesterol level.

"It is not clear in this study," said Dr. Schunemann, "whether the observed association reflects a cause-effect relationship with mortality. However, the lung is a primary defense organ against environmental toxins, and impaired pulmonary function could lead to decreased tolerance against these environmental toxins."

To determine whether subjects were alive or dead, the research team undertook computer-based searches of the New York State Department of Health Vital Records Death Registry, the Cancer Tumor Registry, the Department of Motor Vehicles records of drivers licenses and auto registrations, the U.S. Social Security Administration death master files, and manual searches of the telephone directories of the city of Buffalo.

They also attempted to contact participants' last employers, neighbors, churches or other contact points if listed on the study's original questionnaire. Living participants were followed-up with direct telephone and mail contact or through relatives and other persons such as nursing home personnel.

According to Dr. Schunemann, it is urgent to reach a better understanding of the relationship of impaired pulmonary function to disease in order to undertake preventive measures. He said that we know from several studies that smoking cessation does not seem to be the only answer because the risk from low pulmonary function is found also in never-smokers.

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Dr. Schunemann can be reached by phone at (716) 898-5792 or by email at [HJS@Buffalo.edu](mailto:HJS@Buffalo.edu)

September 2000 Press Releases

Use of Stents Rather Than Repeat Bypass Does Not Have Long-term Benefit for Heart Patients

"Long-term Clinical Results After Stent Implantation in Old Obstructed Saphenous Vein Grafts"

Paulo A. Ribeiro, MD, PhD; Karen Scavetta, MD; Christopher Oh, MD; et al  
CHEST 2000; 118:750-755

[Abstract](#) [Full text](#)

The use of stents to open up obstructed veins that were used in previous coronary artery bypass grafts (CABG) does not result in long-term clinical benefit, according to a new study.

The study was reported in the September issue of CHEST, the peer-reviewed journal of the American College of Chest Physicians (ACCP).

The veins generally used in CABG are called saphenous veins, which are taken from the leg. Although CABG has become a highly successful procedure, these veins typically develop atherosclerosis three years after being implanted, causing the passage for blood flow to narrow. When the narrowing becomes threatening, a second bypass procedure is considered. However, redo CABG is associated with a much higher mortality and morbidity rate than for the initial surgery. For that reason, researchers at Loma Linda University Medical Center decided to assess an alternative course, that of treating patients with obstructed saphenous vein grafts (SVG) with coronary angioplasty, using stents deployed by oversized balloons.

Coronary angioplasty is a catheter procedure which takes a deflated balloon to the site of the obstructive plaque and is then inflated to press the plaque against the vessel wall and enlarge the opening for blood flow. In recent years, a stent—a section of metal mesh—was inserted at the site following balloon angioplasty and opened up to press the plaque against the vessel wall and keep it in place.

Paulo A. Ribeiro, M.D. and colleagues at Loma Linda followed 89 patients who had 121 SVG stent implants, an average of 1.4 stents per patient. The average age was 67. Eighty-four percent were male. The average time since the original bypass surgery was 10 years. The average time of follow-up was 24 months.

At follow-up, 60 of 89 patients (67%) were able to return to their normal daily activities. Twenty-eight percent were free of any clinical events; 47% had angina pectoris; 14% experienced myocardial infarction; 11% had cardiac-related death; and 7% had noncardiac-related death. Of the 37 patients who had a coronary angiogram, 43% had restenosis (a re-closing of the vessel passageway) at the original site; 30% had stenosis at a different site; and 27% experienced no angiographic restenosis or coronary disease progression.

Observing that only 28% of the patients were free of any clinical events, Dr. Ribeiro said: "Despite the excellent immediate angiographic result, there was a high rate of disease progression in both the SVGs and native coronary artery disease, because the atherosclerotic disease progression is inexorable, and SVG stent implant is a short-term palliative procedure for the majority of patients with old obstructed SVGs." He added that the use of the oversized balloon did not translate into an improved long-term clinical outcome, but said a randomized study comparing oversized with regular-sized balloons would provide a more definitive answer to the question regarding size.

"We conclude," Dr. Ribeiro said, "that the late clinical outcome of stent implant in old SVGs using oversized balloons and optimal angiographic results achieves short-term palliation but does not usually translate into good long-term clinical outcome. The majority of patients experienced further cardiac events because of restenosis and atherosclerotic coronary artery and SVG disease progression."

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Dr. Ribeiro can be reached by phone at (909) 824-4652 or by e-mail at paulo\_a\_ribeiro@hotmail.com.