NEWS

THE UNIVERSITY OF TEXAS
SOUTHWESTERN
MEDICAL SCHOOL AT DALLAS

BOB FENLEY, DIRECTOR OF INFORMATION

JOHN WEEKS, ASSOCIATE DIRECTOR

Contact: Bob Fenley

DALLAS--Two new machines are being used by University of Texas Southwestern Medical School surgeons to buy added life for heart and lung patients.

Just arrived for use at Parkland Memorial Hospital is an "intra-aortic balloon assist device" designed to keep patients with severe heart failure alive until they can have coronary vein bypass graft operations.

The previous outlook for patients with severe heart pump failure of this nature had been practically zero. With the heart assist and vein graft combination, patients have a better than so-so chance.

"For some years, the Division of Thoracic and Cardiovascular Surgery has been experimenting with a mechanical cardiac assist device which would allow patients with failing hearts to be supported for an extended length of time," said Dr. W.L. Sugg, professor of surgery and head of the division. "It was proved," he added, "that this mechanical device would support the failing circulation for periods up to four or five days. In essence, the device takes the work load off the heart."

First designed as a plastic chamber which worked outside the body, the heart assist device has evolved into a long, thin balloon which is placed in the aorta. When the heart beats, the balloon deflates--when the heart rests, the balloon inflates. In this way, the device acts as an additional pump to take the load off the heart.

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"It was further shown in a series of experiments," continued Dr. Sugg, "that by supporting the failing circulation in the presence of a heart attack, the actual size of the area of damaged heart muscle would be reduced.

"The prototype equipment was then used on a series of patients who were dying from cardiogenic shock after suffering severe myocardial infarction (death of heart muscle tissue). All means of medical intervention had been exhausted prior to placing these patients," the doctor added.

An immediate response from the patient was generally the result of being placed on the machine and it was found the patient could be supported more or less indefinitely. Once the machinery was discontinued, however, many of the severely damaged hearts could not support the failing circulation.

"Recently," said Dr. Sugg, "since the new coronary vein bypass graft has been developed, it has been shown that if these patients are supported by a mechanical device and then undergo an operation for insertion of the coronary vein bypass, survival has been in the range of 50 to 60 per cent. Prior to this combination of treatment--that is surgery and mechanical support--the mortality has been routinely 100 per cent in all hospitals in this country."

Purchase of the new heart machine was made possible by a grant from Southwestern Medical Foundation from its Fred and Louise McClurkin bequest.

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It takes about 10 minutes to install the assist device after the patient is admitted to the hospital. The balloon is inserted into an artery in the leg of the patient and pushed up until it is in the major artery near the heart. A sensor picks up the beat of the heart, transfers it to an electronics console which causes the balloon to inflate with helium gas and deflate in rhythm.

Heretofore, patients with this type of heart attach had blood pressure so low that no effort could be made to determine where the heart blockage was located. But with the pressure kept normal by the assist device, doctors inject dye and make x-rays. Once they find it, the patient is moved to the operating room (with the balloon still in him and the console rolling alongside the bed).

Then a vein is removed from the patient's leg and sewed in from the large vessel in the chest to the obstructed coronary artery.

"This new equipment now allows a hopeful outlook for those patients who previously would have died," said Dr. Sugg.

In addition to the patients suffering heart failure, there are a significant number of others who need machine support of a different kind. For instance, there are those admitted with severe breathing insufficiency after an auto accident or as the result of disease.

In these cases, the heart is generally performing well but the lungs are no longer able to oxygenate blood. For years surgeons have been able to completely reroute the circulation through a heart-lung machine for short times. This machine oxygenates the blood but previous models have been successful for only very short periods--long enough to conduct most heart operations.

third add machines

But after eight or 10 hours, severe lung problems develop because the machines actually destroyed blood and protein.

Recently, a new generation of oxygenators--called membrane lungs--have been introduced and one has been acquired by UTSMS surgeons for Parkland. These have proved to possess characteristics very similar to the human lung.

Made of very thin sheets of silastic rubber, the membranes are much better able to preserve the blood and protein than the old models.

In practice, a tube is placed in a vein in the leg and a vein in the neck. Blood flows from the leg into the membrane and is put back by the tube in the neck, just above the heart.

"Thus the patient is supplied with well oxygenated blood and experience has shown that this type perfusion may be carried on for up to six to eight days, allowing time for the patient's lungs to heal in the case of injury," said Dr. Sugg.

"At present, three patients have been supported on the membrane lung for periods up to five days. The results have been extremely encouraging. Engineers are now working to refine the membrane for greater efficiency.

"So we are now able to offer a new outlook for those heart and lung problems for which previously there was no treatment," concluded Dr. Sugg.

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