Total Artificial Heart

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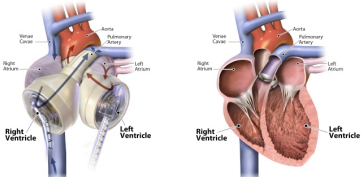
Abstract: **Over the past two decades there has been an increase of population of patients with heart failure, but no increase in organ donators. The solution to this has become the use of an artificial heart. The artificial heart is a device that can be used to bridge the time of the heart transplant or to permanently replace the heart incase if the transplant is impossible. A Total Artificial Heart (TOH) is currently one of the best devices for patients that required biventricular mechanical circulatory support as a bridge to transplant.**

I.INTRODUCTION

Heart failure (HF), also called congestive heart failure (CHF) is when the heart is unable to provide sufficient Pump action to distribute the blood flow needed for the body. It is estimated that about 5 million Americans have congestive heart failure. There are about 550,000 new cases each year. Heart failure treatments consist of lifestyle measurements such as: dietary changes, exercise, and medication. Sometimes it needs to be treated with a heart transplant. But due to the increase of patients needing a heart transplant and the limited amount of organ donors an alternative bridge to a heart transplant is a total artificial heart. Patients can have an total artificial heart implant while they wait for a donor. The reason why this is a good alternative bridge is because it helps the patients stay alive until they receive a heart donor.

II. COMPOSITION OF THE TOTAL ARTIFICIAL HEART

The SynCardia CardioWest total artificial heart was the first FDA total artificial heart approved. It received a FDA approval on October 14, 2004 followed by a 10-year clinical study. The SynCardia TAH is a biventricular orthotropic pneumatic pulsatile pump that has two separate artificial ventricles located where the natural ventricles would be. Both artificial ventricles differ in spacing and angulations of the inflow and outflow valves. The entry sites for the conduits for the left and right remain the same in the same construction. Each ventricle has a rigid spherical "housing" that supports the blood contracting diaphragm, two intermediate diaphragms, and a air diaphragm (All of the diaphragm are made out of segmented polyurethane). The inflow and outflow Medtronic halls are mounted on the housing. The wall of the jaunt is essentially from wall of the housing to the other. It allows the ventricle fully fill and fully eject 70mL per beat. An adjustable polyurethane line inflow connector is sewn to the atrial cuff of the recipient heart and then snapped on the info valve mount of the artificial ventricle. Then the patient is places wired-reinforced air conduits attached to longer drivelines and external console. The console is mobile by batteries and compressed air tanks that allow the patient to move around the hospital or any care facility. An image of a TAH can be seen to the right.



III. RESULTS

In the United States TAH is indicated for an in hospital bridge for patients with end stage of biventricular heart failure awaiting heart transplant. In Europe TAH patients can be discharged to their homes while awaiting transplantation. Statistics of post TAH transplant show that 75% of the patients are able to walk or move about and about 60% are able to walk a 100ft after two weeks following the implantation. In a study the overall survival to transplantation was achieved in 79% of patients receiving the TAH in contrast to 46% of the control group (control group had these qualifications: patients eligible for transplant, NYHA CHF Class IV, BSA range 1.7-2.5m^2, and hemodynamic insufficiency).

IV. Conclusion

In conclusion, TAH is one of the best bridge alternatives for someone who is awaiting a heart donor. It can help the patient expand their life.

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