



“Offering New Hope and Saving Lives: Donation After Circulatory Death (DCD) Heart Transplantation”

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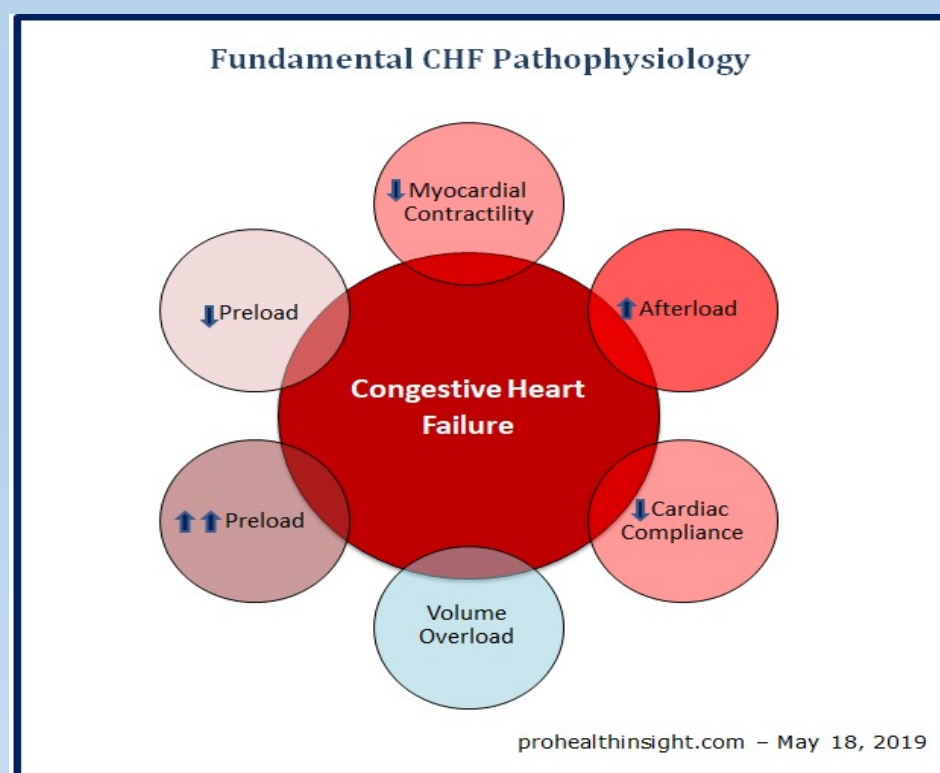
Significance and Background

In the United States more than 3500 people are on the waiting list for a donor heart. The majority are middle aged and most have severe, debilitating heart failure. Fewer than half of the prospective heart recipients receive a heart transplant due to lack of suitable organs. Sadly between eighteen to twenty two people die every year while waiting for an organ donation. In recent years, a breakthrough technological concept known as Donation after Circulatory Death (DCD) is being used to address the gap in the number of available organs by increasing the donor organ pool.



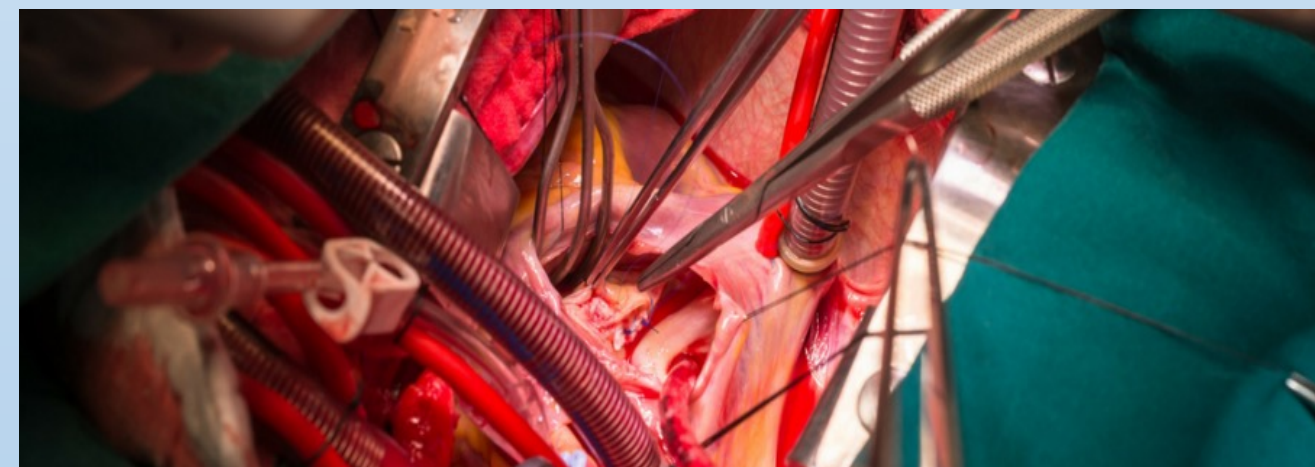
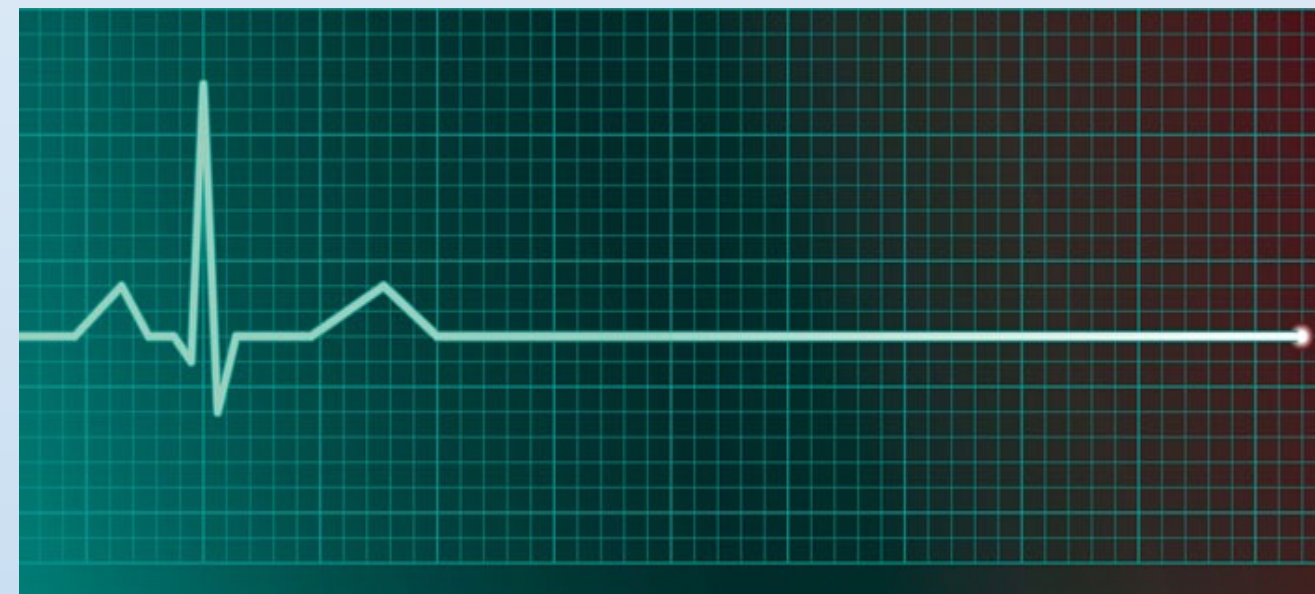
Assessment

Approximately six million patients in the United States live with heart failure. Of those, 10% will progress to end stage heart failure. While there is no cure, heart transplantation can bring hope to patients when other treatments no longer can. However, there is an extreme shortage of viable organs that can provide a life saving transplant in a timely fashion. In 2019 only 3551 heart transplants were performed, with patients waiting up to a year or more for a transplant. On December 1, 2019 Drs Schroder, Benjamin Bryner and Carmelo Milano performed the first heart transplant in the United States using a heart from an adult donor after circulatory Death (DCD). Although this approach has been used for other organs including kidney, liver, pancreas and lung, the heart had not been transplanted by this method in the United States prior to this team.



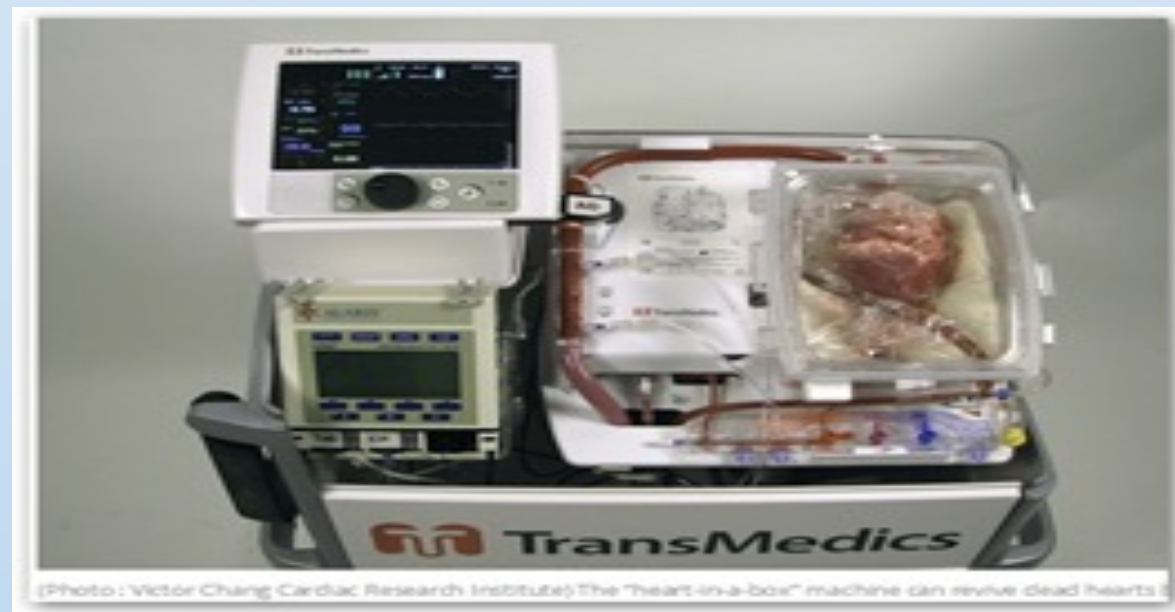
Preparation and Planning

Heart transplants are typically performed using a heart from an organ donor after brain death (DBD) when neurological function is lost following a devastating event, such as trauma, stroke or a drug overdose. DCD organ donors experience the same life altering event that requires life support with no chance of recovery with the exception that they do not meet the strict criteria of being “brain dead” because they may be exhibiting involuntary reflexes. The DCD organ is attained after the family honors the donor’s wish to donate organs and is taken off life support. This withdrawal process is followed by the patient’s cardiac arrest event, the heart stops beating and the patient dies. A “pause period” for cardiac assessment is performed before the heart may be procured.



Implementation

After the donor’s heart stops either naturally or because the family’s wish to discontinue life support, the heart is retrieved via the “Donation after Circulatory or Cardiac Death (DCD) process. This is possible due to a machine that allows the heart to be perfused with warm blood after removal as well as keeping the heart functioning and “alive” enough to be transported and transplanted several hours after retrieval. The donor heart is attached to the machine which perfuses the donor’s blood in a medium containing steroids, antibiotics, adenosine, vitamins and other medications to improve its viability. Prior to this machine, the donor heart was transported on ice in a cooler which prohibited the distance the organ could travel. The machine also allows the surgeon to assess the heart’s functionality. The metabolic consumption, heart stressors and coronary artery disease can be evaluated prior to transplantation. The surgeon can utilize the machine to correct some of the donor heart deficits by replenishing the energy and circulatory functions while visualizing the heart beating on the machine. The “reanimation” of the donor heart is continuously being paced and monitored to ensure it maintains a metabolically equivalent balance similar to the heart’s maintenance in a healthy human body.



Results and Benefits

- *DCD Organs can increase the donor pool by 30% or about 750 – 1000 additional transplants per year
- *This increase will aid in decreasing the national shortage of donor hearts
- *The surgeon has more detailed diagnostics to aid in the evaluation of the donor (DCD) organ versus the standard heart transplant
- *The potential procurement sites can be extended greater distances with the use of the “heart in the box” DCD machine than previously available
- *The parameters for accepting a DCD vs the standard Donation after Brain Death (DBD) Donors is less strict
- *The quality in donor recipient matching is better with a DCD Heart than the standard heart usually due to the DCD donor being younger in age which allows better outcomes for the recipient

Outcomes Comparison Of DCD vs DBD Transplants

Number of cases at DUH – DCD = 80; DBD = yearly avg 1500
AVG Donor Age – DCD = 28; DBD = 35
Long Term Survival Rate – DCD = Unknown; DBD = 13 years

Noticed Delayed Graft Function in a few instances meaning the DCD Heart “wakes” more slowly with need for ECMO usually lasting 24 to 36 hours

Conclusion and Future Implications

The future of DCD Heart transplantation is monumental in the advancement of offering donor hearts to potential recipients. If all parameters are met the DCD Donor Heart could outperform a brain dead donor heart by limiting the lack of oxygen, using warm perfused blood and decrease damage to heart tissue while in transit to the prospective heart recipient. The elimination of the strict 30 to 45 minutes to transplant a traditional heart may triple or quadruple the number of heart transplants offered per year. Currently the main disadvantage with DCD transplant which is also expected with the traditional donor heart is organ rejection and death. Presently, organ transplantation is the most cost effective treatment for end stage heart disease. With continued trials and utilization the DCD heart transplants will allow more scientific advancements thereby offering more people a second chance for a viable donor heart.

References

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