

# Heart Transplant: A Brief History

Rudrajit Paul

## ABSTRACT

Cardiac transplant is a life-saving procedure and with the advancement in technology, it is rapidly becoming available for patients in all corners of the world. As the heart transplant program is extended to Eastern India, this is an opportune moment to look back on the history of this medical miracle and how we reached the current level of excellence. This article is a brief recount of that illustrious history.

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Recently, cardiac transplant program has been started in West Bengal in government-private partnership, and some amount of media fanfare has been created. In India, however, heart transplant started way back in 1994. Many of the budding physicians of today will be working in advanced transplant units in this country or abroad in the near future. Thus, this is a good time to reflect back on the history of heart transplantation.

The first human-to-human heart transplant in the world was carried out in Cape Town by Dr Christiaan Barnard on 3rd December 1967. The heart of a young female accident victim was transplanted into the body of a 55-year-old man with terminal heart failure. This event was considered a medical miracle and it converted Dr Barnard to an international superstar overnight. However, in hindsight, there were a lot of unanswered questions. There were two main contentious issues: declaration of brain death of donor and immunosuppression for the recipient. The issue of brain death would not be addressed adequately for another decade while immunosuppression was still in its infancy. In this first heart transplant, for immunosuppression, steroids, azathioprine, actinomycin C and repeated cardiac irradiation were used.<sup>1</sup> The patient survived for 18 days, eventually

succumbing to pneumonia. This was probably inevitable as the infection control measures were quite primitive then and the recipient was diabetic. According to Dr Barnard's publication after the procedure, phenolic disinfectants were the mainstay of antisepsis then and the patient was washed with hexachlorophene soap.<sup>1</sup> Also, later accounts have shown that this first patient, in direct contravention to established rules for isolation, was often allowed to go near media persons and celebrities, thereby increasing the chances of infection manifold.

Although Dr Barnard was the first to perform a human-to-human heart transplant, xenograft attempts had been made before him. Dr James Hardy performed the first Xenograft cardiac transplant with a chimpanzee heart in 1964. However, as expected, it was a complete failure, and Dr Hardy became a target of derision. Later historical analysis has also revealed that there were important ethical concerns: Dr Hardy did not take proper consent from the patient's relatives before the procedure and especially, the probability of use of animal heart was not mentioned.<sup>2</sup> The recipient of this xenograft was a deaf-mute person, which also raised many other ethical issues.<sup>2</sup> Thus, although credited with the world's first lung transplant (done on a convict), Dr Hardy faced much ignominy for his xenograft heart surgery.

Not to be left behind in the race for immortality, three days after Dr Barnard, the second heart transplant of the world was attempted in New York on a 19 days old baby. The baby survived for six hours only. Dr Kantrowitz, the main surgeon, considered this procedure a failure and in the press conference just after the 8-hour surgery, he candidly confessed as such.<sup>3</sup>

The 3rd heart transplant of the world came on 2nd January 1968 when Dr Barnard performed the procedure on a dentist, Dr Philip Blaiberg. This procedure was notable for one more historic feature: the donor was a colored person, and the recipient was white. This may seem irrelevant today, but in the diabolical apartheid times of South Africa, this was certainly a big issue. Dr Blaiberg lived for 19 months and this was actually the first truly successful transplant. This transplant procedure was also plagued by the issue of death declaration of the donor.<sup>4</sup> Dr Raymond Hoffenberg, the physician who treated the donor and who was responsible for his declaration of death, wrote later that he had a much moral dilemma in declaring the donor dead and he delayed the

Associate Professor

Department of Medicine, Midnapore Medical College, West Bengal, India

**Corresponding Author:** Rudrajit Paul, Associate Professor, Department of Medicine, Midnapore Medical College, West Bengal, India, e-mail: docr89@gmail.com

declaration by 12 hours as he still found "signs of life".<sup>4</sup> Such issues would not be resolved for another decade and would be a source of much ethical concerns and sleepless nights.

The media reaction in South Africa was foreseeable. In a country riddled with the problems of apartheid, such a scientific achievement provided the government with an opportunity to uplift the country's image. The transplant recipients were celebrities, and their quality of life was the subject of media attention. It was circulated that the recipients had an excellent life after transplant and they enjoyed their time. However, Dr Hoffenberg mentioned that the press releases showing the recipient merrily splashing waves at sea after recovery were false.<sup>4</sup> Although Dr Blaiberg did have improved quality of life, it was nowhere near the utopian picture presented to the world by the media.

However, the immediate future of heart transplant was not bright. In the wake of Dr Barnard's success, more than 100 heart transplants were performed all over the world in the same year (1968) only.<sup>4</sup> In most of those cases, the procedure failed because of inadequate expertise of the surgeons or problems with infection. In the UK, the first transplant was conducted by Dr Donald Ross, the eminent cardiac surgeon. But immunosuppression was a problem and cardiac transplant would not start properly in the UK at least for another decade. However, the first surgery by Dr Ross was hailed as a media circus and as rumors spread about the surgery, reporters and the common public gathered outside the London hospital.<sup>5</sup> However, in the coming years, due to the problem of immunosuppression, such transplant procedures would go into decline and Dr Ross concentrated on other surgical procedures with cardiac valves, where he did spectacular pioneering work.

The field of all transplant, not only cardiac, changed dramatically with the discovery of cyclosporine in 1972. The survival for cardiac transplant patients increased dramatically and 20-year survival of more than 50% was recorded recently.

In India, the first successful heart transplant was carried out in AIIMS in August 1994. This delay, compared to other countries was not due to lack of expertise of doctors, but rather, lack of proper laws to guide organ transplantation. Once the suitable laws were passed in 1994, Indian surgeons started transplant procedures at the earliest. The first cardiac transplant in India was carried out on a 42-year-old male with dilated cardiomyopathy (DCM). The patient survived for 14 years (eventually dying of non-cardiac cause) and was on cyclosporine, azathioprine, and steroids.<sup>6</sup> The surgery was performed by a team led by Dr P Venugopal, a legend in India.<sup>7</sup> Since then, the annual rate of organ transplant in India

has been increasing steadily and after 2014, the rate of a heart transplant in India increased even more.

One point of note here is that the first heart transplant of India (and the 6th in the world) was carried out in 1968 by Dr PK Sen in King Edward Memorial (KEM) Hospital, Mumbai on a patient with DCM. But the first two procedures were complete failures [due to on table right ventricular (RV) failure in the recipients] and no further attempt was made till 1994. This part of history is usually not publicized and in most medical history texts, 1994 is taken as the date of "first" cardiac transplant in India. However, in a very recent publication from Harvard, Sen's achievements have been described in details.<sup>8</sup>

In 2016, AIIMS Delhi performed its 50th cardiac transplant starting from 1994. Some private hospitals in India have performed even a number of successful surgeries. Tamil Nadu is the state with the highest number of cardiac transplants. The first successful cardiac retransplant was done in 2014 in Kerala.

One major issue in cardiac transplant procedure is the cost. The cost not only involves the immediate cost of the procedure but also the recurring costs of therapy. In the USA, Medicaid covers the expenses. In the UK, the NHS bears the cost. In India, for private hospitals, the cost is still an issue for patients.

As technological advances are coming within reach of everyone, we can expect such transplant procedures to be more abundant in the future. Physicians of today must be trained to refer patients in time for a transplant and subsequently deal with such recipients.

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