History of cardiac surgery

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My mother is 102 years old, and in her lifetime air travel, space exploration, effective pharmaceutical treatment of infection, computers, the Internet, nuclear energy, and the complete history of surgical treatment of heart disease have occurred! Cardiac surgery has evolved entirely in this century from the suture of a laceration of the ventricle by Rein ----- to the technical tour de force of a double switch operation by Imai. Most of the progress has occurred in the past 60 years, from the ligation of the patent ductus by Robert Gross in 1938, the development of the pump-oxygenator by Gibbon and its successful use in 1953, through coronary revascularization and valve replacement, heart transplantation and correction of increasingly complicated congenital heart disease at earlier and earlier ages. Having achieved a moderately advanced age, I hope I will be permitted to reflect back on my experiences, not as a major contributor to the science, but as a historian who had the good fortune to have known many of the early pioneers in the field of cardiac surgery, and to have worked with several, including Gross, Lillehei, and Harken. However despite the enormous contributions by pioneering surgeons, cardiac surgery would never have been possible without a series of seemingly unrelated contributions by a host of non-surgeons. These anatomists, pathologists, physiologists, biochemists and engineers provided much of the basic requirements for surgeons to begin their work. I will not spend much time reflecting on this part of the History of Cardiac Surgery because time is limited, but I do want to mention a few of these non-surgeons just to give them credit for the help they provided. I will spend my precious time discussing the surgeons who pioneered cardiac surgery.

I am particularly pleased to have the opportunity to give the Sakakibara Lecture because his work, and that of several other Japanese cardiac surgeons, greatly influenced my own approach to the surgical management of congenital heart disease. While much of the development of the specialty occurred in the United States, the reasons for this had not so much to do with the greater creativity of the American surgeons, as it did with the almost insurmountable problems that faced surgeons in Asia and Europe as an aftermath of the Second World War. The article by Sakakibara in Nature in 1972 entitled “----” was dramatically descriptive of those struggles; it gives one not informed about those times insight into the vision and determination of surgeons like Sakakibara as they overcame the obstacles and brought to the people of Japan the benefits of surgical treatment of heart disease. Sakakibara was widely recognized in the United States for his pioneering contributions because he often published his work in English, but many other major contributors around the world were not so extensively known in the United States because their contributions were not readily available in the English language. While not directly applicable, an interesting example of the barriers of language is that of the great Arab physician, Ibn Nafis. Educated in Damascus, and Professor of Medicine in Cairo, Ibn Nafis described the anatomy and function of the greater and lesser circulation in great detail in the 13th century, 300 years before William Harvey. Yet because his work was published in Arabic, it was not known in Europe.

The first successful bold surgical attack on heart disease came with the ligation of the patent ductus arteriosus by Dr. Robert Gross in August 1938. I worked with Dr Gross for over 10 years and had a very close relationship. Consequently I have had the chance to discuss the events of that first successful cardiac operation at great length with Dr. Gross, and I will have some interesting insights to give to you. There were several advances in the surgical
management of cardiac disease from 1938 until 1953, notable among them the operation for coarctation of the aorta by Crafford and Gross in 1944 and the shunt operation for cyanotic congenital heart disease proposed by Taussig and performed by Blalock in 1946. Gross did the first vascular graft with an aortic homograft in 1948, and opened up the entire field of vascular surgery.

The next momentous advance was by Gibbon, when in 1953 he repaired an atrial septal defect in a 19 year old women by open cardiotomy using artificial circulation. Prior to that Lillehei had done 20 open heart cases using controlled cross-circulation, but the real beginning of open heart surgery began with the successful application of the pump-oxygenator. I will describe the story of Cardiac Surgery, and bring into the story the contributions by pioneering Japanese cardiac surgeons. This whole field developed through the efforts of many surgeons throughout the world, and credit should be widely distributed. I will try to do that in this Sakakibara lecture. I thank the Japanese Society of Cardiac Surgery and its President, Professor Yasuharu Imai, for giving me the opportunity to tell this fascinating story.