The present state and challenges for the future of pediatric cardiac surgery

２年　Hisa Asai

Introduction

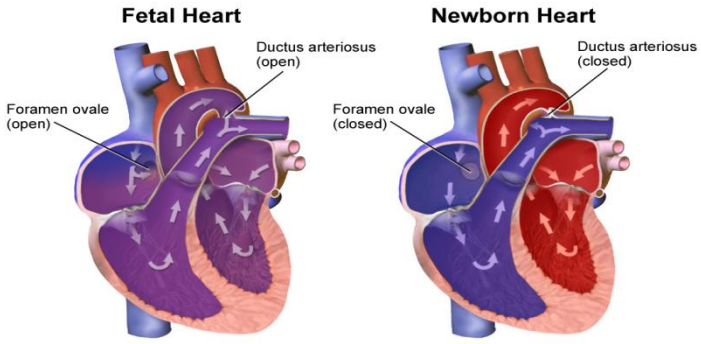
Cardiovascular diseases are roughly divided into two types: Congenital heart disease and Acquired heart disease. In this paper I shall examine congenital heart disease. A congenital heart disease is a general term of a dysplasia at the heart from fetal period to infancyand, and it's said that one out of a houndred children are born with congenital heart disease. Treatment is mainly a surgical operation so that it may be mentioned later. The treatment and the results evolve big in these tens of years, and it will develop. I want to be pediatric surgeon, so I thought it is important for me to research how are they debeloped now and future prospects and decided my research question as follows.

Research question

'The present state and challenges for the future of Pediatric cardiac surgery'.

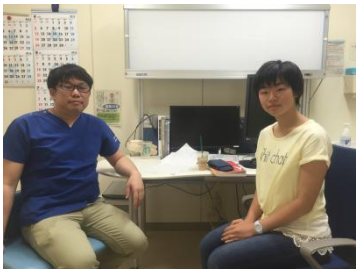
Preliminary survey

When studying about congenital heart disease, knowledge about the structure of the fetus's heart is needed first. There is a point different from newborn's circulation so that that may be represented by an umbilical cord in fetus's circulation. This is called a fetal circulation and 2 of difference exists in a heart. Blood enters the right atrium. When the blood enters the right atrium, most of it flows through the foramen ovale into the left atrium. Blood then passes into the left ventricle. Blood then passes to the aorta. This is the large artery coming from the heart. From the aorta, blood is sent to the heart muscle itself in addition to the whole body. After circulating there, blood returns to the right atrium of the heart through the superior vena cava. Very little of this less oxygenated blood mixes with the oxygenated blood and, instead of going back through the foramen ovale, it goes into the right ventricle. This less oxygenated blood is pumped from the right ventricle into the aorta. A small amount of the blood continues on to the lungs. Most of this blood is shunted through the ductus arteriosus to the descending aorta. This blood then enters the umbilical arteries and flows into the placenta. In the placenta, carbon dioxide and waste products are released into the mother's circulatory system. Oxygen and nutrients from the mother's blood are released into the fetus' blood.



First is existence of the blood vessel which connects the pulmonary artery and the aorta called ductus arteriosus. The second is existence in a hole between the left atrium and the right atrium called a foramen ovale. These are caused by fetus's lung's not functioning, there is a role of making them circulate through blood and without going through a lung. It's usually closed naturally with starting of pulmonary respiration after birth, but when these aren't closed, it's called a patent ductus authoriosus and a patent foramen ovale. Congenital heart diseases are divided into two types by a presence or absence of the cyanosis, and is called a cyanotic heart disease and non-cyanotic heart disease respectively. A cyanotic heart disease accounts for 30-40% of a congenital heart disease, and that the shape of the heart is different from a normal heart in itself. On the other hand, a cyanotic heart disease accounts for 60-70% of a congenital heart disease, and the shape of the heart is normal in many cases, but such as having a hole, a byroad often exists in the way of the process.

These preliminary learning, and, I interviewed three doctors.



Nagoya city university hospital Dr,Matsumae.

Nagoya university hospital Dr,Mutsuga.

Papworth Hospital Dr Sudarsaon.

Papworth Hospital

Papworth Hospital is one of the largest cardiothoracic hospital in England and the country's main heart and lung transplant centre treating over 24,400 inpatient and day cases and 73,600 outpatients each year from across the UK. Papworth Hospital is a founder member of Cambridge University Health Partners, a partnership between one of the world's leading universities and three NHS foundation trusts.

Dr Sudarsaon (On the left)

Dr Sudarshan is the Clinical Lead for the Cardiothoracic Organ Retrieval Service of Pap worth Hospital NHS Trust. She is the clinical supervisor for the Transplant Surgical Fellows. She is the Consultant Cardiac Surgical Lead for the Alert Team Nurses. She was very busy with surgery and she had phone calls during our meeting.
I win research this from the angle of the operative procedure and timing of treatment.

At the timing of treatment

Treatment to a congenital heart disease is an operation mainly. The surgeries are classified into a palliative surgery and a radical surgery by the purpose. A radical surgery is the operation for the purpose of make the heart normal. But it's necessary to arrange the state before a radical surgery and make the condition become stable because a very large-scale operation is needed such as using cardiopulmonary bypass to do a radical surgery. That's the role of the palliative operation. The size of the newborn's heart is walnuts approximately, and when it was a prematurely baby, it may be smaller, so the surgeries are very difficult. A newborn needs the physical which can just stand up to that strength for an operation to ,because surgery become a big burden for them. Therefore you can perform an operation more safely by waiting until it grows while seeing how things are by a medicine, if the desease don't need operate immediately, for example atrial septal defect. But there is also a disease such as a left ventricle hypoplasia which has to operate on over 12 weeks, and even if such case is about 500 grams, it is operated. Additionally when a pulmonary hypertension and a heart failure have happened by increase of the pulmonary blood flow, an operation is needed early. The weight is one of the rule of thumb on which I operate, and when cardiopulmonary bypass is used in particular, 3 kilogram will be the rule of thumb. Development of practicable cardiopulmonary bypass will be expected of less than 3 kilogram of newborn from now on, too, but after all for an operation using cardiopulmonary bypass to involve risk, it's needed that not only wireless technology of cardiopulmonary bypass but also making sugeon's own risk decrease for an early operation.

Treatment method

The above-mentioned passage palliative operation is the operation which arranges the state, and control of bloodstream is the most important in particular in it. It's also inborn by the pulmonary blood flow volume separately again with a presence of the cyanosis, a heart, it's possible to classify a disease. Something with pulmonary blood flow volume a lot more than usual, the pulmonary blood flow volume increased type heart disease and a little one are called the pulmonary blood flow volume decrease type heart disease. Pulmonary arteries kouyakujutsu which ties a pulmonary arteries as a temporizing operation to the pulmonary blood flow volume increased type heart disease and reduces the blood flow volume is performed and the body pulmonary arteries short operation which makes the byroad which connects with a lung with an artificial blood vessel is performed to the pulmonary blood flow volume decrease type heart disease. It's after that, the rad op is various by a disease, and there is a way to treat an atrial septal defect with a heart catheter suturing the hole by an operation, and when there is a hole in a heart, without performing an operation. The operation with which the aorta replaced and a pulmonary arteries are replaced is performed in perfect much blood vessel move slowly. When above-mentioned patent ductus arteriosus and P-F study are also slightness, treatment by a medicine of indometacin is a basis, but when not improving, I need an operation. It's learned that more patent ductus arteriosus supervenes in left ventricle low formation, but that time's newborn will maintain patent ductus arteriosus by prescription of PUROSUTAGURANJIN contrary to just now because it isn't possible to send blood to the whole body when a pulmonary arteries and an aorta aren't connected by an arterial government service. The course where blood from the whole body is poured into a pulmonary arteries directly and the venous blood to which I have returned from a lung is sent to the whole body from a right ventricle is made with the Norwood operation which links a pulmonary arteries and an aorta after that and makes the new aorta from the right room, the two directionality glen operations with which the special main vein and a pulmonary arteries are connected and the phone tongue operation with which a lower main vein and a pulmonary arteries are connected. There are various treatment way systems by a disease this, and the performed operation is also different depending on the states of the newborns..The future and an inborn heart of regenerative medicine, the applicability to the disease is also expected. It was possible to accompany a laboratory visit of Ms. Kiriyama's Mr.Stephen and hear a story about regenerative medicine. It's said that the study which applies regenerative medicine certainly according to Mr.Stephen and makes the organization of the body is developed. But it's said that the most difficult one is revival of myocardial cell in the many organization in the body, an inborn heart, I found out that it would still take time for the applicability of the regenerative medicine to a disease. It isn't organization according to Dr Sudarsaon, but the match which uses the blood vessel which was recycled from patient's cell for the artificial blood vessel used for the body pulmonary arteries short way for an operation has started already, and burdened reduction to a newborn will be expected from now on. I was thinking, an inborn heart, I found out that the remedy of a disease is various and different in the operation and the number of times which do in the same disease all together in the state of the patient. I think more ways of treatment may diversify by technological improvement of regenerative medicine from now on. I thought it was the ability deciding about necessary treatment from a large number of choices to be needed for a future doctor through this study while ascertaining the state of the patient.