File Name : AVR.mp4

*Italic fonts with double quotation marks* indicate the texts on the screen.

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| Time Stamp | PowerPoint Slide in the Background |  |
| 00:00 | *Title* | *“Aortic Valve Replacement procedure”* |
| 00:08 |  | I’m Dr. Tsukui at Cardiovascular Surgery Department of Tokyo Women’s Medical University. I will now explain the aortic valve replacement procedure. |
| 00:17 | AVR.pptx P1 |  |
| 00:21 | AVR.pptx P2 | As you already know, the heart consists of four chambers. Right atrium, right ventricle, left atrium, and left ventricle. Between chambers, there’re valves, and the blood flows in one direction through each valve. Aortic valve is the valve between aorta and left ventricle. As shown in this figure, it has the function to normally flow the blood from left ventricle to aorta and it has the opening area of 2 to 3 square centimeters when the aortic valve is open. |
| 01:05 | AVR.pptx P3 | However, a certain cause such as high blood pressure or aging etc. makes aortic valve harder, which is called calcification by a technical term. This causes aortic valve not to fully open. Patients who has severe aortic valve stenosis can open aortic valve only less than one square centimeter. Left picture shows a normal aortic valve. Right picture shows the advanced stage of aortic valve stenosis with the prominent calcification. When this happens, the valve becomes difficult to fully open, and a patient shows the symptom of aortic valve stenosis. |
| 01:48 | AVR.pptx P4 | There’re mainly three symptoms with aortic valve stenosis. Angina, which sometimes causes the chest pain, fainting and heart failure. The prognosis after these symptoms start to show, the life expectancy after them, is said to be about 5 years after angina, 3 years after fainting or lose consciousness, and 2 years after the heart failure, based on the research so far. And, a treatment is needed when one of these symptoms appears. |
| 02:25 | AVR.pptx P5 | The only treatment for aortic valve stenosis is the aortic valve replacement procedure in which aortic valve is replaced surgically. As shown in this figure, the natural valve is removed and an artificial valve is implanted. |
| 02:42 | AVR.pptx P6 | This shows the types of artificial valves implanted and their characteristics. The figure in the left is a mechanical valve, and the valve on the right is a biological valve. Each valve has merits and demerits. The merit of a mechanical valve is its excellent durability, and there’re many patients who received this type of valves and have lived 20 or 30 years. On the other hand, they have to receive anticoagulation therapy for the rest of their lives. The reason for that is that this mechanical valve tends to make blood clots. Therefore, the blood needs to be flown smoothly. By making the blood flow smoothly, the risk of blood clots is reduced. On the other hand, there’s a risk of bleeding. Specifically, a patient may have bleeding in the brain or digestive tract. Normally for a healthy patient, the bleeding may be in small amount, but there’s a possibility that the patient with a mechanical valve may bleed in large amount and it could be a serious problem. The patient is also required to have blood tests regularly to adjust the dosage of warfarin. Furthermore, warfarin is affected by the plant-based Vitamin K. Therefore, a patient has to avoid eating Natto (Japanese fermented soybeans) for the rest of his life, which is one demerit.On the other hand, the merit of biological valve is that a patient only needs to take warfarin only for the first 2 to 3 months after the surgery. However, the durability of this biological valve is not long compared to a mechanical valve. Normally, about 10% of the patients require the re-replacement surgery after 10 to 15 years. The risk of having the repeat surgery is getting lower recently, but there’s an increased risk of the adhesion in the chest cavity or its separation compared to that in the first-time surgery. So, it is better to avoid it. |
| 04:53 | AVR.pptx P7 | There’s no definitive selection rule so far to choose which type of artificial valves. However, the patient’s age is used as one of the indicators to select one or the other. On the left of this figure, for a patient under 65 years old, if it is possible for the patient to use anticoagulation therapy, a mechanical valve is chosen because of the longer durability. On the other hand, a patient over 65 years old has a higher risk of bleeding, so a biological valve is chosen in many cases. However, we ultimately have to decide one or another for each patient on a case-by-case basis. |
| 05:36 | AVR.pptx P7 (video)*Title:**Subtitle:* | *“Aortic Valve Replacement procedure”**“The entire part of the valve is highly calcified due to dialysis.”* |
| 05:39 |  | I will show you the video of actual surgery of aortic valve replacement. |
| 05:45 | *Title:**Subtitle:* | *“Aortic Valve Replacement procedure”**“Start cutting right coronary cusp off from LR commissure.”* |
| 05:49 | *Title:**Subtitle:* | *“Aortic Valve Replacement procedure”**“Use a tweezer to pull and peel off from the annulus.”* |
| 05:55 | *Title:**Subtitle:* | *“Aortic Valve Replacement procedure”**“Add an incision when difficult to peel off.”* |
| 06:02 | *Title:**Subtitle:* | *“Aortic Valve Replacement procedure”**“Extend the incision from the side of RN commissure.”* |
| 06:17 | *Title:* | *“Aortic Valve Replacement procedure”* |
| 06:19 | *Title:**Subtitle:* | *“Aortic Valve Replacement procedure”**“Confirm that the calcified portion is separated.”* |
| 06:26 | *Title:* | *“Aortic Valve Replacement procedure”* |
| 08:32 |  | That’s the end of the explanation of aortic valve replacement procedure. |
| 08:39 | *Title:* | *“Surgical Processes”* |
| 08:47 |  | I will explain the actual flow of surgical processes. |
| 08:51 | Surgical Process.pptx P2 | Once the patient is in an operating room, an anesthesiologist will apply the general anesthesia. The patient will lose the consciousness due to the use of anesthesia medicine. He will not feel any pain. Because he will not be able to breath by himself, a tube is inserted through his mouth and is connected to a ventilator. Afterward, the anesthesiologist will spend about one hour to perform various procedures, such as connecting intravenous drips on the neck or the arm, or connecting the electrocardiogram, and so on. |
| 09:31 | Surgical Process.pptx P3 | Afterward, the skin is disinfected well and the actual operation will start. The skin is cut open about 20 to 25 centimeters at the center of the chest. Then, the sternum is exposed under the skin. The sternum is cut at the center, too. The heart and the lung are now found in thoracic cavity when the sternum is opened. |
| 10:04 | Surgical Process.pptx P4 | The first thing to do is to connect a cardiopulmonary bypass machine. In many heart operations, it is necessary to use a cardiopulmonary bypass machine to circulate the blood to the entire body because the heart is stopped during the operation. |
| 10:26 | Surgical Process.pptx P5 | Once the cardiopulmonary bypass machine is connected, the heart is stopped using cardioplegic solution, and the actual heart operation begins. The type of operation differs depending on an actual patient, but may be coronary artery bypass surgery, valve repair, or valve replacement and so on. |
| 10:52 | Surgical Process.pptx P6 | Once the operation ends, the heart is restarted. When it becomes possible for a patient to sufficiently circulate the blood to his entire body by his own heart, the cardiopulmonary bypass machine is removed. |
| 11:12 | Surgical Process.pptx P7 | All the body parts which were cut or stitched are checked well, and we make sure that there’s no bleeding. Further, the sternum is set in place with wires at several places, and the chest is closed. These wires are normally not removed after the surgery. Lastly, the skin is stitched and the operation is finished. |
| 11:45 | Surgical Process.pptx P8 | Once the operation is finished, the patient is transported to Intensive Care Unit, ICU, and the family can see the patient there. The patient will not be conscious at this time because anesthesia has still not been worn off. Various monitors are still connected to the patient and the drain, which flows the blood to outside of the body, is connected. Normally, the patient will be gradually removed from a ventilator at late on the night of the surgery or the next morning. |
| 12:33 | *Title* | *“Complications associated with Heart Surgery”* |
| 12:41 |  | I will explain the complications associated with heart surgery.  |
| 12:46 | Complications.pptx P1 | The subject from this point on is not a comfortable topic. In these days, however, we explain in detail the possible complications to the patient and his family members and want them to consent to the procedures before the surgery. So, please bear with my talk. |
| 13:12 | Complications.pptx P2 | Currently, about 60,000 surgeries are performed yearly in Japan. About 500 hospitals perform them, and many of them contribute to Japan Cardiovascular Surgery Database. By gathering the surgery data performed by every hospital to this database, and analyzing it, we can now predict the risk level of a heart surgery for a particular patient who is going to receive one soon. |
| 13:54 | Complications.pptx P3 | I am going to explain these possible complications one by one now. First one is bleeding. As I told you before, cardiopulmonary bypass machines are used in many heart surgeries. A cardiopulmonary bypass machine consists of a circuit which is connected to the patient’s body, extract his blood, oxygenate blood through artificial heart and lung, and return it to the patient’s body through another tube. If we don’t add anything to the blood, it will coagulate immediately. In order to avoid it, we use a large amount of heparin, which makes the blood run smoothly. By doing so, a cardiopulmonary bypass machine will run smoothly. On the other hand, a patient can easily bleed while the surgery is being performed. Many patients who receive heart surgery take anticoagulant medication or antiplatelet medication before the surgery. This increases the possibility of bleeding compared to a surgery associated with other organs. For those patients who are seriously ill before the surgery, there’s lack of platelet or blood coagulation factor which stops bleeding, and they can bleed easily even without a surgery. In order to deal with this kind of bleeding problem, our hospital uses an autotransfusion device which recovers the blood through bleeding and return it to the patient’s body. This minimize the loss of blood by the patient. However, some patients may continue bleeding in ICU after the surgeries which use cardiopulmonary bypass machines and heparin. If that happens, one may go back to an operating room and receive another surgery. If it is needed, we will respond to this need even if it’s at night or a weekend day or holiday. We will notify the patient’s family, but we may proceed with a surgery in case of an emergency before the family members arrive at the hospital, and open the patient’s chest to find out the bleeding spot and apply the hemostasis, which is called an emergency thoracotomy hemostasis. Please understand it in advance. |
| 16:51 | Complications.pptx P4 | Next topic is the transfusion. As I said just now, a heart surgery is performed in an environment where the bleeding occurs easily. However, if we don’t provide transfusion and the patient becomes extremely anemic, it becomes a burden to the heart and increases the possibility of exacerbating heart failure. Because of this, it is considered to be safer to provide the transfusion properly as needed. However, the transfusion has a risk of possibly causing other complications even today, as you may have read in newspapers or heard through news programs. One of the complications which may be caused by transfusion is infectious disease, specifically hepatitis, AIDS and so on, which are caused by virus. Or, a risk still remains that a complication may be caused by an unknown virus as of today. When we use transfusion at our hospital, we use one which is supplied by Japan Red Cross. Japan Red Cross examines each blood supply one by one, but it can not completely eliminate the risk I just mentioned. Another example of the complications by transfusion is allergic reaction. Through transfusion, someone else’s organ is introduced in the patient’s body. The patient displays allergic reaction to a greater or less extent. If the blood introduced in the patient’s body happens to be not quite compatible, the very severe allergic reaction, anaphylactic shock, may occur. If this allergic shock occurs, the blood pressure decreases rapidly and the blood circulation to the brain called cerebral circulation is reduced. This may cause brain dysfunction. It is very hard to imagine that the transfusion causes brain damage, but this is another example of a complication caused by transfusion. However, in most cases, a doctor or nurse will be accompanying the patient 24 hours a day when transfusion is performed in an operating room or ICU, so he or she can respond immediately to the situation if this type of complication happens and most cases do not become a big problem. |
| 19:51 | Complications.pptx P5 | Next, I will talk about the heart failure and myocardial infarction after the surgery. In most of heart surgeries, heart is stopped while operating. When restarting the heart, it will not function at the beginning as good as the healthy heart. This is called the postoperative heart failure. For this situation, a medication is used to make the heart active, which is called cardiotonic agent. If that’s not effective, a mechanical means to help the heart active may be used, such as intra-aortic balloon pump or percutaneous cardiopulmonary support device. Many of these methods insert a catheter or tube through the blood vessel at the groin area. |
| 20:53 | Complications.pptx P6 | Next is the failure of important organs. Even though the surgery is performed on the heart at this time, other organs may be affected by anesthesia or by the use of cardiopulmonary bypass machine. Specifically, it could cause brain dysfunction, mainly stroke or cerebral hemorrhage. Many patients who receive heart surgery already carries the hardening of the arteries, and the procedures during the operation may cause the peeling of calcified plaque inside the aorta, which in turn may cause the stroke in many cases. If this type of brain dysfunction occurs, the patient’s arm/hand and leg may become immobile or paralyzed, or he may lose the sight or may not be able to speak, depending on the location of the brain damage. These symptoms may be temporary, or the permanent damage may be caused for the rest of his life for some patients. If the extent of brain damage is severe, the patient may become unconscious and become comatose. In a very rare case, the patient may become brain-dead. Next is the lung dysfunction. The one most happens frequently is pneumonia. I just mentioned that an anesthesia doctor connects a ventilator to the patient at the beginning of the surgery. The tube used there is inserted through mouth all the way to the lung. Because of this, the bacteria in the mouse may drop into the lung through inside the tube, which may cause pneumonia. Once the patient has pneumonia, he is not able to breath with ease by himself. If that happens, the patient has to use a ventilator for a certain period of time. However, it may not make pneumonia much better as long as the tube is inserted through mouth to the lung. In that case, a cut is made at the throat and a tube is directly inserted through the throat to the lung, which is called as tracheotomy. |
| 23:37 | Complications.pptx P7 | Next is kidney and liver. Especially if kidney dysfunction occurs, urine may not be produced. If that happens, waste materials may accumulate inside the body, which causes uremia. Hemodialysis is performed so that the waste is removed from the body mechanically if this happens. Kidney is set to rest and is given the time to recover until it is able to produce urine by itself, at which time the hemodialysis may be removed. However, the patient whose kidney function becomes weaker than before the surgery, he may have to receive dialysis for the rest of his life after the surgery. Next is digestive tract. The activity level of the digestive tract goes lower temporally after the surgery because of the effect of anesthesia. The gas may be produced in the digestive tract, and the patient may feel nauseated. We can apply the medication to stimulate digestive tract active after the surgery through intravenous drip. When the patient can participate in the rehabilitation program, he may walk often to promote the movement of the digestive tract. The risk of having gastrointestinal perforation goes higher if the patient already had peptic ulcer before the surgery. |
| 25:22 | Complications.pptx P8 | Next is infectious disease. As I talked about it before, pneumonia is the one the patients suffer the most. Another is surgical wound infection, which occurs on the cuts made during the surgery and do not heal for a long time, or seem to heal but open up again later. If the infection occurs deep inside, around the heart, it is called as mediastinitis. If the infection happens further deep inside, inside the heart, along the path of blood flow, it is called as endocarditis. Various parts of the body can be infected, like urinary tract infection. Many sources of these infection are not special bacteria. They are caused by general kinds of bacteria we see around us everywhere all the time. Normally a healthy person has immune power to battle against these bacteria. However, the patient’s immunity goes down temporary after a big surgery which applies the strong stress to the body. Because of that, a person may get a severe infectious disease from bacteria which may not cause a problem normally if he is healthy. To avoid severe infection, a patient is required to take a shower or a bath before the surgery. We will maintain clean surgical procedure during the surgery. We administer antibiotic or globulin preparation to the patient after the surgery in order to prevent infectious diseases.  |
| 27:24 | Complications.pptx P9 | Next is arrhythmia. In the early stage after the heart surgery, various types of arrhythmia occur. There are many types of arrhythmia, and some can be observable and others should be lethal and should be treated within minutes or seconds. An ECG monitor will be hooked to the patient for a while after the surgery so that we can respond to the patient’s malignant arrhythmia immediately when it happens. Depending on the surgical procedure, a patient may be implanted with a pacemaker. We will explain on each case if this type of situation happens. |
| 28:22 | Complications.pptx P10 | I will talk about the impeded blood flow in lower limbs. I said that a catheter or a tube is inserted from the groin area if a heart failure happens after the surgery. This tube has a rather big diameter and may almost completely occupy the inner area of the blood vessel in some cases. Because of arteriosclerosis with some patients, the inner diameter is narrowed. If a catheter or tube is inserted there, peripheral blood flow is impeded and ischemia may occur in the lower limbs of some patients. In this case, muscles in the lower limbs may die, which in turn causes kidney failure and the patient may require dialysis. |
| 29:20 | Complications.pptx P11 | There are other complications which may occur after the heart surgery, other than what I’ve explained. I conclude the explanation of complications, however. If other complications happen, I will explain them at that time individually. |
| 29:42 | Complications.pptx P12 | Next, I will explain the postoperative course after the surgery. After the stay at ICU, the patient will be transferred to the general in-patient ward when his condition has settled down. The length of the stay, however, at ICU largely depends on the patient’s condition and the type of surgical procedure. There’re various restrictions such as blood test, X-ray, fluid intake restrictions and medications after the surgery. We will try to minimize the burdens on the patient. The patient is required to receive a rehabilitation program as soon as possible after the surgery. The recent data shows that the participation to early rehab program makes the result of the surgery better. So, we introduce active rehab program to the patient by a physical therapist. The patient can be discharged when he is able to eat well and do well with the rehab program. About 80% of patients are discharged 10 days or 2 weeks after the surgery. Some patients are transferred to another medical facilities if they need additional rehabilitation or other treatments. |
| 31:04 | Complications.pptx P13 | On the day of surgery, we may perform an emergency surgery depending on the condition of the patient. If another patient requires emergency surgery, the date and time of your surgery may be rescheduled. Please understand this in advance. |
| 31:31 | Complications.pptx P14 | Lastly, if there’s anything you don’t understand, please do not hesitate to ask us at any time. Even though I have given you many information, you and your family should discuss together until you are satisfied and decide whether to go through the surgery or not. You can change your decision until just before the surgery starts. We wish you a quick recovery. That’s the end of explanation about the surgery. |