



SNS COLLEGE OF TECHNOLOGY

(AN AUTONOMOUS INSTITUTION)

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Department of Biomedical Engineering

Vision Tit 2

Vision Title 3

Course Name: **Robotics and Automation in Medicine**

TITLE : Cardiac Surgery



HISTORY OF CARDIAC SURGERY

- Early attempts at cardiac surgery date back to the 19th century, with surgeons exploring techniques for repairing heart injuries. However, the lack of understanding about the intricacies of the cardiovascular system and the absence of effective anesthesia and infection control limited progress.
- Dr. Clarence Dennis is credited with performing the first successful open-heart surgery in 1923.
- Dr. Christiaan Barnard performed the world's first successful heart transplant in 1967 in South Africa.
- Over the years Procedures such as robotic-assisted surgery and trans catheter interventions have reduced the need for traditional open-heart surgery in some cases.



CARDIAC SURGERY



- Cardiac surgery is a medical specialty that involves surgical procedures on the heart and its associated blood vessels.
- It encompasses a range of interventions, including coronary artery bypass grafting, heart valve repair or replacement, aneurysm repair, congenital heart defect correction, and heart transplantation.
- The goal of cardiac surgery is to treat and manage various cardiovascular conditions, restoring normal heart function and improving overall cardiovascular health.





IMPORTANCE OF CARDIAC SURGERY



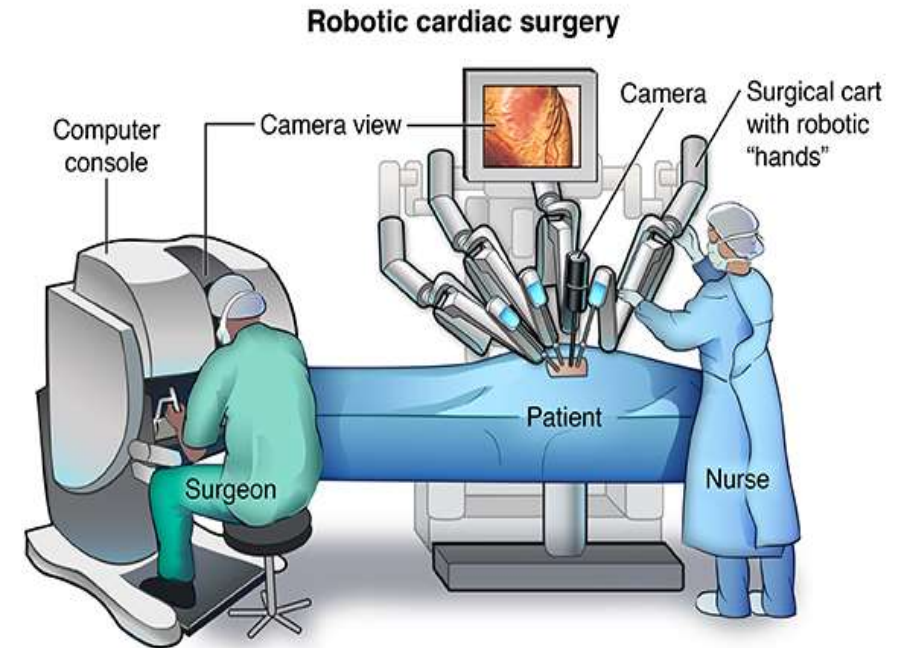
- Cardiac surgery is crucial for saving lives, improving heart function, and alleviating symptoms associated with cardiovascular diseases.
- It addresses life-threatening conditions, prevents complications, and plays a vital role in the comprehensive care of patients with heart issues.
- Advances in cardiac surgery contribute to medical progress and underscore its significance in enhancing both the longevity and quality of life for individuals with heart-related conditions.



ROBOTICS IN CARDIAC SURGERY

Robotics in cardiac surgery involves the use of robotic systems to assist surgeons in performing complex heart procedures.

- **Precision and Dexterity:** Robotic systems offer enhanced precision and dexterity, allowing surgeons to perform intricate maneuvers with greater accuracy. The robotic arms can mimic the surgeon's hand movements with increased range of motion and stability.
- **Improved Visualization:** High-definition 3D imaging provided by robotic systems allows for improved visualization of the surgical site. Surgeons can navigate through complex anatomical structures with a detailed and magnified view, aiding in precise procedures.





ROBOTICS IN CARDIAC SURGERY



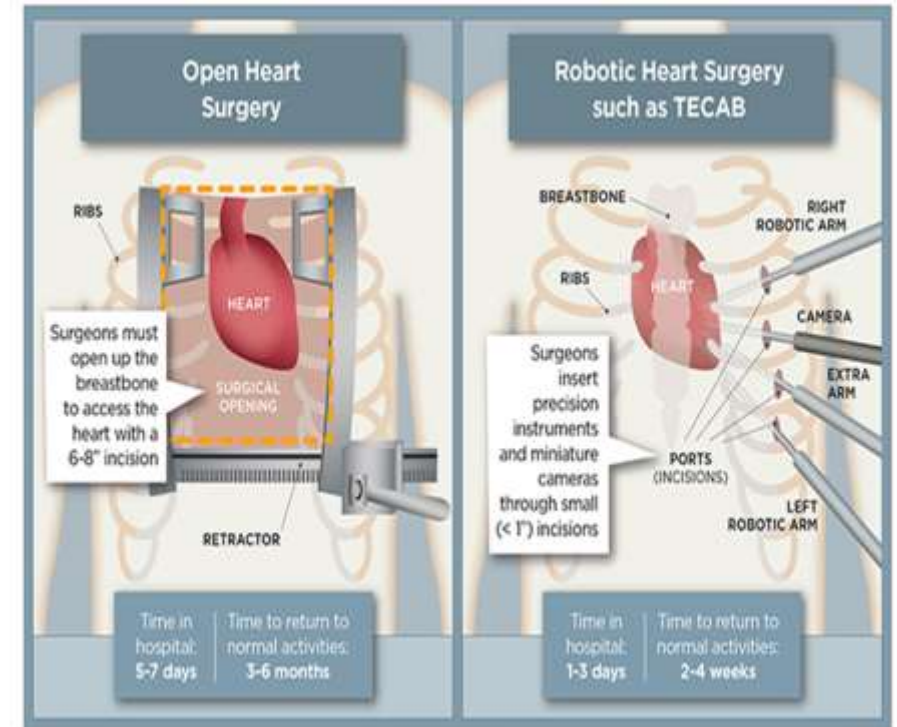
- **Telesurgery and Remote Surgery:** Some robotic systems enable telesurgery, allowing surgeons to control the robotic arms from a console. This feature can be particularly beneficial for remote surgery, where the surgeon is not physically present in the operating room.
- **Enhanced Ergonomics:** Robotic systems are designed to provide ergonomic benefits for surgeons. The console allows them to sit comfortably and operate controls with hand and foot movements, reducing the physical strain associated with long surgical procedures.
- **Applications in Mitral Valve Repair and Coronary Artery Bypass Surgery:** Robotic technology has been widely used in mitral valve repair and coronary artery bypass surgery. The precision of robotic instruments facilitates delicate repairs, such as suturing and tissue manipulation, in these critical cardiac procedures



ROBOTICS IN CARDIAC SURGERY



- **Learning Curve and Training:** While robotic-assisted surgery offers numerous advantages, there is a learning curve for surgeons to become proficient in using the technology. Training programs and simulation tools are essential to ensure surgeons are skilled in harnessing the full potential of robotic systems.
- **Ongoing Technological Advancements:** The field of robotic cardiac surgery continues to evolve with ongoing technological advancements. New robotic platforms and tools are being developed to further enhance the capabilities of these systems, making them more versatile and accessible.

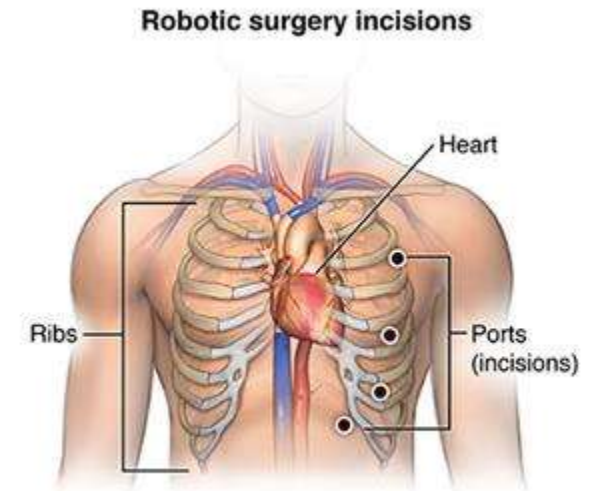




ROBOTIC CARDIAC SURGERY -PROCEDURE

The following is the general sequence of events that will most likely occur during robotic cardiac surgery:

- You may receive a sedative before the procedure to help you relax.
- You will be placed under general anesthesia for the procedure and you will have a breathing tube.
- A surgeon will make a series of keyhole-sized incisions on the side of your chest. These incisions will align with the openings between your ribs.
- You may need to be placed on the heart-lung machine for the procedure.





ROBOTIC CARDIAC SURGERY -PROCEDURE



- Depending on the procedure being done, your surgeon will insert several precision-guided robotic arms into these incisions.
- These robotic arms hold and manipulate tiny instruments to do the required tasks on the heart or surrounding arteries.
- A tiny video camera will be inserted into another incision to provide a magnified, three-dimensional image of the operating site.
- The surgeon will control the robotic arms and camera from a console located within the operating room.
- Once complete, the surgeon will remove the instruments and close the incisions.



RISK IN ROBOTIC CARDIAC SURGERY



One of the main benefits of robotic cardiac surgery is that it has fewer risks than open-heart surgery. The surgeon does not have to cut through the breastbone to open your chest. This removes many of the complications of open-heart surgery.

Robotic cardiac surgery still requires anesthesia and, as with any kind of surgery, there are always risks involved, including:

- Heart attack
- Stroke
- Infection
- Death

In some cases, your doctor may not be able to complete the surgery with the robot. In this case, you would need open-heart surgery.



Thank You!