PHYSIOTHERAPY IN SURGICAL CONDITIONS

[PT 310]

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LECTURE NOTES FOR 3rD GRADE BPT STUDENTS

SPRING SEMESTER 2024-2025

DEPARTMENT OF PHYSIOTHERAPY, FACULTY OF APPLIED HEALTH SCIENCES

TISHK INTERNATIONAL UNIVERSITY

2024/2025

Cardiothoracic surgeries: Coronary Artery Bypass Graft (CABG) Surgery

LECTURE OUTLINE

- Learning objectives
- Definitions/indications
- Surgical procedures/ types of incision techniques
- Contraindications
- Preoperative assessment and treatment
- Postoperative assessment and treatment/rehabilitation
- Complications
- Review
- Reading resources/additional materials

PHYSIOTHERAPY IN SURGICAL CONDITIONS

LEARNING OUTCOMES

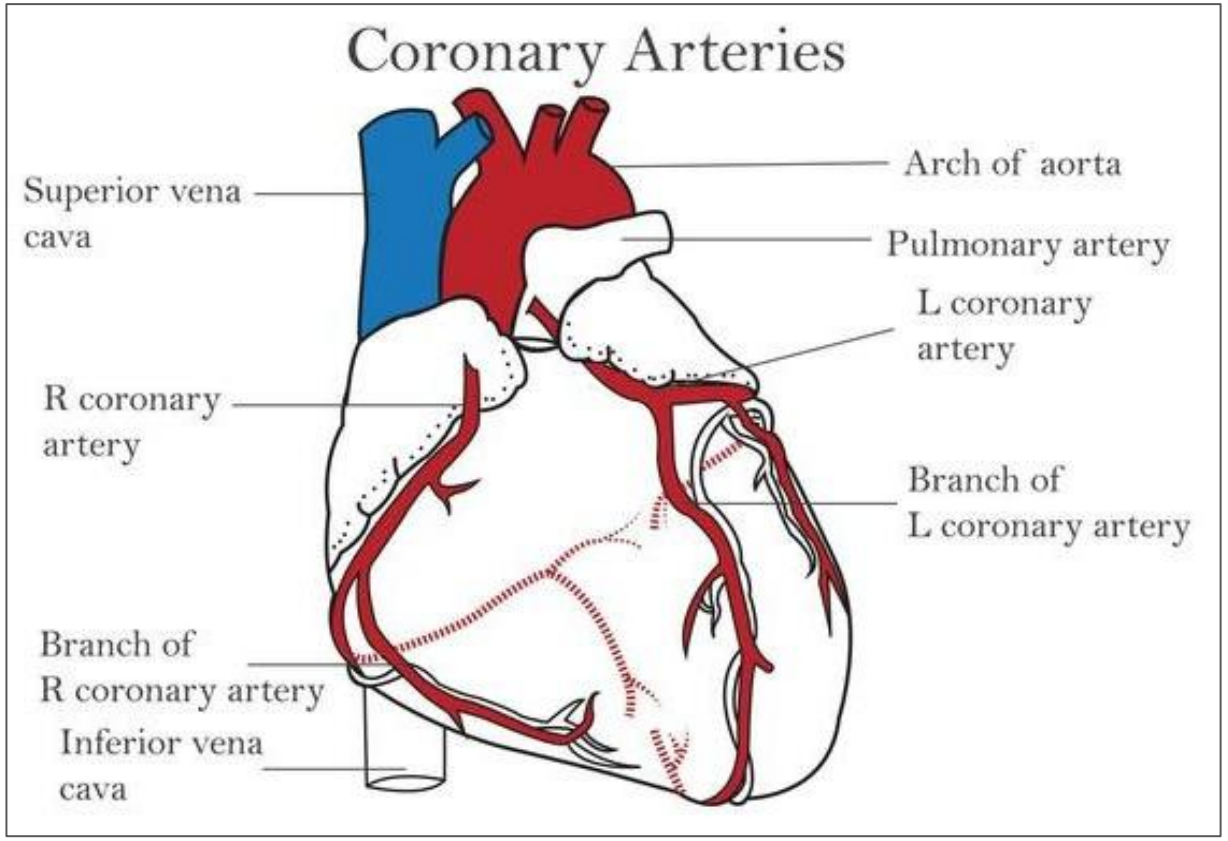
At the end of this lecture, the students should be able to:

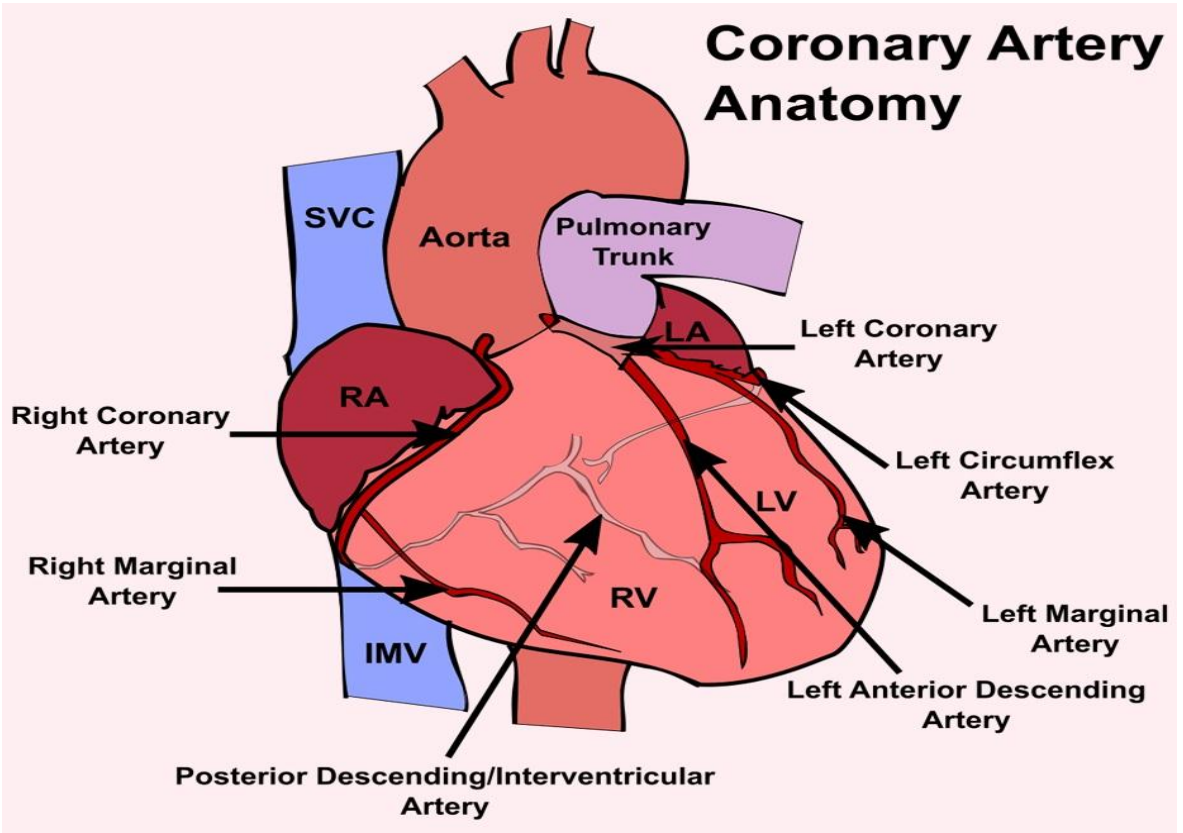
- Understand the indications and contraindications of CABG
- Understand the surgical procedures involved in CABG
- Describe the preoperative & postoperative physiotherapy assessment for CABG
- Describe preoperative & postoperative physiotherapy treatment for CABG
- Recognize common complications after CABG surgery

PHYSIOTHERAPY IN SURGICAL CONDITIONS

CABG (normal anatomy)

- **Right Coronary Artery** supplies the **right atrium and ventricle, posterior part of the interventricular septum, SA & AV nodes (in most people)**
- **Left Coronary Artery** supplies the **left atrium and ventricle, & anterior part of the interventricular septum**





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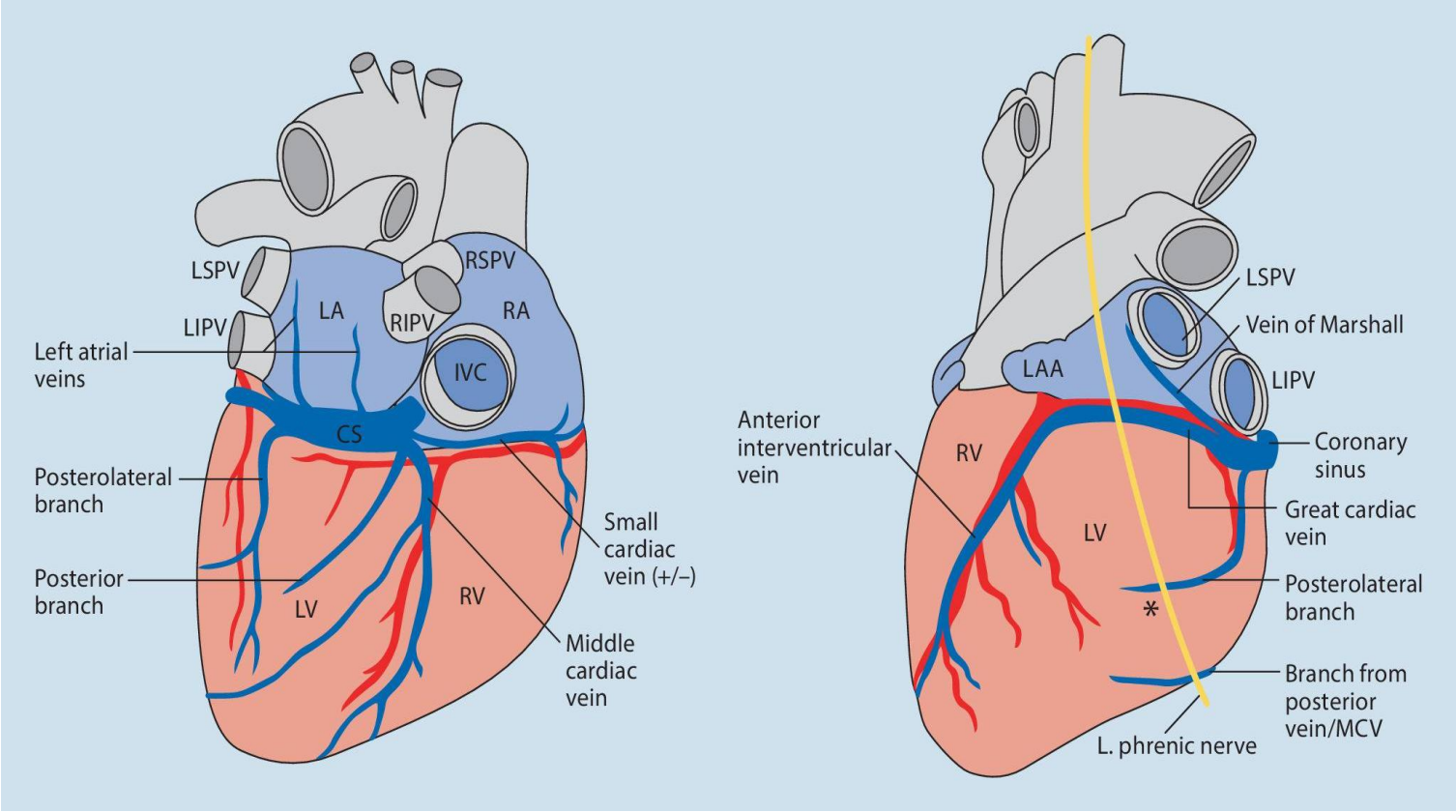

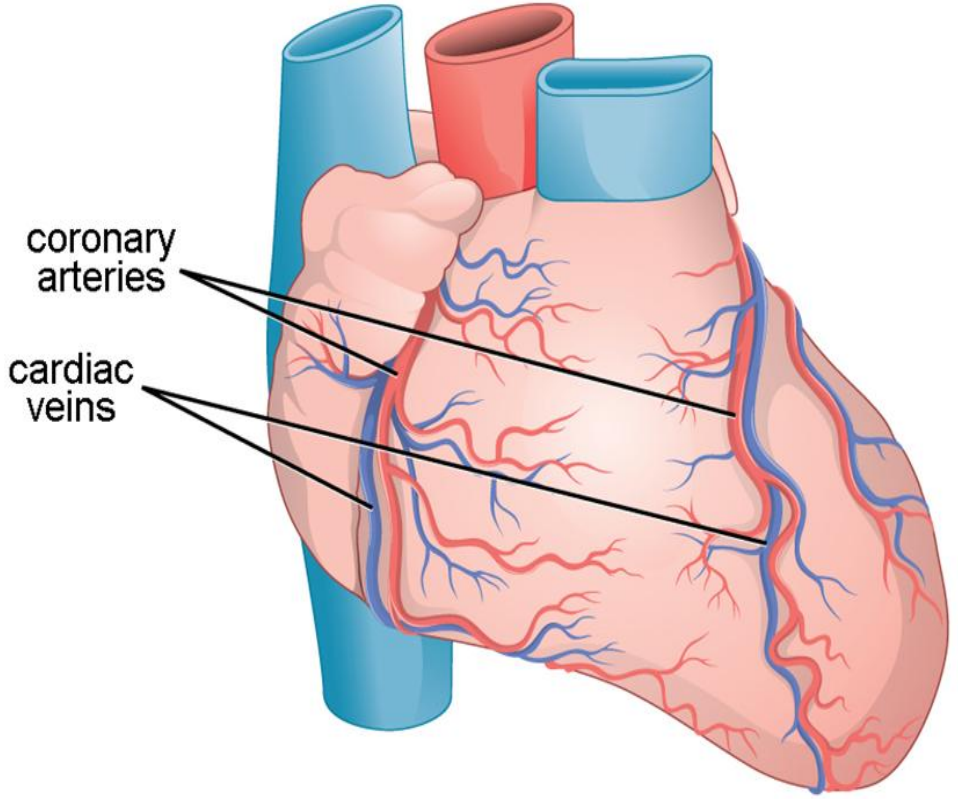

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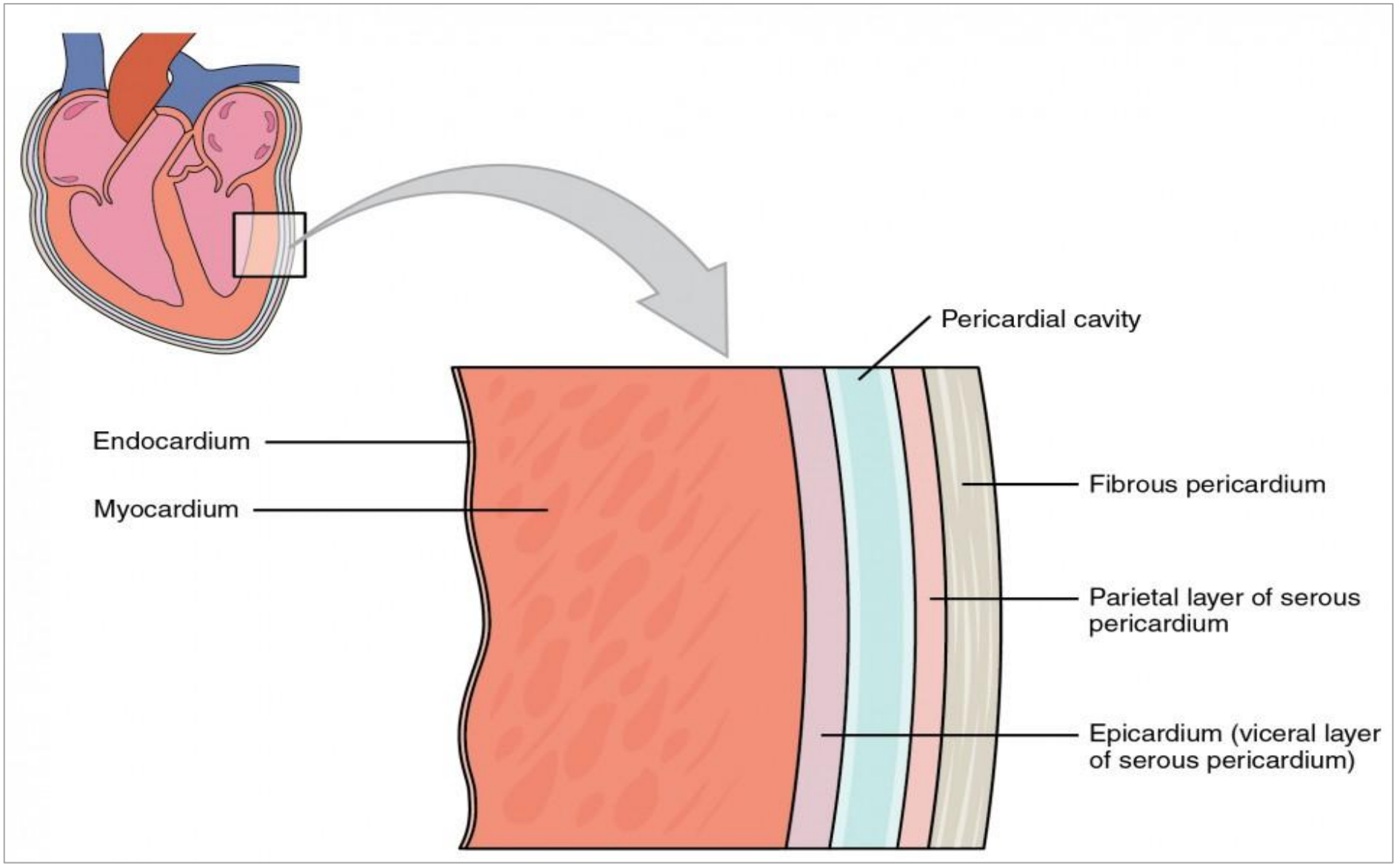


Layers of the heart

PHYSIOTHERAPY IN SURGICAL CONDITIONS

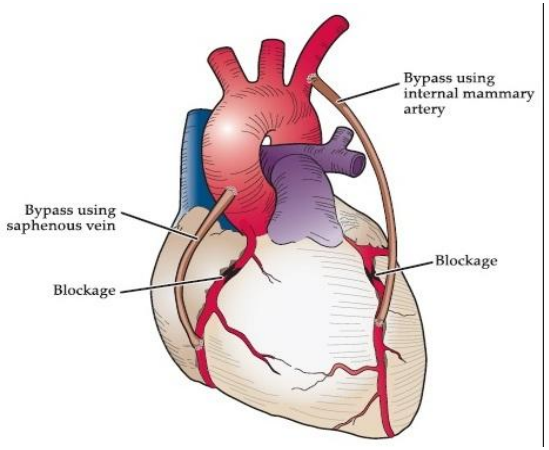
CABG

What is coronary artery bypass graft (CABG)?

- A surgical procedure that improves blood flow to the heart by diverting blood around blocked or narrowed coronary arteries.
- Commonly performed major surgery (about 400,000 CABG surgeries per year)
- Performed to restore blood flow to the myocardium to
  - relieve symptoms of coronary artery dx, e.g. chest pain or angina.
  - Improve oxygen delivery to heart tissue.
- Performed by a cardiothoracic surgeon

Indications:

- High-grade blockages in any of the major coronary arteries
- Percutaneous coronary intervention (PCI) has failed to clear the blockages.



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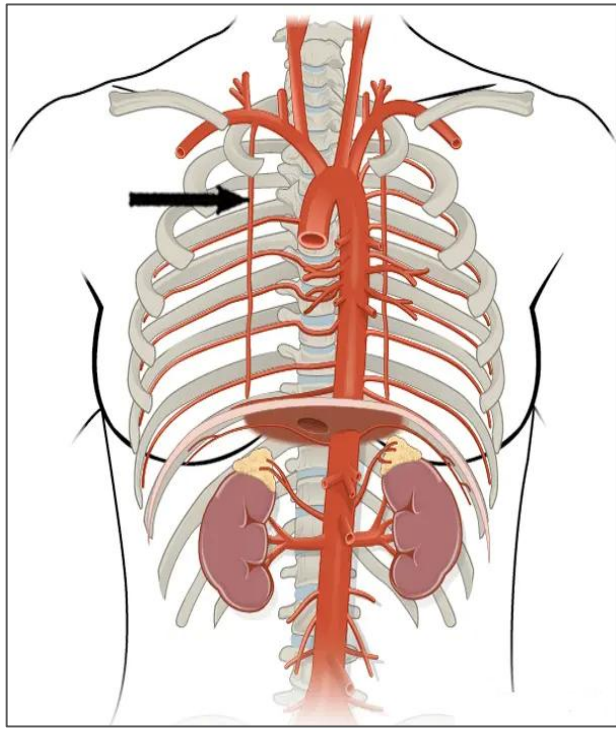
CABG

Surgical procedure

- Involves grafting a healthy artery or vein to bypass blocked coronary arteries.
- The graft is commonly taken from
  - Internal mammary artery (commonly used, from subclavian artery)
  - Radial artery (from the forearm)
  - Saphenous vein (from the thigh or calf)
  - Gastroepiploic artery (from the stomach)
  - Inferior epigastric artery (rarely used, from lower part of the abdominal wall)

Notes: The internal mammary artery or internal thoracic artery is usually preferred because:

- It has better long-term patency (ability to remain open)
- It is less likely to develop atherosclerosis.



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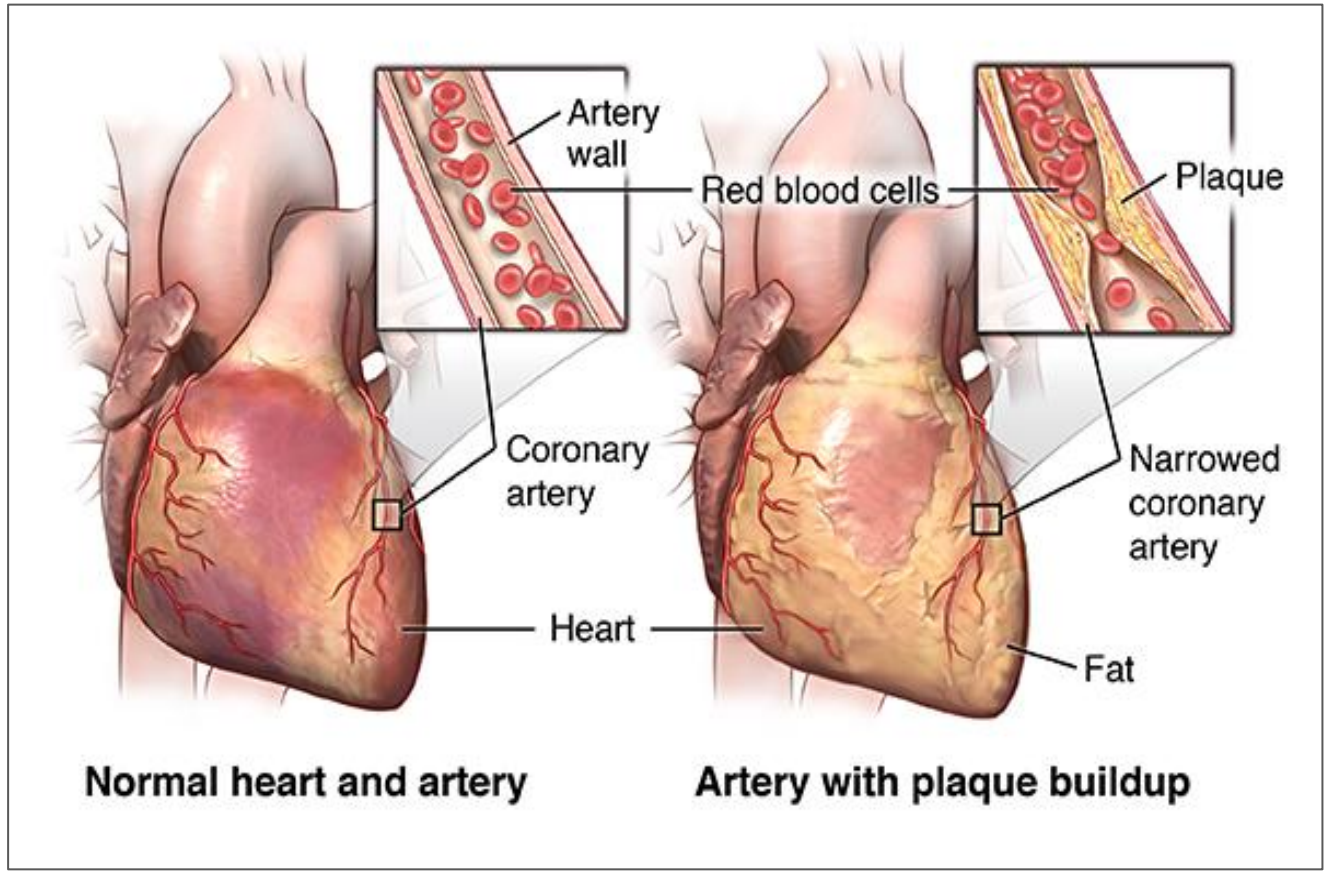
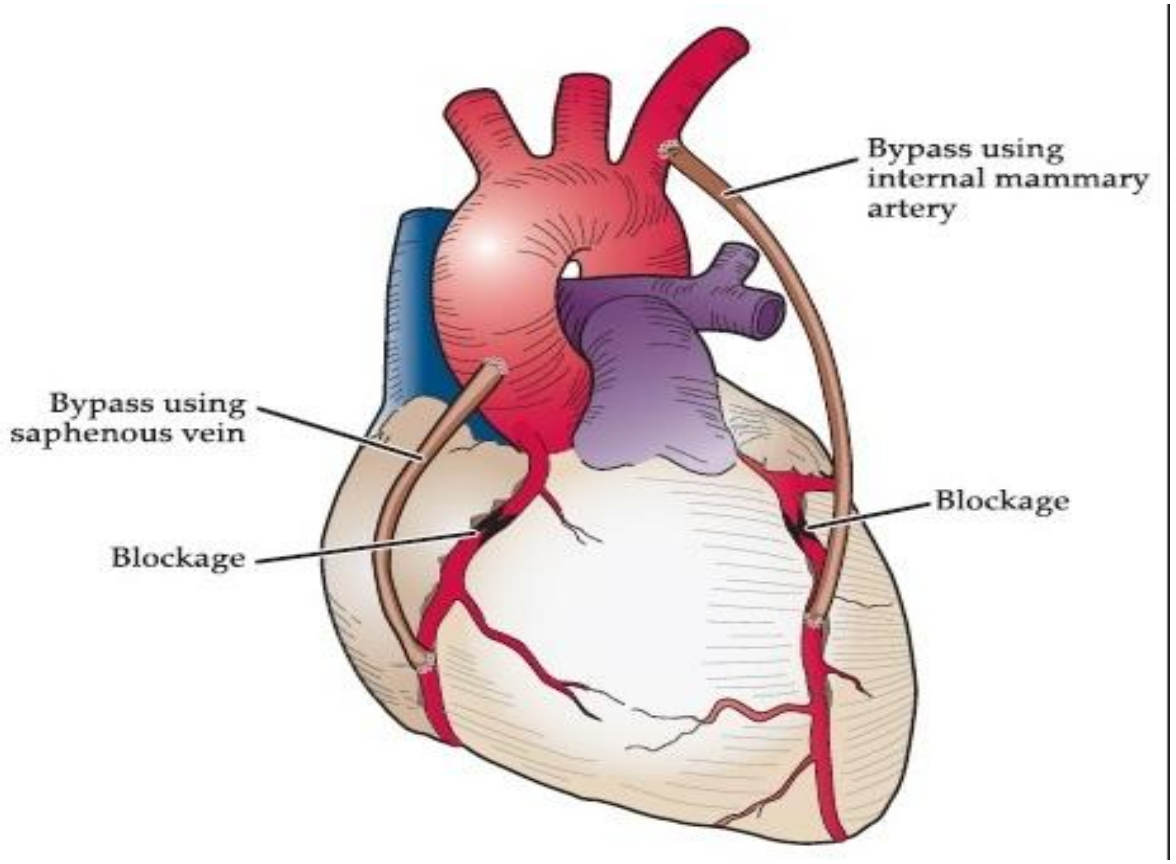
CABG surgical procedure





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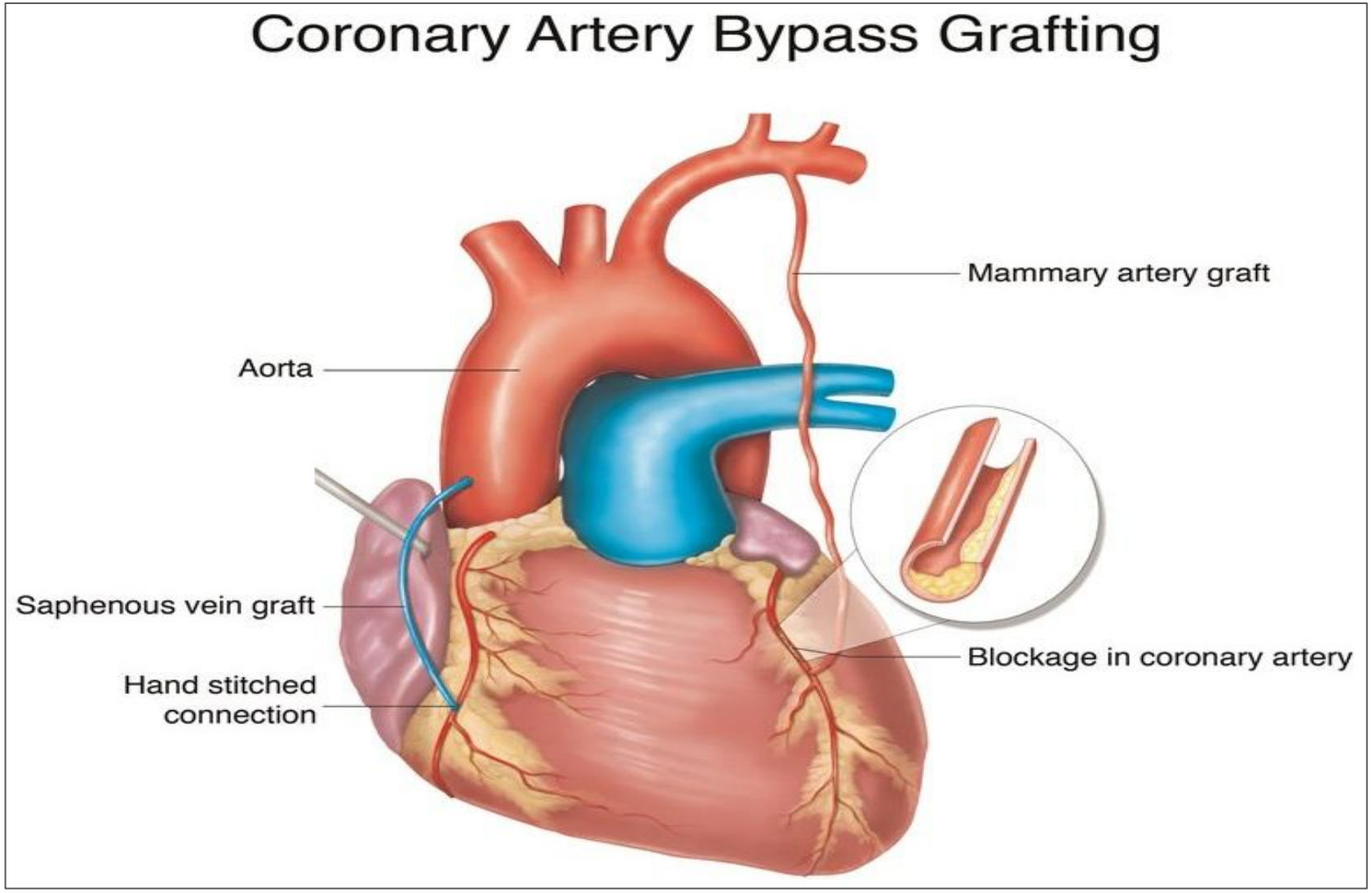
CABG surgical procedure



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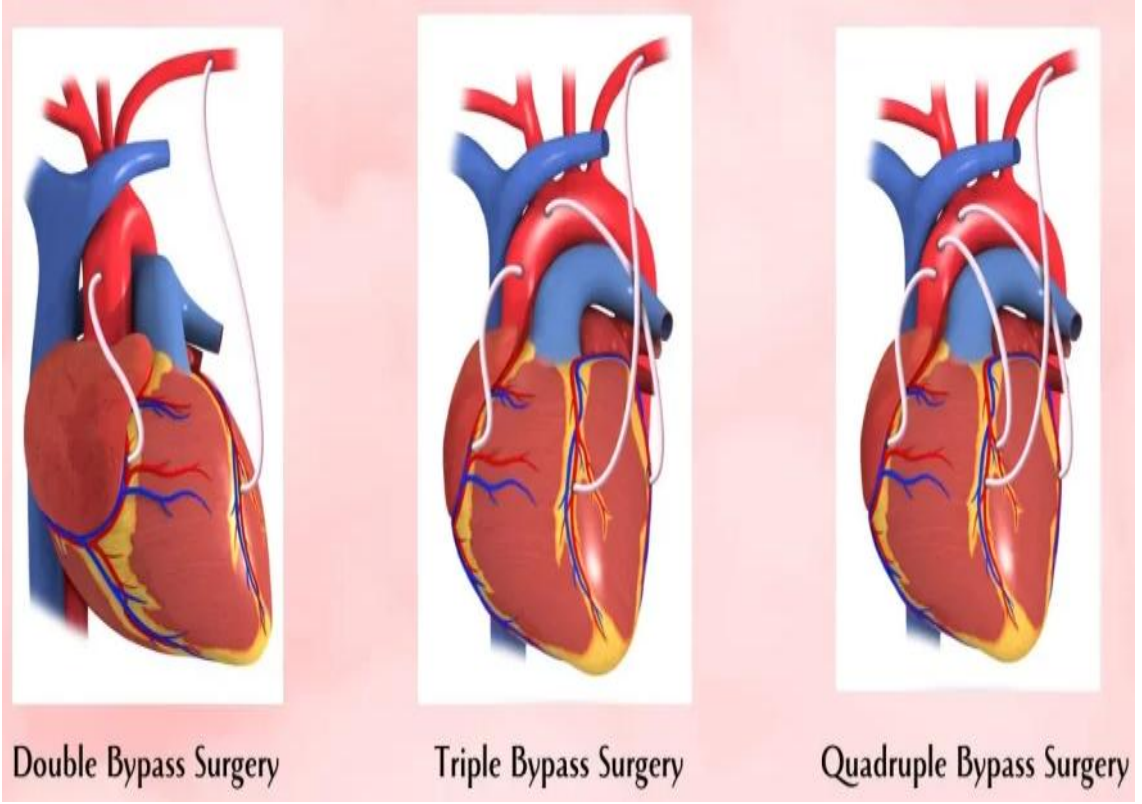
CABG

Types of CABG based on the number of grafts:

- Number of grafts performed during **CABG** surgery depends on several factors:
  - Number of coronary arteries that are blocked or narrowed,
  - Patient's specific condition, &
  - Surgeon's approach.
- Include
  - **Single vessel CABG** – One graft is used to bypass a blocked or narrowed coronary artery.
  - **Double vessel CABG** – Two grafts are used to bypass two coronary arteries.
  - **Triple Vessel CABG** – Three grafts are used to bypass three coronary arteries.
  - **Quadruple Vessel CABG** – Four grafts are used to bypass four coronary arteries.



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Surgical procedure variations:

- **On-pump CABG (Traditional CABG):** Involves bypassing arteries by stopping the heart using a heart-lung bypass machine (cardiopulmonary bypass).
- **Off-pump CABG (beating heart CABG):** Involves bypassing blocked arteries while the heart beats, without using a heart-lung bypass machine.
- **Minimally invasive CABG:** Uses smaller incisions & accesses the heart between the ribs, avoiding the need to open the sternum.
- **Robot-assisted CABG**: Uses robotic systems for smaller incisions, & may involve heart-lung bypass or off-pump techniques.

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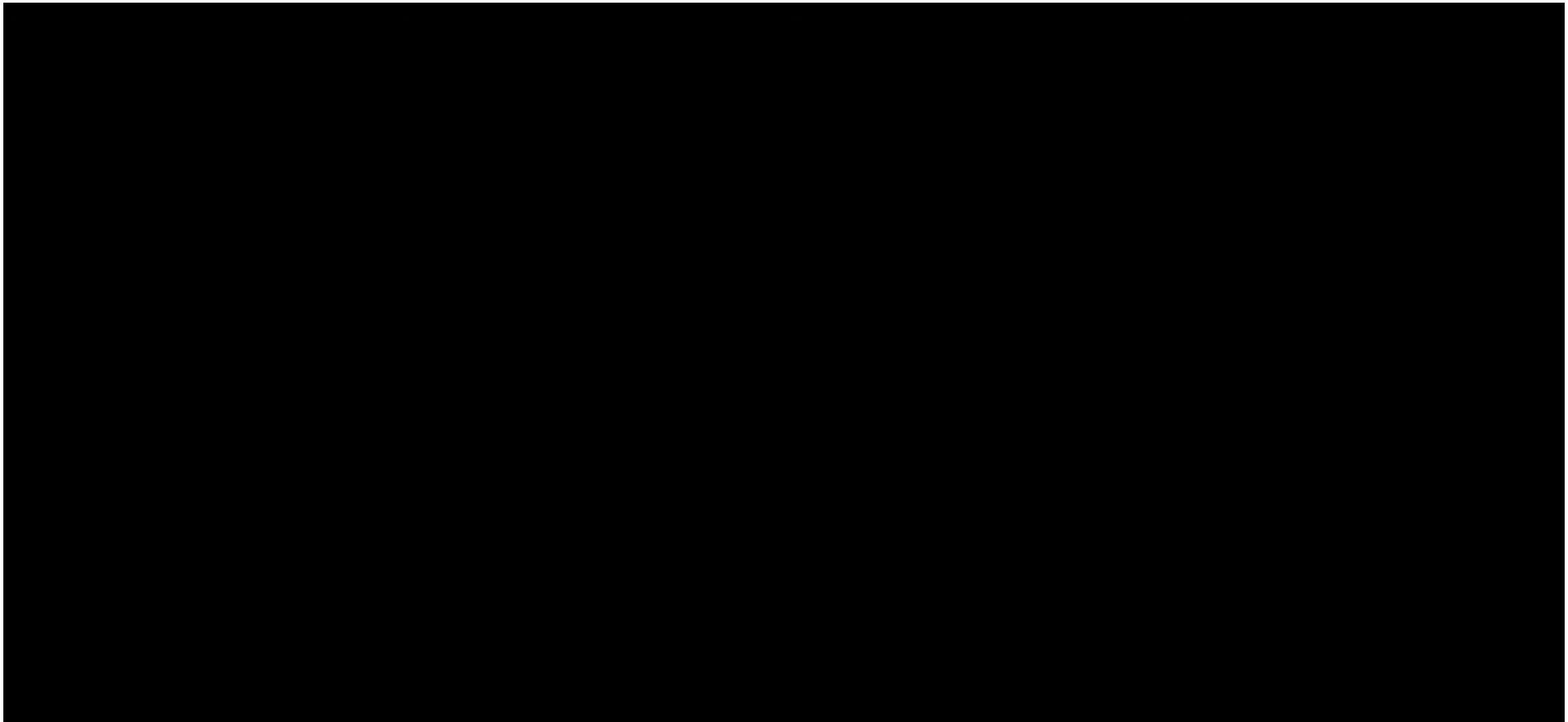
Surgical procedure: On-pump/Off-pump/Minimally invasive CABG



PHYSIOTHERAPY IN SURGICAL CONDITIONS

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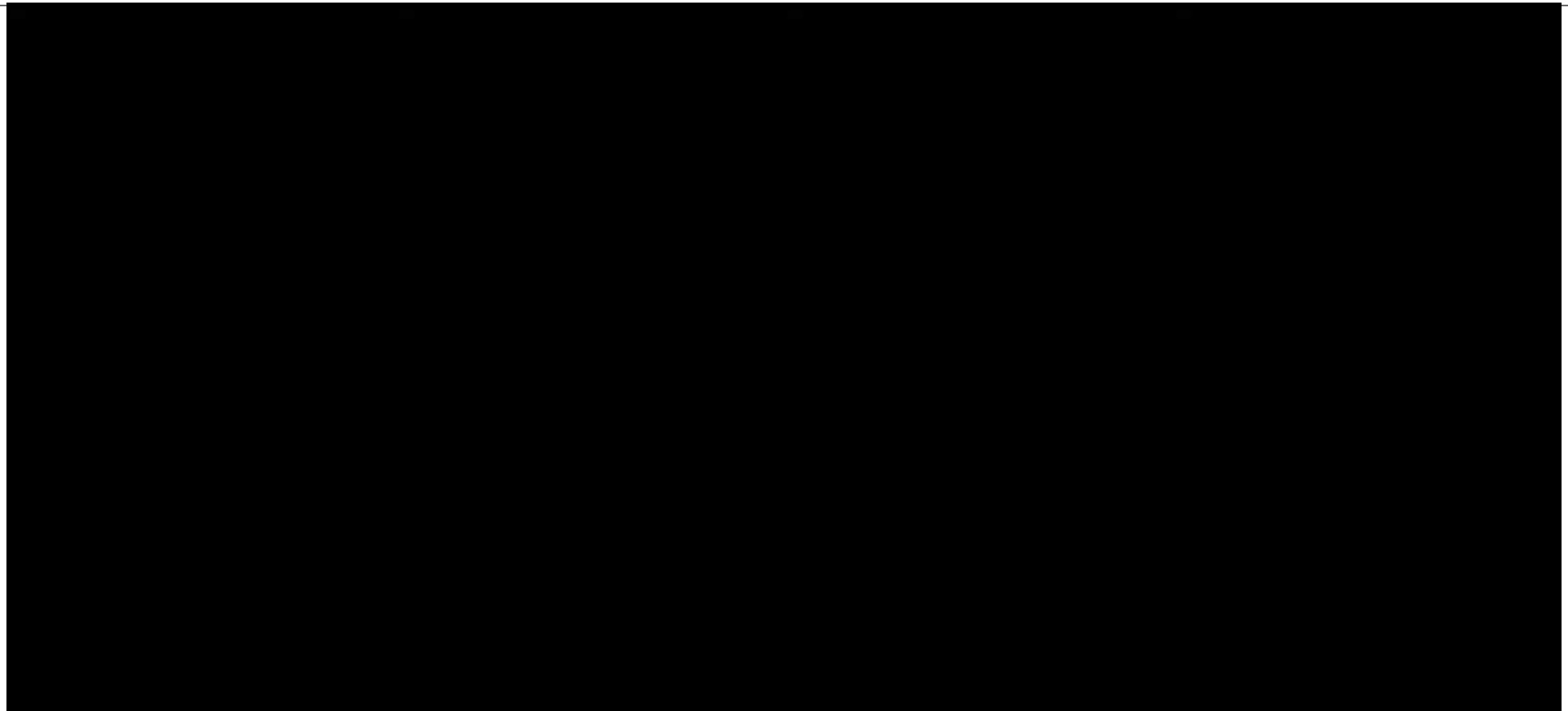
Surgical procedure: On-pump and Off-pump CABG



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CABG

Contraindications

1. Patient refusal
2. End stage heart failure
3. Severe medical comorbidities (e.g., advanced liver dx, kidney failure, uncontrolled diabetes, or severe lung dx).
4. Advanced age: very elderly patients (over 80 years)]
5. Unresectable cancer
6. Coronary arteries incompatible with grafting
7. Absence of viable myocardium to graft.

PHYSIOTHERAPY IN SURGICAL CONDITIONS

CABG

Physiotherapy preoperative assessment

Preoperative objectives

- Improve cardiovascular fitness
- Promote deep breathing to prevent postoperative pulmonary complications.
- Increase muscle strength & joint flexibility for better recovery.
- Teach techniques for post-operative care, including coughing & deep breathing.

PHYSIOTHERAPY IN SURGICAL CONDITIONS

CABG

Physiotherapy preoperative assessment

1. **Cardiovascular assessment**: assess
   - Resting heart rate (RHR)
   - Blood pressure
   - Oxygen saturation
   - Assess exercise tolerance & risk factors for complications
2. **Respiratory assessment:** assess
   - Respiratory or breathing rate
   - Breathing patterns
   - Lung sounds
   - Identify signs of respiratory dysfunction (e.g., shortness of breath)
3. **Musculoskeletal assessment**: assess
   - Muscle strength
   - Joint flexibility
   - Posture
   - Identify any pre-existing musculoskeletal conditions that may affect recovery.
4. **Functional assessment:** assess
   - ADL abilities
   - Identify any limitations or difficulties in mobility

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CABG

Physiotherapy preoperative treatment

1. **Patient education**: explain
   - Importance of early mobilization after surgery
   - Pain management
   - Deep breathing, and coughing techniques to prevent complications.
2. **Posture training & mobility:** teach
   - Correct posture & techniques to prevent postural issues.
   - Gentle stretching (ULs) to improve flexibility
3. **Breathing exercise**: teach
   - Diaphragmatic breathing exercises
   - Incentive spirometry: by encouraging deep inhalation to expand the lungs & prevent atelectasis.
4. **Aerobic & strengthening exercises:** teach
   - Light walking or stationary cycling to improve cardiovascular fitness.
   - Gentle strengthening exercises targeting major muscle groups to improve strength.

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CABG

Physiotherapy postoperative assessment

Postoperative objectives

- Prevent respiratory complications
- Improve cardiovascular recovery
- Increase mobility
- Teach techniques for pain control & support comfort during movement

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CABG

Physiotherapy postoperative assessment

1. **Cardiovascular assessment**: monitor
   - Heart rate, rhythm,
   - Blood pressure during activities.
   - Assess oxygen saturation & signs of exertion or discomfort
2. **Respiratory assessment:** check
   - Adequate lung expansion
   - Breath sounds, & oxygen levels.
   - Monitor for signs of atelectasis or pneumonia.
3. **Functional and mobility assessment**: assess
   - Walking capacity
   - ADL performance and
   - Joint flexibility.
   - The need for assistive devices (e.g., walking aids).
4. **Pain assessment:** assess & monitor
   - Pain levels during mobilization & exercises.

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Physiotherapy postoperative treatment

1. **Breathing exercises:** teach
   - Pursed lip breathing: Improves ventilation and oxygenation, reduces shortness of breath.
   - Incentive spirometry: Continue to encourage deep breaths to maintain lung expansion.
   - Segmental breathing: Targets different lung segments for better ventilation.
2. **Early mobilization:** teach
   - Start with sitting up and progressing to standing & walking within the first 24 hours (if stable).
   - Gradually increase walking distance & intensity as tolerated.
3. **Strengthening exercise:** teach
   - Gentle strengthening for upper & lower limbs (e.g., leg lifts, ankle pumps, arm exercises).
   - Focus on gradual progression to avoid strain on the chest.
4. **Pain management strategies:** teach
   - Use deep breathing, relaxation techniques, and proper positioning to manage discomfort.
   - Consider modifying exercises or mobilization strategies to minimize pain.

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Physiotherapy postoperative treatment

5. Patient education:

- Encourage proper posture, breathing techniques, and mobility.
- Educate on energy conservation, pain control, and how to monitor signs of complications.

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CABG

Complications to monitor

1. Respiratory complications:
   - Atelectasis (collapse of part of the whole lung)
   - Pneumonia (infection of the air sac of lungs)
   - Pleural effusion (abnormal accumulation of fluid around the lungs)
2. Cardiovascular complications:
   - Arrhythmias (irregularities in heart beat)
   - Heart failure
   - Poor wound healing
3. Musculoskeletal complications:
   - Muscle weakness
   - joint stiffness from prolonged bed rest.
4. Psychological complications:
   - Anxiety, depression
   - Fear of activity or re-injury

QUESTIONS AND COMMENTS

REVIEW

OTHER READING SOURCES

TEXT

1. *O'Shea, J. (2019). Principles of physiotherapy in surgery and rehabilitation. Cambridge University Press.*
2. *Dutton, M. (2017). Orthopaedic examination, evaluation, and intervention (3rd ed.). McGraw-Hill Education.*

VIDEO

https://www.youtube.com/watch?v=UY2xGiOwe2o

THANKS FOR LISTENING