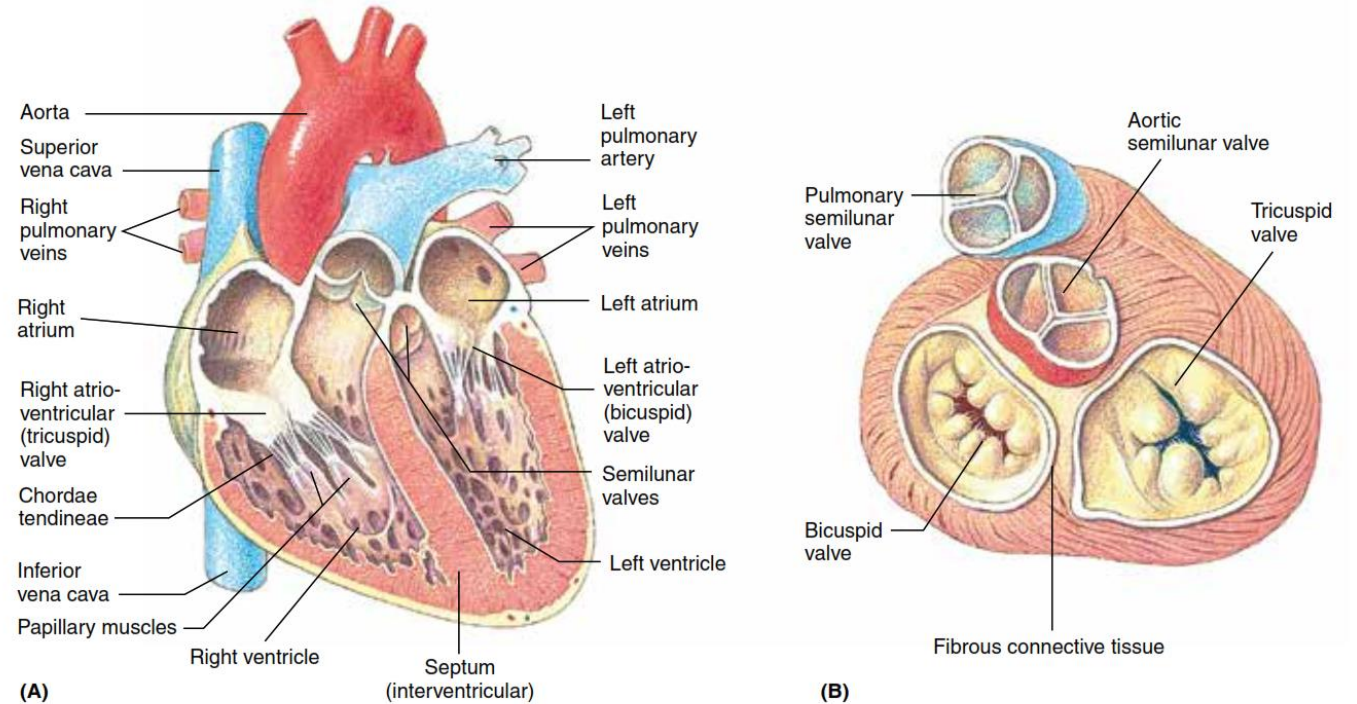# Cardiovascular System

Lamon Willis

The Heart

The Heart

The Heart

Source: Delmar/Cengage Learning.

The Heart

- A fist-sized, cone-shaped muscle (the myocardium) that beats, on average, 80 times per minute .
- Divided into right and left sides by a muscular wall, the septum .
- A two-layered, protective membrane, the pericardium, surrounds the heart and the roots of the great vessels (the aorta, pulmonary trunk, and superior and inferior vena cava) .

The Heart

- Contains four chambers:
  - Upper chambers: Two Atria (atrium = singular)
  - Lower Chambers: Two Ventricles (left ventricle forces oxygen-rich blood into the body)
    - Ventricles have inlet valves which are flaps (cusps/leaflets) that operate like one-way swinging doors
      - The atrioventricular valves (tricuspid on the right and mitral on the left) are inlet valves that open from the atrium to the ventricles .
      - The semilunar valves (pulmonary or pulmonic on the right and aortic on the left) are outlet valves .

The Heart

- The inlet valves are supported by chordea tendinae, string-like tendons (heart-strings) linking the papillary muscles of the inferior wall of the ventricles to the tricuspid valve in the right ventricle and the mitral valve in the left ventricle.

The Heart

- When the atria contract, the valves open, and blood flows into the ventricles during diastole (ventricles relaxed).
- When the ventricles contract, the valves close preventing backflow of blood from the ventricles into the atria.
- The contraction of the papillary muscles prevents inversion or prolapse of these valves during ventricular contraction (systole), forcing the blood out of the ventricles .

The Heart

- Oxygenation Process
  - Oxygen-deficient blood enters the right atrium through the vena cava.
  - The tricuspid valve opens, and the blood flows into the right ventricle.
  - The blood is pumped from the right ventricle, through the pulmonary valve, and into the pulmonary artery to the lungs.
  - Oxygen-rich blood returns to the left atrium through the pulmonary veins.
  - The mitral valve opens, and the blood flows into the left ventricle, which forces the blood through the aortic valve, into the aorta, and out to the body.

The Heart

- Conduction System
  - The heart is controlled by an electrical conduction system containing pacemaker cells, nodes, the bundle of His (AV bundle), and the Purkinje fibers.
  - The pace- maker cells generate an electrical impulse and pass that impulse to other cells.
  - The impulse causes muscle fibers to shorten (contract), causing the heart to "beat."

The Heart

- Conduction System
  - The sinoatrial (SA) node is located in the right atrium by the superior vena cava.
    - It is the normal pacemaker of the heart.
  - The atrioventricular (AV) node is located lower in the septal wall of the right atrium.
    - It slows the impulse between the atria, and the ventricles to allow time for the atria to fill with blood before the ventricles contract.
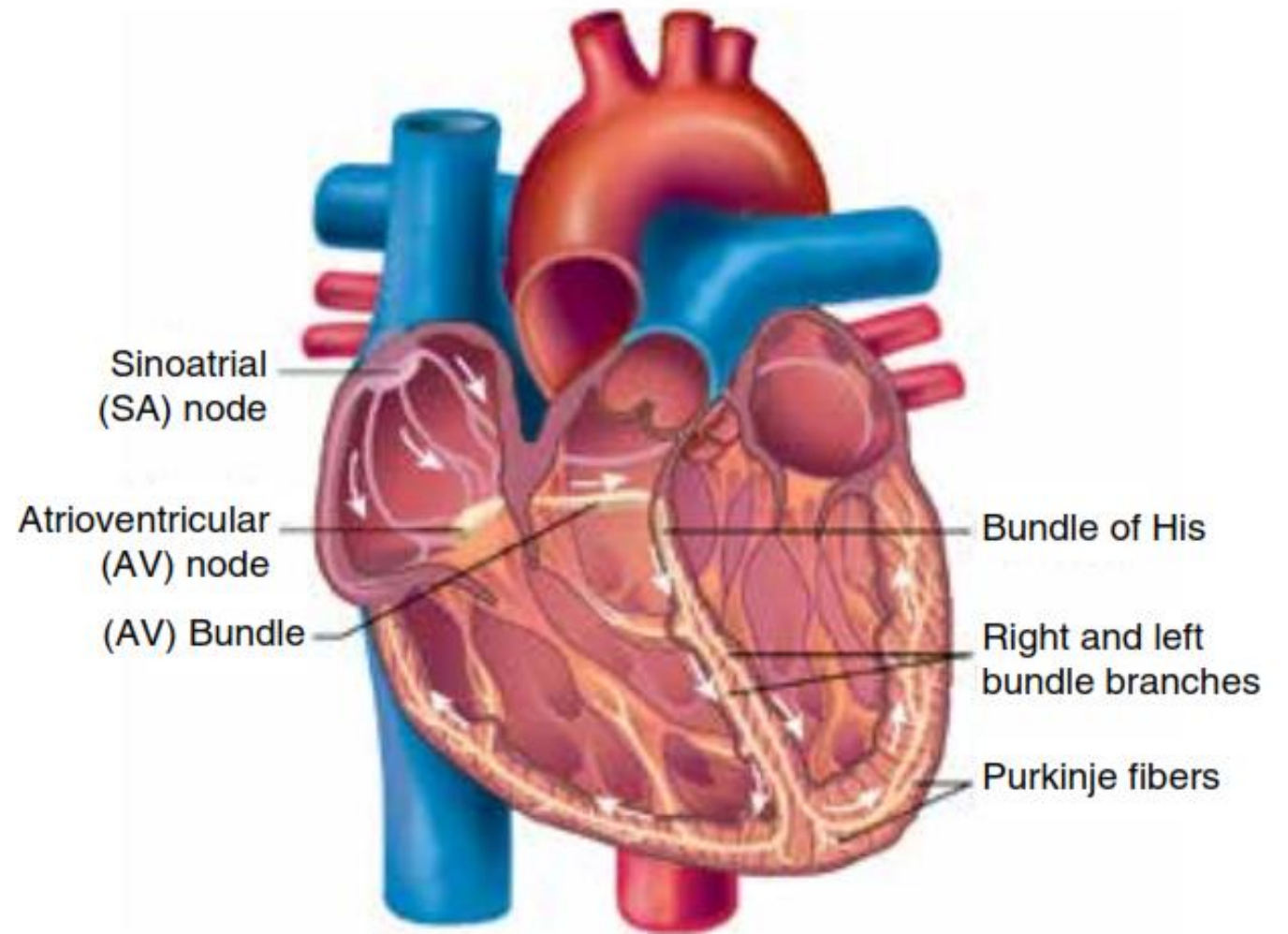
The Heart

- Conduction System
  - The impulse then travels to the bundle of His, which are muscle fibers that branch off to the right and left.
  - The impulse arrives at the Purkinje fibers at the end of the bundle branches .
    - These fibers lie across the surface of the ventricles and give the final signal for the myocardium of the ventricles to contract.

The Heart's Conduction System

Electrical Impulses in the Heart

- Sinoatrial (SA) node
- Atrioventricular (AV) node
- (AV) Bundle
- Bundle of His
- Right and left bundle branches
- Purkinje fibers

Source: Delmar/Cengage Learning.

The Heart

- Coronary Arteries
  - To work effectively, the heart must have a constant supply of oxygen and nutrients.
  - The coronary arteries are the network of blood vessels that carry oxygen and nutrient-rich blood to the cardiac muscle tissue (myocardium).
  - The left and right coronary arteries, which supply the heart, emerge from the beginning of the aorta, near the top of the heart.

The Heart

- Coronary Arteries
  - The initial segment of the left coronary artery is called the left main coronary.
  - It branches into the left anterior descending coronary artery and the left circumflex coronary artery.
  - The arteries continue to branch into progressively smaller vessels.
  - The smallest branches are the capillaries, in which red blood cells provide oxygen and nutrients to the cardiac muscle tissue and bond with carbon dioxide and other metabolic waste products, taking them away from the heart for disposal through the lungs, kidneys, and liver.

The Heart

- Blood Vessels
  - During blood circulation, the arteries carry blood away from the heart, remember:
    - "A" = artery = away.
  - The capillaries connect the arteries to veins.
  - Veins carry blood back to the heart.

The Heart

- Blood Vessels
  - To withstand the pumping pressure of the heart, an artery is composed of three layers:
    1. a tough outer layer of tissue,
    2. a muscular middle, and
    3. an inner layer of epithelial cells.
  - The muscle in the middle of the artery is strong and elastic.
  - The inner layer is very smooth so that the blood can flow easily.

The Heart

- Blood Vessels
  - Veins are similar to arteries, but because they transport blood at a lower pressure, they are not as strong.
  - Like arteries, veins have three layers:
    1. An outer layer of tissue,
    2. muscle in the middle, and
    3. a smooth inner layer of epithelial cells .
  - These layers of veins are thinner and contain less elastic tissue and smooth muscle than arterial layers; however, there is more fibrous connective tissue in the outer layer.

The Heart

- Blood Vessels
  - Unlike arteries and veins, capillaries are very thin and fragile.
  - The capillaries are a single epithelial cell thick— so thin that blood cells can pass through them only in single file.
  - The exchange of oxygen and carbon dioxide takes place through the thin capillary wall.

The Heart

- Circulation
  - Three methods of circulation carry blood throughout the body:
    1. systemic,
    2. pulmonary, and
    3. coronary.
  - Systemic circulation supplies nourishment to all of the tissue located throughout the body, with the exception of the heart and lungs.

The Heart

- Circulation
  - Pulmonary circulation is the movement of blood from the heart, to the lungs, and back to the heart again .
    - Pulmonary circulation accomplishes the exchange of oxygen and carbon dioxide and can be heard through a stethoscope.
    - Coronary circulation refers to the movement of blood via coronary arteries and veins to and from tissue of the heart.

The Heart

Key roots, suffixes, and prefixes for the cardiovascular system

Combining forms

angi/o; vas/o; vascul/o	atrium
arter/o; arteri/o	heart
arteriol/o	sound
ather/o	electrical
atri/o	muscle
cardi/o	oxygen
ech/o; son/o	vein
electr/o	lung
my/o	hard
ox/i	septum
phleb/o; ven/o	sinus
pulmon/o	chest
scler/o	venule
sept/o	
sin/o	
steth/o; thorac/o	
venul/o	
vessel	
artery	
arteriole	
yellowish, fatty plaque	

Prefixes

	slow
brady-	down; from
de-	upon; above
epi-	around
peri-	many
poly-	fast
tachy-	

Suffixes

	pertaining to
-ary	swelling
-edema	instrument used to record
-graph	process of recording
-graphy	recording, writing
-gram	membrane
-ium	enlarged
-megaly	small
-ole	tumor
-oma	hardening, hardness
-sclerosis	narrowing; stricture
-stenosis	artificial opening
-stomy	cutting instrument
-tome	

Cardiovascular Procedures

There are multiple types of services throughout the Cardiovascular System section of CPT which can only be performed on patients in an inpatient setting.

Cardiovascular Procedures

- A pericardiocentesis (33010, 33011) involves drawing off collected fluid (via a specialized needle) built up inside the double-layered pericardial sac.
  - Too much fluid can impede the contraction and effectiveness of the heart, this is called cardiac tamponade.

Cardiovascular Procedures

- Pacemaker or Implantable Defibrillator (33202–33249)
  - A majority of these services are performed as outpatient surgeries.
  - There are several pages of instructive notes in the CPT manual for these surgeries and their component coding.
  - There is a procedure to device chart in the CPT manual as well which displays the component codes for the primary and add-on procedures as well.

Cardiovascular Procedures

- Pacemaker or Implantable Defibrillator (33202–33249)
  - A pacemaker or implantable defibrillator system is made up of a pulse generator (battery and electronics) and one or more electrodes (leads).
  - When reading descriptors for pacer/defibrillator codes, the first word generally defines the procedure; for example, 33202 is an insertion code and 33218 is a repair code.

Cardiovascular Procedures

- Pacemaker or Implantable Defibrillator (33202–33249)
  - Next, you will need to know the type of system.
    - A pacemaker uses low-energy electronic pulses to overcome conduction disorders of the heart.
    - An implantable defibrillator delivers electrical shocks and sometimes paces the heart, if needed.
    - CPT separates some of the codes by the type of system, such as 33222 Relocation of skin pocket for pacemaker, and 33223 Relocation of skin pocket for implantable defibrillator.

Cardiovascular Procedures

- For pacemakers, you will need to know if it is a temporary or permanent pacemaker .
  - Temporary pacemaker placement codes are 33210–33211.
- For pacemakers, there also are different codes if the system is a single or dual chamber.
  - CPT codes 33206 and 33207 are for single chamber pacemaker system insertion or placements.
  - CPT code 33208 is for a dual chamber pacemaker system placement .
  - These codes are for entire systems.
  - If only the generator is inserted, look to 33212, 33213, and 33221.

Cardiovascular Procedures

- Electrodes can be placed transvenously, or epicardially.
- Epicardial electrode placement is further differentiated by approach—open or endoscopic.
  - Open or endoscopy placements are performed as inpatient services.

Cardiovascular Procedures

- More than one code is usually required to describe the full procedure.
- If a new system is placed after removal of an old system, for instance, code the removal of the parts, and the insertion of the new system.
- The removal of a dual system with replacement is reported with 33235, 33208, 33233.

Cardiovascular Procedures

- There are two general types of implantable defibrillators.
  - Transvenous implantable pacing cardioverter-defibrillator (ICD) use a combination of anti-tachycardia pacing, low energy cardioversion or defibrillating shocks to treat ventricular tachycardia or ventricular fibrillation.
  - The subcutaneous implantable defibrillator (S-ICD) uses a single subcutaneous electrode to treat ventricular tachyarrhythmias.

Cardiovascular Procedures

- Review the CPT codebook for the codes for implantable defibrillator insertion (33240, 33230, and 33231), removal of only the implantable defibrillator pulse generator (33241), and removal with replacement of the pulse generator (33262–33264) .
- Do not report 33262–33264 in conjunction with 33241 .

Cardiovascular Procedures

- There are codes to describe the services for subcutaneous implantable defibrillators.
- The insertion or replacement of the system is reported with 33270.
- The removal of a lead is reported with 33272.
- Removal and replacement of the complete system requires codes 33272, 33241, and 33270.

Cardiovascular Procedures

- Cardiopulmonary Valve Procedures 33361-33496 are performed as inpatient services.
- Note: There are percutaneous cardiac/pulmonary valve procedures in the Medicine Section of CPT which are performed and reimbursed in an outpatient setting, example:
  - 92986 Percutaneous balloon valvuloplasty; aortic valve
  - 92987 Percutaneous balloon valvuloplasty; mitral valve
  - 92990 Percutaneous balloon valvuloplasty; pulmonary valve

Cardiovascular Procedures

- Coronary Artery Bypass Grafts (CABG)
  - CABG services are performed on an inpatient basis
  - All services in CPT afterwards until you come to Embolectomy/Thrombectomy procedures are all performed on an inpatient basis

Cardiovascular Procedures

- Embolectomy/Thrombectomy
  - The following services can be performed on an outpatient basis
    - 34101 Embolectomy or thrombectomy, with or without catheter; axillary, brachial, innominate, subclavian artery, by arm incision
    - 34111 Embolectomy or thrombectomy, with or without catheter; radial or ulnar artery, by arm incision
    - 34201 Embolectomy or thrombectomy, with or without catheter; femoropopliteal, aortoiliac artery, by leg incision
    - 34203 Embolectomy or thrombectomy, with or without catheter; popliteal-tibio-peroneal artery, by leg incision

Cardiovascular Procedures

- Embolectomy/Thrombectomy
  - The following services can be performed on an outpatient basis
    - 34421 Thrombectomy, direct or with catheter; vena cava, iliac, femoropopliteal vein, by leg incision
    - 34471 Thrombectomy, direct or with catheter; subclavian vein, by neck incision
    - 34490 Thrombectomy, direct or with catheter; axillary and subclavian vein, by arm incision

Cardiovascular Procedures

- Venous Reconstruction
  - 34501 Valvuloplasty, femoral vein
  - 34510 Venous valve transposition, any vein donor
  - 34520 Cross-over vein graft to venous system
  - 34530 Saphenopopliteal vein anastomosis

Cardiovascular Procedures

- Aneurysm
  - An aneurysm is an excessive localized enlargement of an artery caused by a weakening of the artery wall.

Normal aorta

Abdominal aortic aneurysm
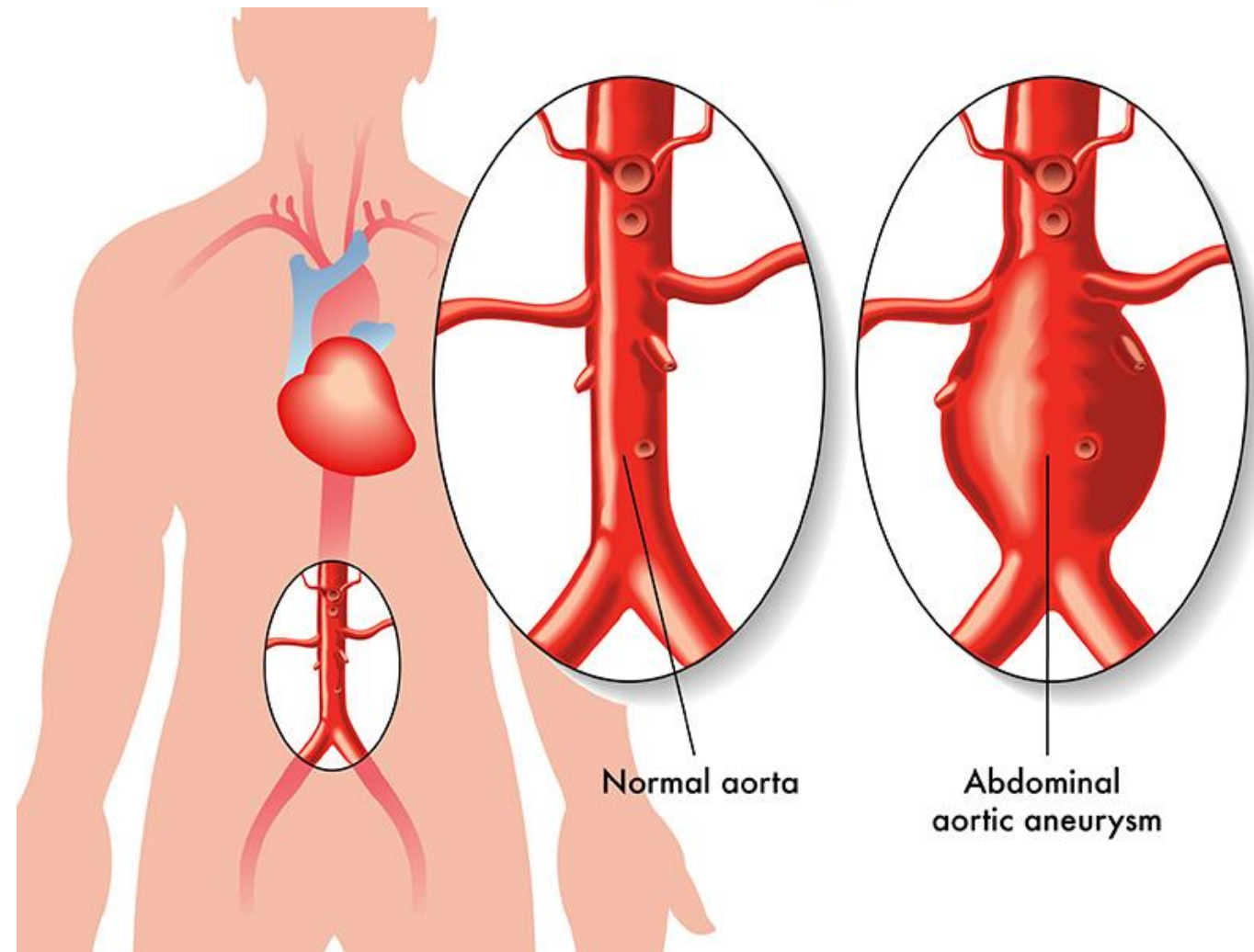
Cardiovascular Procedures

- Aneurysm Repair – Two OP services
  - 35011 Direct repair of aneurysm, pseudoaneurysm, or excision (partial or total) and graft insertion, with or without patch graft; for aneurysm and associated occlusive disease, axillary-brachial artery, by arm incision
  - 35045 Direct repair of aneurysm, pseudoaneurysm, or excision (partial or total) and graft insertion, with or without patch graft; for aneurysm, pseudoaneurysm, and associated occlusive disease, radial or ulnar artery

Cardiovascular Procedures

- Arteriovenous Fistula Repair
  - 35180 Repair, congenital arteriovenous fistula; head and neck
  - 35184 Repair, congenital arteriovenous fistula; extremities
  - 35188 Repair, acquired or traumatic arteriovenous fistula; head and neck
  - 35190 Repair, acquired or traumatic arteriovenous fistula; extremities

Cardiovascular Procedures

- Repair Other Blood Vessel
  - 35201 Repair blood vessel, direct; neck
  - 35206 Repair blood vessel, direct; upper extremity
  - 35207 Repair blood vessel, direct; hand, finger
  - 35226 Repair blood vessel, direct; lower extremity
  - 35231 Repair blood vessel with vein graft; neck
  - 35236 Repair blood vessel with vein graft; upper extremity

Cardiovascular Procedures

- 35256 Repair blood vessel with vein graft; lower extremity
- 35261 Repair blood vessel with graft other than vein; neck
- 35266 Repair blood vessel with graft other than vein; upper extremity
- 35286 Repair blood vessel with graft other than vein; lower extremity

Cardiovascular Procedures

- Excision, Exploration, Repair, Revision
  - This section is under "Adjuvant" or additional techniques.
  - 35761 Exploration (not followed by surgical repair), with or without lysis of artery; other vessels
  - 35860 Exploration for postoperative hemorrhage, thrombosis or infection; extremity

Cardiovascular Procedures

- Excision, Exploration, Repair, Revision
  - 35875 Thrombectomy of arterial or venous graft (other than hemodialysis graft or fistula);
  - 35876 Thrombectomy of arterial or venous graft (other than hemodialysis graft or fistula); with revision of arterial or venous graft35879
  - 35881 Revision, lower extremity arterial bypass, without thrombectomy, open; with segmental vein interposition

Cardiovascular Procedures

- Excision, Exploration, Repair, Revision
  - 35883 Revision, femoral anastomosis of synthetic arterial bypass graft in groin, open; with nonautogenous patch graft (eg, Dacron, ePTFE, bovine pericardium)
  - 35884 Revision, femoral anastomosis of synthetic arterial bypass graft in groin, open; with autogenous vein patch graft
  - 35903 Excision of infected graft; extremity

Coding Vascular Injections

Cardiovascular Procedures

- Code each vascular family separately
- Code <u>each vascular family</u> to the highest order of selectivity <u>within that vascular family</u>
  - Lesser order selectivity within the same vascular family is included in the coding of the higher selectivity
- When multiple second or third order vessels within the same vascular family are catheterized, code to the highest order for the <u>initial</u> selective catheter placement

Cardiovascular Procedures

Vascular Injection Procedures

- CPT guidelines listed under the Vascular Injection Procedure section address proper application of these codes.
- All "necessary local anesthesia, introduction of contrast media with or without automatic power injection, and/or necessary pre- and post-injection care specifically related to the injection procedure" are included.
- Catheters, drugs, and contrast material are not included.
- Additional guidelines for interventional procedures include:

Cardiovascular Procedures

- Additional guidelines for interventional procedures include:
  - Selective catheterizations are coded to the highest level accessed within a vascular family.
  - The highest level accessed when coded includes all of the lesser order selective catheterizations used in the approach (if a second order vessel is catheterized, the first order vessel and nonselective catheterization are bundled).

Cardiovascular Procedures

- Additional second and/or third order arterial catheterization within a vascular family of arteries or veins supplied by a single first order are expressed by 36012, 36218, or 36248, as appropriate.

- Additional first order or higher catheterizations in vascular families supplied by a first order vessel different from a previously selected and coded family are coded separately (you may code separately for catheterizations within each new vascular family).

Cardiovascular Procedures

- To code an interventional radiology procedure, you must consider:
  - The number of catheter access sites (each access site is coded as a separate procedure).
  - The number of catheter end points. This will tell you how many vascular families and how many vessel orders were accessed.
  - The number of vessels visualized.
    - This will tell you how many radiology supervision and interpretation codes would be assigned from the department CDM

Cardiovascular Procedures

- Catheter Placement
  - Selective
  - Non-selective

Cardiovascular Procedures

Selective versus Non-Selective Catheterization

- Catheter placements represent the surgical component of a diagnostic interventional radiology procedure
  - Do code catheter placement in addition to any therapeutic interventional procedure performed, i.e., angioplasty, atherectomy, etc.
- Precedence is placed on selective catheterization over non-selective via the same access/puncture site

Cardiovascular Procedures

- Both a non-selective <u>and</u> selective catheter placement can be coded…only if there are two separate/distinct puncture sites or two separate patient encounters on the same DOS

Cardiovascular Procedures

- Key Phrases to Look For in Documentation:
  - Into, engaged, placed in
  - At, proximal to the opening, to the ostium
- Catheter placement depends on access site(s), any anatomical variations, final catheter placement, and each vessel catheterized, i.e., catheter movement.
- The terms "ipsilateral," "contralateral," "antegrade," & "retrograde" provide insight into non-selectivity vs. selectivity.

Cardiovascular Procedures

- Non-Selective:
  - Catheter does not leave the vessel entered (direct puncture/"stick") or is advanced to the aorta, but no further

Cardiovascular Procedures

- Selective:
  - Once a catheter is placed in the aorta from any access point, any catheter movement beyond the aorta is considered selective
  - Implies a branch off of the vessel entered is catheterized
  - Each bifurcation (division or forking into two branches) traversed (when moving away from the aorta) increases the level of selectivity

Cardiovascular Procedures

Summary of Catheterization Rules

1. Know catheter starting, or insertion, point (puncture site) and end position;
2. Code each vascular family separately;
3. Code to the highest degree of selectivity within a vascular family;
4. Selective catheter placement take precedence over non-selective when performed from the <u>same</u> puncture site;
5. Code for each catheter placement from each separate puncture site;
6. Code to the intent of the study;
7. If performing both a diagnostic and therapeutic study in the same setting, be certain to code separately for each portion, when appropriately documented; and
8. Only one (1) second or third order vessel within a vascular family can be coded/charged. Use the applicable "each additional" CPT code/charge, when appropriate.

PHYSICIAN DOCUMENTATION IS ESSENTIAL TO ACCURATELY APPLYING ALL OF THESE RULES

Cardiovascular Procedures

- Code separately for catheter placement (except when CPT specifically includes ("bundles") in a procedure's code description, i.e. CPT 37210 – Uterine Fibroid Embolization (UFE)).
  - If the same access site is used for both a diagnostic and a therapeutic service on the same occasion, then the access is only coded once.
  - If multiple vascular access sites are necessary, then each access site is coded separately.

Cardiovascular Procedures

- Non-Selective Catheter Placement
  - Vessel originally entered
  - The 2 major vessel are always considered non-selective
    - Aorta
    - Vena Cava

Cardiovascular Procedures

- Non-Selective Terminology
  - <u>Introduction</u> of catheter aorta (36200)
  - <u>Introduction</u> of needle or intracatheter, carotid or vertebral artery (36100)
  - <u>Introduction</u> of needle or intracatheter, extremity artery (36140)
  - <u>Introduction</u> of catheter, superior or inferior vena cava (36010)
  - <u>Injection procedure</u> for contrast venography (36005)

Cardiovascular Procedures

Non-Selective Catheter Placement Examples

- Example 1- Catheter inserted into right femoral artery and advanced to the aorta where an abdominal aortogram is performed

Cardiovascular Procedures
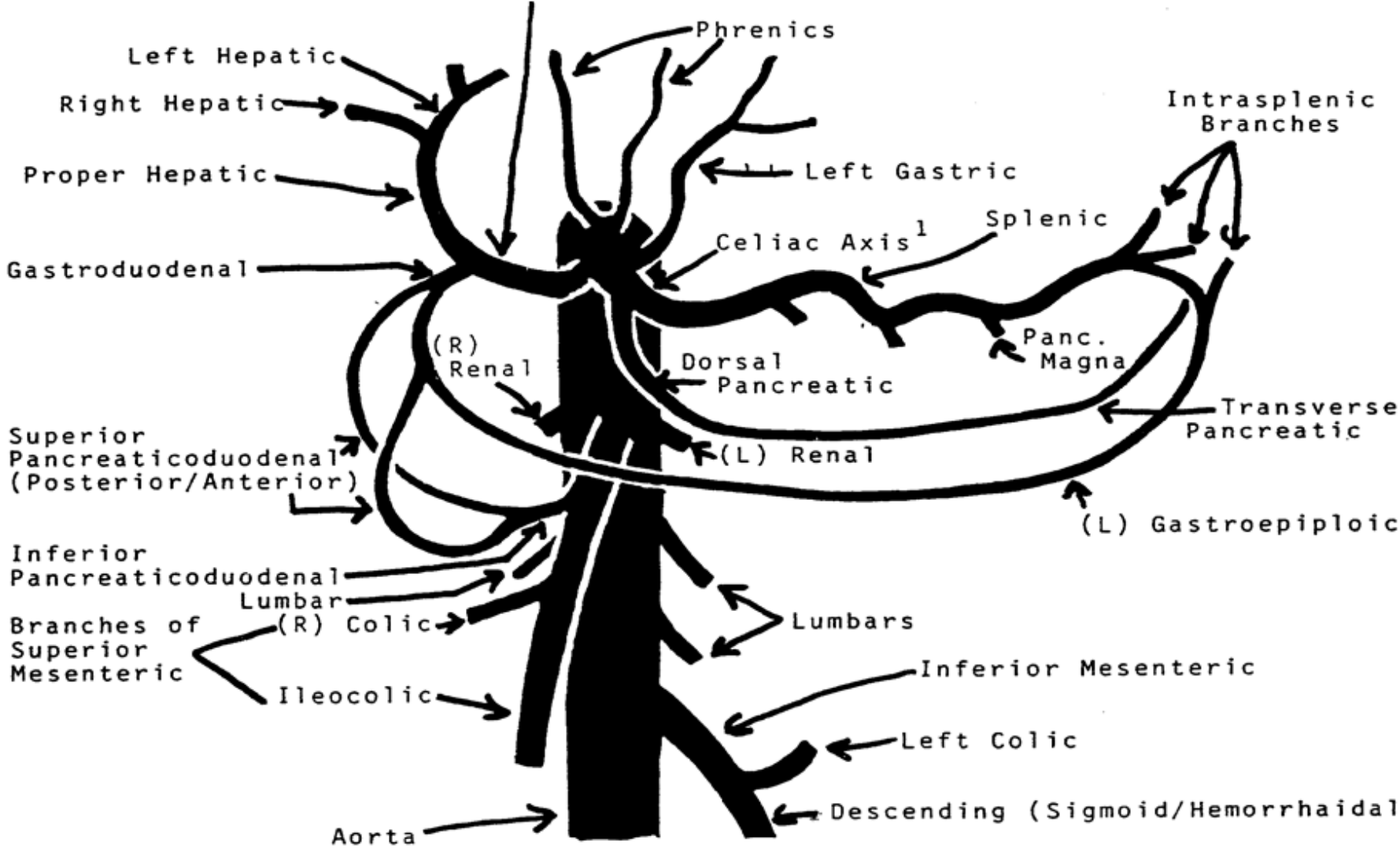
Cardiovascular Procedures

- ✓ Code catheter placement in the aorta
- ✓ Do not submit a separate code for the access site
- ✓ 36200 - Catheter placement in the aorta
- ✓ 75625 - Angio, aorta, abdominal S&I
  - Radiology component from department CDM

Cardiovascular Procedures

Non-Selective Catheter Placement Examples

- Example 2 - Catheter inserted into right femoral artery and advanced to the aorta where an abdominal aortogram is performed. It is then moved to the arch aorta and an arch aortogram is performed.

Cardiovascular Procedures
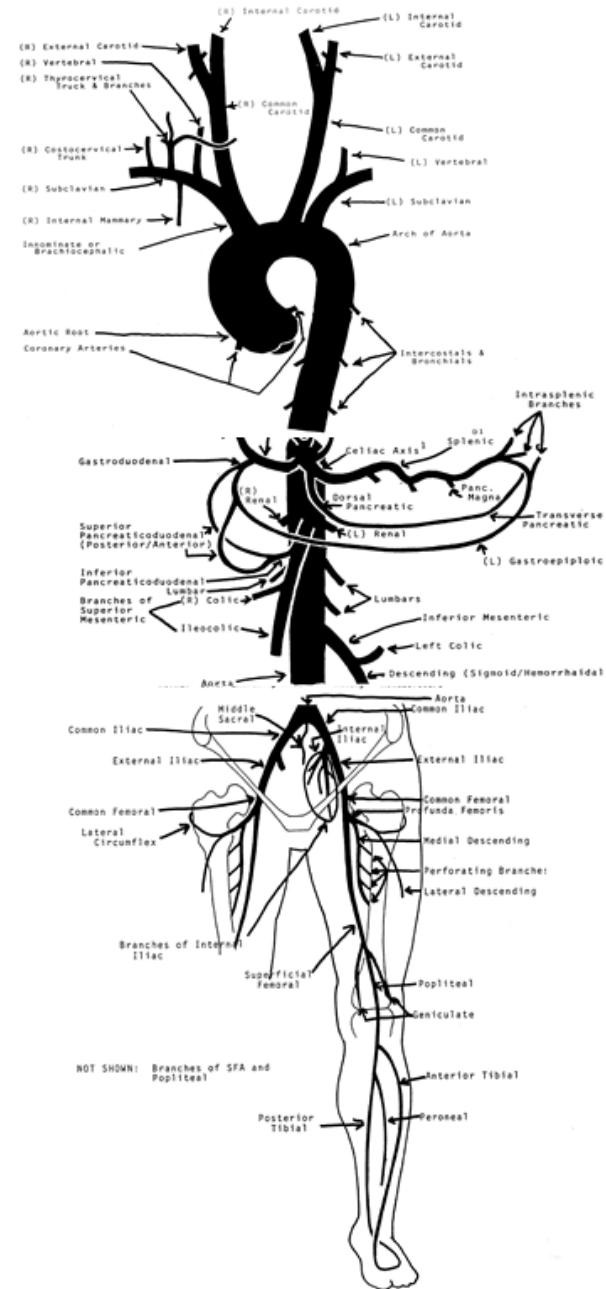
Cardiovascular Procedures

✓Code catheter placement in the aorta one time

✓Do not code more that one catheter placement in a vessel

✓36200 - Catheter placement in the aorta

✓75625 - Angio, aorta, abdominal S&I

✓75650 - Angio, cervicocerebral (arch) S&I

- Radiology component from department CDM

Cardiovascular Procedures

- Example 3 - Catheter inserted into right femoral artery and advanced to the right common iliac. Injection is performed to image the right lower extremity
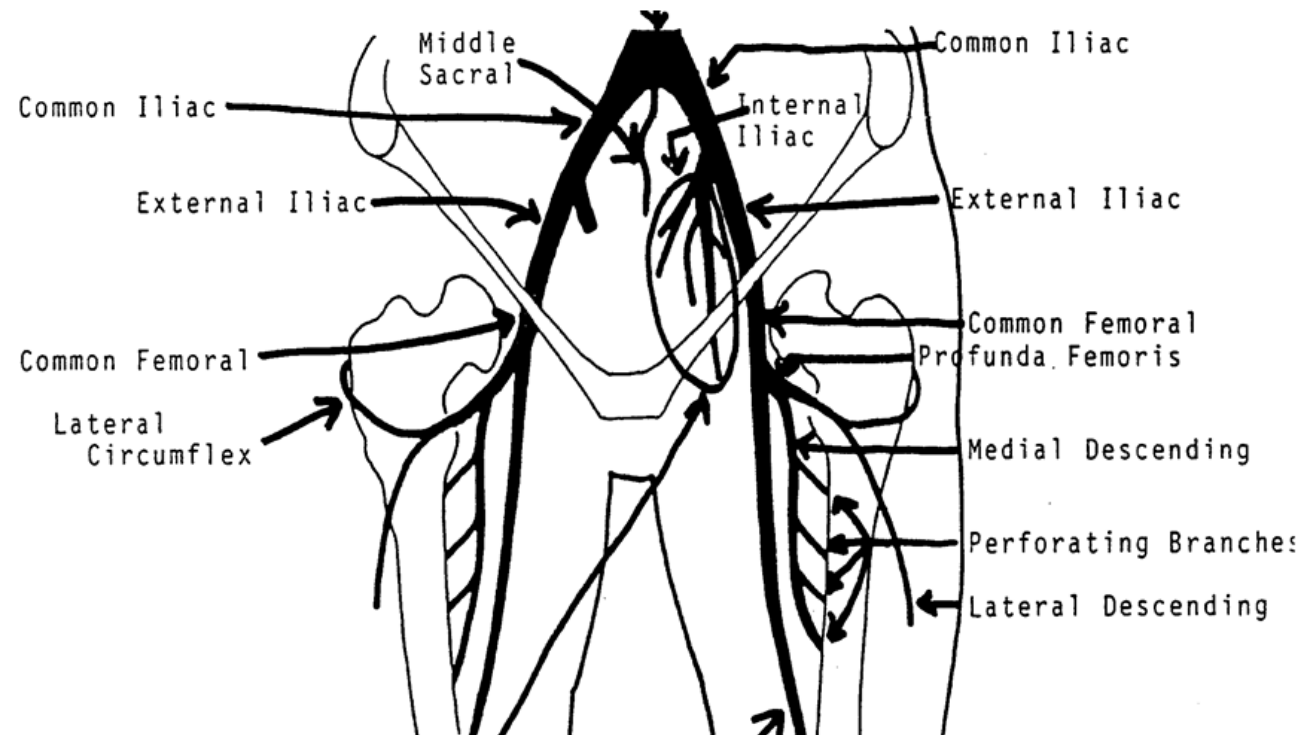
Cardiovascular Procedures

- Code catheter placement in an extremity artery
- ✓ 36140 - Catheter placement in an extremity artery
- ✓ 75710 - Angio, extremity, uni. S&I

Cardiovascular Procedures

Selective Catheter Placement

➔ Defined by vascular family

➔ A vascular family can be a branch off the aorta

➔ A vascular family can be a branch off of the vessel entered

Cardiovascular Procedures

- Selective Catheter Terminology
  - Differentiated by arterial and venous
  - Arterial further differentiated by brachiocephalic and abdominal/pelvic/lower extremity
    - Brachiocephalic is above diaphragm
    - Abdominal/pelvic/lower extremity is above diaphragm

Cardiovascular Procedures

- Selective Catheter Terminology
  - Brachiocephalic and abdominal/pelvic/lower extremity further differentiated by order
    - 1st order selective
    - 2nd order selective
    - 3rd order or higher selective
    - Each add. 2nd order or higher selective

Selective catheter placement is similar to identifying the branches of a tree

Cardiovascular Procedures
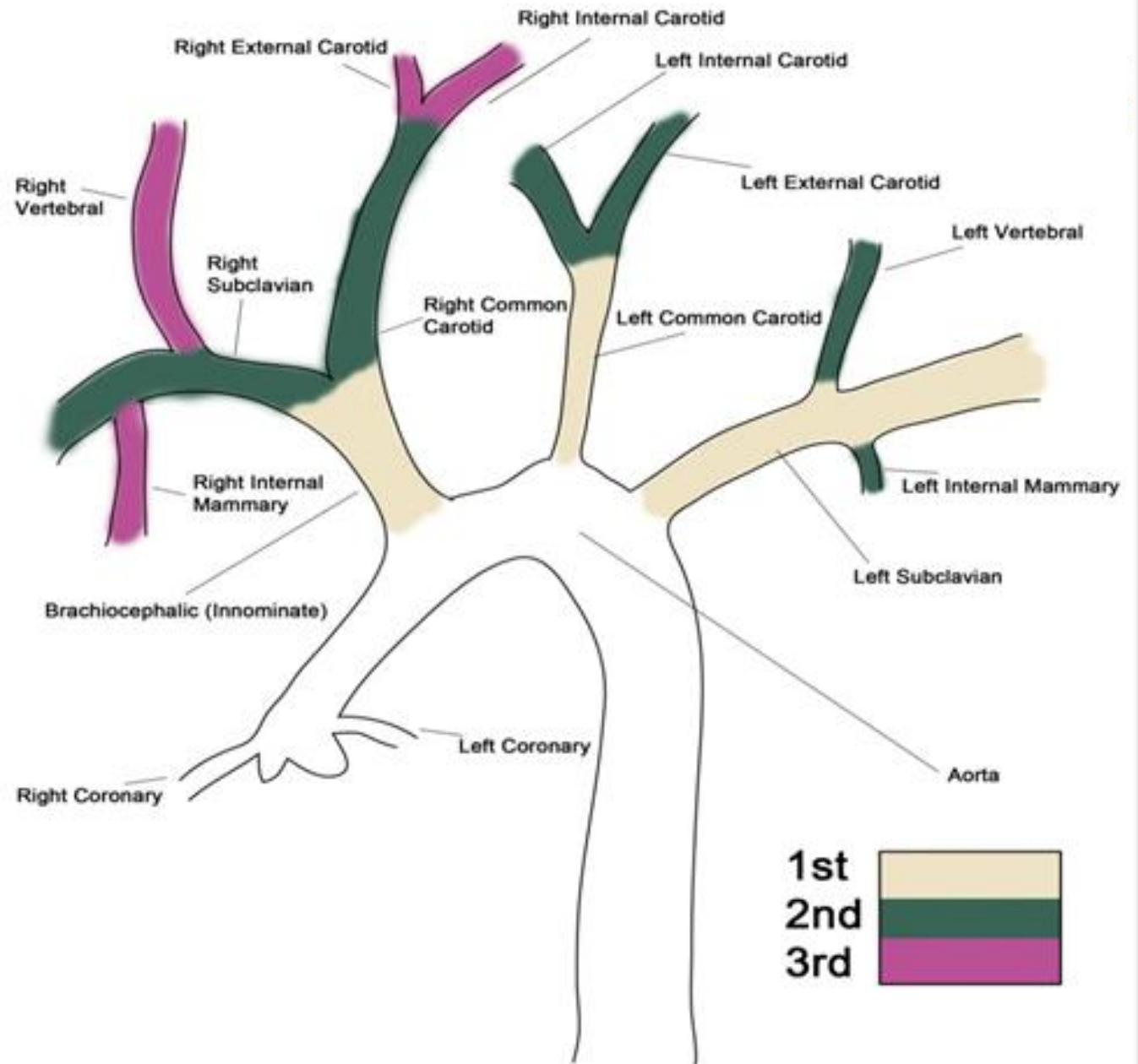
Cardiovascular Procedures

- Coding Rules
  - Only bill for most selective catheter placement in a vascular family
  - Selective catheter placement includes all non-selective work
- Similar to buying a train ticket
  - Buy ticket from Chicago to New York
  - Don't pay for each stop along the way

Cardiovascular Procedures

Selective Catheter Placement Examples

- Example 1 - Aortic flush, bilateral selective common carotid with imaging of neck and head

Cardiovascular Procedures

"Normal" Thoracic Arch Anatomy - Nomenclature
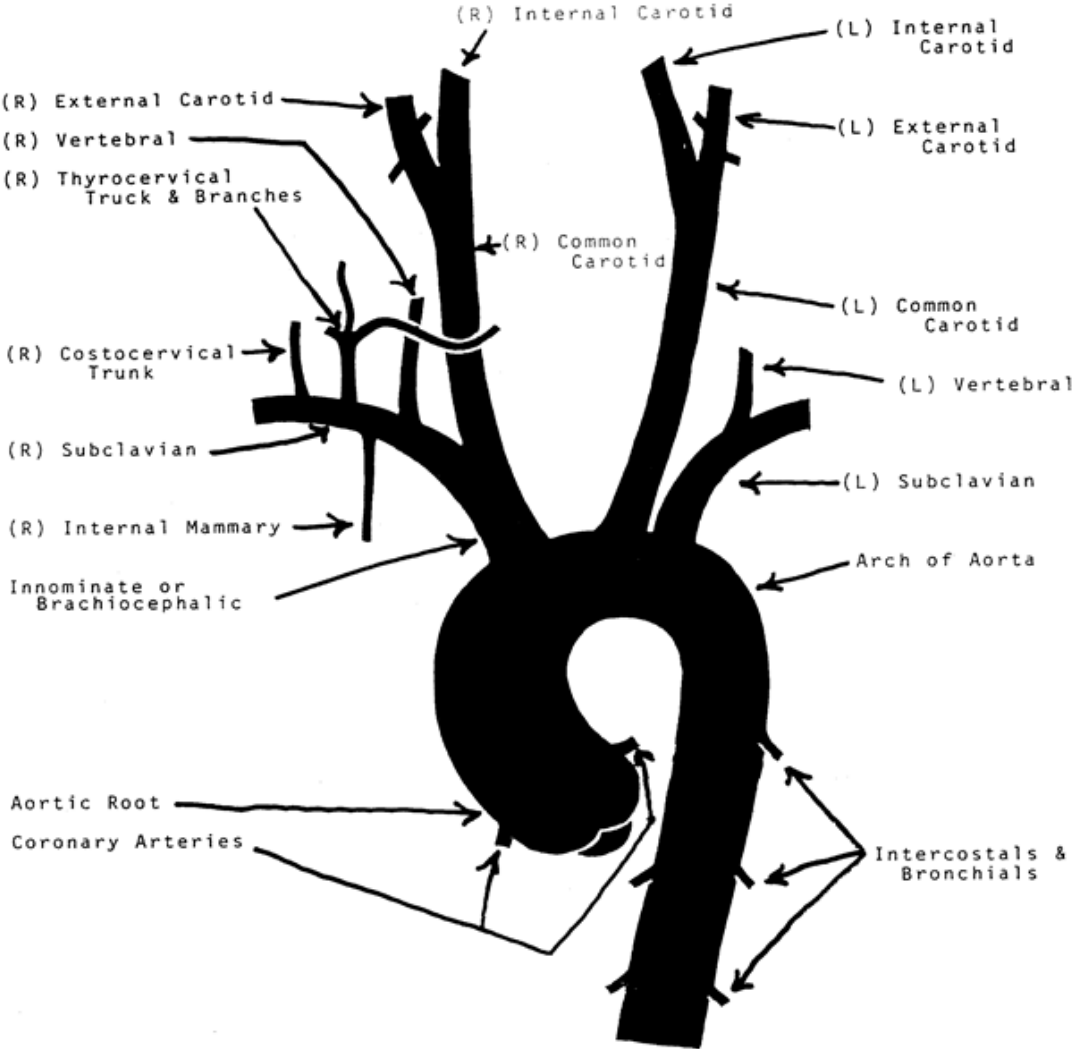
Cardiovascular Procedures

- ✓ Right common carotid = second order selective (36216)
- ✓ Left common carotid = first order selective (36215)
- Note - catheter placement in aorta included in selective catheterization of carotid artery

Cardiovascular Procedures

- Tips for Head and Neck Angiography Coding
  - If document states head and neck were imaged from a common carotid injection, you should see an S&I code for both procedures from the department CDM.
  - You should not code or see a department coded service of 36100 for a selective catheter placement in a carotid.

Cardiovascular Procedures

- If right carotid & right vertebral selectively catheterized (same family)
  - Code right vertebral as 3rd order - 36217
  - Code right carotid as each additional order - 36218

Cardiovascular Procedures

"Normal" Thoracic Arch Anatomy - Nomenclature
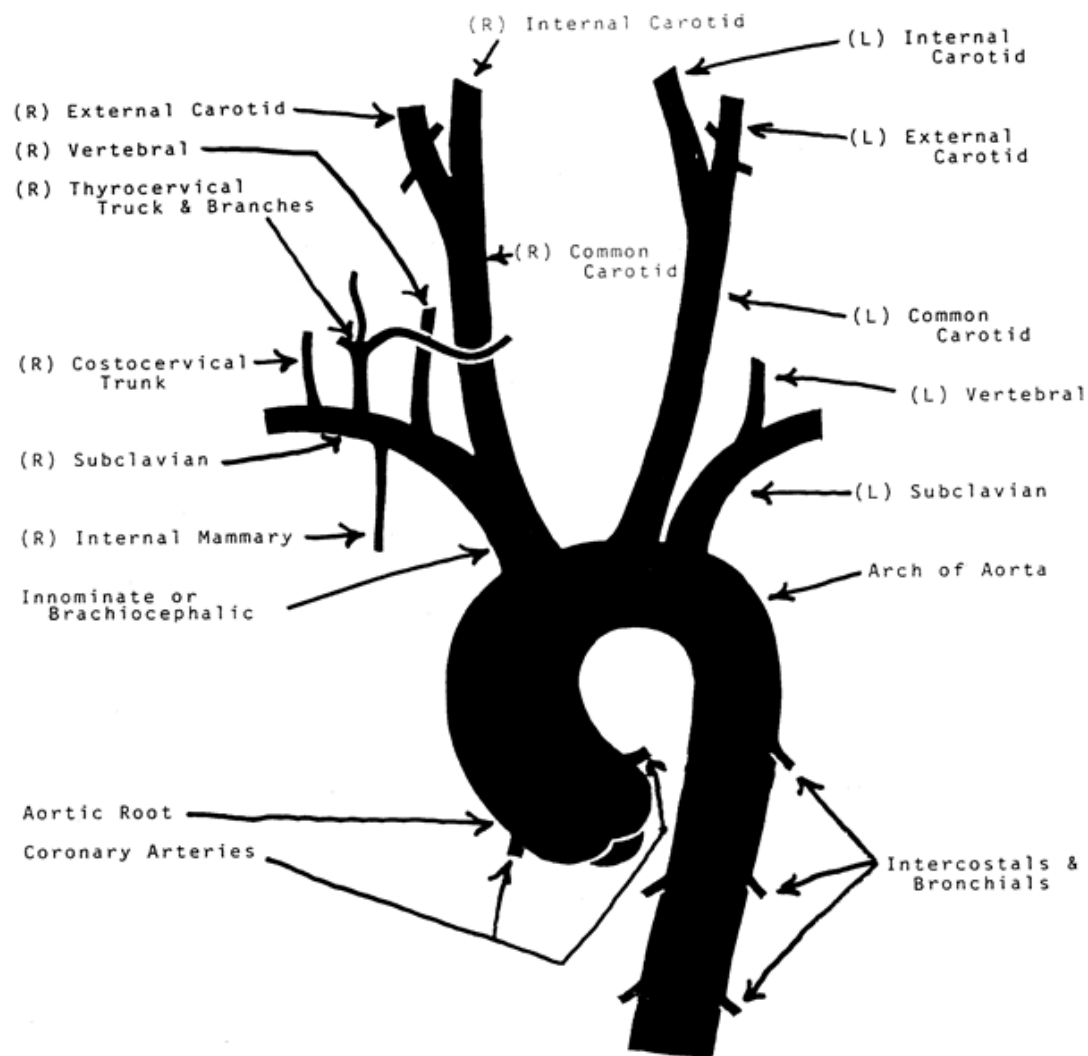
Cardiovascular Procedures

- If left carotid & left vertebral selectively catheterized (different families)
  - Code left vertebral as 2nd order - 36216
  - Code left carotid as 1st order - 36215

Cardiovascular Procedures

"Normal" Thoracic Arch Anatomy - Nomenclature
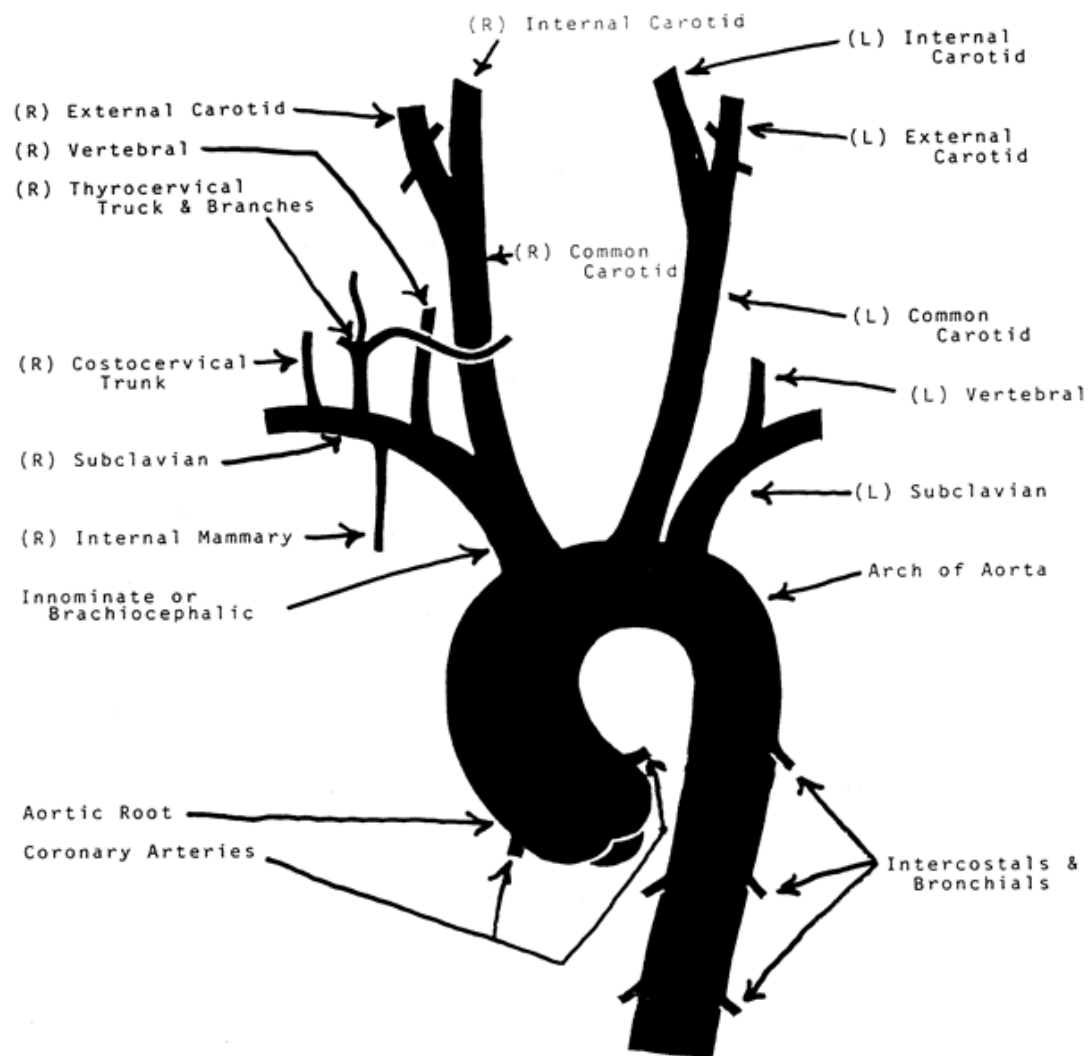
Cardiovascular Procedures

- Think of the vessel order like highway off ramps.
- The main trunk (nonselective) is the main highway. If you take an off ramp to get gas, you have taken one turn off the main highway (first order vessel).
- Two turns off the main highway is a second order vessel. Now, assume you get back on the main highway and need to stop again.
- When you get off the main highway the next time, you have taken a new turn off the main highway (first order of new vascular family).
- Always drive back to the main trunk when coding vascular families and vascular order.

Cardiovascular Procedures

- Appendix L of the CPT codebook contains the vascular families and their orders, which you may find helpful when trying to determine order and families for coding.

- The appendix makes the assumption that the starting point is catheterization from the aorta.

- If the starting point is different, the orders may be different.

Cardiovascular Procedures

Cardiovascular Procedures

- Central Venous Access: 36555-36598
  - Placed for frequent access to bloodstream
  - Tip of catheter must terminate in the:
    - Subclavian vein
    - Brachiocephalic vein
    - Iliac vein
    - Inferior or superior vena cava
    - Right atrium

Cardiovascular Procedures

- Central Venous Access: 36555-36598
  - Code by
    - Procedure (insertion, repair, replacement, removal, etc.)
    - Tunneled or not
    - With pump or port
    - Patient age
- The CPT manual provides a great CVAP procedure table for reference based upon procedure type and patient age

Cardiovascular Procedures

- Hemodialysis (36800-36870)
  - *See 36147 for diagnostic studies of AV shunts for dialysis*
- Portal Decompression (37140-37183)
  - Treat hypertension/occlusion of portal vein
  - TIPS (37182, 37183) diverts blood from the portal vein to the hepatic vein
  - TIPS = transvenous intrahepatic portosystemic shunt(s)
    - Code 37183 - only OP portal decompression service

Cardiovascular Procedures

- Transcatheter Procedures
  - Removal of clot (thrombectomy)
    - Arterial Thrombectomy (37184-37186)
    - Venous Thrombectomy (37187-37188)
    - Other Procedures (37191-37217)
      - Foreign body retrieval, placement vena cava filter, transcatheter embolization, stent placement, etc.