Maximizing the Flexibility of Powerpoint

Dr. Jamie Wikenheiser
Assistant Professor
Director of Medical Gross Anatomy
Director of Surgical Anatomy
University of California, Irvine
School of Medicine
UCI Medical Gross Anatomy

- Most lectures are followed up by a lab
  - 36 total dissection labs
  - Online dissector with videos loaded onto the iPads
  - 5 color groups rotate (each student however dissects 8 times)
  - 2 people per donor
  - The group that dissects presents their dissection with an emphasis on the clinical correlates

- Lectures use interactive powerpoints
  - A main lecture with built in review/practice
  - Hyperlink slide bank
Interactive Powerpoint Format

- Title
- Learning Objectives
- Main Menu
- Chapter Content
  - Slides with internal hyperlinks
- Thank You and Contact Slide
- References
- Hyperlink Slide Bank
  - All slides from internal hyperlinks
Learning Objectives

• Be able to describe the 3 parts of the axillary artery and the branches that come off each part.

• Be able to describe the roots, trunks, divisions, cords and terminal branches of the brachial plexus.

• Be able to list the spinal segments that course through each brachial plexus branch.

• Be able to describe the clinical correlates associated with injuries to the brachial plexus.
Main Menu

I. Vasculature of the Axilla
II. Brachial Plexus
III. Arm Muscles & Neurovasculature

Please Read: Interactive PowerPoint functions like a web-page. Click on the underlined text to go directly to that topic. You must be in Slide Show mode for the hyperlinks and highlights to work. All images are copyrighted by the authors listed on the “References” slide. DO NOT DISTRIBUTE! For educational purposes only. Non-graphical content & organization Copyright 2013 Dr. Jamie Wikenheiser.
I. Vasculature of the Axilla

• The **axillary artery** extends from the lateral edge of the 1\textsuperscript{st} rib to the inferior border of the teres major muscle. The axillary artery begins at the termination of the subclavian artery and ends as the brachial artery.

• The axillary artery has 3 parts.

• The **axillary vein** is formed by the union of the brachial veins & basilic vein and terminates as the subclavian vein.
**Axillary Vasculature**

- The **axillary artery** extends from the lateral edge of the 1st rib to the inferior border of the teres major muscle. The axillary artery begins at the termination of the subclavian artery and ends as the brachial artery.

- It has 3 parts:
  - **1st part**: located between the lateral 1st rib & medial border of pectoralis minor. It is enclosed by in the axillary sheath and has 1 branch.

  - **2nd part**: located posterior to the pectoralis minor has 2 branches.

  - **3rd part**: located between the lateral border of pectoralis minor & inferior border of teres major muscle. It has 3 branches.
Axillary Artery Branches

• The axillary artery has 3 parts:
  • **1st part** has 1 branch:
    • Superior thoracic artery.
  • **2nd part** has 2 branches:
    • Thoracoacromial artery/trunk
    • Lateral thoracic artery
  • **3rd part** has 3 branches:
    • Subscapular
    • Anterior circumflex humeral
    • Posterior circumflex humeral
Shoulder: Axillary Arteriogram

Left Shoulder/Anterior View

1st part of axillary
2nd part of axillary
3rd part of axillary
Supreme thoracic
Thoracoacromial
Lateral thoracic
Subscapular
Anterior humeral circumflex
Posterior humeral circumflex
Brachial
Transverse Section (T2 vertebral level)

CT

MRI

- Trachea
- Brachiocephalic trunk (artery)
- L common carotid artery
- L subclavian artery
- L brachiocephalic vein
- R brachiocephalic vein
II. Brachial Plexus
The brachial plexus is a major network of somatic nerves supplying the upper limb.

Formed by the union of the ventral rami of C5-T1 nerves and constitute the roots of the brachial plexus.

The brachial plexus is divided into:

- 5 roots
- 3 trunks
- 6 divisions (3 anterior & posterior divisions each)
- 3 cords
- 5 terminal branches (musculocutaneous, axillary, median, ulnar & radial)

Clinical Correlate 1

Clinical Correlate 2
All branches associated with the posterior cord of the brachial plexus are listed with the roots/spinal segments that contribute to that particular nerve branch.

Note: the specific root/spinal segment contributions of these nerves will vary slightly from various sources.

- Thoracodorsal (C6-C8)
- Lower subscapular (C5, C6)
- Axillary (C5, C6)
- Radial (C5-C8, T1)
- Upper subscapular (C5, C6)
- Ansa pectoralis
Test Yourself

- Identify the nerve and spinal segments that course through it.
III. Arm Muscles & Neurovasculature
Muscles of the Anterior Arm

- The **biceps brachii** functions in flexion & supination of the forearm and flexes the arm. It has a **long & short** muscle belly.

- The **brachialis** functions in flexion of the arm.

- The **coracobrachialis** functions in flexion & adduction of the arm.

- All three muscles are innervated by the **musculocutaneous nerve**. At the elbow it continues as the **lateral cutaneous nerve of the forearm**.
What is the innervation of the bicep brachii muscle?

Answer: Musculocutaenous nerve
Orbital Muscles: Muscle Function Test

Elevators

Depressors

Adductors

Medial Rotation

Lateral Rotation

Medial

Lateral

Abductors

Depressors

Left Eye
A radiograph of a 45-year-old woman reveals a perforation in the posterior wall of the stomach in which the gastric contents have spilled into the lesser sac. The surgeon notices the gastric juices have eroded parts of the gastroplenic ligament. Which arteries are at risk of being damaged?

Answer  ■ Left gastro-omental (or epiploic) and Short gastric
A radiograph of a 45-year-old woman reveals a perforation in the posterior wall of the stomach in which the gastric contents have spilled into the lesser sac. The surgeon notices the gastric juices have eroded parts of the gastrosplenic ligament. Which arteries are at risk of being damaged?

Answer

Gastrosplenic ligament (contains the left gastro-omental and short gastrics)
THE END!

If you have any questions after using this Interactive PowerPoint please let me know!

Dr. Jamie Wikenheiser
email: jwikenhe@uci.edu
The images were adapted and modified from the following sources:


Hyperlink Slide Bank
Practice: Bicep Brachii

- **Innervation**: musculocutaneous nerve

- **Function**: supinates forearm; flexes forearm when it is supinated; flexes arm; short head resists dislocation of shoulder

- **Origin**: long head: supraglenoid tubercle of scapula; short head: coracoid process of scapula

- **Insertion**: radial tuberosity and fascia of forearm via bicipital aponeurosis
Prefix versus Postfixed Brachial Plexuses

• A normal brachial plexus begins at cervical root C5 and ends at thoracic root T1.
• The prefixed brachial plexus begins cervical root C4 and ends at cervical root C8.
• The postfixed brachial plexus begins at cervical root C6 and ends at thoracic root T2.
Brachial Plexus Block

• The injection of an anesthetic solution into or immediately surrounding the axillary sheath interrupts nerve impulses of the structures supplied by the branches of the cords of the brachial plexus.

• This procedure allows surgeons to operate on the upper limb without using a general anesthetic.

• Needle approaches include an interscalene, supraclavicular, infraclavicular & axillary approach.

Common approaches to the brachial plexus

Interscalene approach

Supraclavicular approach

Vertical infraclavicular block

Axillary approach

a Sternal notch, b mid-point, c ventral apophysis of acromion. Note: needle entry at right angles to table.

a Sternal notch, b pulsation of subclavian artery (mid-point clavicle).

a Axillary artery, b needle entry at lateral border of pectoralis major.
Thoracodorsal (C6-C8)

Lateral cord

Posterior cord

Medial cord

Superior trunk

Middle trunk

Inferior trunk

Ansae pectoralis

C5

C6

C7

C8

T1
Lower subscapular (C5, C6)

Ansa pectoralis

Lateral cord

Posterior cord

Medial cord

Superior trunk

Middle trunk

Inferior trunk

C5

C6

C7

C8

T1

AD

PD
Axillary (C5, C6)

Lateral cord

Posterior cord

Medial cord

Superior trunk

Middle trunk

Inferior trunk

Ansa pectoralis
Ansa pectoralis

Radial (C5-C8, T1)

C5
C6
C7
C8
T1
Upper subscapular (C5, C6)
• The bicipital myotatic reflex or biceps brachii reflex is one of several deep-tendon reflexes that are routinely tested during a physical examination.

• A normal (positive) response is an involuntary contraction of the biceps, felt as a momentarily tensed tendon with usually a brief jerk-like flexion of the elbow.

• A positive response confirms the integrity of the musculocutaneous nerve and the C5 & C6 spinal cord segments.
Biceps Brachii

- **Innervation**: musculocutaneous nerve

- **Function**: supinates forearm; flexes forearm when it is supinated; flexes arm; short head resists dislocation of shoulder

- **Origin**: long head: supraglenoid tubercle of scapula; short head: coracoid process of scapula

- **Insertion**: radial tuberosity and fascia of forearm via bicipital aponeurosis
Brachialis

- **Innervation**: musculocutaneous nerve
- **Function**: flexes forearm
- **Origin**: distal 1/2 of anterior surface of humerus
- **Insertion**: coronoid process and tuberosity of ulna
**Coracobrachialis**

- **Innervation:** musculocutaneous nerve
- **Function:** flex and adduct the arm; resists dislocation of the shoulder joint
- **Origin:** coracoid process of scapula
- **Insertion:** middle 1/3 of medial surface of humerus
Orbital Muscles: Function (Elevation)

- Inferior oblique
- Superior rectus

Horizontal axis

Medial

Lateral

Superior rectus
Orbital Muscles: Function (Depression)

- Superior oblique
- Inferior rectus
Orbital Muscles: Function (Abduction)

- Lateral rectus
- Inferior oblique
- Superior oblique

Medial  Lateral
Orbital Muscles: Function (Adduction)

- Medial rectus
- Superior rectus
- Inferior rectus

Medial | Lateral
Orbital Muscles: Function (Lateral Rotation)

- Inferior oblique
- Inferior rectus
- Anteroposterior axis

Lateral rotation

Lateral | Medial
Orbital Muscles: Function (Medial Rotation)

- Superior rectus
- Superior oblique
- Medial rotation
- Anteroposterior axis

Lateral  Medial