

MUSCULOSKELETAL ANATOMY

Section I - Upper Trunk, Axillary, Musculocutaneous, Suprascapular Nerves

- I. The brachial plexus is composed of roots, trunks, divisions, cords and branches. For board examination purposes, attention should be focused on only the trunks and branches. (See Table 3.6.1 - Brachial plexus nerves (axillary, musculocutaneous, suprascapular))

Nerve	Motor	Sensation	Injury Location	Presentation
Axillary	<ul style="list-style-type: none"> Deltoid → shoulder abduction (>15°) 	<ul style="list-style-type: none"> Shoulder 	<ul style="list-style-type: none"> Surgical neck of humerus Anterior dislocation Upper trunk damage 	<ul style="list-style-type: none"> Arm at side
Musculocutaneous	<ul style="list-style-type: none"> Biceps brachii → elbow flexion and forearm supination 	<ul style="list-style-type: none"> Lateral forearm 	<ul style="list-style-type: none"> Upper trunk damage 	<ul style="list-style-type: none"> Elbow extended Pronated
Suprascapular	<ul style="list-style-type: none"> Supraspinatus → shoulder abduction (0°-15°) Infraspinatus → external rotation (Infection) 	<ul style="list-style-type: none"> Shoulder (above axillary) 	<ul style="list-style-type: none"> Upper trunk damage 	<ul style="list-style-type: none"> Arm at side Internally rotated
Upper trunk (C5-C6 roots)	<ul style="list-style-type: none"> Deltoid (axillary) → shoulder abduction (15°-90°) Supraspinatus (suprascapular) → shoulder abduction (0°-15°) Infraspinatus → external rotation (Infection) Biceps brachii → elbow flexion and supination 	<ul style="list-style-type: none"> Shoulder Lateral forearm 	<ul style="list-style-type: none"> Traumatic neck-shoulder separation (fall or delivery) 	<ul style="list-style-type: none"> Elbow extended (biceps dysfunction) Pronated (biceps dysfunction) Arm at side (deltoid dysfunction) Internally rotated (infraspinatus dysfunction) "Up by the deli inn"

Table 3.6.1 - Brachial plexus nerves (axillary, musculocutaneous, suprascapular)

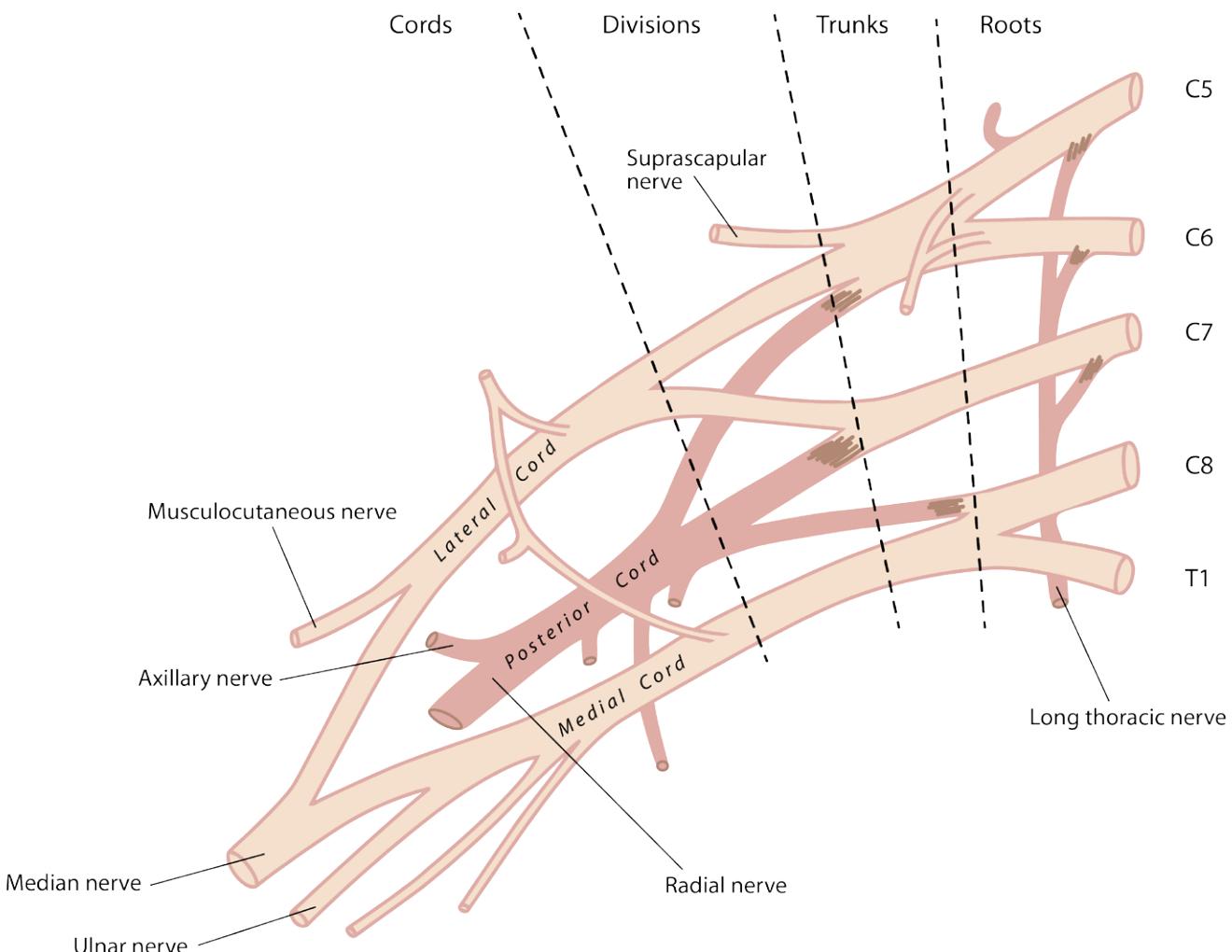


Figure 3.6.1 - Brachial plexus diagram

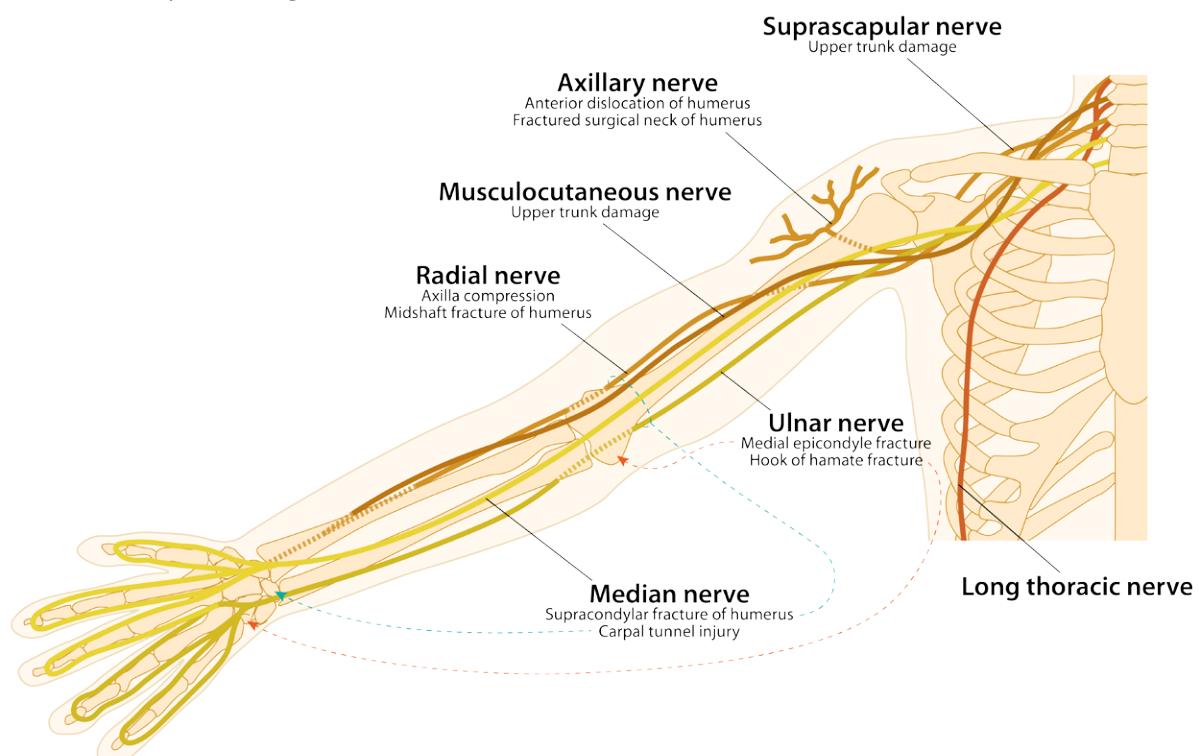


Figure 3.6.2 - Course of the brachial plexus nerves

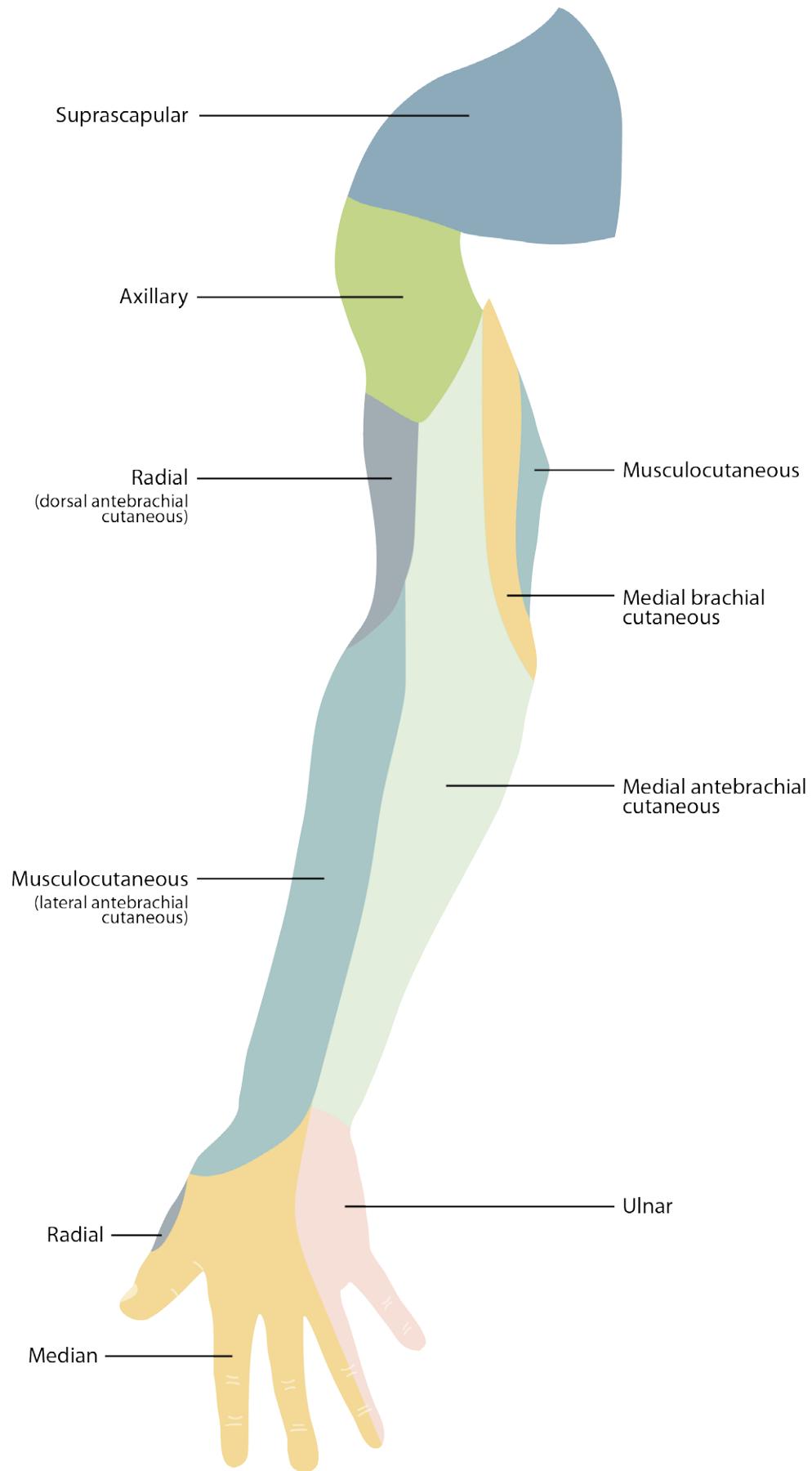


Figure 3.6.3 - Cutaneous innervation of the brachial plexus

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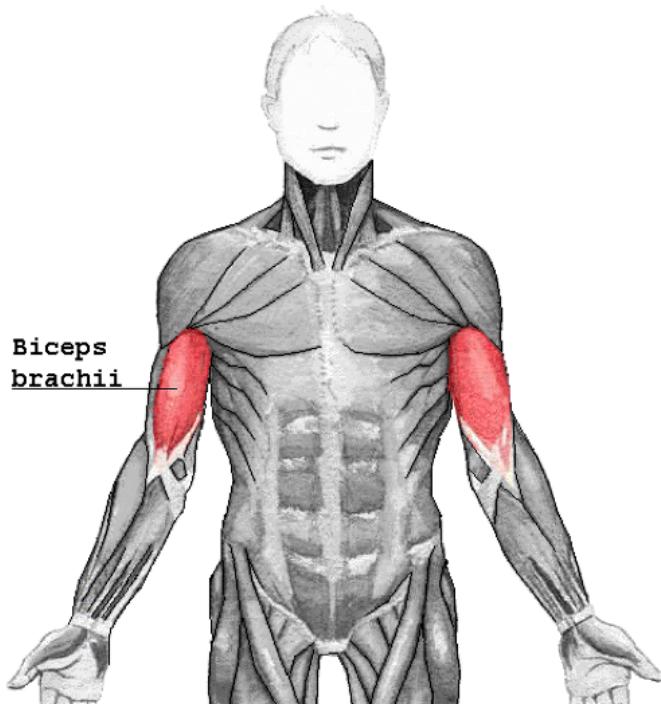


Figure 3.6.4 - Biceps brachii

By Bildbearbetning: sv:Användare:Chrizz (Transferred from sv.wikipedia to Commons.) [CC-BY-SA-3.0]

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A. Supination and Elbow Flexion

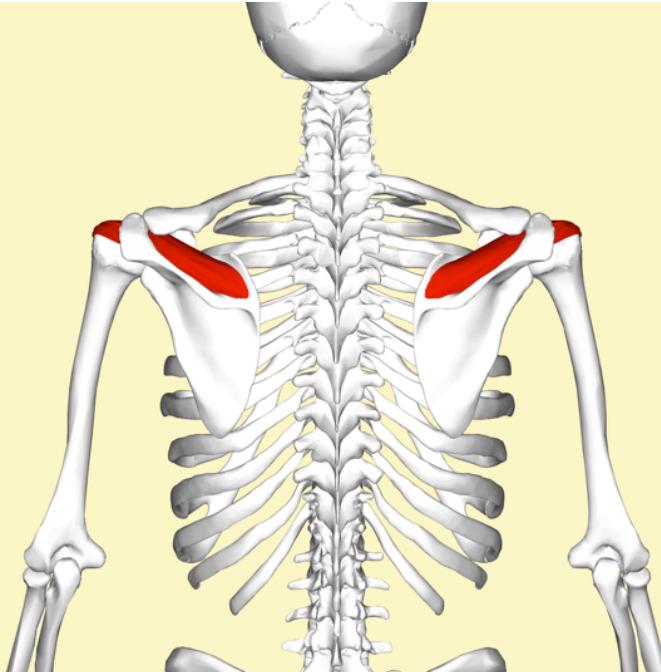


Figure 3.6.5 - Supination and elbow flexion

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B. Suprascapular Muscle

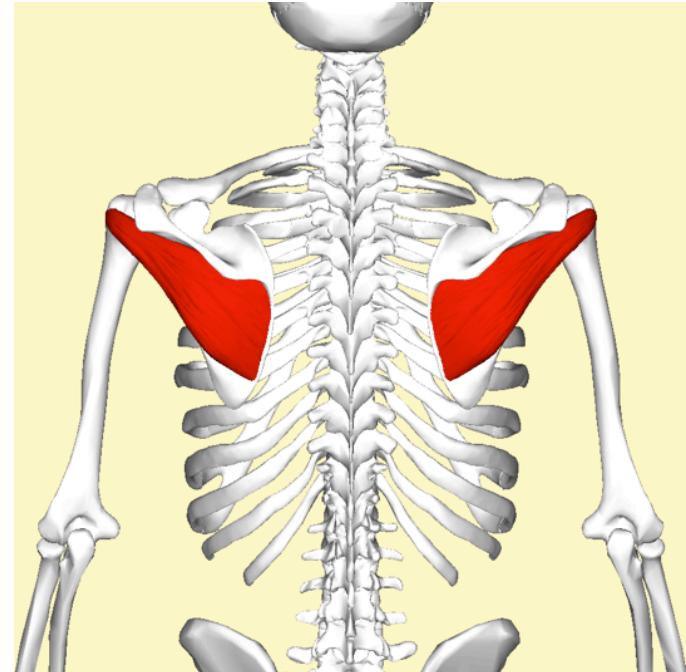


Figure 3.6.6 - Suprascapular muscle

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C. Infrascapular Muscle

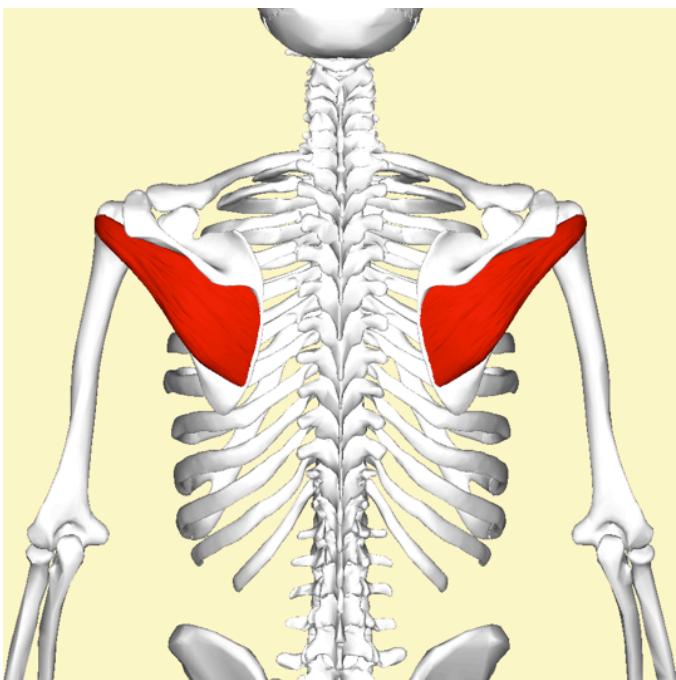
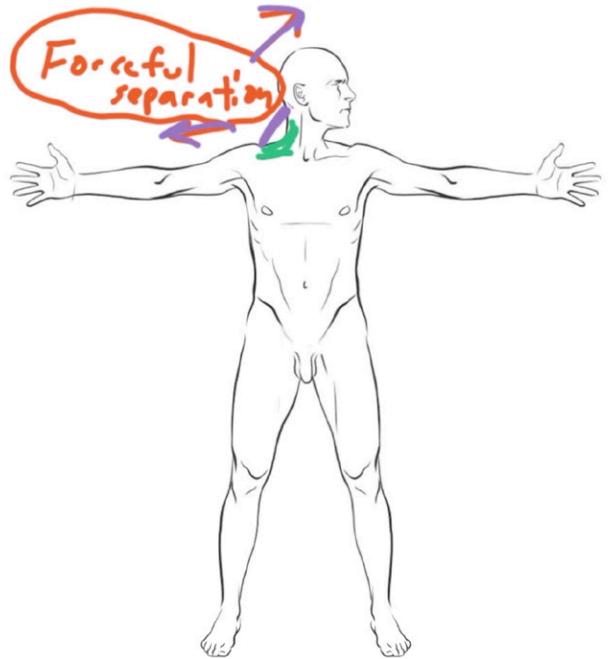


Figure 3.6.7 - Infrascapular muscle

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II. Upper Trunk Damage

- A. Forceful separation of the neck and shoulder can damage the upper trunk



REVIEW QUESTIONS



- A 45-year-old man presents to the emergency department holding his right shoulder and wincing in pain. His speech is incoherent and he appears intoxicated. A witness to the incident states the patient was hit multiple times in the arm with a pool cue. A radiograph of his arm is shown below. What neurological deficits will most likely be seen in this patient?



By Hellerhoff [CC BY-SA 3.0 (<https://creativecommons.org/licenses/by-sa/3.0>)], from Wikimedia Commons

- Hopefully you can see on the image that the surgical neck of the humerus is broken.
- This should immediately make you think of the axillary nerve
- If this nerve is damaged, what muscle will be dysfunctional?
 - The deltoid, so the patient will be unable to abduct the shoulder
- What sensation will be lost?
 - Sensation over the deltoid

- A 14-year-old boy presents to a neurology clinic because his right arm "doesn't seem normal". He briefly states that he recently experienced some trauma. On exam, the patient cannot feel sensation in the region indicated by the physician's finger. Assuming the patient's presentation is the result of a denervated branch of the brachial plexus, what actions will the patient be unable to perform?



- Answer: If a patient does not have sensation to this part of the arm, what branch of the brachial plexus should we think of?**
 - Musculocutaneous nerve
- What muscle does the musculocutaneous nerve innervate?
 - Biceps brachii
- And what does that muscle do?
 - It allows flexion of the elbow joint and SUPINATION of the forearm
- So the patient would be unable to flex or supinate

REVIEW QUESTIONS



3. A 23-year-old woman with cerebral palsy presents as a new patient to a family medicine clinic. The physician notices that her left arm is internally rotated. When asked if she can raise her arms to the ceiling, her right arm elevates but her left arm remains next to her body. Based only on these two physical exam findings, what muscles are not functioning?
- **Hopefully you noticed that this cerebral palsy patient has difficulty with external rotation. As you can see here, her arm is perpetually internally rotated.**
 - **What muscle causes external rotation? (Remember the memory hook, infection)**
 - Infraspinatus external rotation
 - So the left infraspinatus muscle is likely not functioning
 - **She also cannot raise her left arm, rather, she cannot abduct her left arm. What muscles abduct?**
 - The supraspinatus abducts the first 15 degrees, the deltoid does the remainder
 - **So, she must have deficient supraspinatus and deltoid**
4. A 12-year-old girl presents to the emergency department following a traumatic fall from a tree she was climbing. Her parents state the impact forced her left ear to her left shoulder, creating a forceful stretch on the right side of her neck. Based on this history, the physician is concerned the patient may have damaged the upper trunk of her right brachial plexus. If the physician is correct, in what ways would the right arm be positioned?
- **If the upper trunk is damaged, what muscles are dysfunctional?**
 - Recall the memory hook, up by the deli inn
 - Up for upper trunk
 - By for biceps
 - Deli for deltoid
 - Inn for infraspinatus
 - **If these muscles do not work, how would the right arm be positioned?**
 - The biceps normally supinates and flexes, so her elbow would be extended and her forearm pronated
 - The deltoid normally abducts, so this patient's arm should be at her side
 - The infraspinatus normally externally rotates, so this patient's arm would likely be internally rotated