Orthotics and Prosthetics Combined Written Boards Practice Exam (Sample)

Study Guide

BY EXAMZIFY

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Questions

1. **What action can a patient perform to check for a lesion or injury at S1?**
   - **A. Walking on toes**
   - **B. Raising the toes**
   - **C. Heel raise**
   - **D. Sitting on the ground**

2. **Which cervical level exhibits the most sagittal motion?**
   - **A. C0 to C1**
   - **B. C1 to C2**
   - **C. C2 to C3**
   - **D. C3 to C4**

3. **How can you further immobilize a patient with bilateral pars fractures of L5?**
   - **A. Add a cervical collar**
   - **B. Add a hip spica to the LSO**
   - **C. Increase the lumbar lordosis**
   - **D. Utilize a pelvic belt**

4. **Which correction is best for a flexible hindfoot varus?**
   - **A. a metatarsal bar**
   - **B. a lateral heel wedge**
   - **C. a Thomas heel**
   - **D. a medial heel wedge**

5. **What hand function is particularly affected by radial nerve damage?**
   - **A. Fine motor control**
   - **B. Wrist extension**
   - **C. Power grip**
   - **D. Finger opposition**

6. Which myotome is primarily involved in elbow flexion and wrist extension?

A. C4

B. C5

C. C6

D. C7

7. Where is the ground reaction force located during the midswing phase?

A. Anterior to ankle, posterior to knee, anterior to hip

B. Posterior to ankle, anterior to knee, posterior to hip

C. Posterior to ankle and knee, anterior to hip

D. Anterior to ankle and knee, posterior to hip

8. What is described as missing the radius but not affecting other bones?

A. Pre or post axial radial hemimelia

B. Paraxial radial hemimelia

C. Complete phocomelia

D. Incomplete phocomelia

9. What might cause a patient with a TF prosthesis to feel a ramus pressure during ambulation?

A. Prosthesis too long

B. Socket too tight

C. Weak hip flexors

D. Insufficient knee extension

10. What is the location of the ground reaction force during terminal stance?

A. Posterior to the ankle and anterior to the hip

B. Anterolateral to the foot

C. Anterior to ankle and knee, posterior to hip

D. Through the midfoot

Answers

1. C
2. A
3. B
4. B
5. B
6. C
7. C
8. B
9. B
10. C

Explanations

1. What action can a patient perform to check for a lesion or injury at S1?

A. Walking on toes

B. Raising the toes

C. Heel raise

D. Sitting on the ground

The action that can be performed to check for a lesion or injury at the S1 nerve root is the heel raise. The S1 nerve root is primarily responsible for controlling the muscles that allow for plantar flexion of the foot, specifically the gastrocnemius and soleus muscles. By performing a heel raise, where the patient stands on their toes, it directly assesses the functioning of these muscles and consequently the integrity of the S1 nerve root. When a patient raises their heel off the ground, they activate the plantar flexor muscles. If there is a lesion or injury at the S1 level, the patient may experience weakness or inability to perform this action effectively. Thus, the heel raise is a crucial functional test for assessing the health of the S1 nerve root. Walking on toes, raising the toes, or sitting on the ground do not specifically target the S1 nerve root function as effectively as the heel raise. They might evaluate other aspects of motor function or may involve different lower extremity nerve roots. Therefore, the heel raise stands out as the most relevant action in this context.

2. Which cervical level exhibits the most sagittal motion?

A. C0 to C1

B. C1 to C2

C. C2 to C3

D. C3 to C4

The segment between the occiput (C0) and the first cervical vertebra (C1) exhibits the most sagittal motion due to its unique structure and functional characteristics. This joint, known as the atlanto-occipital joint, primarily allows for flexion and extension of the head, enabling nodding movements (commonly referred to as "yes" motion). In contrast, the other cervical levels involve more complex interactions that include additional rotational and lateral motion. For example, the C1 to C2 junction is primarily responsible for rotation due to the dens of C2 fitting into the atlas (C1), allowing for a greater range of axial rotation rather than sagittal movement. The lower cervical levels, such as C2 to C3 and C3 to C4, continue this trend of increased complexity in movement patterns, incorporating more combined motions such as side bending and rotation along with limited flexion and extension. Thus, the greatest range of sagittal motion is distinctly found in the C0 to C1 segment, highlighting the fundamental role of the atlanto-occipital joint in cervical spine dynamics.

3. How can you further immobilize a patient with bilateral pars fractures of L5?

A. Add a cervical collar

B. Add a hip spica to the LSO

C. Increase the lumbar lordosis

D. Utilize a pelvic belt

Choosing to add a hip spica to the lumbar sacral orthosis (LSO) effectively enhances immobilization in a patient with bilateral pars fractures of L5. The hip spica extends the orthotic support to encompass the pelvis and lower extremities, thereby limiting mobility in multiple planes of motion. This additional support is crucial in cases where there is a risk of further injury or instability in the lumbar spine, particularly in the presence of pars fractures. The hip spica achieves this by stabilizing the hips and pelvis, which can reduce the load and movement in both the lumbar spine and the sacroiliac joints. This is important as motion in these areas can exacerbate the condition or delay healing. In contrast, other options, such as adding a cervical collar, would not specifically address immobilization of the lumbar region and could unnecessarily restrict the cervical spine. Increasing lumbar lordosis is contraindicated as it may place more stress on the lumbar vertebrae rather than promoting stability. The use of a pelvic belt can provide some support but is generally less effective than a hip spica in providing comprehensive immobilization and stabilization in this scenario.

4. Which correction is best for a flexible hindfoot varus?

A. a metatarsal bar

B. a lateral heel wedge

C. a Thomas heel

D. a medial heel wedge

A lateral heel wedge is the best correction for a flexible hindfoot varus because it provides the necessary support to realign the heel and improve overall foot posture. In cases of hindfoot varus, the calcaneus (heel bone) tilts inward, which can lead to difficulties in weight distribution during ambulation. By using a lateral heel wedge, the force is redirected to encourage a more neutral alignment of the hindfoot, allowing it to function properly during the gait cycle. This approach not only helps in addressing the deformity but also minimizes the risk of associated complications, such as calluses or joint pain, by promoting a more stable footing during movement. The lateral wedge effectively increases the ground reaction force on the lateral aspect of the foot, helping to correct the varus position dynamically as the individual bears weight. Other options like the metatarsal bar, Thomas heel, or medial heel wedge may not specifically target the misalignment associated with flexible hindfoot varus. The metatarsal bar primarily impacts the metatarsal head region, which doesn't directly correct the heel's position. The Thomas heel provides added support to the arch but is more useful in managing different types of foot issues (such as rigid pes planus). A medial

5. What hand function is particularly affected by radial nerve damage?

A. Fine motor control

B. Wrist extension

C. Power grip

D. Finger opposition

Radial nerve damage primarily affects wrist extension due to the nerve's role in innervating the extensor muscles of the forearm. These muscles are responsible for extending the wrist and fingers. When the radial nerve is compromised, the ability to extend the wrist is diminished, resulting in a condition often referred to as wrist drop. This impairment directly limits the functional position of the hand and affects overall hand function but particularly compromises the ability to sustain the wrist in an extended position, which is critical for many activities, including gripping and object manipulation. While fine motor control, power grip, and finger opposition may be impacted to some extent due to the overall weakness and instability of the wrist, the most direct and immediate consequence of radial nerve injury is the inability to extend the wrist. This makes the function of wrist extension the most notable and specific deficit associated with radial nerve damage.

6. Which myotome is primarily involved in elbow flexion and wrist extension?

A. C4

B. C5

C. C6

D. C7

The myotome primarily involved in elbow flexion and wrist extension is C6. The C6 myotome is responsible for the function of muscles that perform these actions, specifically targeting the biceps brachii for elbow flexion and the muscles responsible for wrist extension, such as the extensor carpi radialis and extensor carpi ulnaris. Understanding the myotomes and their associated motor functions is crucial in assessing nerve injuries and planning rehabilitation. C5 primarily contributes to elbow flexion through the biceps, but does not encompass wrist extension. C7, while it plays a role in wrist extension, is more associated with elbow extension rather than flexion. C4 is largely involved in shoulder elevation and has no direct role in elbow flexion or wrist extension. Therefore, C6 is the correct answer, as it includes the muscles that facilitate both elbow flexion and wrist extension effectively.

7. Where is the ground reaction force located during the midswing phase?

A. Anterior to ankle, posterior to knee, anterior to hip

B. Posterior to ankle, anterior to knee, posterior to hip

C. Posterior to ankle and knee, anterior to hip

D. Anterior to ankle and knee, posterior to hip

During the midswing phase of gait, the lower limb is advancing forward and the ground reaction force (GRF) acts on the foot as it swings. Typically, the location of the GRF can be understood by analyzing its interactions with the center of mass and the positions of the joints engaged in weight bearing. In this phase, the foot is off the ground, which means that the force being exerted from the ground is no longer directly beneath the foot, but rather is aligning with the other leg's joint configuration during the swing. The ground reaction force will be posterior to the ankle and knee because these joints are in a flexed posture with the leg progressing forward. When the swing leg moves forward, the moment arm for the GRF in relation to the ankle and knee is posterior, essentially leading to a moment that encourages flexion at these joints. At the hip, the ground reaction force tends to shift anteriorly due to the forward momentum of the leg. This positioning serves to maintain balance and stability while allowing the swing phase to progress smoothly, preparing the limb for the next phase of gait, which is heel strike. Thus, the configuration described positions the ground reaction force as being posterior to both the ankle and the knee, aligning correctly with

8. What is described as missing the radius but not affecting other bones?

A. Pre or post axial radial hemimelia

B. Paraxial radial hemimelia

C. Complete phocomelia

D. Incomplete phocomelia

The correct answer pertains to a specific classification of a congenital condition involving the forelimb development, particularly concerning the radius. Paraxial radial hemimelia refers to a condition where a person is born with a complete or partial absence of the radius but with the other forearm bones remaining unaffected. In this context, "paraxial" indicates that the absence of the radius occurs along the axis of the limb without affecting adjacent structures. This allows for a functional similarity among individuals with this condition—while the radius may be absent, the ulna and the other components of the forearm remain intact, facilitating normal or near-normal function. This contrasts with other conditions listed. For instance, pre or post axial radial hemimelia often involves additional malformations or discrepancies in adjacent skeletal structures, which does not match the description of only missing the radius. Complete and incomplete phocomelia generally refer to a more severe disruption in limb development, often involving significant absence of limb structures, which does not coincide with the specific absence of only the radius while leaving other bones intact. Thus, the specificity of "paraxial radial hemimelia" accurately captures the essence of the question regarding isolated absence of the radius without broader implications for other osseous structures

9. What might cause a patient with a TF prosthesis to feel a ramus pressure during ambulation?

A. Prosthesis too long

B. Socket too tight

C. Weak hip flexors

D. Insufficient knee extension

A patient with a transfemoral (TF) prosthesis feeling pressure against the ramus, which is part of the pelvic bone, is typically due to the socket being too tight. When the socket is overly constrictive, it can lead to excessive force being applied to specific areas of the residual limb during weight-bearing activities, such as walking. This pressure can cause discomfort and potential skin issues due to the compromised blood flow and tissue adherence to the socket. The proper fit of the socket is crucial for optimal alignment and distribution of forces throughout the prosthesis. An appropriately fitted socket ensures that weight is evenly distributed, preventing localized pressure points that can detract from comfort and efficiency of ambulation. Therefore, addressing the tightness of the socket would be essential to alleviate the ramus pressure the patient is experiencing. While factors like the length of the prosthesis or insufficient knee extension can cause other forms of discomfort or gait deviations, they are less likely to directly result in localized ramus pressure issues compared to the socket's tightness. Similarly, weak hip flexors might affect gait mechanics but do not typically cause pressure directly against the ramus in the context of a TF prosthesis.

10. What is the location of the ground reaction force during terminal stance?

A. Posterior to the ankle and anterior to the hip

B. Anterolateral to the foot

C. Anterior to ankle and knee, posterior to hip

D. Through the midfoot

During terminal stance, the ground reaction force (GRF) is primarily located anterior to the ankle and knee joints while being posterior to the hip joint. This positioning of the GRF plays a critical role in providing stability and facilitating forward progression during walking. In this phase, the body is transitioning into the next step. The center of mass must move forward over the supporting leg, requiring the GRF to act in a manner that allows the body to maintain balance and prepare for the swing phase. The force's location helps propel the body forward while also counterbalancing the forces generated by the downward motion of the center of mass. The location of the GRF being anterior to the ankle and knee aids in extending these joints, while being posterior to the hip prevents excessive forward lean and aids in hip stabilization. This understanding of the GRF's location during terminal stance is important for the design of orthotic devices, rehabilitation strategies, and gait analysis as it relates to optimizing walking efficiency and reducing the risk of falls or other gait-related issues.