Physical Examination Of The Spine And Extremities

Physical Examination Of The Spine And Extremities Physical Examination of the Spine and Extremities The physical examination of the spine and extremities is a fundamental component of clinical assessment, enabling healthcare professionals to identify musculoskeletal abnormalities, neurological deficits, and functional impairments. A thorough examination not only aids in diagnosing conditions such as herniated discs, scoliosis, or osteoarthritis but also guides management plans and surgical considerations. Given the complexity of the musculoskeletal system, a systematic approach ensures that no critical signs are overlooked, ultimately improving patient outcomes. Importance of a Systematic Approach in Musculoskeletal Examination Performing a detailed physical assessment involves multiple components—inspection, palpation, range of motion testing, neurological evaluation, and special tests. Each step provides valuable insights into the structure and function of the spine and extremities. A systematic approach ensures consistency, comprehensive evaluation, and accurate documentation, which are essential for effective diagnosis and follow-up care. Preparation Before Examination Ensure the patient is comfortably positioned and adequately draped to maintain dignity. Explain the procedure to the patient to reduce anxiety and improve cooperation. Gather necessary equipment such as a goniometer, reflex hammer, tuning fork, and dermatomal testing materials. Review the patient's medical history and prior imaging or laboratory results. Inspection of the Spine and Extremities General Inspection - Observe the patient’s posture in standing and sitting positions. - Look for abnormal spinal curvatures such as scoliosis, kyphosis, or lordosis. - Assess gait and balance for abnormalities or compensatory mechanisms. - Examine skin for scars, deformities, swelling, or signs of inflammation. 2 Spinal Inspection - Identify asymmetry of shoulders, scapulae, or iliac crests. - Detect visible deformities such as hump or gibbus. - Note skin changes over the spine, including dimpling or pigmentation. Extremities Inspection - Observe limb alignment and symmetry.

- Assess for muscle wasting, swelling, or deformities. - Check for abnormal postures or limb length discrepancies. - Evaluate for signs of joint swelling or erythema. Palpation Techniques Spinal Palpation - Palpate spinous processes to identify tenderness or deformities. - Feel for paraspinal muscle hypertrophy or spasm. - Assess for step-offs or signs of vertebral fractures. - Check for warmth or swelling indicating inflammation. Extremities Palpation - Palpate joints for tenderness, warmth, or swelling. - Examine bone prominences and muscle groups. - Detect areas of crepitus or abnormal masses. - Evaluate peripheral pulses and vascularity. Range of Motion (ROM) Assessment Spine ROM - Flexion: Have the patient bend forward, touching toes if possible. - Extension: Ask the patient to lean backward. - Lateral Flexion: Side-bending to the left and right. - Rotation: Turning the torso left and right. Note: Record the degree of movement using a goniometer for precise measurement. Extremities ROM - Shoulders: Flexion, extension, abduction, adduction, internal and external rotation. - Elbows: Flexion and extension. - Wrists: Flexion, extension, ulnar, and radial deviation. - Hips: Flexion, extension, abduction, adduction, internal and external rotation. - Knees: Flexion and extension. - Ankles: Dorsiflexion, plantarflexion, inversion, and eversion. 3 Neurological Examination Motor Function Testing - Assess muscle strength in each limb group (graded 0-5). - Test specific muscle groups innervated by different nerve roots. - Observe for weakness, atrophy, or abnormal movements. Sensory Evaluation - Examine light touch, pinprick, temperature, vibration, and proprioception. - Map dermatomes corresponding to spinal nerve roots. - Identify areas of sensory loss or abnormal sensations. Reflex Testing - Use a reflex hammer to test deep tendon reflexes: - Biceps (C5-C6) - Brachioradialis (C5- C6) - Triceps (C7-C8) - Patellar (L2-L4) - Achilles (S1-S2) - Note hyperreflexia or hyporeflexia, indicating neurological pathology. Special Neurological Tests - Straight Leg Raise Test: To evaluate for lumbar nerve root compression. - Babinski Sign: To assess corticospinal tract integrity. - Clonus: For hyperreflexia detection. Special Tests for the Spine and Extremities Spine-Specific Tests - Adam’s Forward Bend Test: Detects scoliosis. - Spring Test: Assesses spinal segment mobility. - Valsalva Maneuver: Elicits pain suggestive of disc herniation or space- occupying lesion. Joint and Limb Tests - McMurray’s Test: For

meniscal tears. - Lachman Test: For anterior cruciate ligament integrity. - Faber (Patrick) Test: For hip pathology. - Tinel's Sign: Tapping over nerve sites for tingling or paresthesia. Documentation and Interpretation Accurate documentation of findings is crucial. Record the presence or absence of deformities, tenderness, muscle weakness, sensory deficits, reflex changes, and special test results. Interpretation involves correlating clinical signs with possible diagnoses, such 4 as nerve root compression, joint degeneration, or structural deformities. Summary of Key Points A systematic approach enhances the accuracy of the musculoskeletal assessment. Inspection, palpation, and ROM testing form the foundation of physical evaluation. Neurological examination helps identify nerve involvement or central nervous system issues. Special tests provide additional diagnostic clues for specific conditions. Effective documentation and interpretation are essential for guiding management. Conclusion The physical examination of the spine and extremities remains a cornerstone of clinical practice in musculoskeletal medicine. Mastery of examination techniques allows clinicians to diagnose a wide range of conditions accurately, plan appropriate interventions, and monitor disease progression. Given the diversity and complexity of musculoskeletal pathologies, ongoing education and adherence to a structured examination protocol are vital for all healthcare providers involved in musculoskeletal care. QuestionAnswer What are the key components of a physical examination of the spine? The key components include inspection for deformities or asymmetry, palpation for tenderness or abnormalities, assessment of range of motion, neurological assessment (reflexes, sensation, motor strength), and special tests for stability or nerve impingement. How do you assess for scoliosis during a physical exam? The Adam's forward bend test is commonly used, where the patient bends forward at the waist, and the examiner looks for asymmetry or rib hump, indicating scoliosis or spinal rotation. What are common physical examination findings in a patient with herniated disc? Findings may include localized back pain, positive straight leg raise test, weakness or numbness in relevant dermatomes, decreased reflexes, and sometimes motor deficits depending on nerve root involvement. How is the examination of the extremities performed to assess for joint or nerve issues? It involves inspection for swelling or deformity, palpation for tenderness,

assessment of active and passive range of motion, muscle strength testing, reflex testing, and sensory examination to identify deficits or abnormalities. 5 What is the significance of checking reflexes during extremity examination? Reflex testing helps identify neurological deficits, nerve root compression, or peripheral nerve lesions, which can assist in localizing the level and nature of nerve involvement. Which special tests are used to evaluate for rotator cuff injuries during extremity examination? Tests such as the Neer impingement test, Hawkins- Kennedy test, and empty can (Jobe's) test are used to assess rotator cuff integrity and impingement. How can you differentiate between neurogenic and musculoskeletal causes of extremity pain during examination? Neurogenic pain often involves sensory disturbances, reflex changes, and motor weakness aligned with nerve distribution, while musculoskeletal pain is usually localized, may worsen with movement, and lacks neurological signs. What are common signs of spinal instability on physical examination? Signs include excessive movement during palpation, pain with certain maneuvers, and sometimes positive clinical tests indicating abnormal motion or segmental instability, often confirmed with imaging. Physical Examination of the Spine and Extremities The physical examination of the spine and extremities is a cornerstone of clinical assessment, providing vital clues for diagnosing a wide range of musculoskeletal, neurological, and systemic conditions. A systematic approach ensures thorough evaluation, minimizes oversight, and facilitates accurate interpretation of findings. This review delves into the methodologies, key components, and clinical significance of examining the spine and extremities, offering clinicians a comprehensive guide to mastering this essential aspect of patient assessment. --- Introduction to the Physical Examination of the Spine and Extremities The musculoskeletal system plays a crucial role in supporting mobility, stability, and function. Its examination involves assessing structural integrity, range of motion, neurological function, and vascular status. The spine and extremities—comprising the cervical, thoracic, lumbar regions, and the upper and lower limbs—are often affected by trauma, degenerative changes, infections, inflammatory conditions, and neoplastic processes. An effective examination aids in identifying abnormalities, determining severity, and guiding further diagnostic testing. --- Preparation for the Examination Before

commencing, clinicians should: - Ensure adequate lighting and privacy. - Position the patient comfortably, typically supine or sitting for the extremities and standing for certain assessments. - Explain procedures to the patient to obtain cooperation. - Observe the patient's gait, posture, and general appearance for initial impressions. --- Physical Examination Of The Spine And Extremities 6 Examining the Spine Inspection of the Spine Inspection offers initial insights into deformities, asymmetry, swelling, or skin changes. - Posture and Alignment: Observe for abnormal curvatures such as scoliosis (lateral curvature), kyphosis (exaggerated thoracic kyphosis), or lordosis (exaggerated lumbar lordosis). - Skin Changes: Look for scars, dimpling, or signs of infection or neoplasia. - Muscle Atrophy or Hypertrophy: Asymmetry may suggest nerve impingement or muscular pathology. - Palpation: Feel along the spinous processes, paraspinal muscles, sacrum, and iliac crests for tenderness, swelling, or deformities. Palpation and Range of Motion Testing - Palpation: Detect tenderness, step-offs (indicating vertebral fractures), or abnormal masses. - Active Range of Motion (AROM): - Flexion, extension, lateral bending, and rotation are assessed. Normal movement should be smooth and symmetrical. - Be attentive to pain, limitation, or crepitus. - Passive Range of Motion (PROM): - Performed if AROM is limited or painful. It helps differentiate joint versus muscular causes of restriction. Neurological Assessment of the Spine - Sensory Testing: Evaluate dermatomal sensation using light touch, pinprick, or temperature. - Motor Testing: Examine strength in key muscle groups innervated by spinal nerve roots. - Reflexes: Test deep tendon reflexes (e.g., knee, ankle) for hyperreflexia or hyporeflexia. - Special Tests: - Straight Leg Raise (SLR): Assesses for nerve root irritation, notably sciatic nerve involvement. - Femoral Nerve Stretch Test: For upper lumbar nerve roots. --- Examining the Cervical Spine The cervical spine is examined with particular attention to mobility, neurological function, and signs of compression. - Posture and Inspection: Look for torticollis or head tilt. - Range of Motion: Flexion, extension, lateral flexion, and rotation. - Neurovascular Exam: Evaluate for symptoms of radiculopathy or myelopathy. - Special Tests: Spurling's test to reproduce radicular symptoms. --- Examining the Thoracic and Lumbar Spine - Inspection: Scoliosis, kyphosis, or other deformities. - Palpation: Check for tenderness along the spinous

processes, paraspinal muscles, and sacrum. - Range of Motion: Flexion, extension, lateral bending, and rotation. - Neurological Testing: As with cervical spine, Physical Examination Of The Spine And Extremities 7 assess dermatomal sensation, muscle strength, and reflexes. - Special Tests: - Patrick's (FABER) Test: For sacroiliac joint pathology. - Beck's Test: To detect lumbar nerve root compression. --- Examination of the Extremities Upper Limb Examination - Inspection: - Look for swelling, deformities, scars, muscle wasting, or skin changes. - Assess for asymmetry or abnormal positioning. - Palpation: - Check joints (shoulder, elbow, wrist, fingers) and muscles for tenderness or swelling. - Palpate for temperature differences indicating inflammation. - Range of Motion: - Active and passive movements of joints—shoulder abduction, flexion, extension, rotation; elbow flexion/extension; wrist movements; finger dexterity. - Note any restriction or pain. - Strength Testing: - Test muscle groups innervated by specific nerves (e.g., deltoid for axillary nerve, wrist extension for radial nerve). - Neurological Testing: - Sensory examination for dermatomal distribution. - Reflexes: Biceps, brachioradialis, triceps. - Fine motor coordination and grip strength. Lower Limb Examination - Inspection: - Observe gait, limb length discrepancy, swelling, skin changes, or deformities. - Note muscle wasting or asymmetry. - Palpation: - Joints: hip, knee, ankle, foot. - Muscles for tenderness. - Range of Motion: - Hip: flexion, extension, abduction, adduction, internal/external rotation. - Knee: flexion and extension. - Ankle and foot: dorsiflexion, plantarflexion, inversion, eversion. - Strength Testing: - Hip flexion (iliopsoas), extension (gluteus maximus), abduction (gluteus medius), knee extension (quadriceps), flexion (hamstrings). - Ankle dorsiflexion (tibialis anterior), plantarflexion (gastrocnemius), toe movements. - Neurological Examination: - Sensory testing along dermatomes. - Reflexes: patellar, Achilles. - Coordination and gait assessment. --- Specialized Tests and Maneuvers To detect specific conditions, clinicians utilize additional maneuvers: - Lhermitte's Sign: Electric shock sensation on neck flexion, suggestive of cervical myelopathy. - Tinel's Sign: Tapping over nerve roots or peripheral nerves to elicit tingling. - Finkelstein's Test: For de Quervain's tenosynovitis. - Hoffman's Sign: Indicates cervical myelopathy. - Trendelenburg Test: For hip abductor weakness. --- Vascular and Soft Tissue Examination

Assessing peripheral vascular status is vital, especially in cases of limb ischemia or arterial disease: - Palpation of Pulses: Femoral, popliteal, dorsalis pedis, posterior tibial Physical Examination Of The Spine And Extremities 8 arteries. - Capillary Refill: Less than 2 seconds indicates good perfusion. - Skin Temperature and Color: Changes may suggest vascular compromise. - Edema and Lymphatic Assessment: For soft tissue pathology. --- Interpreting Findings and Clinical Implications A meticulous physical examination allows clinicians to: - Detect structural deformities or instability. - Identify neurological deficits indicating nerve root or spinal cord involvement. - Differentiate between musculoskeletal and systemic causes. - Guide further investigations such as imaging (X-ray, MRI, CT) or laboratory tests. - Monitor disease progression or response to treatment. --- Limitations and Challenges While physical examination remains invaluable, it has limitations: - Variability among examiners. - Patient factors such as pain tolerance, cooperation, or obesity. - Deep or subtle lesions may evade detection. - Necessity of correlating findings with clinical history and ancillary tests. --- Conclusion The physical examination of the spine and extremities is a vital skill that requires systematic technique, keen observation, and clinical judgment. When performed meticulously, it provides critical insights that underpin diagnosis, management, and prognosis. Continuous practice and familiarity with special tests enhance diagnostic accuracy, ultimately leading to better patient outcomes in musculoskeletal and neurological health. --- References (Note: As this is a generated article, specific references are not included, but in a formal publication, references to authoritative sources, textbooks, and clinical guidelines would be provided.) spinal mobility assessment, neurological exam, range of motion, palpation, muscle strength testing, reflexes, joint stability, postural assessment, tenderness evaluation, orthopedic testing

Endoscopy of the SpineImaging of the Spine E-BookTumors of the Spine E-BookManipulation of the Spine, Thorax and Pelvis E-BookInterventional Neuroradiology of the SpineSurgery of the Spine and Spinal CordUnilateral Biportal Endoscopy of the SpineRegenerative Biology of the Spine and Spinal CordCancer in the SpineEssentials of Radiofrequency Ablation of the Spine and JointsOn concussion of the spine, nervous shock

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this book provides detailed advancement of endoscopic procedures of the spine it covers basic knowledge of endoscopic procedures and dedicated introduction of surgical techniques for treatment of diseases in spine with better surgical outcome and less surgical morbidity endoscopic procedures with their advantage in surgical exposure and post

operative rehabilitation have been extensively performed in orthopedic diseases cases presentation with well illustrated endoscopic photos for common clinical conditions was provided the format is a step by step procedure for easy reference particularly for surgeons in their training

imaging of the spine an exhaustive full color reference combines the ease of use of an atlas with the comprehensive coverage of a definitive reference work renowned experts drs thomas p naidich mauricio castillo charles raybaud james g smirniotopoulos soonmee cha and spyros kollias cover every aspect of spine imaging including the latest diagnostic modalities interventional techniques and image guided procedures through over 1300 digital quality illustrations view 1300 digital quality images of both radiographic images and cutting edge modalities mr multislice ct ultrasonography and nuclear medicine consult the expertise of a diverse group of experts from around the globe on the imaging of the spine tap into comprehensive coverage that includes diagnostic and therapeutic options with an emphasis on cost effective imaging find information quickly and easily thanks to consistent and tightly focused chapters a full color design and key points boxes

achieve optimal outcomes for your patients with this new multimedia reference organized by tumor then by region this resource details diagnostic and therapeutic options for primary and malignant spinal tumors over 25 key procedures including minimally invasive surgery are presented in a concise stepwise fashion putting the key information you need right at your fingertips over 600 illustrations round out this exhaustive new reference keep up to date on the latest advances in diagnosis and therapy with discussions of the latest surgical techniques including minimally invasive spine surgery chapter templating helps you understand the entire procedure as well as key aspects pearls and pitfalls before heading into the or have all the information you need to make a diagnosis and plan patient management with oversized full color clinical photos and line drawings that illustrate key diagnoses and surgical procedures

this highly illustrated step by step guide gives detailed instructions for dozens of different manipulation techniques covering all levels of the spine thorax and pelvis it also includes a

helpful overview of the principles and theory of spinal manipulation and its use in clinical practice the accompanying dvd contains video clips demonstrating the techniques described in the book the new edition is a highly illustrated step by step guide to 41 manipulation techniques commonly used in clinical practice the book also provides the related theory essential for safe and effective use of manipulation techniques provides a comprehensive review of spinal kinematics and spinal positioning and locking the only osteopathic text with a specific focus on the acquisition of skills relating to high velocity low amplitude hvla thrust techniques a companion dvd provides comprehensive video demonstrations provides a comprehensive review of the research evidence supporting the use of hvla thrust techniques in clinical practice makes clear the risks and emphasises the points to be aware of for safe practice contains the most current information available relating to safe practice of hvla thrust techniques up to date comprehensive and extensively referenced all the techniques described are illustrated with photographs within the book and supported by demonstration video clips on the accompanying companion dvd includes a troubleshooting part on how to deal with difficulties in the application of hvla thrust techniques includes video introduction to cervical and lumbar hvla thrust techniques kinematics and spinal positioning that also includes unique fluoroscopy of coupled movement in different spinal postures

accurate interpretation of indications for treatment is the cornerstone of success in medicine this book carefully examines the relation between clinical features diagnosis and choice of minimally invasive technique for a range of spine pathologies it explains how selection of technique is intimately related to clinical and diagnostic aspects and how recognition of this relation forms the foundation for an optimal outcome in addition to examining the various minimally invasive options including the latest techniques careful attention is paid to the role of medical treatment in avoiding recurrence after initial therapy nerve blocks epidural injections and intradiscal procedures are among the many options available in the armamentarium of the interventionalist and advice is given on their use in different contexts this volume will be of great value for neuroradiologists and others responsible for treating patients with spine disorders

this book offers essential guidance on selecting the most appropriate surgical management option for a variety of spinal conditions including idiopathic problems and degenerative disease while the first part of the book discusses the neuroanatomy and biomechanics of the spine pain mechanisms and imaging techniques the second guides the reader through the diagnostic process and treatment selection for disorders of the different regions of the spine based on the principles of evidence based medicine i e it clearly explains why a particular technique should be selected for a specific patient on the basis of the available evidence which is carefully reviewed the book identifies potential complications and highlights technical pearls describing newer surgical techniques and illustrating them with the help of images and accompanying videos though primarily intended for neurosurgeons the book will also be of interest to orthopaedic surgeons specialists in physical medicine and pain specialists

endoscopic spinal surgery has become popular due its procedure related benefits the biportal endoscopic surgery is a recent technique which has gained popularity in asia europe and latin america since it can be applied to treat many diseases of the whole spine as cervical thoracic lumbar and sacral divided into thirty four chapters this first ever book on unilateral biportal endoscopic spine surgery presents the technique history review and its current applications the currently available technology and basic principles of this surgery anesthesia position and operative room setup endoscopic instruments hydrostatic pressure and intraoperative radiology as well as anatomical considerations of basic approaches it also details the techniques to resolve lumbar cervical and thoracic spine diseases written by the world s most influential groups that perform the method unilateral biportal endoscopy of the spine an atlas of surgical techniques will certainly be widely accepted by all surgeons interested to improve their daily practice in minimally invasive spine surgery

editors hope that regenerative biology of the spine and spinal cord appeals to the nostalgic sentiments of investigators and intellectuals in that it can be held in hand and provide a broad survey of leading edge science at the same time its chapters can be digitally acquired

for those established in the field to refine particular knowledge interests or gaps most importantly we ask the reader whomever that may be to peruse without prejudice as countless more chapters will have been written before total spinal regeneration is achieved

distinguished physicians and researchers from prestigious cancer centers around the world offer their expertise in current and innovative management of cancer in the spine these authors bring together the latest thinking from diverse fields of medicine to provide in one volume a guide to coordinated management of all aspects of spinal tumors covering chemo and radiation therapy pain management diagnostic radiology as well as reconstructive surgery and palliative care highlights include management of vertebral metastases innovations in radiotherapy treatment of pathological fractures curative strategies for primary malignancies as well as a guide to pain management and end of life care

this book provides a comprehensive review of the development of radiofrequency ablation rfa for the treatment of chronic pain the book consists of three sections it begins with the foundations of rfa by examining its history development mechanisms of action and types the second section explores various indications for rfa including cervical pain spinal metastasis vertebral body and hip joint pain the final section then discusses the utilization of peripheral nerve ablation the book concludes with future indications and forward looking options for these therapies essentials of radiofrequency ablation of the spine and joints is a forward looking resource that recognizes the expanding field of rfa indications and new tools for ablation

written by a leading proponent of the alexander technique anatomy of the moving bodyoffers movement educators a basic manual that provides not only drawings and names but also written lectures that tie this sometimes difficult material into a coherent series of presentations the book is divided into accessible sections that present muscles and joints in a clear and concise manner without oversimplifying or leaving out necessary details each of the 31 chapters covers a basic region of the body included is information about bones origins and attachments of muscles and related actions joints major ligaments and actions at joints major functional structures such as the pelvis shoulder girdle ankle and hand

etymology of anatomical terms major landmarks and human topography and structures relating to breathing and vocalization

this guide to spinal injuries is designed to give greater understanding of the medical side of personal injury cases using clear and simple terms and detailed diagrams and drawings it provides medical information that can be used to strengthen cases

dynamic reconstruction of the spine is an essential reference on the current techniques and equipment for dynamic stabilization of the spine covering both anterior and posterior approaches to dynamic stabilization the book presents a complete overview of the state of the art technologies in spinal arthroplasty and instrumentation for dynamic stabilization each chapter of this authoritative text focuses on a different technology the authors illuminate the key concepts of each implant device and provide concise discussion of the rationale indications contraindications surgical techniques and postoperative results highlights synthesizes the vast amount of literature on the newest implantable artificial disks for restoring and preserving motion of the spine features contributions from the inventors of or experts on these systems demonstrates key concepts of instrumentation and techniques with more than 400 instructional illustrations dynamic reconstruction of the spine is an indispensable reference for all spine specialists neurosurgeons orthopedic surgeons radiologists fellows and residents seeking the latest information on this emerging technology

this book provides the solid foundation of knowledge therapists need to safely and accurately treat musculoskeletal disorders of the spine it presents a comprehensive view of applied functional anatomy and biomechanics of the whole spine examining normal and abnormal function of the spine the response of tissues to injury and the effects of age related changes thoroughly referenced and extensively illustrated with over 200 original high quality diagrams it serves as an excellent resource for clinical decision making the 2nd edition explores several areas in greater depth including the sacroiliac joint thoracic biomechanics muscles and reviews recent papers and the scientific evidence of functional anatomy accessory and physiological spinal movements are thoroughly described palpation

is covered in detail numerous guidelines for safe practice are provided a valuable comprehensive chapter covers posture lifting and the prevention of injury coverage of applied anatomy and biomechanics is written by therapists for therapists new theories on thoracic biomechanics are presented rarely covered by other anatomy books all topics have been updated to reflect recent scientific evidence enabling the reader to more effectively formulate and manage treatment plans new illustrations to complement the text and improve readers understanding of the material a one of a kind chapter covering the sacroiliac joint has been comprehensively revised expanded material is provided on the autonomic nervous system thoracic spine biomechanics and the biomechanics of the lower limb as it relates to the spine new sections address adverse neural tension cervical discs proprioception and muscle imbalance and mechanics of the jaw and upper cervical spine an update on vertebral artery and blood supply presents the latest knowledge on the subject

the 6 chapters in this book have been selected from the contents of the spine section in grainger allison s diagnostic radiology 6e these chapters provide a succinct up to date overview of current imaging techniques and their clinical applications in daily practice and it is hoped that with this concise format the user will quickly grasp the fundamentals they need to know throughout these chapters the relative merits of different imaging investigations are described variations are discussed and recent imaging advances are detailed

the cervical spine is the most comprehensive current and authoritative reference on the cervical spine prepared by internationally recognized members of the cervical spine research society editorial committee the fifth edition presents new information new technologies and advances in clinical decision making the text provides state of the art coverage of basic and clinical research diagnostic methods and medical and surgical treatments bringing together the latest thinking of the foremost orthopaedic surgeons neurosurgeons neurologists rheumatologists radiologists anatomists and bioengineers chapters cover anatomy physiology biomechanics neurologic and functional evaluation and radiographic evaluation and address the full range of pediatric problems fractures spinal

cord injuries tumors infections inflammatory conditions degenerative disorders and complications accompanying the text is a website with the fully searchable text plus a color image bank

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