CLINICAL – SURGICAL OVERVIEW:
WHAT THE ORTHOPAEDICIAN EXPECTS FROM ULTRASOUND

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ULTRASOUND

• High frequency sound waves
• Non ionizing
• Noninvasive
• Low cost
• Portable
• In patients unable to tolerate: - CT - MRI
ULTRASOUND - Advantages

• Image - soft tissues
  - bony structures

• For the purposes
  - diagnosing pathology
  - guiding real-time interventional procedures
  - with the advantage of examining the joints in a dynamic way

ULTRASOUND - Disadvantages

• **Operator dependant**
  - has to have a **wide knowledge** of the physical principles of ultrasonography
  - to be familiar with the **sonographic anatomy** and musculoskeletal anatomy
  - the ability to recognize the sonographic phenomena that can present as decoys, nominated **artifacts**
  - ecoographic studies can be interpreted and recognizing artifacts and **avoiding** wrong diagnosis and unnecessary procedures

[Acta Ortop Mex. 2008 Nov-Dec;22(6):361-73. [Basic physical principles of ultrasonography, anatomy of the musculoskeletal system and ecographic artifacts]]
ULTRASOUND

• drive the proliferation of ultrasound in clinical medicine of musculoskeletal system

• Recently, an increasing number of orthopaedicians have integrated musculoskeletal ultrasound into their practices to facilitate patient care
ULTRASOUND

• **Evaluation** of:
  - Tendons
  - Muscles
  - Joints
  - Soft tissue masses
  - Cysts

• the *sonographic anatomy* has become *broader* and *more detailed*

• *sonographic semiology* is more *precise* and *reliable*
ULTRASOUND
ULTRASOUND

- Musculoskeletal medicine
- Soft tissue trauma / injury
- Ligament / tendon ruptures
- Nodules, bursae, etc
- Inflammatory arthritis (i.e. RA)
- Crystal disease
- Osteoarthritis
- Others (i.e. scleroderma, GCA)
ULTRASOUND

• Ideal modality for *guiding* musculo-skeletal interventions

  - Its *real-time* capabilities allow *continuous observation* of needle placement into the targeted area and direct visualization of interventions such as injection of medication while avoiding other soft tissue structures or nearby neurovascular bundle
ULTRASOUND guidance

- **an accurate method** for the delivery of therapeutic injections in the musculoskeletal system

- **visualization of the needle in real time**
  - allows for reliable placement of the needle tip
    a. in the Tendon sheath
    b. Bursa
    c. Joint of interest

Both **superficial and deep articulations and tendon sheaths** can be **targeted** for diagnostic or therapeutic interventions
ULTRASOUND guidance

• Performing percutaneous interventions with ultrasound ensures accurate needle tip placement

• Helps direct the needle away from other regional soft-tissue structures such as nearby neurovascular bundles.

ULTRASOUND guidance
ULTRASOUND guidance

• To perform these procedures safely and accurately, two steps must occur.

1. the appropriate structure must be localized using diagnostic US imaging
2. a needle must be guided under constant visualization toward the targeted tissue.

Although US imaging can help place the needle and, hence, therapeutic medication more accurately, there is still debate about whether or not image-guided procedures result in improved outcomes.

Diagnostic ULTRASOUND

- Image:
  - soft tissues
  - bony structures

- Evaluation of:
  - Tendons
  - Muscles
  - Joints
  - Soft tissue masses
  - Cysts
Long Head of Biceps Tendon
Rotator Cuff

- Subcutaneous Fat
- Deltoid
- Supraspinatus Tendon
- Greater Tuberosity
- Humeral Head
Full thickness tear of the RC
P.A.S.T.A. lesion of the RC
Distal biceps tendon rupture
Carpal Tunnel
ELBOW

- CV
- PrTM
- LAbCN
- BrM
- Tendon (Biceps)
- BA
- BM
- MN
ULTRASOUND

- Robotic Ultrasound Guided System for Orthopedic Surgical Procedures
CONCERNS

• Most commonly cited obstacles to use of MSUS
  • Concern about operator and reader variability vs. other imaging modalities
  • Initial cost of purchasing equipment
  • Fear of not enough reimbursement / labor intensive
  • Lack of support for training
  • Doubt of its utility and impact on patient care
ULTRASOUND IN ORTHOPAEDICS

“Rapid, efficient, and powerful imaging allows orthopedic surgeons to improve patient care and decrease overall health costs.”
THANK YOU!