

Ultrasound of Soft Tissue Tumors

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Disclosures

- Consultant: Bioclinica
- Contractor: POCUS PRO
- Advisory Board: Philips
- Book Royalties: Elsevier
- Not relevant to this lecture

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Fundamentals of Musculoskeletal Ultrasound are
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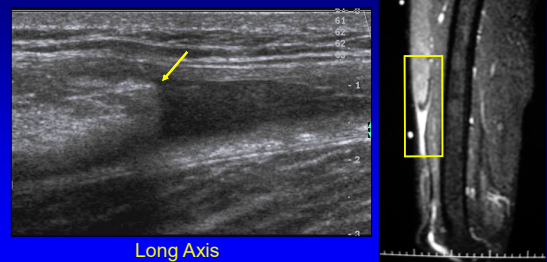
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Question: tumor or pseudotumor?

- Pseudotumors:
 - Tendon tear with retraction:
 - Rectus femoris, tibialis anterior
 - Muscle hernia
 - Anomalous muscle:
 - Accessory soleus
 - Extensor digitorum brevis manus
 - Rheumatoid nodule

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Rectus Femoris Tear: full tear, pseudomass



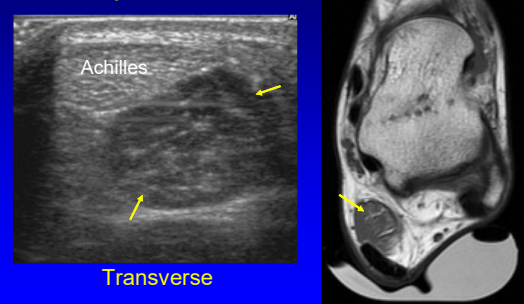
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Muscle Hernia: anterior tibialis



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Accessory Soleus Muscle



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Question: anatomic location?

- Joint, tendon sheath, or bursal origin
 - Synovial: benign
- Tendon
 - Gout
- Osseous origin
 - Aggressive: infection or malignancy
- Soft tissue origin
 - Variable etiology

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Outline:

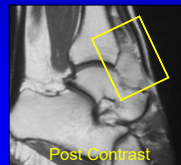
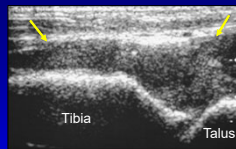
- Joint recess
- Bursa
- Tendon
- Lymph Node
- Ganglion
- Subcutaneous
- Other

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Joint Recess

- Mass arising from a joint is a benign synovial process:
 - Rheumatoid arthritis
 - Tenosynovial giant cell tumor (pigmented villonodular synovitis)
- Synovial sarcoma: very rarely involves a joint

Tenosynovial Giant Cell Tumor



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Outline:

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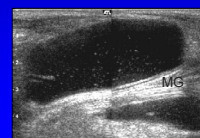
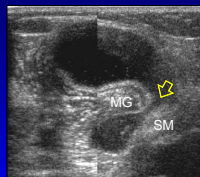
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Bursa

- Mass arising from a bursa
 - Benign synovial process
 - Know locations of normal bursa
 - Anechoic or hypoechoic
 - Compressible
 - May be complex
 - Example: Baker cyst

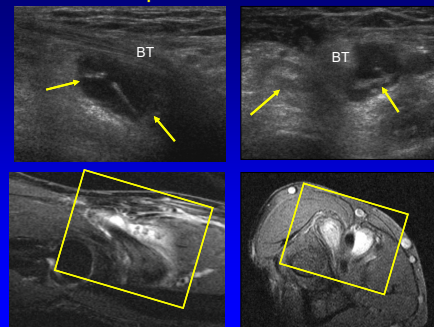
Note: characteristic "neck" between MG and SM tendons (yellow arrow)

Baker Cyst



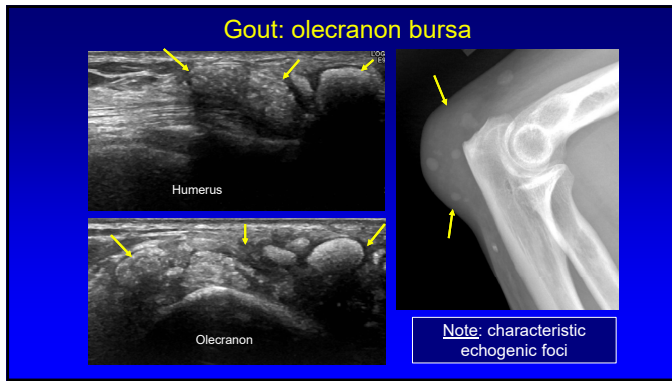
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Bicipitoradial Bursitis

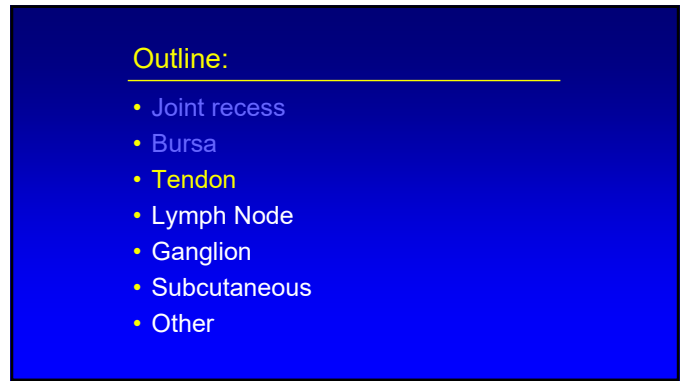


Note: characteristic "U" shape of bursa

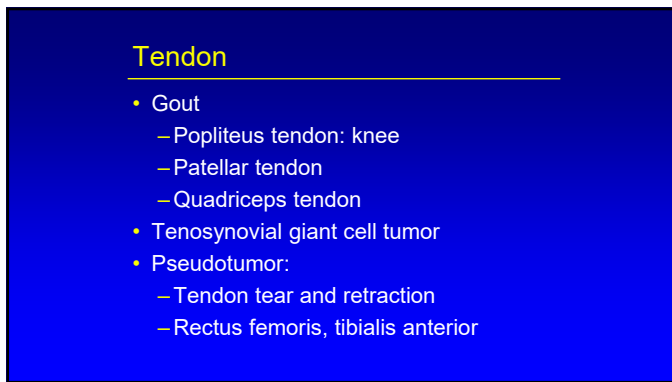
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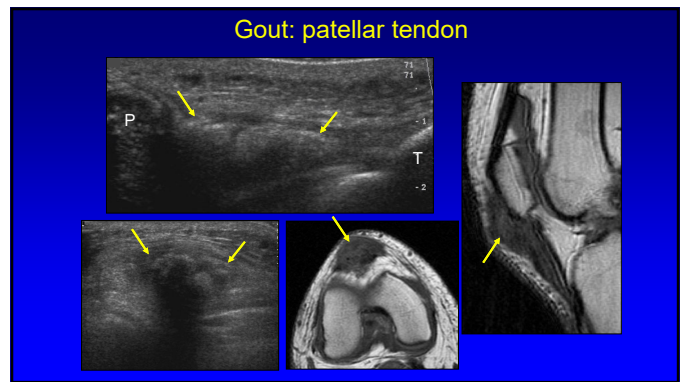
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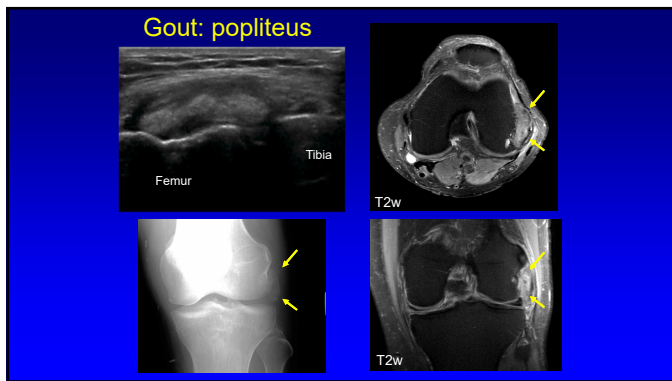
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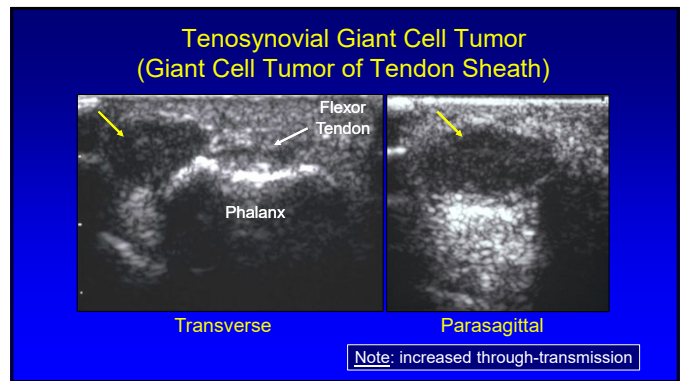
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Outline:

- Joint recess
- Bursa
- Tendon
- **Lymph Node**
- Ganglion
- Subcutaneous
- Other

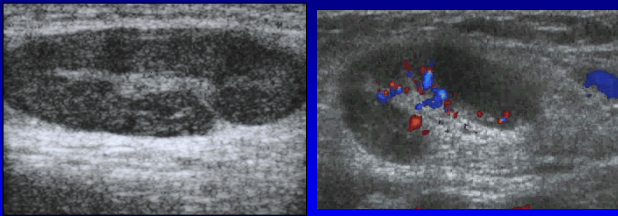
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Lymph Node

- Hyperplastic:
 - Oval, hyperechoic hilum
 - Hilar vascular pattern
- Malignant:
 - Asymmetric thick cortex
 - Round
 - Loss of hyperechoic hilum
 - Variable vascular pattern

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Lymph Node: reactive

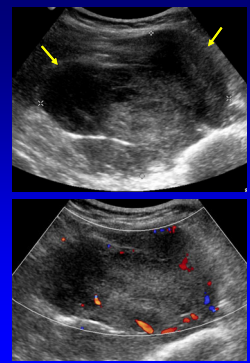


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Lymphoma: nodal

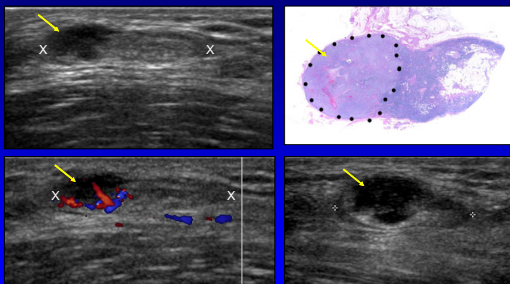
- Hypoechoic enlarged lymph node mass
- Malignant:
 - Round shape
 - Absence of echogenic hilum
 - Irregular vascular pattern

Vassallo et al. Radiology 1992; 183:215



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Lymph Node: angiosarcoma metastasis



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Ganglion

- Ultrasound features:
 - Hypoechoic
 - Multilocular
 - Not compressible
- Specific locations
- Differential: paralabral, parameniscal cysts

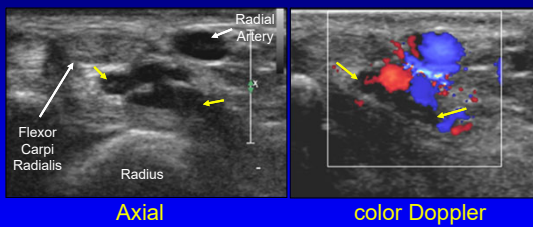
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Ganglia

- Wrist:
 - Volar: between radial artery and FCR
 - Most common site (69%)
 - Dorsal: over scapholunate ligament
- Knee:
 - Cruciates, gastrocnemius tendon
 - Hoffa fat pad
- Ankle: tarsal tunnel

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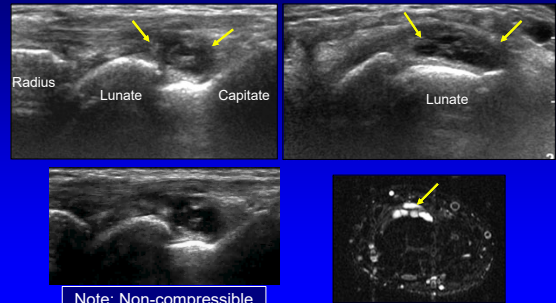
Ganglion: volar wrist



Zhang A et al. J Ultrasound Med 2019; 38:2155

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Ganglion: dorsal wrist

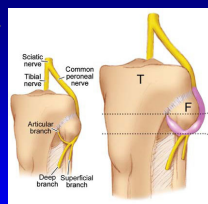


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Peroneal Intraneural Ganglion

- Up to 22% of patients with foot drop
- Patients have high body mass index
- Joint fluid from proximal tibiofibular joint
 - Enters peroneal nerve via articular nerve branches
 - Shown at MR arthrography after exercise
 - Extends proximal via epineural sheath¹

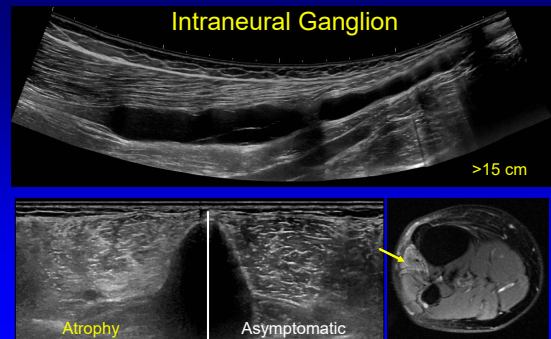
¹Spinner et al. Clin Anatomy 2007; 20:826



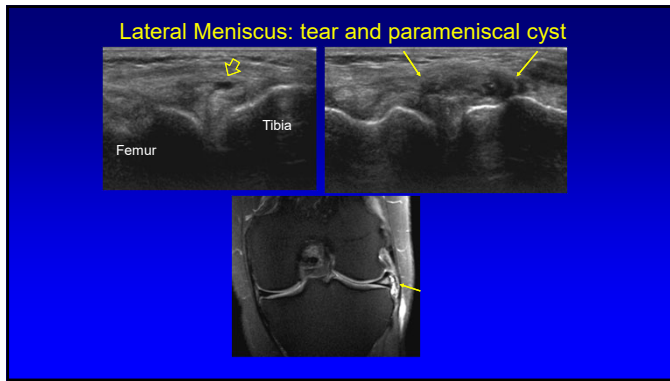
From: Spinner et al. Skeletal Radiol 2008;37:1091

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Intraneural Ganglion



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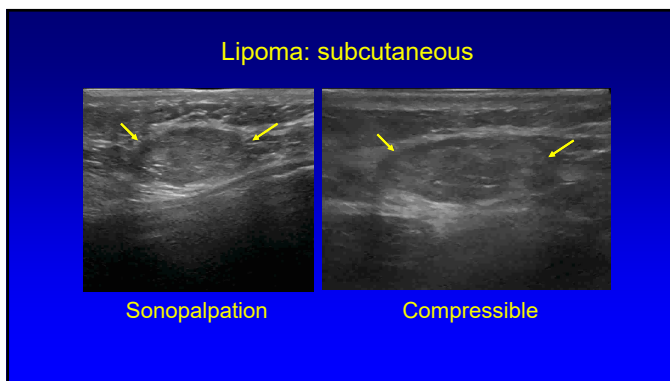
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- Subcutaneous Masses
- Lipoma
 - Fat necrosis
 - Epidermal inclusion cyst
 - Other: benign versus malignant
- *Note:** subcutaneous masses that are hyperechoic are almost certainly benign
- Jacobson JA et al. Radiology 2022; 304:18

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- Lipoma: subcutaneous
- Oval or oblong
 - Homogeneous
 - Isoechoic to adjacent fat
 - Hyperechoic:
 - With increased fibrous tissue components
 - No internal vascularity
 - Compressible
 - Clinically benign
-
- Inampudi et al. Radiology 2004; 233:763

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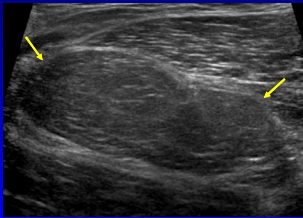
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- Lipoma: deep
- Variable echogenicity
 - Often ill-defined
 - Often difficult to assess
 - Cannot reliably differentiate from low-grade liposarcoma!
 - Need MRI
-
- Paunipager et al. Insights Imaging 2010; 1:149

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Liposarcoma: *well-differentiated*

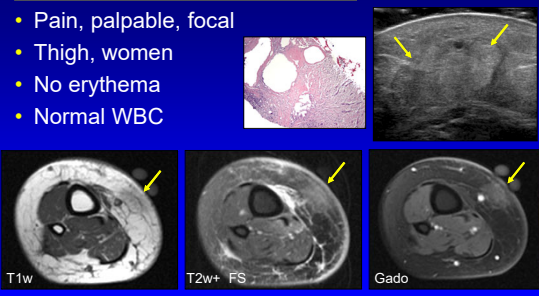
- Also called atypical lipomatous tumor
- Hypochoic
- Looks like a lipoma
- Need MRI with any suspected deep lipoma!



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Fat Necrosis

- Pain, palpable, focal
- Thigh, women
- No erythema
- Normal WBC

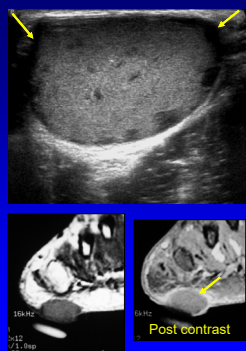


J Ultrasound Med 2008; 27:1751

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Epidermal Inclusion Cyst

- Etiology: implantation of epithelium, congenital, squamous metaplasia, hair follicle obstruction
- US findings:
 - Low level echoes and hypochoic halo
 - Through transmission
 - Hypochoic clefts
 - Periscope sign: extension to skin



Kim et al. Skeletal Radiol 2011; 40:1415

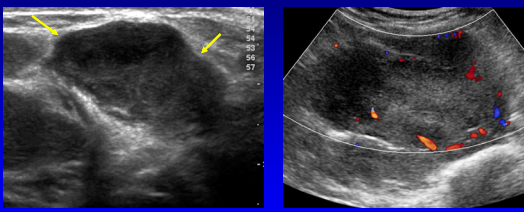
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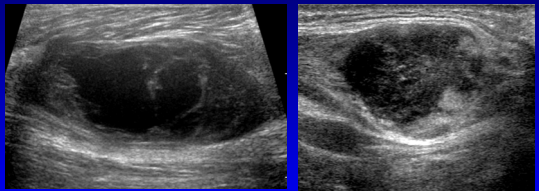
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Synovial Sarcoma



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Tumor



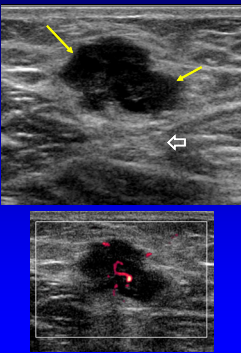
Metastasis: Renal Cell Carcinoma Sarcoma: high grade

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Melanoma

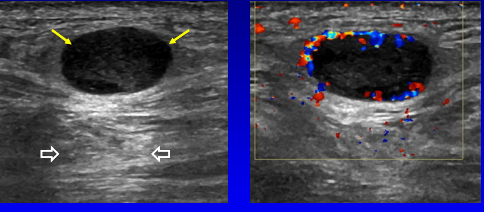
- Hypoechoic mass
- Usually increased flow on color Doppler
- Lymph node:
 - Focal cortical enlargement
 - Diffusely abnormal

Nazarian et al. AJR 1998; 170:459



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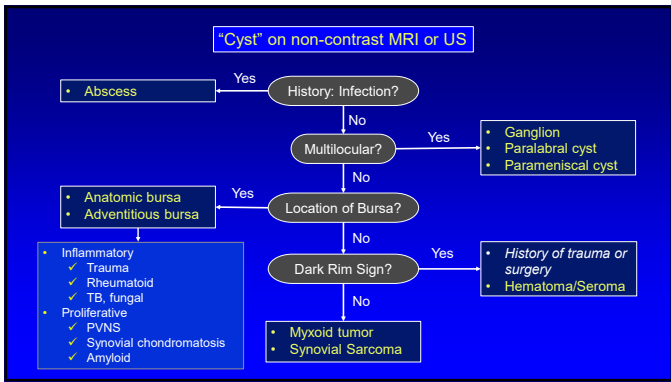
Metastasis



Squamous cell carcinoma

Note: increased through-transmission (open arrows)

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Take Home Points

- Key to differential diagnosis:
 - Specific anatomic location
- Joint and tendon: benign
- Bursa: key location, unilocular, compressible
- Ganglion: location, multilocular, not compressible
- Lipoma: subcutaneous, oval, compressible
- Malignancy: hypoechoic, heterogeneous

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Thank you!



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Syllabus on line and other educational material:
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Twitter handle: @jjacobsn



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