Ultrasound-Guided Knee Procedures

Daniel R. Lueders, MD[a], Jay Smith, MD[a,b,c], Jacob L. Sellon, MD[a,*]

KEYWORDS

• Injection • Knee • Musculoskeletal • Sonography • Sports Ultrasound • Ultrasound • Ultrasound-guided injection

KEY POINTS

- The anatomy of the knee is particularly amenable to ultrasound imaging, and therefore most knee structures can be accurately targeted using ultrasound guidance.
- Studies of ultrasound-guided knee procedures have consistently shown high accuracy.
- Using ultrasound guidance for knee procedures is particularly useful for obese patients, diagnostic injection specificity, safety around neurovascular structures, and precise targeting of pathology.
- More studies are needed to assess the clinical efficacy and cost-effectiveness of various ultrasound-guided knee procedures.

INTRODUCTION

The anatomy of the knee is particularly amenable to ultrasound (US) imaging, and therefore most knee structures can be accurately targeted using US guidance. In most individuals, these structures are superficial, and the overlying soft tissues are mobile and compressible, facilitating excellent visualization with a high-frequency linear array transducer. The circumferential accessibility to the knee affords flexibility and often multiple procedural approach options. In most cases, an in-plane approach (ie, parallel to the transducer) can be easily achieved, improving needle visualization and injection safety.

ULTRASOUND-GUIDED KNEE JOINT INJECTIONS

Indications

General indications for US-guided (USG) knee joint injections include failure of a prior landmark-guided (LG) knee joint injection, complex postoperative or

Disclosure: The authors have nothing to disclose.

[a] Department of Physical Medicine and Rehabilitation, Mayo Clinic Sports Medicine Center, Mayo Clinic, 200 1st St Southwest, Rochester, MN 55905, USA; [b] Department of Radiology, Mayo Clinic, 200 1st St SW, Rochester, MN 55905, USA; [c] Department of Anatomy, Mayo Clinic, 200 1st St SW, Rochester, MN 55905, USA
* Corresponding author.
E-mail address: sellon.jacob@mayo.edu

Phys Med Rehabil Clin N Am 27 (2016) 631–648
http://dx.doi.org/10.1016/j.pmr.2016.04.010 **pmr.theclinics.com**
1047-9651/16/$ – see front matter

posttraumatic anatomy, obese body habitus, need for diagnostic specificity, and orthobiologic injections (eg, hyaluronic acid, platelet-rich plasma, bone marrow aspirate concentrate), in which intra-articular placement is essential for the treatment mechanism.[1–4]

Cost-Effectiveness

- Although studies have generally shown superior accuracy of USG knee joint[2,3] injections, there remains some debate regarding cost-effectiveness.
- Sibbitt and colleagues[5] showed that, relative to LG knee joint corticosteroid injections, USG injections led to 13% reduction ($17) in cost per patient per year and 58% ($224) reduction in cost per responder per year.
- Because injection accuracy is likely more critical for orthobiologic versus corticosteroid injection efficacy, USG may be more cost-effective when delivering orthobiologic injections, although this has not been specifically investigated.

KNEE JOINT INJECTION: SUPRAPATELLAR APPROACH

Indications

- Easy access to the joint via the suprapatellar recess.[1,2,4,5]
- Avoid contact with cartilage and other intra-articular structures.
- Preferred approach for visualizing and aspirating effusion.

Accuracy

- Bum and colleagues[4] showed greater accuracy with the suprapatellar USG approach (96.0%) than LG injections (83.7%).
- Curtiss and colleagues[2] showed 100% accuracy with the suprapatellar USG approach across experience levels, whereas LG injections showed less accuracy and more variability (55%–100%).

Safety

There are no published complications with this approach.

Clinical Efficacy

Relative to LG injections, the suprapatellar USG approach resulted in 48% reduction in procedural pain, 42% reduction in pain at outcome, and 36% increase in therapeutic duration.[5]

Positioning

- Patient supine with knee partially flexed (**Fig. 1**A).
- Transducer in anatomic transverse plane over suprapatellar recess.

Preprocedural Scan

- Visualize suprapatellar recess deep to the quadriceps fat pad/tendon and superficial to the prefemoral fat pad.
- If effusion present, this makes for an effective target (**Fig. 1**B). Small effusions can be enhanced with knee flexion. Check dependent portions of joint recess.
- Note depth of target for planning skin entry point.

Needle Approach

- In plane relative to transducer (**Fig. 1**C, D).
- Advance lateral to medial or medial to lateral.