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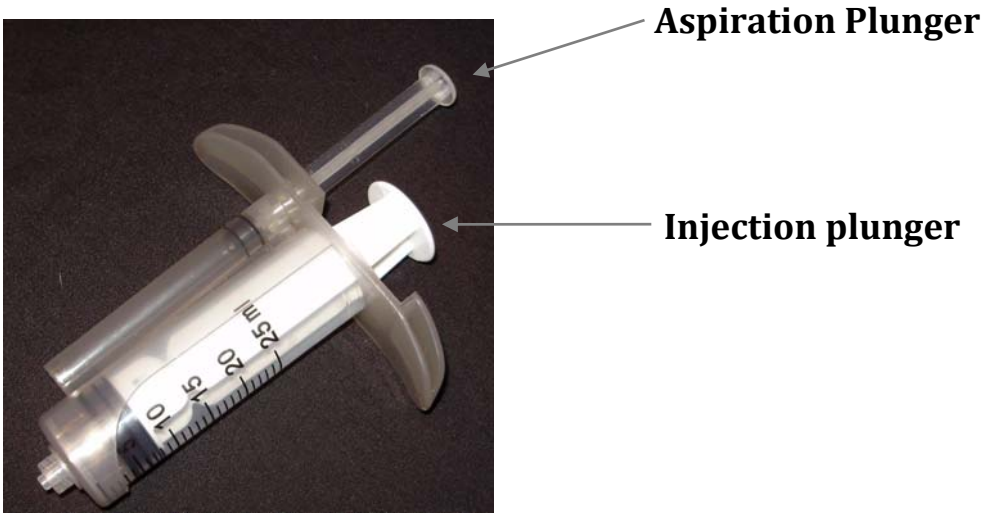
Use of the RPD syringe for 1-handed aspiration of musculoskeletal effusions

The RPD syringe is the first disposable safety syringe to enable 1-handed aspiration. It is especially useful when aspirating a palpable effusion because the clinician's second hand remains free to stabilize the needle or move the effusion toward the site of needle drainage. Randomized clinical trials comparing the RPD to standard syringes (J Rheum, (2008) 35:1124) have shown that the RPD significantly increases the ease of effusion drainage and the volume of effusion removed, while significantly decreasing patient pain, and significantly reducing tissue trauma associated with unintended needle movement during aspiration procedures.

Suggestions for getting comfortable with the RPD syringe: Review the RPD instruction sheet, and familiarize yourself with its construction and operation before use in clinical practice.

1. **RPD construction:** Note the difference between the two syringe barrels on the RPD. The larger barrel (with volume markings and luer lock) operates similar to any standard syringe. The second barrel is smaller, non-graduated, and has no needle fitting. This second barrel's only purpose is to serve as the conduit for the aspiration-plunger, and it will always remain empty of fluid. The aspiration plunger is mechanically coupled to the injection plunger on the larger barrel, so that the two plungers always move in opposite directions (i.e. the reciprocating mechanism).

2. **Principle of operation:** When preparing to aspirate, the injection plunger in the larger barrel should be fully depressed, as it would be when aspirating with a standard syringe. This will cause the aspiration plunger to rise to the top of the smaller barrel. To begin aspirating, depress the aspiration plunger to cause the injection plunger to rise and fluid to collect into the larger graduated barrel.



   a. **Purpose of the aspiration plunger:** The only purpose for the aspiration plunger and second syringe barrel is to enable aspiration to be performed by pushing the aspiration plunger rather than by pulling the injection plunger. This increases the ease of aspiration because it utilizes the hand flexor muscles, and increases leverage between the thumb and the fingers holding the syringe flanges.
   b. **Mock aspiration procedure:** Practice aspiration with a cup of water to get comfortable with the RPD's operation. When ready to begin, the injection plunger on the larger barrel should be in the fully depressed position, causing the aspiration plunger to rise to its highest point. When the syringe tip is placed into the water and the aspiration plunger is depressed, note how the injection plunger rises while the larger syringe barrel fills with fluid. Note that the hand holding the syringe performs the entire

operation, leaving the second hand completely free to perform any additional maneuvers required.

3. **One-handed aspiration in the clinic:** Once comfortable with the technique for aspirating with the RPD, it is best to first try the syringe in an easily accessible joint, (e.g. the knee) with a clinically apparent effusion requiring drainage. Determine the size RPD syringe required, prepare the knee for sterile injection, cycle the RPD plungers a few times to ensure smooth movement, and begin the arthrocentesis procedure. Advance the needle through the skin and joint capsule and identify the site for effusion drainage, using standard clinical technique. While probing for the intended site of fluid drainage, the RPD design makes it easy to switch your thumb between the two plungers, and thereby facilitates localization of an optimal site for aspiration. After the site of effusion collection is identified and drainage is begun, the clinician's second hand can be used to stabilize needle positioning, and to move fluid from peri-articular areas to the site of needle aspiration. When performing an aspiration with the RPD it is common to collect more effusion than expected, so it is generally best to use the largest size RPD that is comfortable for the specific clinical situation.

    a. **NOTE:** If local anesthetic is to be injected, it can be filled into the injection barrel of the RPD, and injected as the RPD is advanced through dermal and capsular tissues. Feeling the back-pressure from different tissues as anesthetic is injected can facilitate correct needle placement. Easy switching of the thumb between the aspiration and injection plungers allows simple confirmation that the needle tip is not in an unexpected vascular structure when the anesthetic is injected.

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