

Use of the RPD syringe for 1-handed suction biopsy (Fine Needle Aspiration)

The RPD syringe is a disposable patient safety syringe to enable 1-handed aspiration for suction biopsy, fine needle aspiration biopsy (FNA), and cyst aspiration for breast, thyroid, lung, and other tissues. Levels of vacuum up to 600 torr (mm Hg) can be obtained easily with the 10 ml RPD, and levels of 530 Torr with the 5 ml RPD. Experts recommend performing both non-suction and suction FNA during the same session. Suction with FNA is necessary in those dense or fibrotic lesions that typify benign lesions that provide little tissue yield with non-suction FNA (capillary action biopsy). Thus BOTH suction and non-suction biopsy should be performed in each FNA session to prevent unnecessary open biopsy for a diagnosis. The RPD is also superb for aspirating and/or ablating cystic lesions. The pulley mechanism of the RPD permits easy generation of vacuum while preventing unintended forward penetration of the needle, thus, preventing needle complications while providing high levels of vacuum.

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 Syringe and Other Biopsy Devices:** Clinical trials have shown that the RPD is better controlled, easier to generate vacuum, and safer for the patient than the conventional syringe, biopsy syringes with plunger locks, biopsy guns, biopsy pistols, syringe holders, syringe handles, and other dedicated biopsy syringes.
2. **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 or tissue. The aspiration plunger is mechanically coupled to the injection plunger on the larger barrel via a pulley mechanism, so that the two plungers always move in opposite directions (i.e. the reciprocating mechanism).
3. **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 to generate vacuum and to suck tissue into the biopsy needle.



Aspiration Plunger

Injection plunger

- 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.
4. **One-handed aspiration biopsy (FNA) in the clinic:** Once comfortable with the technique for aspirating with the RPD, it is best to first try the RPD in an easily accessible lesion in thyroid or breast. Determine the size RPD syringe required (usually a 10 ml or 5 ml RPD), prepare site for sterile biopsy, cycle the RPD plungers a few times to ensure smooth movement, attaché the biopsy needle, and begin the biopsy procedure with the injection plunger fully depressed. Advance the needle through the skin and subcutaneous tissues to the lesion using standard clinical technique. After the lesion is identified and the needle tip brought into proximity, the aspiration plunger is depressed creating vacuum in the syringe, and the biopsy passes are performed sucking tissue into the needle and hub. After the sample has been obtained, the aspiration plunger is released to reduce vacuum in the syringe before pulling the needle from the biopsy site. Releasing vacuum prevents the sample from being sucked from the needle into the syringe barrel where it is difficult to extract. Once vacuum is released and the needle is then extracted, the needle is removed from the RPD, air aspirated into the RPD syringe by depressing the aspiration plunger, and the needle is reattached to the RPD syringe. The needle is brought over a slide or cytologic fluid container, and the injection plunger is depressed, creating pressure in the syringe, and expelling the sample. The RPD syringe is then ready for the next biopsy pass. To perform FNA without suction, the same process is used with the RPD, but the aspiration plunger is not depressed, no vacuum is generated, and the tissue enters the needle through capillary action. The sample is expelled with the RPD as above. When using a cutting needle with a stylet, the needle is placed first, the stylet removed, and the RPD is attached either by rotating the needle or rotating the RPD so the needle is seated.
5. **Note:** The RPD syringe has a safety mechanism in the Luer threads to prevent stripping – when the needle is overtightened the fitting will “jump” to the previous thread. When the threads of the needle “jump” in this manner, over tightening and stripping are prevented, and the fitting remains completely airtight. Do not mistake this protective mechanism for a failure of the device. After “jumping” the fitting remains completely airtight.
 - 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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The Avanca RPD Biopsy Advantage

- ✓ Safer
- ✓ Easier to generate vacuum
- ✓ Better Controlled
- ✓ Larger biopsy samples