

CLINICAL TECHNIQUES AND TECHNOLOGY

Needle aspiration of peritonsillar abscess with the new safety technology: The reciprocating procedure device

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Peritonsillar abscess is the most common deep infection of the head and neck.^{1,2} The peritonsillar bulging and deviation of the uvula are characteristic, and can be confirmed by ultrasound or CT. The next diagnostic step is needle aspiration of the abscess, which decompresses the abscess and permits bacterial cultures.^{1,2} Usually the technique for aspiration of a peritonsillar abscess requires using one hand to apply a tongue depressor while using the other hand to simultaneously aspirate with a syringe. One-handed aspiration with a syringe is a difficult and dangerous maneuver. Even experienced surgeons may lose control of the needle tip, resulting in unintentional forward penetration as much as several centimeters, which can cause puncture of the carotid artery, hemorrhage, hematoma formation, respiratory compromise, and massive aspiration of blood and pus into the lungs.¹⁻³ In the present report, we report safer abscess aspiration with new surgical safety syringe technology: the reciprocating procedure device.³⁻⁵

The Reciprocating Procedure Device and Aspiration of Peritonsillar Abscess

The reciprocating procedure device (RPD) is presently available in sizes of 1, 3, 5, and 10 mL (RPD-1, RPD-3, RPD-5, RPD-10; AVANCA Medical Devices, Inc, 600 Central Ave SE, Ste 232, Albuquerque, NM, 87102, USA; tel: 505-243-4600, www.avancamedical.com). Clinical use of the RPD is exempt from approval by an institutional review board, and the RPD is CE-marked and approved by the Food and Drug Administration. The RPD is formed around the core of a conventional syringe barrel and plunger, but the device has an extra plunger and barrel.^{3,4} The two plungers are mechanically linked by a pulley system in an opposing fashion, resulting in a set of reciprocating plungers. Thus, when one plunger is depressed with the thumb, the syringe injects; when the accessory plunger is depressed, the syringe aspirates, and the index and middle fingers do not change position (Figs 1 and 2). These char-



Figure 1 Reciprocating procedure device (RPD). The RPD safety device aspirates when the smaller plunger is depressed and injects when the larger plunger is depressed; a pulley system connects the two plungers so that the plungers reciprocate cyclically. Unlike a syringe, the RPD safety device does not lengthen during aspiration or injection, and provides markedly improved safety and needle control.

acteristics of stable finger positioning and the exclusive use of the intrinsic flexor musculature create a powerful and finely controlled one-handed procedure syringe that precisely controls the needle tip position, strength of vacuum, and depth of penetration.³⁻⁵

One hand operates the RPD and the other hand applies the tongue depressor. For individuals with a large oral cavity, an 18-gauge 1.5-inch needle is placed on a 5 or 10 mL RPD. After administration of topical anesthesia, the physician presses the injection plunger with the thumb while the RPD is advanced simultaneously within the oral cavity until the needle penetrates the abscess (Fig 1). For an individual with a smaller oral cavity or severe trismus, a 4- or 6-inch 18-gauge spinal needle with the stylet removed is used; the RPD remains completely outside of the oral cavity. Once the mucosal surface is

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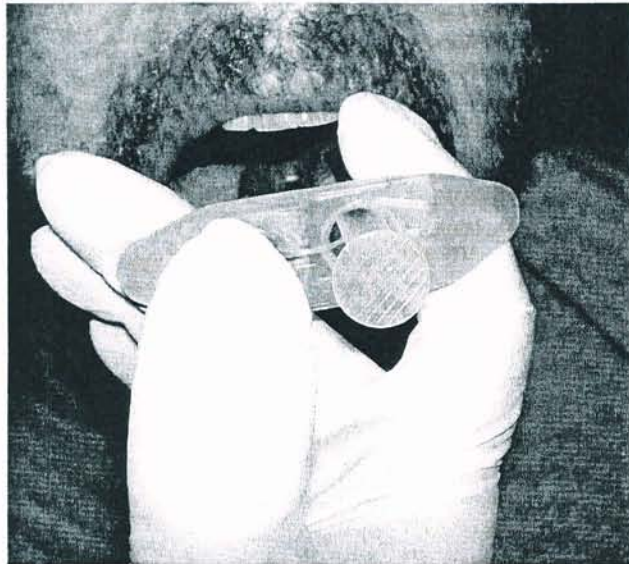


Figure 2 Aspiration with the reciprocating procedure device (RPD). The RPD aspirates pus when the thumb is placed on the smaller aspiration plunger.

penetrated, the aspiration plunger is depressed, providing controlled vacuum for aspiration without movement of the needle tip (Fig 2). After the RPD fills with pus, the aspiration plunger is released prior to extracting the needle from the mucosal surface to prevent aspiration of air into the syringe, which could interfere with the culture of fastidious anaerobic organisms.

DISCUSSION

Needle aspiration remains a crucial diagnostic and therapeutic tool for peritonsillar abscess.^{1,2} Although generally a safe procedure, aspiration of a peritonsillar abscess can result in patient pain, puncture of the carotid artery, hemorrhage, hematoma formation, aneurysm or pseudoaneurysm formation, respiratory compromise, and massive aspiration of blood and pus into the lungs. Thus, control of the syringe and needle tip by the operating physician is crucial. However, during aspiration with a syringe, a skilled physician may unintentionally advance the needle tip as much as 1.2 cm if using two hands and as much as 2.0 cm if using one hand; this lack of control is clearly an undesirable characteristic of the conventional syringe.^{3,4}

The RPD, also known as the reciprocating syringe, is formed around the core of a traditional syringe barrel and plunger, but has an extra plunger and barrel (Figs 1 and 2).³⁻⁵ The two plungers are mechanically linked in an opposing fashion by a pulley system, resulting in a set of reciprocating plungers. Thus, when the aspiration plunger is depressed with the thumb, the RPD aspirates; when the injection plunger is depressed with the thumb, the RPD injects. The characteristics of stable finger positioning, one-handed op-

eration, exclusive use of the flexor musculature, enhanced finger flanges with better hand grip, shock-absorbing qualities of the reciprocating mechanism, and absence of device lengthening permit enhanced needle control and safer, more accurate aspiration procedures.³⁻⁵

The RPD has been demonstrated to decrease the complications of syringe and needle procedures, including hemorrhage, by 35 to 60 percent.³⁻⁵ Because of its enhanced safety, reduced pain, and the ability of physicians to aspirate and inject with one hand, the RPD is also used for nerve blocks, administration of local anesthesia, fine-needle aspiration (FNA) biopsy, injection of corticosteroids, cyst aspiration, joint procedures, and injection of cosmetic pharmaceuticals including botulinum toxin and hyaluronate.³⁻⁵ As of 2008, the RPD costs \$1.50/device (US\$); thus, the RPD is used as only a safety device for physician-performed syringe and needle procedures, not for nursing and pharmacy uses. Because the RPD is safer, better controlled, and reduces the complications of needle procedures, the RPD should be considered for head and neck syringe procedures that require precise needle control, including FNA biopsy of head and neck tumors, local and regional anesthesia, injection of cosmetic pharmaceuticals, and aspiration of peritonsillar abscess.

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Wilmer L. Sibbitt Jr, study design, primary author, references; **Randy R. Sibbitt**, study design, techniques, secondary author; **Dennis J. Palmer**, study design, techniques, secondary author; **Arthur D. Bankhurst**, secondary author, research.

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Wilmer L. Sibbitt Jr owns stock in AVANCA Medical Devices, manufacturer of RPD technology.

REFERENCES

1. Johnson RF, Stewart MG. The contemporary approach to diagnosis and management of peritonsillar abscess. *Curr Opin Otolaryngol Head Neck Surg* 2005;13:157–60.

2. Bauer PW, Lieu JEC, Suskind DL, et al. The safety of conscious sedation in peritonsillar abscess drainage. *Arch Otolaryngol Head Neck Surg* 2001;127:1477-80.
3. Sibbitt WL Jr, Sibbitt RR, Michael AA, et al. Physician control of needle and syringe during traditional aspiration-injection procedures with the new reciprocating syringe. *J Rheumatol* 2006;33:771-8.
4. Sibbitt RR, Sibbitt WL Jr, Nunez SE, et al. Control and performance characteristics of eight different suction biopsy devices. *J Vasc Interv Radiol* 2006;17:1657-69.
5. Moorjani GR, Michael AA, Peisjovich A, et al. Patient pain and tissue trauma during syringe procedures: a randomized controlled trial. *J Rheum*. 2008 Apr 15; [Epub].