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41 Gauge Transvitreal Fine-Needle Aspiration Biopsy for Intraocular Tumors Without Vitrectomy

To the Editor:

Several different techniques of transvitreal biopsy have been described in the literature using 23–27 gauge (G) needles.[1–3] Variable rates of post-procedural complications, such as localized vitreous hemorrhage (24.0%−74.1%), retinal tear, retinal detachment, endophthalmitis (0.0%−1.0%), and choroidal detachment (0%−3.6%) occurred.[1–3] Nanovitreoretinal (NVR) subretinal gateway device (Vortex Surgical) comprises a 28 G external (Fig. 1A) and a 41 G internal needle (Fig. 1B), originally designed for subretinal injections.[4] We describe a fine-needle aspiration biopsy (FNAB) technique using the NVR gateway device and viscous fluid control (VFC) extraction mode of the Constellation device (Alcon).

Initially, the NVR device is mounted on the 10 mL syringe of the VFC Pak. The syringe is connected to the syringe adaptor, and the extraction vacuum level is set at 200 mm Hg on the Constellation screen, which can be adjusted up to 650 mm Hg as needed. One or two 25 G valved/nonvalved cannulas are inserted into the pars plana (Fig. 1C). A standard operating microscope and the BIOM-5 fundus viewing system (Oculus Surgical) are used for visualization. An endoilluminator or chandelier lighting is inserted through one cannula and the NVR device through another cannula (Fig. 1D). After locating the NVR device near the biopsy site (Fig. 1E), the internal 41 G needle is extended by slide-action control on the hand-piece (Fig. 1F). After guiding the needle into the subretinal area of the tumor, aspiration of specimens is performed by the VFC extraction mode of the Constellation system, controlled steadily by a foot pedal. Gentle back-and-forth movement of the needle may allow higher cellular yield (Fig. 1G, H).[2] Care must be taken during this maneuver as unwanted transverse movements may enlarge the retinotomy size. Double check was done to ensure that cells were aspirated beyond the needle tip and located within the cannula of the needle, as clogged specimens at the needle tip may be lost when exiting the eye. Care must be taken as loss of specimen may result in vitreous seeding. After adequate aspiration, the aspirated specimen is retrieved into a vial containing Hank balanced salt solution and expelled using the VFC injection mode (Fig. 1I, J). The specimens are sent for cytologic analysis (Fig. 1K). Cytogenic analysis was performed when technically possible. Treatment of malignant melanoma was performed after the biopsy was performed in the same setting. For small tumors, plaque brachytherapy was performed. For very large tumors, debulking endoresection or partial lamellar sclerouvectomy were performed for removal of the tumor with adjunctive plaque brachytherapy. The successful yield of cytologic samples of uveal melanoma in 2 patients and biopsy videos are presented in the Supplementary Digital Content Video (http://links.lww.com/APJO/A239).

In this report, we presented a novel biopsy technique for cytologic diagnosis that combines the use of the NVR device and the Constellation system under BIOM-5 visualization. This is the first report of positive cytologic yield in malignant choroidal melanoma obtained using the 41 G needle, demonstrating its safety and feasibility for FNAB of intraocular tumors. The 41 G FNAB has the following advantages over conventional biopsy techniques: (1) It does not require vitrectomy, minimizing time, costs, and burden on both patients and physicians. (2) Needle of 41 G creates a self-sealing retinotomy site,[4] minimalizing surgical complications such as hemorrhage and retinal detachment. (3) Aspiration using the VFC mode with foot pedal aspirates tumor cells in a controlled manner. (4) The transparency of the needle track allows visualization of tumor cells traveling into the needle, facilitating the surgeon's decision on when to stop. (5) Using BIOM-5 for visualization, tumors located anterior to the equator may also be biopsied.

In conclusion, 41 G transvitreal FNAB, a minimally invasive biopsy procedure prone to fewer complications, may open new horizons in the early detection of intraocular malignancy. Further studies are warranted for smaller flat tumors, where this technique could be most advantageous.

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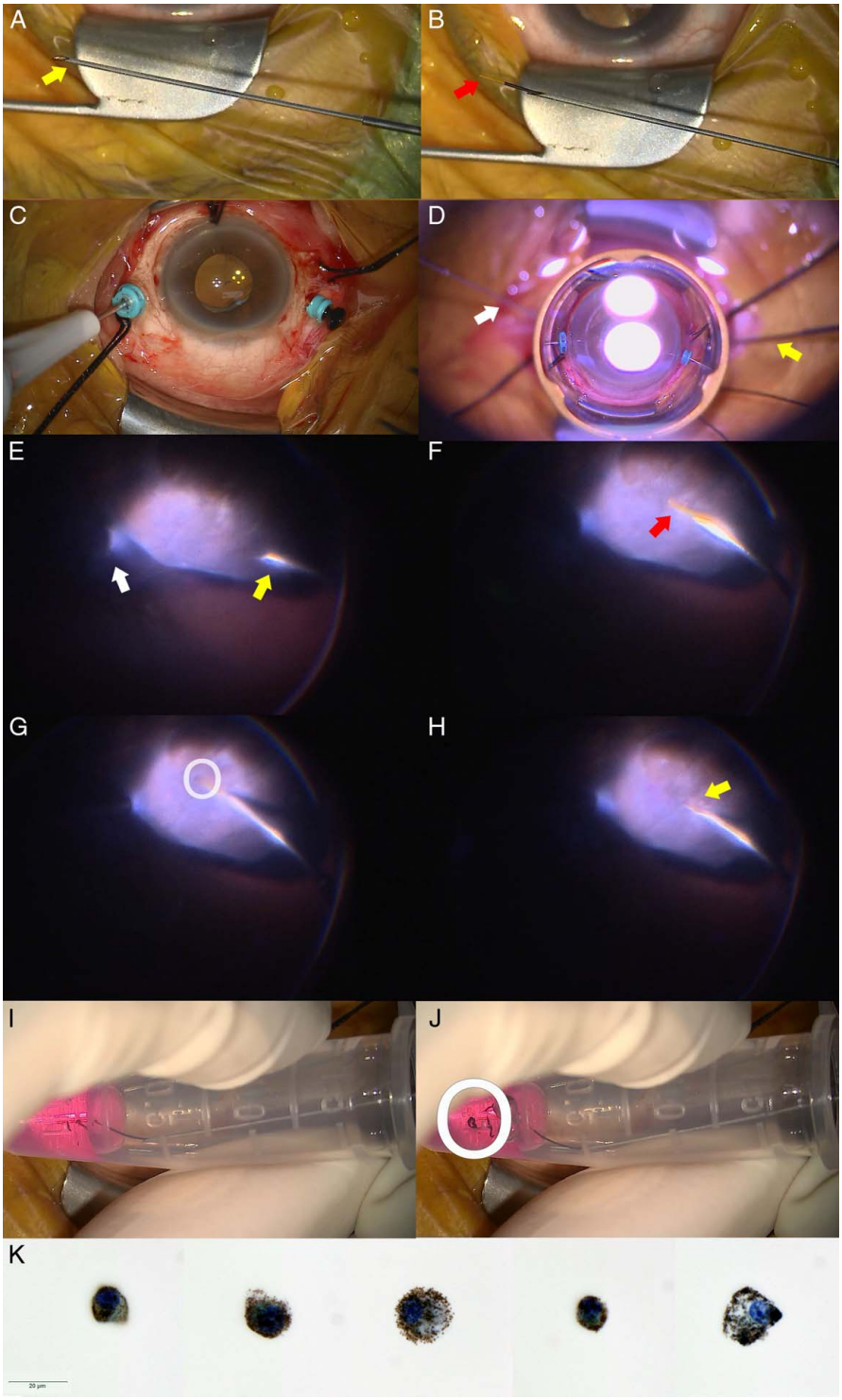

FIGURE 1. Surgical technique for 41-gauge transvitreal fine-needle aspiration biopsy for intraocular tumors.

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