Biopsy of vertebral and paravertebral structures with a new coaxial needle system.

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Biopsy of Vertebral and Paravertebral Structures with a New Coaxial Needle System

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Summary: The authors describe a coaxial needle system for use in percutaneous CT-guided biopsy, citing it as safer and less dependent on operator experience than the tandem needle technique.

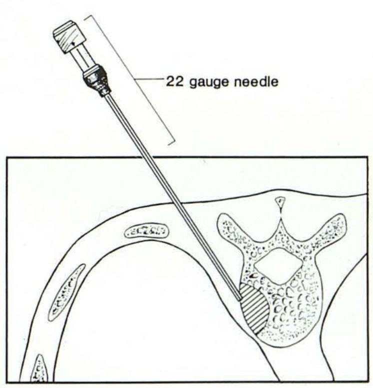
Index terms: Biopsies, instrumentation; Biopsies, CT guidance

The merits of computed tomography (CT) guided percutaneous needle biopsy of lesions throughout the body have been well documented in the recent literature (1–4). Radiologists have employed this technique for sampling lesions involving the vertebral body and adjacent soft-tissues (5–7). This report describes a coaxial needle system (CoANS) which has several advantages over the tandem needle technique (TNT) widely used today for percutaneous CT-guided biopsy of the paravertebral and vertebral body structures (5, 7).

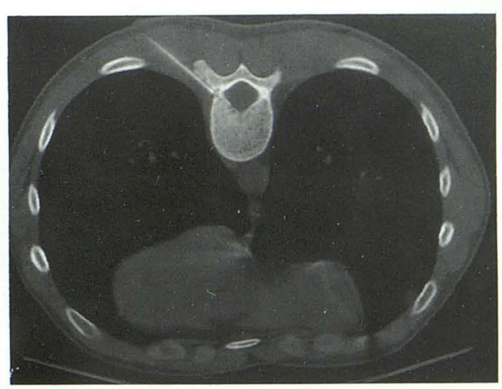
Description of Technique

The CoANS (Cook Inc., (Code #DHWK-100-CD5799), Bloomington, IN, and Manan Medical Products, Northbrook, IL) consists of a 22-gauge needle with a removable hub and an inner stylet, a longer hubless stylet, and a 16-gauge bone biopsy needle.

Under CT guidance, the thin needle is positioned in the lesion or placed along the outer cortical margin of the vertebral body for which a biopsy is to be done (Fig. 1). The depth of penetration of this needle is predetermined by measurements achieved from CT at the level of interest. The soft-tissue and periosteum of the bone are infiltrated with local anesthesia. Once optimal placement of the thin needle has been achieved, the stylet and hub are removed. The longer hubless stylet is then threaded into the cannula of the 22-gauge needle, providing greater stiffness of the unit to prevent kinking or displacement of the skinny needle during coaxial placement of the larger biopsy needle (Fig. 2). The biopsy needle is then advanced coaxially over



A



B

Fig. 1. *A*, Placement of the 22-gauge thin needle at the cortical margin of the vertebral body biopsy site.
B, CT scan demonstrates thin needle placement at the cortical margin of the vertebral body to be biopsied.

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the thinner needle, following the track that the smaller needle has traversed (Fig. 3). When the biopsy needle has reached the desired depth, the 22-gauge needle is removed. An aspirate and/or core biopsy of the target lesion is then obtained through the 16-gauge biopsy needle (Fig. 4). The biopsy needle tip is designed to cut through bone. Clockwise rotation with simultaneous downward pressure produces a core sample of tissue. An aspirate is obtained by attaching a syringe to the hub of the needle.

Results

We have used the coaxial needle technique in 33 cases involving lesions in the cervical, thoracic, and lumbar spine regions. There have been no complications. An adequate amount of tissue for cytologic determination was obtained in all 33 cases, and, in the majority of cases, the sample volume was suitable for cell block preparation. In no instance was a second biopsy necessary to retrieve additional tissue. We have not had to use a needle larger than the 16-gauge needle included in this system to acquire an adequate tissue core. Pathologic and microbiologic results revealed nine normal tissue specimens, 15 cases positive for neoplasm, and nine samples positive for osteomyelitis/diskitis.

Discussion

Although the TNT has been successful in acquiring tissue biopsies using CT guidance, we believe the coaxial system is safer, less dependent

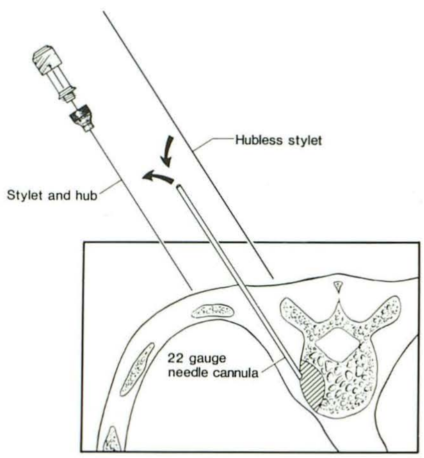


Fig. 2. The stylet and hub of the cannula are removed. The hubless stylet is threaded into the cannula.

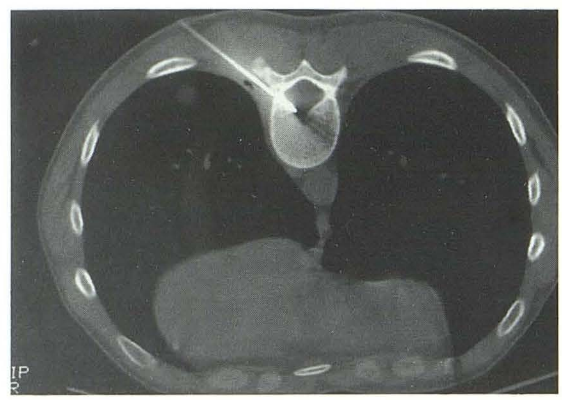
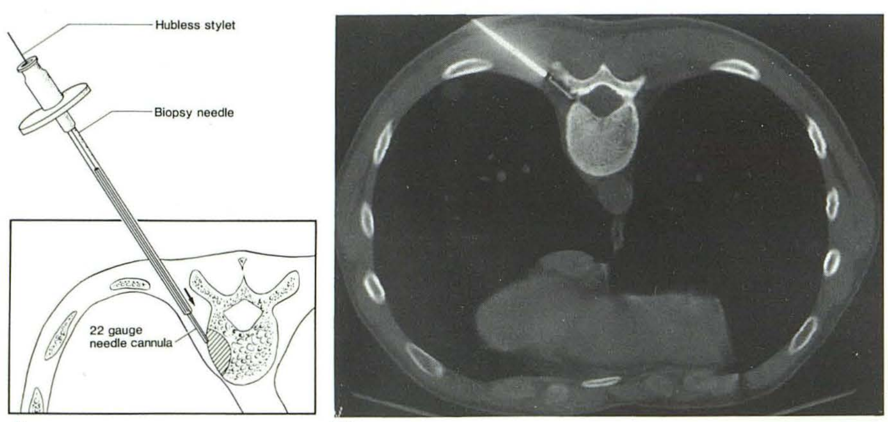


Fig. 4. CT scan reveals the biopsy needle advanced into the vertebral body. A core sample of the bone is then obtained.



A B

Fig. 3. *A*, The biopsy needle is coaxially advanced over the thinner needle until the tip of the biopsy needle reaches the cortical margin of the vertebral body.

B, CT scan reveals biopsy needle traversing the 22-gauge needle so that it follows the same path previously formed by the thinner needle.

upon operator experience, and allows more precise placement and sampling.

Greater safety of the CoANS is demonstrated by the fact that the large bone-cutting biopsy needle, by passing coaxially over the 22-gauge needle, advances along the exact tract previously determined to be safe by the thinner needle. With the TNT, on the other hand, the biopsy needle forms a separate track parallel to, but distant from, the skinny needle. Therefore, damage to previously undetected small structures, such as peripheral nerves and vessels lying several millimeters from the thin needle, is more likely.

The CoANS is also a more precise method for needle placement because the anesthesia needle acts as a mechanical guide for the coaxially placed biopsy needle. This is in contrast to the TNT, where the anesthesia needle acts as an optical guide for proper alignment of the biopsy needle. The free-handed TNT is usually successful but limited in that it is highly dependent upon operator experience and an intangible "feel" for the proper alignment of biopsy needle during its advancement. There is no mechanical attachment between the two needles, and thus, deviation of the biopsy needle, relative to the track of the anesthesia needle, is more likely. With the CoANS, the tip of the biopsy needle can lie at the same point as the anesthesia needle, or, if necessary, the tip of the biopsy needle can be advanced beyond this point into the desired depth in the tissue for which a biopsy is to be done.

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