

State of the Art in Tissue Diagnosis of Cancer using small biopsies in Dhaka City

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Cancer is a leading cause of morbidity and mortality worldwide, and Dhaka, the capital of Bangladesh, is no exception. The integration of advanced diagnostic modalities, especially imaging techniques, has opened new horizons in the diagnosis of malignancies. However, histopathology has remained the cornerstone of cancer diagnosis over the centuries. Until recently, Dhaka faced significant challenges in obtaining reliable diagnosis for deep-seated and inaccessible lesions of the body. The recent introduction of image-guided needle core biopsy has been a paradigm shift in cancer diagnosis in the city.

This article explores the current state of tissue diagnosis services, particularly the use of image-guided core biopsy samples in Dhaka City, highlighting the challenges and opportunities for improvement.

Historical Context and Current Practices: Just a few years ago, limited imaging techniques, high radiation exposure, lack of real-time guidance, and the unavailability of appropriate techniques made diagnosing suspected lesions difficult. Physicians in Dhaka City had to rely heavily on invasive procedures. The advent of image-guided fine-needle aspiration cytology (FNAC) allowed physicians to begin unraveling the mysteries of many deep-seated and inaccessible small lesions. However, FNAC has several limitations as a diagnostic tool. In many anatomical sites, such as the breast, liver, kidney, and mesenchymal tissue, FNAC has been replaced by core biopsy in developed countries. Additionally, in other sites like the thyroid and salivary gland, core biopsy is the preferred method.

Needle core biopsy enhances the histopathologist's ability to provide a confident diagnosis by obtaining larger tissue samples and studying tissue architecture in detail. Needle core biopsy is now the accepted preferred method over FNAC for several reasons, including higher diagnostic accuracy, reduced uncertainty, lower rates of inadequate samples, and the ability to provide additional information beyond a simple identification of malignancy, such as distinguishing invasive from in situ carcinoma, type, subtype and grading. The tiny tissue samples embedded in paraffin blocks are expected to provide enough material for diagnosis as well as for immunohistochemistry, molecular studies, and the study of prognostic and predictive markers. One biopsy procedure shows how to “do more with less” contributing to cost containment.

Advancements in Imaging and Diagnostic Techniques: Revolutionary imaging techniques have made body lesions more evident. PET scans can detect hidden lesions deep within the body. Skilled radiologists in Dhaka City are now able to obtain samples from deep and risky anatomical sites. Histopathologists in the city are reorienting their focus on the histomorphology of small tissue samples. An anxious patient with a breast lump in Dhaka can now get an answer in less than 24 hours.

Challenges in Tissue Diagnosis: The small size of core needle biopsy samples poses significant challenges for histopathologists in meeting diagnostic demands. They must re-learn histomorphology on small tissue samples and be aware of what is missing from the slide, as a significant portion of the tissue remains in the body. The tumour is often heterogeneous, and tissue

samples are usually only a portion of a complex lesion. It may be inadequate for various reasons. Sometimes, the sample may not be representative or may come from normal tissue adjacent to the lesion. To alleviate these uncertainties, immunohistochemistry has emerged, making diagnosis easier. New immunomarkers are continually being added to the diagnostic toolkit. Immunohistochemistry revolutionizes diagnostic histopathology practices and provides prognostic and predictive information.

Barriers to Advanced Diagnostic Practices: The lack of standardized academic medical institutions is a significant barrier to integrating advanced technologies and ensuring continuous professional development in Bangladesh. Like other healthcare sectors in the country, histopathology suffers from inadequate resources and neglect. Public medical institutes struggle with poor infrastructure and faculty shortages, which hinder their ability to focus on subspecialties and establish quality training programs to develop histopathology skills. The quality of tissue processing in most histopathology labs in Dhaka is subpar. The major share of histopathology services in Bangladesh are provided by a few private laboratories. They are operated without institutional structure and are often dependent on a single pathologist. These labs have a monopoly in the market which hinders the healthy growth of histopathology of the country. These labs show reluctance to introduce immunohistochemistry and so lack extensive experience in immunohistochemistry.

There is a severe shortage of skilled radiologists to collect image-guided tissue samples. Those who do practice face high stress levels and procedural risks. Advanced diagnostic technologies are typically only available in urban centers like Dhaka, leaving rural areas underserved. The cost of image-guided sample collection needs to be affordable for the poor population of Bangladesh to ensure equitable access to cancer diagnosis and treatment. Additionally, endoscopic ultrasound-guided (EUS) needle core tissue biopsy remains unavailable to patients in Bangladesh.

In the End: Accurate and early tissue diagnosis is the cornerstone of effective cancer care, guiding treatment decisions and improving patient outcomes. Dhaka is now better equipped to resolve the mystery of a lesion in the body without invasive surgery, enabling patients to begin treatment at home or abroad with confidence. The integration of immunohistochemistry with small core biopsy specimens enhances diagnostic accuracy, providing critical insights into prognostic and predictive markers. Despite these advancements, challenges persist in ensuring accessibility, affordability, and quality of cancer care. Ongoing efforts to expand services, enhance training, and promote research are vital for further advancing cancer diagnosis and care in Dhaka.