Global Perspectives: The Quest for Knowledge in Cytopathology
Cytopathology Section at Alnilain Center for Medical Diagnosis, Omdurman, Sudan

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Overview

Cytopathology practice in Sudan is comparable to that of the US and other developed countries in the 1960s to 1970s; however, attempts are being made to correct and improve the situation. The primary barriers to advancement of cytology have been lack of effective links between the pathologists and cytologists (BSc Clinical Laboratory Science graduates), and limited physician awareness about the value of cytology in clinical practice, especially in areas with limited resources. There is no national cervical cancer screening program in Sudan to date, however many efforts have been made by interested individuals including pathologists, cytologists and gynecologist to provide GYN cytology services. Although GYN screening work is limited, fine needle aspiration procedures are not infrequently performed in Sudan, though traditionally training in this area has only been available to pathologists. Still, many bright prospects to provide more training and opportunities to cytotechnologists are on the horizon following recent approval of Clinical Laboratory Scientists specialist training, including in the fields of Histotechnology and Cytotechnology, by the Sudan Ministry of Health CPD Section. Also now there are some twenty cytology services in Sudan, including those located at Khartoum (the capital of Sudan), and others in the regional states.

About our Laboratory

The cytology section at Alnilain Center for medical diagnosis was established in 2003 where initially only fluids and some FNA cytology samples were received and later gynecologic cytology and FNA services were included. It is a private facility and the cytology section receives a considerable number of gynecologic cytology samples from different hospitals and health centers in the Omdurman area. The cytology section is a part of the general clinical laboratory at Alnilain Center. The center is just located at the downtown of Omdurman, the oldest capital city in Sudan. The cytology section serves the surrounding facilities including Omdurman Teaching Hospital (the largest governmental hospital in Omdurman), Tropical Disease Hospital, and several private facilities. The section is established by myself and operated by one clinical cytologist (Consultant Biomedical Scientist/Cytologist), one pathologist, and two trainee cytologists supported by two assistants. The center is fully supported with radiology, clinical and nursing practitioners. There is a great opportunity for multidisciplinary discussions and case management as all sections in the center work in harmony.

Ratio of Gynecologic Samples and Non-GYN samples

The center receives about 700 gynecologic samples and 900 non-gynecologic samples, which include predominantly urine, body fluids, various respiratory samples, and FNA. The ratio of gynecologic cytology to non-gynecologic cytology samples is 44% to 56% respectively. Breast samples are the most frequent FNA sample, followed by thyroid, head and neck and other sites. The number of all cytology samples is continuously increasing with corresponding positive feedback from surgeons and treating physicians received through our audit system.

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Gynecologic Specimens

Sudan is an evolving country; however with regard to local facilities, most of the samples received are conventional samples. During the last eight years we relied entirely on conventional smears, and we have successfully monitored a variety of gynecological pathologies especially infectious agents including HPV (morphologically) as well as premalignant and cervicovaginal carcinomas. Most recently, we implemented LBC service and our center was the first among others in Sudan to introduce a LBC facility using LiquiPrep™ (LP), which was provided by LGM International Inc., in Florida. The LBC method was cost-effective, simple and accurate and requires only basic training needs comparable to conventional smears. At the current time, we have constructed training in LP and six cytologists were enrolled through our collaborative work with training centers that provide training in cytology. We look forward to seeing the outcome of LBC at wider utilization in the community. Interestingly, this method has gained acceptance by our colleagues’ gynecologists and cytologists, and it could gain more acceptance in the near future based on our statistics. We currently screen both conventional smears and LBC because the choice of method depends on the interest and experience of gynecologists. We have audited our LBC samples results from the perspective of morphologic appearance, cost effectiveness and reproducibility; we have found that the result is similar to that of conventional smears. We have found the training of cytologists in screening LBC using LiquiPrep™ technology to be straightforward, and have been able to use essentially the same methods developed for conventional smear training.

HPV Testing

For HPV testing, our center relies on morphological interpretation of HPV; therefore at the current time we have found that morphological interpretation is quite sufficient to direct the gynecologist towards proper patient management. We can proudly declare that HPV testing by molecular means in Sudan is on the horizon, and many research projects run towards utilization of HPV testing in the

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near future in Sudan; however, a lack of training facilities, short budgets and the low economic status of our patients represent significant barriers to implementation of HPV testing. Our center is open to researchers for this purpose and we look forward to HPV testing results based on local statistics.

**Laboratory's Abnormal Rate**

With regard to our laboratory abnormal rates, and based on our recent six years retrospective findings from our center (this data was presented during ASC 56th Annual Scientific Meeting in Florida), and from another center, the Fath E. Rahman Bashir Center, we have estimated that the cervical cancer rates were 3% of the screened population at our center and 4% at the center of our colleagues. HPV evidence by morphological screening was present in 20% of our screened population. These figures indicate that cervical cancer and HPV prevalence in developing countries may be even higher than what might be expected; generally patients presented with advanced disease based on the Radio and Isotopes Cancer Center of Khartoum, the largest oncology center in Sudan.2

**Signing out Negative and Abnormal GYN Specimens**

For signing out the negative GYN specimens, the number of qualified cytologists (CTs) is quite low and always it is the pathologist responsibility; however the training of pathologists in GYN Cytology in Sudan is questionable and needs further assessment. The problem is that there is no national cervical cancer screening program in Sudan and only five laboratories, including ours, provide GYN cytology service. As a result, the GYN cytology service does not receive attention from the government or medical community and is based only on gynecologist and pathologist interest. Although some cytologists sign out negative GYN specimens, in most instances it is the responsibility of the pathologists to decide and to sign out all cytology results. It is also important to mention that the authority to run cytology services in Sudan is a privilege of the pathologists only and there is no established mechanism for the cytologists to be licensed for providing cytology services alone.

**Screening Patterns in the Cytology Laboratory**

There are no well-organized screening systems in our laboratory or other facilities. The cytologist’s responsibilities in many cases are limited to specimen preparation and staining only, although some pathologists do recognize a screening role for cytotechnologists in GYN cytology and non-GYN cytology as well.

**Pathologist’s Responsibilities**

A pathologist’s responsibilities include patient examination, performing FNAs and interpreting results. There is no well-organized training system such as fellowship training programs in the US, but there are higher educational programs such as a clinical pathology doctorate program, which was established by the Sudan Medical Specialties Council and the Faculty of Medicine at the University of Khartoum. Other training centers such as the National Health Laboratory and some teaching hospitals provide cytology training for pathologists. All pathologists rely on training facilities outside Sudan, mainly in the UK and some European and Asian countries. This training format is conducted in the form of short training courses and workshops.

**Cytologists (CTs) Training**

Cytologists training is the most critical issue in this country and internationally. This issue was best illustrated by a survey of medical training in cytopathology carried out by the journal, *Cytopathology* and published this year by the same journal.3 Interestingly, the education level of cytologists in Sudan is fairly high with many possessing a BSc in Clinical Laboratory Science (approx. 600), with some

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The Medical Laboratory Union in Sudan is actively involved in expanding the role of clinical laboratory scientists and cytologists in the pathology industry.

having even more education including a MSc (about 40) and a few with PhDs. The bulk of the MSc and PhD holders work in educational institutions. Unfortunately, they often do not receive proper professional training in cytology, despite having the necessary prerequisite knowledge, and therefore are usually not actively involved in diagnostic cytology services. The level of CT participation in FNA is limited to assisting in aspiration, contribution to FNA in performing on site evaluation and sometimes basic interpretative responsibilities.

The minimum training requirements for cytologist are BSc in CLS/Histopathology & Cytology, two years cytology practice training and passing the license exam offered by the Ministry of Health, or equal professional experience as evaluated by the Ministry of Health medical laboratory section to offer license in general medical laboratory practice. Training requirements include screening skills, basic cytomorphology, molecular diagnostics training and interpretative skills in non-GYN cytology. The bright side of the picture is a marked increase in the number of qualified cytologists as well as their interest in pursuing future careers in cytology. As expanding roles of cytologists in medical services has gained international support, the Medical Laboratory Union in Sudan, which is the regulatory body for clinical laboratory scientists, is actively involved in expanding the role of clinical laboratory scientists and cytologists in the pathology industry.

It has recently been proposed to upgrade technologists to specialists, which would mean upgrading of clinical laboratory scientists to independent professionals equal to physicians. As a result, the Allied Health Professions Council has been renamed the Council of Medical and Health Professions. Finally, specialist training was approved for clinical laboratory scientists through CPD/CME of the Sudan's Ministry of Health CPD/CME Center; therefore, the portfolio for training cytologists was approved and implementation of training has begun. I was actively involved in this matter; however training requirements were elucidated as the CLSs are regulated by the Sudanese Clinical Laboratory...
Professional Union and career plan for CLSs was highlighted. Currently, I serve as the head of the Professional and Academic Development Committee to this union. The professional academy for CLSs was proposed; however, this issue is awaiting the approval of the newly proposed Sudanese Council for Medical and Health Profession. These attempts seem to be promising and much hard work is needed to improve current training needs in cytopathology.

As a part of personal commitment, we have linked our cytology laboratory with the Sudanese Centre for Training in Biotechnology, clinical laboratory cytology section for providing training in cytology. The first batch six CLSs/Cytologists (CTs) for the US are currently enrolled in the first GYN cytology training course in Sudan. This course was designed in collaboration with Mr. Allen C. Rinas, Director of the Cytotechnology Program at the University of North Carolina at Chapel Hill as an independent consultant. Other efforts of Dr. David Kaminsky through Africa Calls teleconferences have provided the Sudanese with updated information in cytology and encouraged cytologists to enroll in CME in cytology.

Cytologist Responsibilities

Cytologist responsibilities depend on the willingness of the pathologist and the availability of qualified cytologists, as well as the pathologist’s view and awareness of the role of CT contribution in cytology result sign out.

Sometimes CTs may sign out negative non-GYN cases. As for the situation in our center, we have developed a specific format for reporting in that the clinical interpretation and patient examination are performed by the pathologist and microscopic interpretation is done by a well-trained cytologist; the final result is signed by both the pathologist and the cytologist. Following this procedure, our reporting format outcome was excellent; as result of this work, our center has gained excellent recognition among surgeons, physicians and gynecologists. We have reached overall diagnostic accuracy approaching 100%, and false positive and negative rates closer to zero and less that 1%. We have highlighted the validity of this approach in that the combination of CT interpretative skills and pathologist’s clinical background will provide the best of what is expected from cytology practice. This will also supports the expanding roles of CTs as highlighted recently by conjoint efforts of RCPath and IBMS (UK) in cytology practice and the ASC Taskforce for expanding the roles of CTs within the medical team.

Reporting and Database System

All results are reported by computer in our laboratory, and access to the previous history of patients in some laboratories is done through hard copy documentation. However our laboratory supports “Going Green Issue in the Cytology Laboratory;” therefore, we keep all cytology records in a computer including patient’s demographic data. In most instances and due to shortages in internet coverage and network system facilities, all results are provided as a hard copy. Currently we are modifying our result system, and we plan to provide all results in electronic formal whether through email or soft copy dissemination.

Ancillary Techniques

We perform many special stains, including special stains for infectious agents and other microorganisms and for glycogen, mucin, melanin. The cytology results are correlated and discussed with other departments when necessary. All these stains are performed in the cytology laboratory and interpreted by cytologists. CT qualifications are quite reasonable to provide the cytologist with knowledge essential to interpret special and cytochemical and immunocytochemical staining results. Immunocytochemical techniques are not performed in our laboratory, although these techniques are

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available limitedly for a wider utilization by the cytology laboratories in Sudan; however markers for breast cancers are available including Her/Neu. Our laboratory has communicated with other laboratories to provide immunocytochemistry service.

**Preparation of Cytology Specimens**

All cytopreparatory tasks are performed by the cytologist. The cytologists are well trained in all aspects of cytopreparatory procedures except molecular diagnostics techniques.

**GYN Cases Review**

As repeatedly mentioned, Sudan is severely lacking a national cervical cancer screening program. In our laboratory and from the available data we do not review previous negative cases. We just review our cases for three years back as our data is so scant compared to international experiences; this review is solely done as a QA matter.

**Challenges Face Our Cytopathology Laboratory**

The main challenge facing our cytopathology laboratory is the availability of well trained cytologists and pathologists, attributed to lack of training in cytology in the country. Others challenges include implementation of LBC; this will help us and other cytology laboratories receive adequate and satisfactory samples. Implementation of immunocytochemistry and molecular diagnostics services in the cytopathology laboratory is our near future goal. Planning of fellowship training for CTs and pathologists is also a great challenge and needs capital support.

Recognition of cytologists (CTs) role in cytology practice remains the main issue for improving cytology practice in Sudan. In my view, adoption of a national cervical cancer screening program in Sudan is the most important commitment to help our patients in Sudan. It might need global attention, as illustrated by the efforts of Dr. David Kaminsky and Mr. Allen C. Rinas, to enhance cytology practice in Sudan, and we owe all the best of our thanks them.

2. Radio and Isotopes Cancer Center of Khartoum, Sudan Cancer Statistics, 2010
3. Anshu et al. Survey of medical training in cytopathology carried out by the journal Cytopathology 2010, 21, 147–156.

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