EDUCATIONAL FORUM

Future of Breast Ultrasound in Obstetrics and Gynecology

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With the advances in imaging technology, resolution and identification of images have improved. Breast ultrasound as a screening tool for breast cancer is a very popular topic. A few years ago, the Health Promotion Administration of the Ministry of Health and Welfare attempted to integrate related specialties countrywide, including obstetrics and gynecology, family medicine, radiology, and breast surgery, to formulate common criteria for developing an ultrasound-based breast cancer screening guideline suitable for women in Taiwan.

Since 2003, the Taiwan Association of Obstetrics and Gynecology has been offering breast ultrasound examination technique training to medical specialists. Headed by Professor Fon-Jou Hsieh, the instructors’ training classes were established, and the first training was complete for the charter group of approximately 20 obstetrician—gynecologists in breast ultrasound examination. With the strong support of two breast surgeons, Professors King-Jen Chang and Ming-Feng Hou, and locations chosen by the Taiwan Society of Ultrasound in Medicine for practical ultrasound field training, we were able to become familiar with performing breast ultrasound examinations within a very short time. The author was the class leader of the training class, and was responsible for the smooth implementation of the program and arrangement of subsequent ultrasound field trainings.

In 2008—2009, the Taiwan Association of Obstetrics and Gynecology completed the two-level “basic” and “advanced” training classes for breast ultrasound examinations in the northern, central, and southern regions of Taiwan, under the leadership of three presidents (Drs Maw-Sheng Lee, Yu-Shih Yang, and Horng-Der Tsai), with assistance from the specialists of the Breast Cancer Society of Taiwan and the Taiwan Society of Ultrasound in Medicine. At the time, a total of approximately 500 members completed the compulsory course in the breast ultrasound examination technique and passed the final test, thus enabling obstetrician—gynecologists to participate in breast ultrasound examinations for breast cancer screening within a very short time.

However, the promotion of breast ultrasound as a first-line screening tool for comprehensive breast cancer screening in Taiwan has encountered some difficulties. The reasons are complicated and cannot be explained in brief. Nevertheless, some of the reasons are described herein.

(1) Massive funding requirement: Using breast ultrasound as the only tool for breast cancer screening resulted in a detection rate of 7.6 breast cancer cases per 1000 persons in a high-risk female population with 50% sensitivity, as reported by Berg et al (2008) [1] in JAMA. In the report, the ultrasound and mammography detection rates and sensitivities were similar. In recent years, newly diagnosed breast cancer cases exceeded 7000 persons per year. If the breast ultrasound detection rate is 3—4/1000 in women at average risks, approximately 2 million women should be screened every year. If the cost of screening is NT$700 per person, the Health Promotion Administration must allocate NT$1.4 billion per year. Even if there is sufficient funding, the available funds will be exhausted soon, which the Legislative Yuan will not accept.

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Lack of manpower: Although the Breast Cancer Society of Taiwan has approximately 600 members, including clinical surgeons, only a small proportion participates in practical breast ultrasound examinations. Among family physicians, radiologists (most of whom are members of the Breast Cancer Society of Taiwan), and gynecologists, only 200–300 physicians are able to perform routine breast ultrasound examinations. Thus, every physician will screen 10,000 cases per year. However, performing screening examinations, in addition to their regular jobs, places an additional load on the medical personnel, and they may not be able to cope with it. Moreover, hospitals do not have extra space for such a large program.

Pre-existing limitations of breast ultrasound: Based on the present imaging ability, nonpalpable breast tumors and early ductal carcinoma in situ (DCIS) are the most troublesome shortcomings of breast ultrasound for breast cancer screening. Only mammography screening meets this requirement. Yang (2004) reported in AJR that ultrasound detected 90% (54/60) of DCIS cases, which is impressive. According to Dr Chen, the Immediate Past President of the Taiwan Society of Ultrasound in Medicine, general practitioners will have difficulties detecting 100% of DCIS cases using ultrasound. Shin (2008) reported in AJR that ultrasound detected 89% (95/106) of DCIS cases in a high-risk population, 74% of which were mass lesions. For the ultrasound characteristics and examination principles of these two types of lesions, we should consult the Chairman, Dr Chen. If the Taiwan Society of Ultrasound in Medicine has arranged any lectures, please attend as many as possible. In 2004, the Health Promotion Administration commissioned a 5-year plan. Professor Chiu-Sheng Huang of the National Taiwan University Hospital was the principle investigator. The 5-year plan was a randomized trial combining samples from several medical centers and regional hospitals in Taiwan to screen women aged between 40 years and 49 years, and showed that mammography was the first-line screening tool, with a screening sensitivity of 90.6%; DCIS accounted for 32.5% of the cases. When breast ultrasound was used as the first-line screening tool, the screening sensitivity was 60.1%, of which the majority was mass lesions, and DCIS accounted for only 16% of the cases. Based on the existing data, the use of ultrasound as the first-line breast cancer screening tool is not effective because DCIS is often missed. When false-negatives occur too often during “screening”, we need to consider the possibility of being liable and have to proceed with great caution.

Therefore, the Health Promotion Administration changed the screening policy and recommended that the general female population aged >45 years should undergo routine regular mammography screening. Other high-risk females with a family history of breast cancer should receive routine mammography screening starting at 40 years of age. The population of women being screened is much smaller, and the feasibility and rationale are considered reasonable. What is the future of breast ultrasound?

We need to investigate this issue as a niche in cancer screening.

Effective screening brings at least three benefits: the tumor is smaller at discovery; the chance of lymphatic metastasis is lower; and the tumor stage is earlier. Thus, the greatest benefit of screening is to detect a rapidly growing tumor earlier. A tumor with a larger diameter is more likely to be a late-stage tumor. In a textbook by Tabar (2005) [4], after logistic regression analysis, the odds ratio of a grade 3 tumor is 1.83 for a breast tumor 10–14 mm in diameter; however, the odds ratio is 3.76 if the tumor is 15–19 mm in diameter. When the diameter of the tumor exceeds 20 mm, the odds ratio of a grade 3 tumor is >5.83. Therefore, the primary goal of breast ultrasound is to detect tumors <20 mm in diameter. Breast ultrasound does not necessarily detect occult DCIS.

In addition, the analysis by Tabar also showed that the proportion of grade 3 tumors <1 cm in diameter in the 40–49 years, 50–59 years, and 60–69 years age groups were 19.1%, 14.9%, and 11.9%, respectively. Thus, younger patients have a higher probability of having grade 3 breast cancer, suggesting that breast cancer screening is most beneficial for young women, thereby enhancing the detection of tumors. Of note, dense tissues in young breasts may interfere with mammography and affect the detection rate (Kolb et al, 2002) [5]. Therefore, the advantage of breast ultrasound is achieving the same sensitivity in breast tissues of different densities.

Most obstetrician–gynecologists perform ultrasound examinations. Indeed, obstetrician–gynecologists can perform complicated examinations to screen for fetal abnormalities; the diagnosis of breast tumors should not be obstacles. The real pitfall is whether or not we fully understand the limitations of using breast ultrasound for breast cancer screening and the information we can provide. Thus, the problem is how you interpret it.

In summary, attempting to use breast ultrasound to perform breast cancer screening is extremely dangerous; however, if the new generation of ultrasound is used to make the differential diagnosis of “visible” breast tumors, it will be powerful and appropriate. Professor Hsieh, the Immediate Past President of the Taiwan Association of Obstetrics and Gynecology, has emphasized the importance of breast ultrasound examination training: “We will continue to cooperate with the Taiwan Society of Ultrasound in Medicine and the Breast Cancer Society of Taiwan to arrange continuing education for our members.”

The take-home messages we bring to you are as follows:

1. Currently, ultrasound is not an appropriate tool for first-line breast cancer screening.
2. The examiner should receive training to be familiar with the steps of the examination.
3. At the same time, information provided by mammography should be fully integrated with the findings of ultrasound.
4. If feasible, fine needle aspiration should be completed as well. It can provide the best service and reference for diagnosis and treatment.

Let us work hard together.
References


