The Past, Present and Future of Ultrasound Technology

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Terry DuBose, M.S., RDMS, FAIUM, FSDMS: "We've got Dr. Stuart Campbell here, the founding President of the International Society of Ultrasound and Obstetrics in Gynecology here at Edinburgh. It's a landmark meeting being in Edinburgh because it is the birthplace of obstetrical sonography, and we're going to ask him to talk about the organization, where it's coming from, and particularly where we're going. Dr. Campbell?"

"This is an important meeting, clearly, from my perspective because Scotland is the birthplace of obstetrical and gynecological ultrasound, and this is my last year as President of the International Society, which was founded in 1990. Ian Donald was the pioneer - he was the first person to development equipment where the transducer could be placed directly onto the abdomen, and his landmark paper was in 1958, where he first described his contact scanner. This made ultrasound equipment very practical, and a whole host of machines were developed - the Diasonograph in Scotland, and the Picker machine in America, both followed after this initial work. Of course, in those days you got static images, and you had to sort of paint the picture on the screen by moving the transducer in a series of movements across the abdomen. Then in early 1970, real-time scanning came on the scene. The equipment was portable and the transducers were easily moveable. Then the level of expertise grew throughout the world so that in virtually all countries women were extensively scanned, and in fact, in the majority of countries, routine scanning took place on the fetus and the uterus. Then in the 1980's, the transvaginal probe was developed so we could get tremendously improved information - not to study pregnancy, but information about gynecological tumors, endometrial cancer, fibroids, and all the gynecological usage of diagnostic ultrasounds. In fact, the gynecological component of scanning has increased tremendously with the improvement of information and is now an essential part of infertility work-up and management. More recent developments were made in the late 1980's. We got colored Doppler ultrasound, which is still producing a tremendous amount of information, and we're still exploring the use that. What I have essentially use colored Doppler for is to predict many of the complications of pregnancy before they occur. For instance, if you study the uterine artery, by finding an abnormal waveform you can predict a deadly disease called preeclampsia, intrauterine growth, retardation, bleeding behind the placenta, and abruptio placenta, and we are now taking steps to manage and prevent these complications from developing. You can see whether the fetus lacks oxygen by finding the fetus switching blood flow to his brain, and this is now becoming the most important means of monitoring fetal well-being. In gynecology, we can study the blood flow patterns in the ovary, and in most cases decide whether an ovarian tumor is a cancer or not a cancer. So colored Doppler is playing an increasingly important role in the evaluation of pregnant and non-pregnant women. And finally, this has been headline news for this Congress because 3-D equipment is now becoming really quite sophisticated, so much so that I think many centers are now purchasing this type of equipment. Certainly from the woman's perspective, to see a baby-like face on the ultrasound screen is a very, very exciting thing, and I can actually see quite obviously that they're bonding with their babies much more so than with the typical two-dimensional slice of echoes that they normally see. I truly believe it will enhance our ability to diagnose abnormalities earlier and earlier, and maybe even advance the prospect of prenatal surgery. So with 3-D scanning in obstetrics - already, in fact, in gynecology - we can get information on certain conditions that we can't normally get, such as whether there's a congenital abnormality of the uterus. This is instantly diagnosable by 3-D ultrasound, which can't be done on
2-D. So overall, the technology continues to improve, and we apply this technology to an increasing number of areas of obstetrics and gynecology. Really, you can't be an obstetrician-gynecologist now without ultrasound... it's an essential part of the diagnosis and management of women."

**Terry DuBose, M.S., RDMS, FAIUM, FSDMS:** "That's obvious and it's wonderful. I'd like to go back to historical development because you're a key person, as far as being able to give us information is concerned, especially since Ian Donald is gone now. Were you his colleague?"

"Yes, I worked with Ian Donald, I was his junior colleague. He really was a most remarkable man, and one of the most brilliant minds I've ever met actually. He was a tall, charismatic figure. He worked at the Queen Mother's Hospital in Glasgow. It was funny, though, because many junior doctors in those days weren't particularly interested because ultrasound was just a fuzzy picture on the screen. Many people were amused and thought he was a bit mad. But I just liked imaging, so I sort of became his junior doctor, or junior research fellow. There weren't such things as research fellows in those days - you had to do your research while you were doing the job. So on Sunday mornings, I used to have my clinic, and I worked at ways of measuring the biparietal diameter and the abdominal circumference of the fetus and things like that, developing growth charts. He was very supportive and very excited that there was a young man interested in ultrasound. Of course, now he is the most historically important figure in the development of ultrasound, and that's why our society has our most prestigious award, which is the Ian Donald Gold Medal."

**Terry DuBose, M.S., RDMS, FAIUM, FSDMS:** "Yes, thank goodness for that kind of madness."

"Yes, that's right."

**Terry DuBose, M.S., RDMS, FAIUM, FSDMS:** "It has brought us a long way, and it's unbelievable where it's come since then, much less the A-mode that you were using. I appreciate it. This is Terry Dubose with Dr. Stuart Campbell, who is the founding President of the International Society of Ultrasound in Obstetrics and Gynecology at the meeting in Edinburgh in 1998. Thank you very much."

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