



EFSUMB History of Ultrasound

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Norway, Radiology

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Acknowledgment:

Radiology, “the view of the radiologist”

Technology

The first ultrasound images from the 1960's were presented in a bistable black and white format. They had poor contrast and spatial resolution. For unskilled people they looked like moon landscape. Norwegian radiologists who were used to look at X-ray images with high resolution were in the beginning sceptical and did not catch much interest to this new modality. On the other hand, the gynaecologists grabbed the new modality with great eager.

At the same time the Doppler technique was developed, and both cardiologists and vessel surgeons got interested in flow measures. Thus the first presentations in Norwegian medical journals of experiences with diagnostic ultrasound, were given by vessel surgeons (1969) and gynaecologists (1974). The Norwegian Society of Diagnostic Ultrasound (NFUD) was established in 1976. Most members were gynaecologists.

Not until imaging with greyscale shades became available in the 1970's and the stationary heavy compound scanners were replaced by smaller, moveable real time imaging scanners, Norwegian radiologists in general caught real interest for diagnostic ultrasound. However, in 1973 the two Oslo University Hospitals Rikshospitalet and Ullevål, started using heavy, stationary scanners. At Ullevål an enthusiastic ultrasound group was established (Tore Nordshus, Terje Swensen, Trond Larssen, Arne Høiseth). Due to their great interest, the compound scanners were partly replaced by a real time scanner (Toshiba Sonolayer SAL 20) in 1976. The first radiologic article on ultrasound was published in 1977 [(1)].

In 1979 the enthusiastic Ullevål group also started yearly ultrasound courses for Norwegian radiologists. Terje Swensen in this group moved to Rikshospitalet in 1979. There he pushed forward on a replacement of the stationary B-scanner with a modern, movable real time scanner. It did not happen until the medical company Technicare launched their mechanical sector scanner in 1981, and head of the gastro-enterology department, professor Flatmark supported him.

Through the 1980's the radiologic interest for ultrasound and the expansion of US-scanners grew, and more radiologists became members of NFUD. At their yearly meeting in 1984 Terje Swensen had the presentation "Ultrasonography in patients with acute appendicitis" and Arne Heilo presented his experience with both ultrasonographic assessment of pancreatic

transplants, and histologic Biopsy biopsies.

The yearly courses in radiologic ultrasound continued through the 1980's, and in 1987 every radiologic department in Norway and also many private institutes could offer ultrasound examinations.

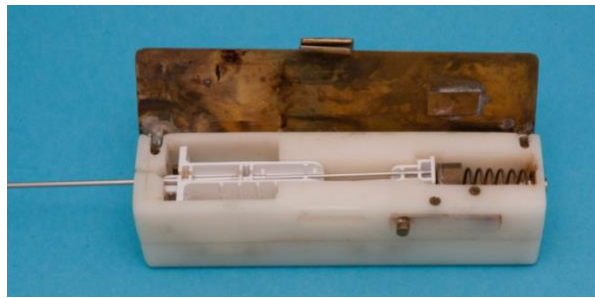
However, due to constantly increasing image quality and relatively cheap equipments, many other medical specialties and also general practitioners started their own ultrasound practice. Through the 1980's it was a turf battle between radiologists and other ultrasound performers. Who should be allowed to perform US examinations in Norway? In 1988 the Norwegian Medical Society settled a committee with mandate to solve the problem. The conclusion was that Norwegian radiologists could not prevent any other ultrasound practice. Thus we understood that we had to strengthen our own activity in both quality and quantity. As an important result, the education panel in the Norwegian radiologic society decided that an obligatory four days radiologic ultrasound course should be included in the new speciality criteria coming into effect in 1990.

Through the 1980-ies Aslak Aslaksen at Haukeland hospital, UiB strongly contributed to the promotion of radiologic ultrasonography, and in 1991 he defended his thesis [(2)].

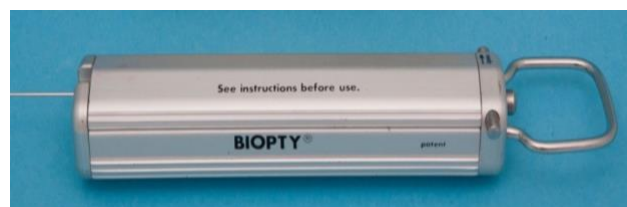
Interventional ultrasound (ultrasound-guided intervention)

Also the radiologists who were not very much interested in ultrasound, realized that, in skilled hands, ultrasound was very suitable as guide for any percutaneous puncture when the target was visible on ultrasound. Thus, already in 1984 enthusiastic radiologists started dedicated courses in interventional ultrasound at Rikshospitalet. Lessons in puncture- and biopsy techniques and different drainage procedures were given, and the participants could also practice US-guided punctures on phantoms under supervision.

The year 1982 inaugurated a new era in biopsy. Until then, the clinicians had performed histologic needle biopsies with a two-hands technique using either the Menghini suction needle, mostly for liver biopsies, or the more modern TruCut cutting needle, mostly in kidney biopsies. In other regions surgical biopsies were normal. However, in 1981 the Swedish radiologist P.G Lindgren at Uppsala University Hospital, in collaboration with the Swedish company RadiPlast AB, invented a new instrument in which one could put a TruCut needle [Figure 1].

Figure 1 Pistol prototype.

This new tool gave the doctor the possibility to perform an automatic pistol biopsy with a one-hand technique. The pistol was presented at a Scandinavian radiology meeting. After the meeting Arne Heilo working at The Norwegian Radium hospital visited Lindgren in Uppsala. There he got one copy of the prototype and started to use this new biopsy technique at his own hospital. However, the TruCut needles were weak and could only be used for a single puncture. The Bard company then bought the concept and developed a new metal pistol with strong dedicated needles. These needles could be used several times in the same biopsy procedure. The given brand name was Biopty [Figure 2].

Figure 2 First patented pistol.

Biopty biopsies were used in a wide range of areas, and Arne Heilo's results convinced the clinicians. Head of the lymphoma department declared that this new biopsy technique had become more important than CT in the diagnostics and in the stage assessment of lymphomas. The first international articles from the Norwegian Radium Hospital were published in 1993 [(3, 4)]. In the last half of the 1990's, the Norwegian Radium Hospital published another four articles concerning histologic core-needle biopsies [(5-7)].

Collaboration

International collaboration 1991-93

Frode Lærum radiologist at Aker hospital in the 1980's, was appointed professor in 1987. He was always full of ideas, (as he has been the rest of his medical career). He wanted to collaborate with foreign medical institutions and universities, and was interested in spreading new knowledge in radiology and especially ultrasonography in the Soviet Union.

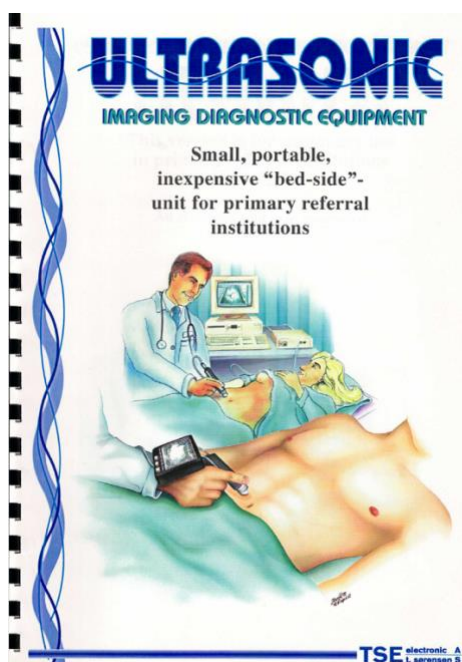
The 13th of January 1991 Soviet troupes captured the television station in Vilnius and killed fourteen unarmed Lithuanian people, despite Lithuania formally became an independent state in 1990. Eight months later Aker hospital donated one ATL ultrasound equipment to Vilnius Municipal Hospital. The donation opened possibilities to arrange a Baltic radiologic seminar in Vilnius in June 1992, financed by Nycomed.

In 1992 Lærum established the UiO Moscow Centre, and already in 1993 this centre, in collaboration with Nycomed, arranged the Russian-Scandinavian Symposium on medical imaging, Moscow, October 25-26, and Symposium on medical imaging, Tashkent, October 28.

Hand-held ultrasound equipment

In 1990 Frode Lærum also had an idea on developing very small hand-held ultrasound equipments. He had a meeting with Vingmed Sound, but the owner did not catch any interest. Two years later he again promoted his idea, now in collaboration with Sintef, and in 1995 industrial designers at NTH made a concept study of the equipment. In collaboration with Tore Sørensen Electronics, a presentation brochure was launched [Figure 3].

Figure 3 In collaboration with Tore Sørensen Electronics, a presentation brochure was launched.



However, at that time the technology for such a product was immature, and further development was cancelled.

Collaboration with Österreichische Gesellschaft für Ultraschall in der Medizin

Owing to profound knowledge and thorough experience in ultrasonography and US-guided intervention, Arne Heilo was invited to participate in the yearly meetings in Österreichische Gesellschaft für Ultraschall in der Medizin. In 1996-98 he presented several lectures on different topics, and also offered his homemade biopsy phantoms to the participants for practical learning.

Collaboration with general practitioners in Norway

In 1998 Arne Heilo was invited by the two general practitioners, Arne Ivar Østensen and Gunnar Aasheim, and also Bjørn Aske, salesman for ultrasound equipments, to start courses in ultrasonography for general practitioners. Many of his colleagues in radiology warned him, but Heilo wanted to spread his knowledge. The first course in Trondheim started a very fruitful collaboration with these colleagues through more than ten years. (In 2007 these general practitioners established their own society for ultrasonography in private practice, FUA.)

Collaboration with Russian colleagues in Petrozavodsk, Karelia

In 1998 professor Svein Ødegaard and some other Norwegian doctors participated in a Barents Region meeting in Kirkenes, arranged by the Norwegian Foreign Department, where also head of Petrozavodsk University Hospital in Karelia, professor Alexandr Balashov participated. He wanted a new Barents meeting focused on ultrasound and US-guided intervention, in Petrozavodsk in year 2000. Arne Heilo was invited to this first international Karelian meeting, which took place in Petrozavodsk 4-6 September 2000. This meeting started a fruitful collaboration with many Russian colleagues for seven years.

Pioneers**Arne Heilo, Invited speaker**

1992: Baltic radiologic seminar in Vilnius, Lithuania.

1993: Russian-Scandinavian Symposium on medical imaging, Moscow October 25-26.

1993: Symposium on medical imaging, Tashkent, October 28.

1994: The 7th Congress of WFUMB, Sapporo Hokkaido, Japan, July 17-22.

1996: The 7th EUROSON congress in Budapest

1996: Österreichische Gesellschaft für Ultraschall in der Medizin.

1997: Österreichische Gesellschaft für Ultraschall in der Medizin.

1998: Österreichische Gesellschaft für Ultraschall in der Medizin.

1998: The 8th Congress of WFUMB in Taipei.

1998: 1th course in ultrasonography for general practitioners, Trondheim

1998: 1th course in ultrasonography for general practitioners, Kristiansand

1999: 1th course in ultrasonography for general practitioners, Asker

2000: 2th course in ultrasonography for general practitioners, Trondheim.

2000: 1th international meeting on US and US-guided intervention. Petrozavodsk

Events and congresses

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Student ultrasound education, ultrasound for medical students

Frode Lærum and Arne Heilo also wanted to make medical students interested in ultrasound already in the beginning of their study. They thought knowledge in sonographic anatomy would make the students more familiar with ultrasound diagnostics when they would face ultrasonography in their practical life as doctors. In 1994-96, in collaboration with the Anatomic Institute at University of Oslo, they made a pilot study teaching the second year students different anatomy on ultrasound. The students were given both theoretical and practical introduction, and they also performed examinations on each other. The very promising results were published in European Journal of Ultrasound in 1997 [(8)] Due to new plans for the medical study in Oslo, implementing problem-based learning (PBL), the pilot project was not continued. In a revised study plan from 2014, the ultrasound modality has been incorporated in several subjects in the medical study at Oslo University.

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