

Ergonomic innovation: working with natural alignment

We were aware of the health issues associated with probes and sonographers and we believed that a new probe design could reduce these issues.

In our research we found studies that supported our idea that the change in grip was necessary. One of these studies by the University of Wisconsin-Madison, from December 8, 2004, explained the problem of the grip, what health issues are associated with the traditional pen grip, and what action could be taken to prevent it.

One of the most interesting facts from the study highlights the occupational hazards associated with the use of probes, "Roughly 80% of sonographers report that they have some sort of musculoskeletal complaint of the hand and wrist and neck and back in conjunction with use of the probe and specific to the limb used to examine a patient."

The study also showed that beyond the personal health issues of the sonographers, the problems associated with the use of the probes affected the hospitals and patient care.

"Many of the workers reporting injury stated that they had to use sick time, vacation time, and workers' compensation benefits to deal with the time lost due to injury.

Sick time and workers' compensation costs for thirteen work sites using ultrasound imaging reached levels upwards of \$180,000 because of injuries during 2001-2002. [...]"

Finally, the call to action by the study (see below) addresses what needs to change specifically in the hand-held transducer. "While manufacturers have made many ergonomic modifications to the ultrasound machines as a whole, the client wanted a design that focused on the hand-held transducer. The design needs to address the pinching and pushing associated with transducer use by sonographers.

The design would need to alleviate the stress put on the sonographer when they are required to grasp the probe and apply pressure with it onto the patient.

The main goal is to improve the well being and safety of the sonographer, especially their wrists, elbows and shoulders.

Ultrasound imaging relies on very small adjustments of the transducer head during exams for quality imaging; therefore a new design must give the sonographer a good amount of fine movement ability. In addition, good sonography is a learned skill that technicians work at to become proficient, so drastically changing probing procedures should be avoided. A design that can assist for long periods of time would also be ideal because of the large variation in exam times (from 30 minutes up to 8 hours).



Sometimes the probe must be held in only one spot with constant pressure for a long exam, and this can be very taxing on the sonographer. Regular exams are also getting longer as newer scanning technologies are being utilized, and sonographers are only being put under a bigger burden."

We believe that with the appleprobe we have changed the way transducers are held, creating a new way to grip the probe and respecting the traditional grip of the probe that so many have become accustomed to. It is our hope that the appleprobe will better the lives of sonographers making their work less painful and allow them to focus on their patients.



Esaote has designed a number of ultrasound probes over the years, each time trying to make them more comfortable and more ergonomic, yet something more drastic needed to be done. The design needed to address the pinching and pushing associated with transducer use by sonographers. And at the same time alleviate the stress put on the sonographer when they are required to grasp the probe and apply pressure with it onto the patient. After looking into the various changes that could be made it became clear that the way the probe is held could be re-designed.

The pen grip was the accepted way to hold and design the probes, yet it causes stress on the hand and wrist. It was decided to find a new way to hold the probe using a more natural grip. Through various studies, mock-ups and models our design team tested sonographers and doctors alike to best understand what kind of grip would be comfortable and natural for the hand and wrist and allow the small adjustments necessary for the ultrasound exam.

During the studies the palm grip was discovered. It is new to probe handling, yet very intuitive.

The palm grip is achieved by holding the cord end between the index and middle fingers and cupping the probe with the palm of the hand. This allows for the user to move the fingers and wrist during an exam without compromising the ultrasound image. With this new grip the pressure needed to create the ultrasound image could come from the upper arm and elbow, this would alleviate the pressure on the wrist. A new probe could allow for this new grip to be used as well as the traditional pincer grip.

Conventional grip

USE POSITION



F1
PUSHING

F2
PINCHING

F3
ROTATION

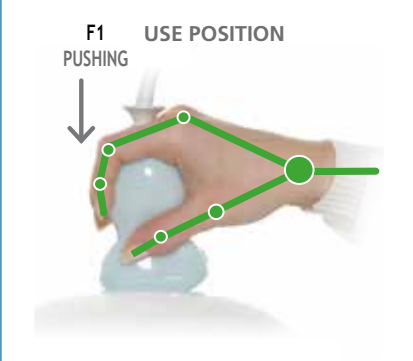
NO RELAX POSITION

as in the other probes on the market

The muscles, tendons and nerves remain in constant tension, caused by two necessary movements to keep the probe in the hand Pinching and to scan Pushing.

appleprobe grip


USE POSITION



F1
PUSHING

RELAX POSITION

the hand does not have to squeeze the probe (it rests between the fingers).



Allowing for both grips gives the user the power to decide how to hold the probe.

By having two different grips for one probe, the user can switch from one grip to another, reducing the stress created by the constant repetition of the traditional grip. The palm grip aligns the wrist and the hand and allows the user to avoid the pressure associated with the pinching in the pincer grip. Yet the pincer grip may be more comfortable for certain exam positions.

Switching between the grips increases the range of movement and limiting the time spent in one single grip. Doctors and sonographers have used the palm grip now, and the feedback is positive. They say that they find the new palm grip natural and comfortable. Sometimes something innovative is very instinctive.

Thank you for considering Esaote

Where listen to your needs and work every day to provide the most advanced technologies and the most innovative design for you to excel in the care of your patients.

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