Chapter 1

Basic principles

Part 1

Holding the probe

Holding the probe correctly

To obtain a good image one first has to hold the probe correctly.

Fig. 1: Holding the probe correctly.

The probe should be grasped close to the patient. This will enable the investigator to keep it stable and obtain a calm image. It also helps to steer the probe in the required direction. The weight of the arm and the hand is effectively passed on to the probe so one can exert enough pressure on the surface if necessary.

Holding the probe at the end of the cable or just loosely at "the neck" will make it wobble back and forth. Force from the arm and hand cannot be passed on effectively. The fingers become tense rather rapidly, especially at the beginning. Rather than being stable, the image will be restless. One's hand tires easily.

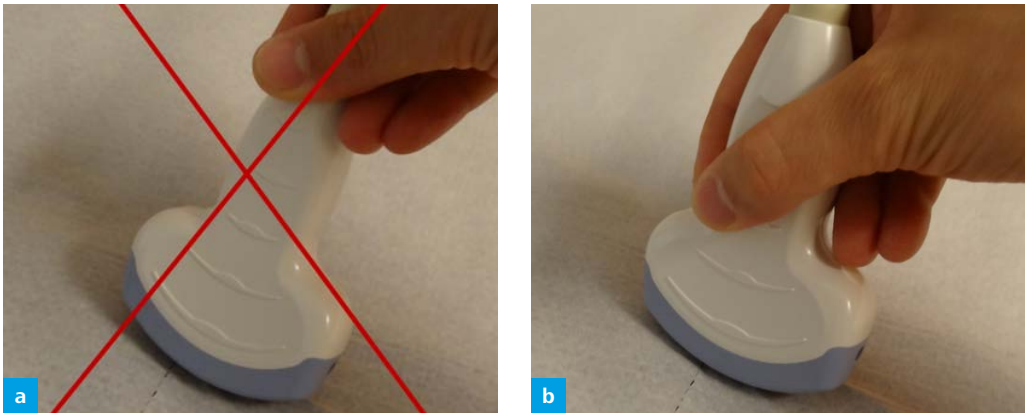

Fig. 2: Holding the probe inappropriately at the end of the cable (a); holding it ineffectively at "the neck" (b).

Marker on the probe

Another important aspect of successful ultrasound scanning is the orientation of the probe.

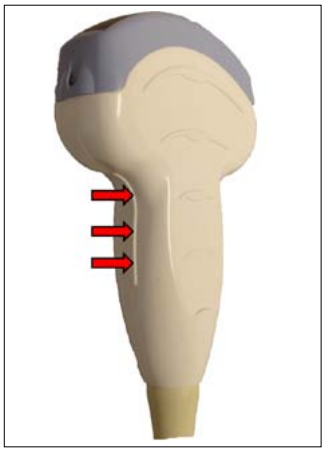

Fig. 3: Three red arrows indicate the marker on the probe, which concurs in a standardized way with the left side of the image on the monitor.

Every probe has a marker on its side, which concurs in a standardized way with the left side of the image when performing an ultrasound investigation of the abdomen. Usually there is a circle, a company logo, a product logo or something similar on the upper left margin of the image, which corresponds to the marker on the probe. On the probe it may be a line, a small lamp or a company logo. The orientation can be changed manually on the device. During transthoracic echocardiography, for instance, the marker concurs exactly with the right side of the image on the monitor.

Information provided by the image

Part 2

B-mode image

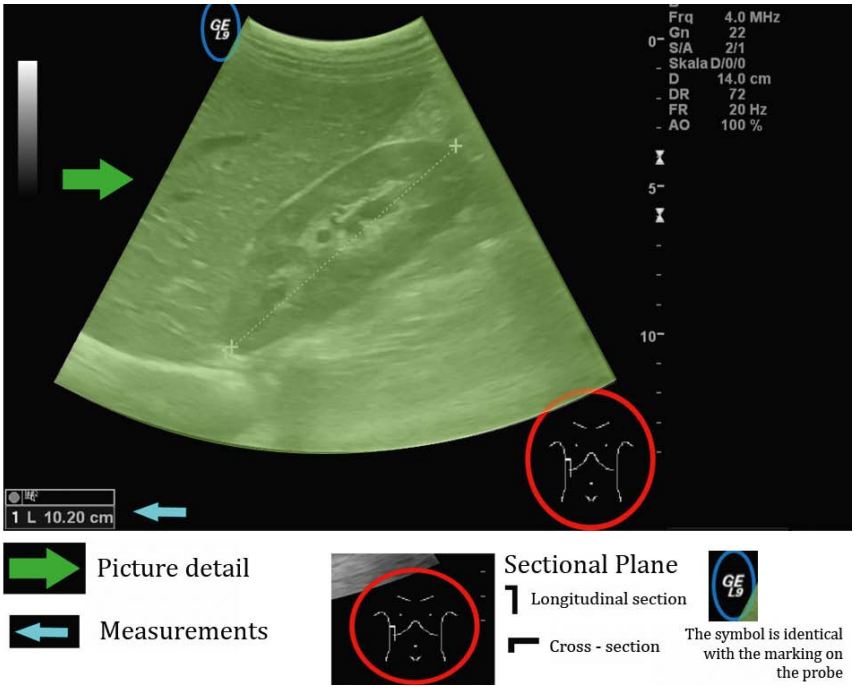

Fig. 1: Information provided by the typical B-mode image.

On the monitor an ultrasound image yields various types of information.

The picture detail (shaded light green here) is shaped like the filter of a coffee percolator. Close to the probe, ultrasound waves are emitted in a fan-shaped manner from the convex surface of the probe to the periphery. The picture detail on the upper left shows a logo, a dot or something similar, which symbolizes the position of the probe marker on the image.

Various technical data are given on the right side of the image, such as "Frq 4.0 MHz" – which means that one is working with an ultrasound frequency of 4 MHz, or "D 14 cm" – which means that the penetration depth of the image is 14 cm. These data are not very significant in the beginning, but as one's training progresses, they help to focus the device rapidly and handle it in an optimal way.

Picture detail, pictogram showing the sectional plane and penetration depth or the scale constitute essential image data.

The scale on the right side of the image is much more important. Resembling a ruler, it expresses the depth of penetration and gives an idea of sizes and dimensions on the monitor. Depending on the depth of penetration, individual structures may appear smaller or larger than one expects them to be. Therefore, correct setting of depth and knowledge of penetration depth on the image are essential aspects of one's skills.

On the right lower margin of the image there usually is a "body pattern" – which are pictograms showing the sectional plane of the probe (red circle). This is very useful to understand the still image. Measurements are usually given on the lower left of the image (blue arrow).

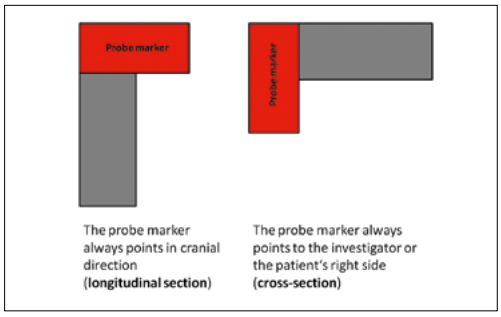

Fig. 2: Probe marker on the longitudinal section and the cross-section.