2 General Remarks on Examination Technique

Applications

All body regions that are not situated behind expanses of bone or air-containing tissue (lung!) are accessible to examination by B-scan ultrasonography. Thus, this technique is suitable for evaluation of the following:

- Neck: thyroid gland, lymph nodes, traumatic soft-tissue lesions
- Chest (from skin surface to surface of aerated lung): pleural effusion, empyema or tumor; peripheral lung tumors; mediastinal tumors; heart; mammary glands
- Abdomen, retroperitoneum, small pelvis: parenchymatous organs, fluid-containing organs, blood vessels, lymph nodes, tumors, abnormal fluid collections
- Limbs: joints, vessels, muscles

General Indications for B-Scan Ultrasonography

- Ascertaining the position, size, and shape of parenchymatous organs;
- detecting stases and concretions and evaluating function on the basis of changes in the shape and echo structure of fluid-containing organs (obstructive jaundice, hydronephrosis, calculi, residual urine, aortic aneurysms, venous stasis);
- search for tumors and their differentiation (cystic or solid);
- diagnosis of abnormal fluid collections in body cavities, parenchymatous organs, and soft tissues, including ultrasound-guided puncture
- detection and surveillance of inflammatory and other non-neoplastic diseases of the parenchymatous organs, assuming that gross lesions are present (e.g., pancreatitis: irregular echo structure, enlargement; hepatic cirrhosis: rounding of contours, changes in size and echo structure; arteriosclerotic “shrunken kidney”);
- evaluating transplants;
- evaluating response to cancer therapy;
- ultrasound-guided percutaneous puncture techniques (renal biopsy, liver biopsy, pericardial aspiration, etc.);
- evaluating follicular maturation;
- evaluating pregnancies;
- detection and exclusion of congenital defects, including family examinations.

Preparation

The preparations for an ultrasound examination naturally depend on the organ or body region that is to be examined. Therefore, they are discussed in the chapters dealing with the ultrasonography of specific organs.

Here we shall limit our remarks to methods of dealing with a major obstacle to abdominal ultrasound imaging: overlying bowel gas. Ultrasound is totally reflected at tissue-gas interfaces, causing an acoustic shadow. As a result, anatomic structures that are situated behind large collections of air are inaccessible to ultrasound evaluation. This problem can be avoided by:

- examining the patient in the fasted state;
- imposing dietary restrictions (avoidance of gas-producing foods);
- premedication (combination product containing an antifoaming agent and pancreatic enzyme);
- physical exercise (e.g., walking 30 min before the examination).

In addition, bowel gas can sometimes be removed from the examination field by:

- massaging the gas-filled bowel loop;
- filling the stomach with fluid (e.g., to displace the air-filled transverse colon out of the pancreatic region);
- filling the urinary bladder with fluid (small pelvis, iliac region);
- placing the patient in right lateral decubitus position, lowering the patient’s head, or positioning the patient erect during the examination; this will cause the air to migrate to other parts of the bowel;
- reexamination (often the most suitable method!).

**Positioning**

Owing particularly to the relatively small contact transducers that are used with many real-time scanners, it is possible to examine the majority of abdominal organs (which make up the bulk of ultrasound evaluations in internal medicine and obstetrics-gynecology) in the supine position. Additional scans in the lateral decubitus and prone positions may prove useful or necessary in obese patients or patients with skeletal deformities, in cases where anterior access is prevented by bowel gas, or to avoid misinterpretations and artifacts.

Various other positions may prove useful depending on the nature of the examination:
- hyperextension of the neck for examining the thyroid gland;
- placing a sponge roll beneath the supine patient for evaluation of the pancreas;
- elevating the head or positioning the patient erect for evaluation of the upper abdominal organs;
- elevating the flanks (with pillow or examiner’s hand) to visualize the kidneys from anterior;
- turning the patient 45° to the left to evaluate the hilus of the liver, gallbladder, bile duct, or, in some cases, the pancreatic head;
- right lateral decubitus to evaluate the spleen through the intercostal spaces and the pancreatic tail with a fluid-filled stomach;

**General Remarks on Examination Technique**

[Diagram: a Thyroid gland (neck roll), b Kidneys (supine with flanks elevated), c Spleen (lateral decubitus), d Small pelvis (pelvis elevated), e Kidneys (prone over pillow)]

- pelvic elevation to evaluate the small pelvis;
- prone position over a pillow to evaluate the kidneys from posterior (Fig. 2.1).

The examination procedure is facilitated by the use of a suitable couch that allows multiple position adjustments. Also, the couch should stand on wheels or castors so that it can be moved about as needed.

**Coupling Agents**

A coupling agent is necessary to ensure good acoustic contact between the ultrasound transducer and the skin. It may take the form of a gel or oily liquid. In aspirations and biopsies, the liquid antiseptic can sometimes provide adequate coupling for short periods.

The coupling agent may be purchased from practically any dealer in ultrasound equip-