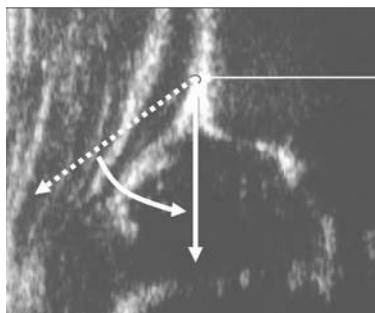


## 7 Measurement Technique



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The measurement lines that have been adapted for sonographic practice do not have strict mathematical definitions. Two angles emerge from the lines; these are the bony angle alpha which quantifies the bony socket and the cartilage angle beta which quantifies the cartilaginous acetabular roof. With these two angles, the entire socket with its bony and cartilaginous parts can be accurately assigned to a specific hip type. This measurement system with alpha and beta angles has the advantage that it is not dependent on either the position of the baby or the projection. It is not tied down by the position of the femoral head and is therefore irrespective of the position of the leg. Furthermore it is not dependent on the presence of the femoral head ossification centre. Other measurement systems with factors, quotients etc., do not improve the measurement results and precision.

All measurement techniques which include the size of the femoral head, the “centre” or the nucleus are no more than eyeballing: the head is not round but more or less oval, no centre can be accurately defined and the nucleus is not the centre of the femoral head!

### 7.1 The Bony Roof Line (Fig. 7.1a)

The inferior rim of the os ilium is a pivot point from which a line is drawn laterally “tangential” to the bony roof.

*Attention:* For practical reasons, the definition reads “tangential” to the bony roof rather than tangential to the bony rim.

Problems:

1. The osseous rim artefact (Fig. 7.1b). If the wrong focus is used a pointed strip may be seen on the bony rim. It is important that this osseous rim artefact is not mistaken for the actual osseous rim.
2. Problems with the lower limb of the os ilium (Fig. 7.1c). The lower limb of the os ilium

must be a clearly defined echo and must not be a faint or fading echo.

3. A further problem for the identification of the lower limb of the os ilium is caused by the anatomical circumstances. Caudal to the lower limb of the os ilium is the hypoechoic zone of the triradiate cartilage. Lateral to the lower limb the echoes of the fatty tissue in the acetabular fossa are seen. Even further laterally, the echo of the ligamentum teres runs caudally to cranially to the central fovea of the femoral head. Therefore it is possible, with bad tuning of the equipment or a bad scanning technique, that the echoes of the fatty tissue obscure the precise definition of the os ilium. The lower limb is not seen as a spot but is striped caudolaterally. The second error is to mistake the lower limb for the central fovea. This is, however, easy to avoid as gentle rotation of the femoral head causes the echo of the central fovea to vanish, whereas the lower limb of the os ilium stays in position (Fig. 7.1d).

### 7.2 Base Line (Fig. 7.2a–c)

First the upper-most portion of the hyaline cartilage roof must be found. This is the point where the proximal perichondrium turns into the periosteum. Anatomically, this is the upper insertion point of the rectus tendon. From this pivot point the base line is drawn caudally tangential to the echo of the os ilium.

Problems:

1. The available measurement guide that the base line is laid on may be very short.
2. The so-called upper-most point as a necessary starting point for the base line cannot be identified. In this case it is necessary to use the so-called subsidiary line through the acoustic shadow of the wing of the os ilium with a replacement base line. (Auxiliary base line or help line.)