

using the radial, brachial, or femoral arteries or from indwelling arterial catheters. Assess adequate circulation before arterial puncture by observing capillary refill or performing the **Allen test**, a procedure that assesses the circulation of the radial, ulnar, or brachial arteries. Because unclotted blood is required, use only heparinized collection tubes or syringes. In addition, no air bubbles should enter the tube because they can alter blood gas concentration. Crying, fear, and agitation affect blood gas values; therefore, make every effort to comfort the child. Pack the blood samples in ice to reduce blood cell metabolism and take it to the laboratory immediately.

Take capillary blood samples from children by finger stick. A common method for taking peripheral blood samples from infants younger than 6 months old is by a heel stick. Before the blood sample is taken, warm the heel for 3 minutes and cleanse the area with alcohol. Holding the infant's foot firmly with the free hand, the nurse then punctures the heel with an automatic lancet device. An automatic device delivers a more precise puncture depth and is less painful than using a lance ([Vertanen, Fellman, Brommels, et al, 2001](#)). A surgical blade of any kind is contraindicated. An example of a safe device is the BD Quickheel Safety Lancet. The Tenderfoot Preemie device was compared with the Monolet lancet and was found to be safer than the lancet and required fewer heel punctures, less collection time, and lower recollection rates ([Kellam, Sacks, Wailer, et al, 2001](#)). [Shepherd, Glenesk, Niven, and colleagues \(2005\)](#) reported that the Tenderfoot device was more effective and safer than a lancet for newborn screening tests. Although obtaining capillary blood gases is a common practice, these measures may not accurately reflect arterial values.

The most serious complications of infant heel puncture are necrotizing osteochondritis from lancet penetration of the underlying calcaneus bone, infection, and abscess of the heel. To avoid osteochondritis, the puncture should be no deeper than 2 mm and should be made at the outer aspect of the heel. The boundaries of the calcaneus can be marked by an imaginary line extending posteriorly from a point between the fourth and fifth toes and running parallel with the lateral aspect of the heel and another line extending posteriorly from the middle of the great toe and running parallel with the medial aspect of the heel ([Fig. 20-9](#)). Repeated