4  Suturotomy for Various Flaps in the Newborn and Infant

“Nothing may fail like success.”
VARé, Italian Diplomat

In the newborn and infant for reflection of frontal, bifrontal, parietal, and other flaps the use of the perforator and either Gigli saw or craniotome is unnecessary and potentially dangerous, since the skull thickness measures less than 3 mm, and each of the membranous bones rides freely over the underlying brain, suspended and moored, as it were, from the membranous sutures. Individual bones are separated from one another by open suture lines, and ossification is at least a year from being complete. The bones offer no resistance to the pressure of a perforator or bur (see Figs. 4.1–4.6).

The individual bones cover almost completely the respective lobes of the brain, so that one may expose the parietal, or frontal, lobes simply by cutting the appropriate bone from – and at – its junction with the surrounding suture. Reflection of a frontal flap necessitates use of heavy scissors to cut the squamous portion of the frontal bone from the supraorbital ridge, a line along which no suture exists. A suboccipital flap may not be reflected by sectioning a suture because the squamosal suture is located well above the transverse sinus.

The anterior fontanelle and the three sutures with which it is continuous (metopic, coronal, sagittal) offer the key area for reflecting frontal, bifrontal, parietal, or biparietal flaps. The metopic suture begins to ossify inferiorly at the glabella, a process that extends postero-superiorly to the anterior fontanelle. Consequently, at the time of birth one may encounter bony union at the glabella.

The suturotomy is performed by stripping the periosteum from the bone edge at a point no more than 1 mm from the suture line. The periosteum is reflected from the bone edge, over a linear distance of approximately 1.5 cm. The highly vascularized bone and the interosseus portion of the suture are then exposed before using a sharp periosteal elevator, such as the Oldberg or a sharpened Penfield #4 dissector, to separate the suture line from the inner table of the skull. This permits one to separate completely the inner table of the skull from the outer layer of the dura by inserting a blunt Penfield #2 or #4 dissector and stripping the former from the latter. It is not possible to run the dissector across the suture line, so the surgeon separates the outer layer of the dura from the inner table of the skull on either side, bringing the separation up to the suture line. This is done through the small opening already described.

Heavy scissors, either curved or straight Mayo, are inserted so that one blade serves as a dissector, and then the bone is cut along the suture line, extending from superomedial to inferolateral, cutting the coronal suture. The direction of cut is from superior to inferior and then from the anterior fontanelle to the glabella if one wishes to open the metopic suture. To separate the parietal bone from the sagittal suture, it is best to proceed from the anterior fontanelle to the posterior fontanelle, taking care to cut along the junction of bone and suture, so as to avoid damage to the superior sagittal sinus or the bridging veins.

Reflection of the free or osteoplastic flap, after suturotomy, exposes the underlying dura and suture lines. One may choose to reflect any combination of unilateral frontal, bifrontal, biparietal, frontoparietal, and tempoparietal flaps for access to the desired area.
Figure 4.1. Anatomical drawing of the infant’s neurocranium, illustrating the bones of the calvarium and the sutures continuous with it. The sagittal (1), coronal (2), and metopic (3) sutures are continuous with the anterior fontanelle (4). The coronal suture extends anteroinferiorly in the coronal plane, to the pterional area (5), where the parietal (6), frontal (7), sphenoid (8), and squamous temporal (9) bones fuse. The metopic suture extends anteroinferiorly, in the sagittal plane, past the glabella (10) to the frontonasal (11) sutures, where it is joined by the frontal processes of the maxillae (12).

Figure 4.2. Membranous bony plates, seen in transparency, overlying the respective lobes (frontal, parietal, temporal) of the brain. Suturotomy around the appropriate bone, therefore, suffices to expose the underlying lobe of the hemisphere.