Sagittal synostectomy

Technical note

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A procedure for correction of scaphocephaly is described. It differs from strip craniectomy in that it provides early correction of the deformity by removing the protuberances at the bregma and at the occiput. The morbidity and mortality of this procedure is no greater than with the more standard linear craniectomy.

KEY WORDS · scaphocephaly · synostectomy · craniosynostosis

Premature closure of the sagittal suture occurs about five times as often as the next category of suture closure. In a significant number of these patients repair for cosmesis is indicated. Linear strip craniectomies, as described by Ingraham, et al., or a strip craniectomy in which the bone over the sagittal sinus is removed, remain the most widely used method of repair. We should like to report a procedure designed by one of us (MPS) and carried out on a large number of patients without significant morbidity and mortality. Its value lies in the fact that it allows for an almost immediate restoration of the normal skull contour by removal or reduction of the bone protuberances at the bregma and occiput (Fig. 1).

Operative Technique

The child is positioned in a prone position, care being taken to avoid pressure on the orbits. Every effort is made to secure the endotracheal tube and the patient’s position on the operating table. After routine preparation and draping, the scalp is heavily infiltrated with normal saline. This not only enhances reflection of the scalp flaps but aids in hemostasis. A vertical midline incision is opened and carried down to the pericranium. It is important to carry the incision far enough posteriorly to allow for removal of the occipital protuberance. Blood infusion is begun at the time of the skin incision. Perhaps the most serious surgical error involved in this procedure is the underestimation of blood loss in these young infants, most of whom are younger than 4 months of age.

Once the scalp flaps have been reflected and hemostasis obtained, the pericranial incisions are outlined parallel to the sagittal suture and separated from one another by about 2.5 to 3.0 cm. As the incisions approach the anterior fontanelle they are carried across the coronal suture flaring out far enough to reduce the bulge at the coronal sutures and to parallel the normal diamond shape of the fontanelle. Posteriorly the incisions diverge widely to cross the lambdoid suture several centimeters from either side of the midline. They then curve downward and continue...
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FIG. 1. Skull films of a 2-month-old infant with premature closure of sagittal suture, lateral (left) and anteroposterior (right). Note prominent occipital protuberance, narrowing of AP diameter, and bony bridging of sagittal suture.

medially to return to the midline below the occipital protuberance (Fig. 2). Removal of bone between these incisions is begun anteriorly and laterally and carried posteriorly and medially. It is important that the first assistant follow the steps closely and control bleeding from the bone edges as it occurs. Stripping the pericranium prior to the craniectomy adds nothing to the procedure and significantly increases blood loss. In general the bone peels easily from the sagittal sinus and any oozing from the sinus is readily controlled with Gelfoam or Surgicel. Care should be taken with the endosteal dura which may be tightly adherent to the bone and one may tend to separate the dura into its two leaves. Failure to recognize this as one approaches the sagittal sinus may lead to a significant rent and consequent blood loss.

As one approaches the posterior aspect of the craniectomy it is well to keep in mind the small emissary veins which pierce the skull at and slightly above the torcula. At times removal of the small island of bone directly overlying the torcula may be quite difficult and associated with significant bleeding. Generally the surface of bone involved is no larger than 1 sq cm and can be thinned and left in situ if necessary. It is, however, desirable to reduce the outward flare of the occipital bone below the occipital protuberance.

Silastic strips are placed along the craniectomy edges paralleling the sagittal sinus. No

FIG. 2. Diagram showing extent of craniectomy (dotted line). Note the resection laterally and inferiorly to encompass the occipital protuberance. Occasionally a small island of bone may be left centrally in the region where perforating emissary veins enter the torcula.
attempt is made to line the enlarged anterior fontanelle or posterior craniectomy. No hernias will occur. In infants less than 6 months old the occipital bone will quickly regenerate in a more normal contour. In older children a very loose mosaic of bone should be left over the denuded occipital dura mater. The wound is then copiously irrigated with Bacitracin solution, and after meticulous hemostasis has been obtained, the galea and scalp are closed in separate layers with interrupted Tevdek suture. Bulky or occlusive dressings are avoided.

Postoperatively hematocrit is followed closely for the first 72 hours, but otherwise no special care is needed. Subgaleal effusions often occur, but have not been a problem and the infant is discharged 5 to 7 days postoperatively.

Discussion

It is generally accepted that scaphocephaly does not significantly alter brain growth and consequently the single indication for operative correction is cosmetic improvement. Any procedure designed to achieve this goal must, therefore, be associated with a negligible morbidity and mortality. Strip craniectomy of either type done in a neurosurgical center is associated with a significant morbidity and mortality of less than 0.5%. There has been no increase in either category with the procedure outlined here.

The major disadvantage of the strip craniectomy is that the restoration of normal skull contour is slow and variable. Since the procedure is designed to produce a cosmetic effect, early achievement of this result appears desirable. The method described achieves this goal within 3 to 6 weeks (Fig. 3) or virtually as soon as hair growth is sufficient to conceal the scar.

Operative blood loss remains the most serious complication of the procedure. Careful attention to hemostasis, avoidance of dural stripping and control of the posterior emissary veins as they enter the torcular should allow the surgeon to keep blood loss to an acceptable minimum. The awareness of the problems in maintaining blood volume, body temperature and fluid balance in these small infants contributes to making this a safe, remarkably effective method for providing an early predictable cosmetic result in these cases.

Reference


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