SPECIAL ARTICLE

NEWER TECHNIQUES IN NEUROSURGERY*

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This paper illustrates certain newer techniques that I have used over the past twenty years. They have been developed without reference to the work of others, although their originality cannot be confirmed in every case.

1. *Cranioplasty with heavy gauge stainless steel mesh.*[1] Used since 1950, it constitutes a rapid, simple method for covering post-traumatic and operative skull defects of any size or shape. The steel mesh is cut with heavy scissors, molded by hand, and held in place with a steel sling suture. It has given excellent cosmetic results without tissue reaction or infection in nearly 500 cases.

2. *Large trephine craniotomies.*[2] One and half and two inch "simple hole saw" trephines as used in auto supply stores have been used since the late 1940's for a rapid approach to the majority intracranial lesions including brain gliomas, aneurysms of the circle of Willis, pituitary and suprasellar tumors, pinealoma, intra-cerebral clots and brain abscesses. Occasionally two adjoining trephines are used for lobectomies. On completing the operation the bone button may be replaced without wiring, or may be substituted by steel mesh covering, thus effecting exposure and closure in a matter of minutes.

3. *Extradural spinal sensory rhizotomy.* Extradural spinal rhizotomy can be accomplished quite simply through a midline incision, extending it laterally to the transverse process, and taking one bite by a Kerrison punch rongeur of the lateral edge of the lamina (pars articularis) just caudal to the transverse process. The spinal root ganglion is thus exposed. The sensory root in its own dural sleeve is cut by scissors just proximal to the ganglion. The majority of sensory rhizotomies are done in

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* Abstract of a more complete article "Steel Mesh Spinoplasty for Repair of Severe Infantile Meningomyeloceles" in process of publication.

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the dorsal spine, requiring sectioning of three to five roots because of sensory overlap. This approach avoids opening the dura, prevents nerve regeneration, and permits immediate ambulation with minimal discomfort. Extradural cervical rhizotomies can done through the "key hole" approach used by the writer in "Cervical Disks". Both cervical and dorsal sensory roots have a separate root sleeve from that of the motor root.

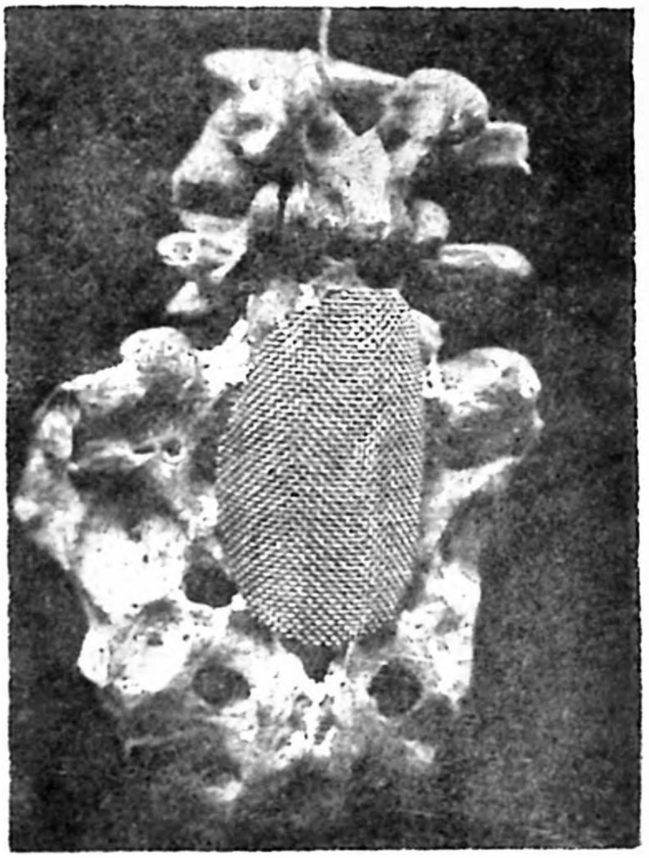

Figure 1. Steel mesh tunnel applied on a lumbo-sacral spine to demonstrate position and appearance.

4. "*Key hole*" *surgery for lateral cervical disks.* This process using high speed [3] and low speed [4] electric or hand drills, with a blade and hook retractor [5] was first presented at the Harvey Cushing meeting in Boston in 1949, in the same year that Frikholm in Sweden used a dental drill for uncapping the cervical root and lateral disk through the medial portion of the facet. The operation is performed in a sitting position under local cervical block anesthesia. The blade and hook retractor is used also in lumber disk exposure operations with the patient *on his side*, permitting maximum exposure with a minimal incision.

5. *Partial section of the proximal portion of the facial nerve for treatment of hemifacial spasm.* (W. J. German partially sectioned distal branches). Two-thirds of the nerve is sectioned and rolled backwards just proximal to its original branching under the ear, weakening function sufficiently

to stop the spasm but not paralyze. Overcutting is done which causes a temporary weakness lasting three months. Both early and late results are better than by traditional methods.

6. *Unilateral inferior temporal lobectomy with hippocampectomy* (1952) for the treatment of temporal lobe herniation. Its use is restricted to moribund patients (with decerebrate rigidity, fixed pupils, stiff neck and Cheyne–Stokes breathing). Resection of the inferior temporal lobe is carried out through and below the temporal horn and extended medially to include the hippocampus and and uncas, thus removing the hippocampal herniation and permitting an immediate flow of blocked spinal fluid through the incisura. The tentorium may or may not be sectioned, but resection of the herniation is imperative. Ten year follow-ups have been

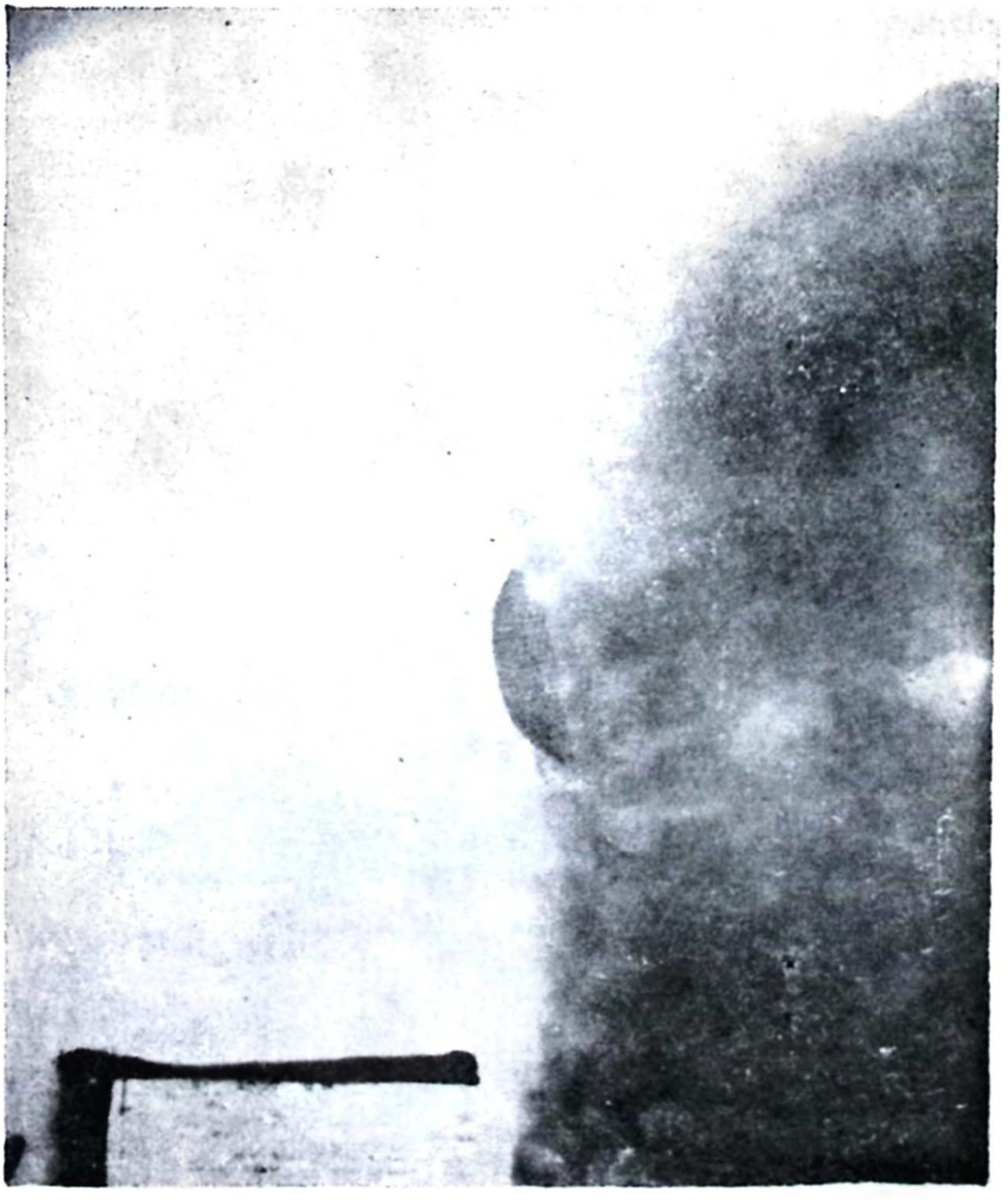

Figure 2. Lateral post-operative x-ray to show location of steel mesh tunnel.

made on eight patients. Normal lives may be anticipated in unilateral but not bilateral resections which exhibit marked loss of recent memory.

7. *Heavy steel mesh artificial tunnel formation in the repair of severe meningomyelocele and early hydrocephalus.* Such infants reveal a congenital absence of both a wall and a roof to the spinal canal. The bulging outwards of the exposed and extended spinal cord results in a direct compression of the spinal cord by overlying facia and skin when conventional methods of repair are used. This is especially true when the child sits or anteriorly flexes his back. The writer uses an artifical "Quonsett Hut" tunnel made of convex molded heavy steel mesh. Over this is drawn the erector spinal muscles' subcutaneous tissue and skin, using stainless steel sutures. A transverse skin incision is used with undermining from the scapulae to the rectum. In the nine cases which were followed up in a nine year period, there has been a continuing progression of neurologic improvement from the initial paraplegia to an unexpected arrest of hydrocephalus in all cases. Previous traditional repairs had resulted in four out of five developing progresive hydrocephalus. Postoperatively, the infant is kept with a 20 degree elevation of the head of the crib and for six months fluids are sharply limited to 350 cc.

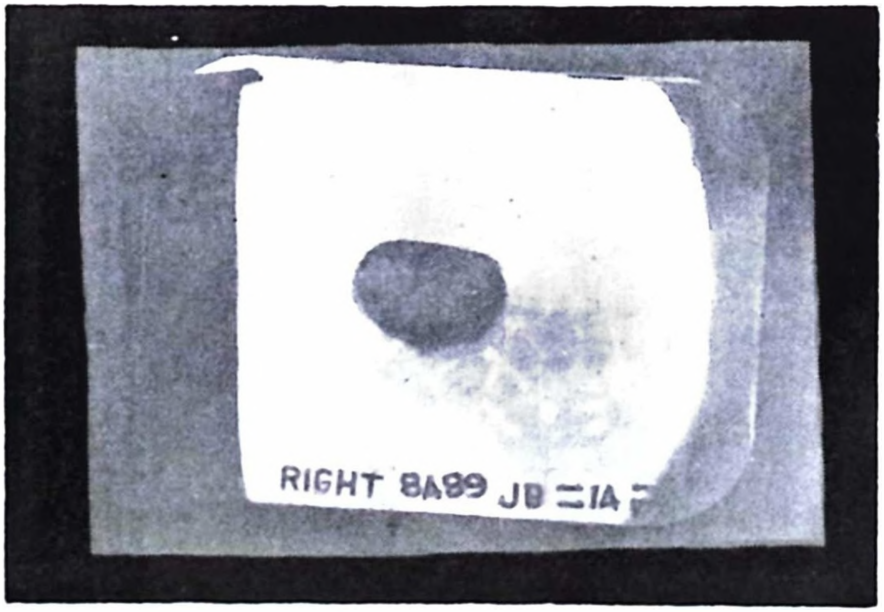

Figure 3. A-P post operational x-ray of spine demonstrating location of steel mesh tunnel.

8. *Simplified surgical approach for craniostenotic scaphocephaly.* Using a semi-upright position to lessen venous bleeding, we fashion a groove on either suture of the stenotic longitudinal suture followed by separation of the dura from the overlying bridge of bone by sliding a wire between the dura and bone. Thus a plastic filia "cigar wrapping" of the central bridge

is carried out, thus saving the necessity of making multiple drill holes or using clips. The result is a minimum of blood loss and an extra wide separation of bone edges by intervening plastic film.

9. *Miniature torsion bar spring clips for aneurysm surgery*[6] were developed by Lewis Down Brothers for the writer with omission of the large loop found and necessary in other models. They may be inserted and removed with simple pressure on the proximal end, using special applicators or ordinary hemostats.

REFERENCES

1. United Surgical Supply Company, Maromak, New York.
2. Codman Shurtleff Surgical Instrument Company, Boston.
3. Mueller Company.
4. Stryher, Jordan Day, 3 air drills.
5. Codman Shurtleff.
6. Down Brothers and Mayer and Phelps, Ltd., London.