Table-fixed retractor system for noncranial surgery

Technical note

RICHARD L. SAUNDERS, M.D.

Section of Neurosurgery, Department of Surgery, Dartmouth-Hitchcock Medical Center, Hanover, New Hampshire

A retractor system based on the principle of table fixation of the retraction device has been fabricated and utilized in a broad range of noncranial procedures. Based on the refinement of self-retaining brain retractor methods, this device allows an atraumatic fixed exposure without the danger of "self-retained devices" impaling soft tissue and the compromises of hand-held retractors.

KEY WORDS • retractor • spinal surgery • carotid endarterectomy • scalp flap • instrumentation

The quiet evolution to self-retaining brain retraction concomitant with the era of microneurosurgery represents a significant refinement in cranial surgery. Basic to the self-retaining brain retractor is the principle of table fixation of the retraction device. Noncranial surgery, although perhaps also changing, has not seen a similar fundamental alteration in methodology. We have fabricated a retraction system based on table fixation and report our experience with this device in a wide range of noncranial neurosurgical procedures.

Description of Device

The various components of the retraction system are shown in Fig. 1. A series of blades similar to those of conventional hand-held retractors was fabricated for the initial prototype. Each blade is riveted in a single-axis swivel to a rod 15-cm long and 1.2 cm in diameter. By means of a screw clamp with two axes of freedom, the retractor handle is attached to one of a variety of 1.2-cm diameter arms, which in turn is clamped to the side rail of the operating table. This side-rail clamp grasps the rail through the sterile drapes, allowing for system sterility and easy manipulation by the operating surgeon (Fig. 2).

Discussion

Brain retraction is improved when the retractor can be fixed in place and adjusted only as new exposures develop. These simplistic observations are seemingly incontroversible and stem from newer methods of stabilized retraction that have eliminated the encumbrance.

Fig. 1. Components of the retractor system. The blades can be secured to the three different arms by means of a screw clamp that has two axes of freedom. Shown at the bottom is the clamp for attachment of the arms to the table rail.
to the operating surgeon of hand-held retractors and the element of assistant fatigue with its inherent compromise of exposure. Compared with self-retaining brain retraction, retraction of soft tissue in noncranial surgery usually involves methods other than table fixation. One exception is the Gomez retractor* for abdominal surgery, wherein a series of rods fixed to the table create a framework upon which major visceral retractors can be secured. Most soft-tissue retractors are either hand-held or so-called “self-retaining” involving equal and opposite forces. The toothed blades of self-retaining retractors work by impaling soft tissue and exerting forces against tissues of different resistance. Although simply constructed, these devices have inherent disadvantages: namely, inadequacy of exposure and soft-tissue injury. The alternative to these disadvantages lies in the use of a system similar to that developed for self-retaining brain retraction.

Use of our initial prototype in 100 anterior and posterior spinal procedures as well as in carotid endarterectomy confirmed that fabricating a device with retractor blades similar to those of conventional hand-held retractors but which could be fixed to a table could add significant refinements in surgical technique with no disadvantages. The main advantage of this retraction system is the elimination of tissue trauma caused by toothed blades and the facilitation of exact unchanging exposure. The amount of pressure on tissues is actually decreased by eliminating the need for equal and opposite pressures and the use of a swivel connection of the retractor blade to the blade handle. For example, this retractor provides excellent exposure of the distal internal carotid artery in carotid endarterectomy — exposure often obtained only by hand-held retractors. High carotid bifurcation exposure can be readily achieved with a table-fixed right-angled retractor. Improved and more precise exposure in anterior cervical disectomy eliminates entirely the dependence upon impaling the longus colli muscles and allows precise incision placement. Lateral mobilization of the longus colli musculature, if necessary, is a simple adjunct. Movement of the soft-tissue bulk either cephalad or caudad, as interspace exposure requires, is readily accomplished by simply placing the retractor blade at a precise point and fixing the clamp connectors. When interspace distraction is required, the mobility provided by the swivel handles of the retractor is more than adequate to prevent injury or loss of exposure.

In more extensive anterior cervical vertebral exposure, no other retractor method, hand-held or otherwise, approached the simplicity, safety, and minimal morbidity of the table-fixed retractor method. Figure 3 illustrates the exposure that is feasible in a three-level vertebrectomy and fusion procedure. Unilateral posterior spinal procedures were refined simply by eliminating the midline post that was integral to the Scoville1 and Williams2 retractors for hemilamina exposure. The risk of avulsing the interspinous ligament was thereby obviated, as was crowding of the operating field that had been created by the additional retractor hardware.

In the initial design of the retractor, we assumed that some fixation of the body would be necessary, at least in cases of neck surgery. This has not proven to be the case. Even in a demanding exposure such as multilevel

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Fixed retractor for noncranial surgery

anterior cervical vertebrectomy (Fig. 3), no body fixation has been required. On the other hand, in cervical facetectomy and laminectomy it is our practice to use three-point head fixation regardless of the retractor method; consequently, we are unable to comment on use of this instrumentation in posterior cervical exposures performed without body fixation.

When compared with standard retractors, our retractor apparatus seems bulky; however, this has not been an encumbrance. The freedom of device positioning, facilitated by the 15-cm long blade handles and mobile screw clamps, allows for an extremely low attachment profile, well away from the surgical wound. Often, as in the case of endarterectomy, a single table-fixed blade is used in conjunction with a conventional Weitländer-type device for the critical distal exposure.

Conclusions

This retraction system represents an extension of a valuable adjunct to cranial surgery; that is, table fixation of the retraction device. This system offers improved and more precise exposure without risk to soft tissue. Although we found the initial prototype generally satisfactory, the possibilities are infinite for modification of the entire system, from retractor blades to table fixation arms for specific surgical tasks. For example, with two blunt claw blades and a single-arm table fixation, a large scalp flap can be easily and exactly retracted. We believe that this device represents a fundamental change in the methodology of soft-tissue retraction.

References


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