Vertebral trephine: a new instrument for anterior cervical fusion

Technical note

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A simple yet versatile instrument for anterior cervical fusion is described.

KEY WORDS • anterior cervical fusion • cervical spondylosis • myelopathy • cervical spine • instrumentation

Cloward recommended excision of degenerated and herniated discs by drilling a hole straddling the disc site, and devised instruments to facilitate this procedure. However, it is a common observation that the four-flanged drill often employed to drill a hole fails to cut through the end-plates of the vertebral bodies, or the intervertebral disc itself. As a consequence, these tissues buckle up in the drill hole, and, if not evacuated, they may frequently jeopardize the spinal cord. Also, a four-flanged drill, no matter how sharp, requires some pressure to drill through the vertebral bodies. Such pressure may rock the cervical spine back and forth, which is undesirable, especially when drilling the vertebral bodies close to the anterior surface of the dura and the spinal cord. The cord, lying within its tight confines, appears quite vulnerable even to minor trauma. In addition, with the four-flanged drill, the sharp-nailed guard sleeve must be hammered into the vertebral bodies, and during the process of drilling it rocks and rolls despite the best efforts of the assistant to keep it steady.

All these drawbacks can be obviated by using the "vertebral trephine," a simple instrument that was devised for anterior spinal fusion because Cloward's instruments were not available. It proved so effective and useful that we now prefer it to Cloward's drill.

Instrument Design and Use

Basically, the vertebral trephine is a sharp-toothed instrument, designed like a cranial trephine with a continuously adjustable depth guard sleeve, and a metric ruler engraved on its side (Fig. 1). Its outer diameter is either 9, 10, or 12 mm, with corresponding inner diameters of 8, 9, and 11 mm. The size of instrument employed depends upon the sizes of the vertebral bodies or personal preference of the surgeon. The effective

* Vertebral trephine manufactured by Aesculap, Werke AG, Postfach 40, D-7200, Tuttlingen, West Germany.

FIG. 1. The vertebral trephine (upper) and a magnified view of its cutting end (lower). The centering pin is not shown.
length of the trephine is 35 mm, and the length of the entire instrument is 170 mm. Thus, it is long enough to keep the operating surgeon's hands clear of the patient's face, yet short enough to impart a good tactile sensation to the drilling hand. The guard sleeve can be adjusted to a fraction of a millimeter, which makes this instrument extremely safe. Furthermore, a reverse-screw free nut has been incorporated which, when approximated to the guard sleeve, will prevent its accidental retraction during the process of drilling. Also, a trephine one size larger can be used to cut an appropriately sized cylindrical graft from the iliac crest.

Use of the instrument is very simple. After evacuating the disc contents the trephine, with its centering pin mounted, is placed across the disc space. It is important to determine the axis of the hole to be drilled because, unlike Cloward's instrument, once drilling has gone deeper than 5 mm, it is neither possible nor desirable to change the alignment unless one starts all over again. Following an initial 2-mm deep cut, the centering pin is removed and further drilling is continued for approximately three-quarters of the anteroposterior diameter of the vertebral body. The instrument is withdrawn and the partially sawn bone cylinder is removed with rongeurs. Thereafter, the trephine is repeatedly withdrawn and advanced a few millimeters or a fraction of a millimeter, as required, until the hole is complete. Just before drilling the last millimeter or so, the bone cylinder becomes mobile, a warning sign to the surgeon. Further dissection must therefore be performed by fractional advancement of the instrument until the bone is cut through. The remnants of the bone cylinder are removed and the posterior longitudinal ligament is excised by alligator-action microscissors. After use in a few cases, the procedure is surprisingly easy, and the intact bone cylinder can be removed without the need of nibbling. Thereafter, the operation is akin to Cloward's operation.

Comment

Since 1970, we have successfully used the vertebral trephine in 166 cases that required anterior spinal fusion. Not once have we injured the dura; in fact, it is virtually impossible to do so. Even if the measurements of the size of the vertebral body on the x-ray films (after eliminating magnification) are incorrect, an excellent warning of impending completion of the hole is obtained when the bone cylinder becomes limp and begins to move with very little or no force. No effort must be made, however, to excise the posterior longitudinal ligament with the trephine. The instrument is particularly invaluable for excision of diseased vertebral bodies. Two holes, one above and one below, are made and the intervening bone can then easily be nibbled off. We have performed 27 such operations, the results of which are being assessed. The other advantages of this instrument include its simple fail-proof construction, the integrally incorporated ruler to measure the depth of the trephine, its light weight, and the fractionally adjustable depth guard. Also, it obviates the possibility of spinal trauma by eliminating to and fro movement of the cervical spine, which is not uncommonly seen during drilling of the hole or with hammering in of the guard sleeve. Briefly, this instrument is safe, simple, inexpensive, easy to use, and serves the function of five instruments; namely, a drill, guard, Hudson brace, foot rule, and measure for the length of the graft required.

References


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