The Use of the Twist Drill to Evaluate Head Trauma

B. O. Rand, M.D.,* A. A. Ward, Jr., M.D., and L. E. White, Jr., M.D.
Division of Neurosurgery, University of Washington School of Medicine, Seattle, Washington

The twist drill technique was originally developed at the Montreal Neurological Institute by Dr. William V. Cone and his associates over twenty years ago as a substitute for burr holes in many circumstances. Although well-known to those who received training at the Montreal Neurological Institute, the technique was not published because Dr. Cone was concerned that its great advantages of simplicity and safety in trained hands were qualities which might lead the uninstructed to utilize the technique with dangerous abandon.

Our experience at the University of Washington during the past 17 years indicates that the twist drill technique can be both safe and useful. Not only is it readily used for ventriculography and tumor biopsy, but the safety, ease and rapidity with which this procedure can be performed make it a valuable tool in the diagnosis and treatment of traumatic intracranial hemorrhage. The mere simplicity of the technique prompts rapid and definitive diagnosis and decreases the time between injury and treatment.

There are 3 objectives that have prompted us to publish our experience with this technique as it has been applied in a variety of conditions associated with head trauma.

1. To describe the technique in detail so that interested neurosurgeons can perform and evaluate the procedure.
2. To illustrate with clinical material the rapidity and ease with which the procedure can be performed, using a minimum of equipment and technical assistance.
3. To demonstrate the low mortality and morbidity associated with the procedure.

Technique

The diagnostic and therapeutic problem is to gain access into the subdural and epidural spaces.

This is readily accomplished in the emergency room, on a stretcher or in an operating room by drilling a small hole through the skull using the equipment illustrated in Fig. 1. Through this hole a blunt needle can be inserted into the epidural or subdural space.

The patient is placed in a supine position with the head of the bed, stretcher or operating table elevated 15 to 20° or to an angle that is comfortable and convenient for the operator and patient. The scalp is then shaved, including the temporal areas, and prepared with a suitable solution. Surgical caps and masks are worn by the operating personnel and the hands of the operator are washed and gloved. A sterile towel is then placed under the head of the patient. The location of each proposed hole is marked by a gloved fingernail or a sterile needle. In cases of trauma, as illustrated in Figs. 2 and 3, the anterior holes are placed just in front of the coronal suture and 4 to 5 cm. from the midline. The posterior or parietal holes are placed over the parietal boss 7 to 8 cm. from the midline. A ½ inch circle of skin and subcutaneous tissues at these sites are infiltrated with 1% xylecaine containing 1:100,000 epinephrine. If a large wheal is raised with the local anesthetic it tends to distort the relationship between the scalp incision and the underlying twist drill hole. This is more of a problem with re-exploration of the hole than with the initial exploration.

Using a #15 Bard-Parker blade or its equivalent, a small stab wound is made through the scalp and peristomeum. Occasionally a bothersome scalp bleeder is encountered at this point and can usually be controlled by further injection of local anesthesia or by pressure. A 7/64 inch, regular angle carbon bit driven by a Smedberg hand drill is used to perforate the skull. It is inserted through the scalp incision perpendicular to the skull. Care must be taken as the hole is started not to allow the drill point to "walk," otherwise the underlying bony opening will be difficult to identify. With care, the twist drill first binds at the diploe and again as the inner surface of the skull is reached. In cases where ventriculography or brain biopsy is being performed, it is necessary to tunnel-out (bevel) the outer rim of the twist drill hole. This can be best accomplished by angling the drill around the circumference of the hole periodically after the drill has penetrated the outer table of the skull and before the inner table has been reached. Too much angulation of the drill after the hole has been started may break the drill point. After the

Received for publication July 6, 1965.
Revision received April 12, 1966.
* Present address: Division of Neurosurgery, University of Kentucky Medical Center, Lexington, Kentucky.
inner table has been perforated, the drill is removed and the bone dust is cleaned from the area and from the drill point.

The dura is then palpated by means of a #16 or #18 Cone ventricular needle. Occasionally fresh blood from the diploe will be obtained but this should cause no concern if, by palpation, the dura is found to be tightly adherent to the inner table. If the dura cannot be palpated and if proper care has been taken not to perforate it, then one is dealing with an epidural hematoma. If, on the other hand, the dura is adherent to the inner table, then the next step is carefully to shred (perforate) the dura by replacing the drill and making partial revolutions of the drill handle. Care must be taken at this point not to plunge the drill point into the subjacent cerebral tissue. It is recommended that only slightly more than the estimated amount of drill point needed to go through the scalp and bone be exposed beyond

---

**Fig. 1. Twist drill tray.**

**Fig. 2. Location of stab incisions and needle placement through twist drill hole.**