

TECHNIQUES IN  
**EPILEPSY  
SURGERY**

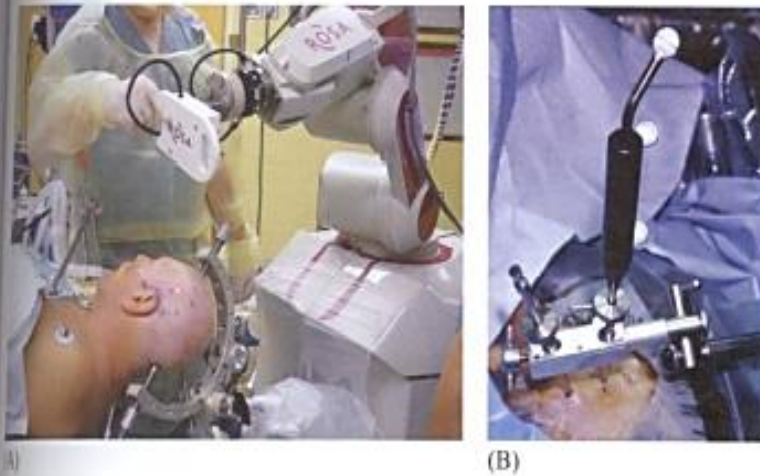
The MNI Approach



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**Figure 5.15** (A) Robotic assistance can be used for registration and selection of trajectories and (B) The Free Guide is essentially made of 2 "chucks," one for stabilization with a sharp pin and the other a working chuck for image guidance with a stereotactic pointer, scalp/skull penetration and electrode insertion. The optical neuronavigation pointer when inserted within the guidance chuck is adjusted to fit the predetermined trajectory to a target.

orthogonal approach to use the information provided by angiography.

### Frameless stereotactic apparatus (Free Guide)

The Free Guide is essentially an articulated arm equipped with a double chuck assembly, one chuck being used for stability while the working chuck accommodates tools for image guidance, scalp/skull penetration, and electrode insertion (Figures 5.15, 5.17). The articulated arm is easily locked in position by hand and provides an exceptional range of movement. Each chuck is mounted within a rotating sphere for fine adjustment. Both chucks can be locked securely to ensure that an instrument inserted through them retains its position or an instrument can slide freely along a selected path. A sharp cranial pin is inserted through the proximal stabilizing chuck to the scalp or can be gently hammered into the skull through the skin to provide additional stability during steps of electrode insertion, in particular the twist drill skull-perforation step. The distal working chuck receives an optical pointer used to select and maintain the electrode trajectory, as well as to enable the navigation to calculate the distance to target. Transcutaneous perforation of the skull and dura then insertion of electrode is performed through the working chuck (Figures 5.15–5.18).

### Robotic Assistance

Although entirely satisfied with the Free guide in the implantation of several thousand electrodes, we have progressively relied on robotic assistance (ROSA, Medtech, Montpellier, France), otherwise using the same operative sequence and instrumentation for electrode placement including the C-shaped head clamp (Figure 5.15A) (16). A definite advantage of the robot over the Free guide is the ease with which a trajectory can be automatically established rather than manually selected, leading to a significant saving in operative time.

### Registration (see also Chapter 4)

#### Fixation of the optical reference device

The optical tracking device is affixed to the base of the C-clamp. The camera is placed in such a way as to be able to detect the probe movements on both sides of the head. Registration of a series of specific anatomical landmarks is then performed between the real head and the computer-reconstructed head according to a strict protocol for neuronavigation coregistration (see Chapter 4). Paired common reference point registration is performed using both canthi of the eyes, the nasion (bridge of the nose), and a point (the small depression) immediately above both tragi of the ears (supratragal points). Accuracy of registration is evaluated by performing several visual checks over the scalp.