Magnetic Navigated Catheterization

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April 4, 2005
ELE482

Cardiac catheterization involves passing a thin flexible tube through an artery or a vein up to the heart, and into a coronary artery. The procedure, which produces angiograms of the coronary arteries and the left ventricle, can be used to measure pressures in the pulmonary artery, and to monitor heart function, usually in critically ill patients.

In most cases, cardiac catheterization is recommended when a partial or complete arterial blockage is suspected. It is used to evaluate how well the heart is functioning and to obtain information about blockages. For most of the history of cardiac catheterization, the instrument was manually inserted into the patient by the physician. The direction the catheter took relied on the flexibility of the physician and instrument as well as its diameter.

Magnetic navigation is an interaction between: a magnetic field of specified direction and magnitude, positioned externally to the patient, and a tiny magnet in the tip of the interventional device. The end result is alignment of the distal tip of the magnet with the field direction — literally steering catheters and guide wire through the heart. Magnets are rotated to change field orientation as an automatic advancement system automatically controls catheter advancement and retraction — eliminating any pulling or pushing on the interventional device.

Potential Advantages include:

— Does not rely on physician dexterity
— More device flexibility, it can make turns 90–degrees or sharper
— Device controlled at the distal tip
— Automated advancement system supports remote navigation
— Reduced radiation exposure for physicians

The interface used by the surgeon is a joystick that controls the magnets, and navigation tools on the computer permit further device direction and movement control with the click of a mouse. Stereotaxis' Navigant software provides a range of preset commands; including bulls' eye orientation, target-based navigation, and 3D Virtual anatomical displays.

<u>The magnetic requirements include:</u>

— In order to contain the 5 Gauss magnetic field within the procedure and control rooms, it is necessary to install a magnetic shield composed of commonly available steel sheeting
— The magnetic field needed for catheter and guide wire control is less than 1/20th that of a standard MRI machine
— The magnets create constant precisely–controlled field strength in a defined volume of space within the body