

MAGNETIC NAVIGATION IN PERCUTANEOUS CARDIAC INTERVENTION

Mark Patterson 29th June 2010

1. In primary percutaneous coronary intervention (PCI) time is crucial and magnetically navigated PCI can be performed as well, if not better than, conventional PCI, as defined by contrast media use, procedural time, fluoroscopy time, and success rate. (This thesis).
2. The addition of the third dimension to steering angioplasty wire direction is a breakthrough from the limitations of 2 dimensions as seen on a fluoroscopy screen. (This thesis)
3. Patient specific characteristics such as the degree of angulation, number of bends in the coronary artery can predict wire passage, and therefore (to a degree) the success, of a percutaneous coronary intervention procedure. (This thesis)
4. Many factors, such as familiarity with the software, frequency of use, thorough training and operator experience, combine to give a distinct learning curve when beginning with magnetic navigation. (This thesis)
5. The properties of the magnetic wire, (over and above the magnetic properties of the tip) are significantly different to conventional wires. (This thesis)
6. Magnetic Navigation shows its potential in the success with those patients in who conventional wire technique has failed. (Journal of the American College of Cardiology 2005; 47(3):515-21, Clinical Research in Cardiology 2009: 98(9):541-7).
7. Tortuosity can be present in different segments of the coronary arteries and is associated with increased technical difficulty, increased use of contrast and fluoroscopy, and reduced PCI success rates. These are problems that are pre-eminently addressed by magnetic navigation. (Journal of Interventional Cardiology 2008; 21(6):504-11).
8. The integration of multislice computerized tomography and IVUS with the magnetic navigation system now allows percutaneous coronary intervention procedures to be performed entirely without contrast. As contrast is a known risk factor for the development of patient complications, magnetic navigation could play a major role in reducing morbidity or mortality. (Journal of the American College of Cardiology 2009; 53:741-6).
9. 'The technological capacity to remotely manipulate devices, using robotic arms and computational tools, has been developed for surgery and other medical procedures.' The use and integration of computers will revolutionize PCI as the autopilot has revolutionized the Air travel industry. (Annals of the New York Academy of Science. 2010; 1188:207-13).
10. With the 'development and integration of external robotic magnetic control', will we in the future see navigation of an untethered micro device in humans. (Conference Proceedings: Annual International Conference of the IEEE Engineering in Medicine and Biology Society 2009;2009:6068-71).
11. Humanity is one of the top skills of an Interventional Cardiologist.