Catheter Based Imaging for Percutaneous Medical Device Placement

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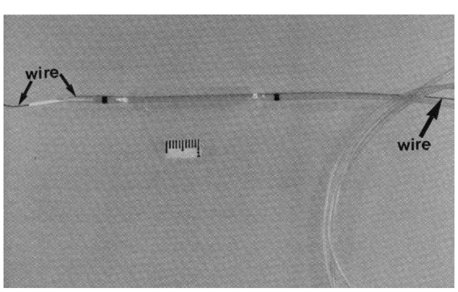
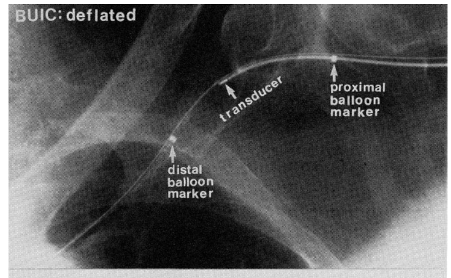
February 9,2009

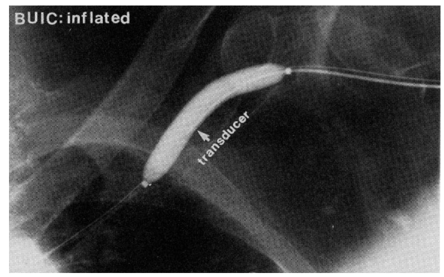
Percutaneous medical device placement has become the leading method for less invasive cardiothorasic surgery. A study was performed on the relationship between procedure indications and outcomes of percutaneous coronary interventions which referenced the ACC National Cardiovascular Data Registry for the period of January 1, 2001, through March 31, 2004 indicated that nearly 500,000 percutaneous coronary interventions (PCI's) had been performed and was still climbing at considerable rates (2).The coronary interventions reviewed had been classified from mild to high risk starting with Class I (Patients with asymptomatic or mild angina , to Class II and Class III (patients with unstable angina) (2). For the number of cases reported, a medical device that could image vasculature with simultaneous deployment could change the face of cardiothorasic surgery.

Many sources of imaging exist already and have been used for such procedures. Recent discoveries and invention include rtMRI, ultrasound tomographic imaging, magnetic resonance imaging, and ultrasonic imaging.

In particular balloon-ultrasound imaging catheters have the ability to be simultaneously deployed with other medical devices such as stents and percutaneous heart valves. This device captures information by using a force transducer placed strategically at the proximal end of the balloon catheter. Boston Scientific BUIC uses an 8F cathter shaft with a standard guidewire port at the most distal end. A transducer and inflation port run centrally throughout the catheter starting at the most distal end to the proximal end of the 4 cm balloon. The inflation lumen also houses the rotary drive shaft with a single element 20MHz transducer at its tip. To compensate for inflation fluid and surrounding tissue the device permits ultrasound transmission at <6 dB one-way attenuation. This device has been used in human trails for the intervention of vascular occlusive disease plaque to vessels measurements. After careful assessment, this device cleared for use in analyses of lumen-plaque-wall alterations preceding, during, and immediately after PTA in patients with peripheral vascular disease. (4)







Ultrasound technology has taken cardiothorasic surgery to new heights making diagnosing and treating patients safety, efficiency, and cost. Hope for three dimensional percutaneous catheter imaging could be a new direction at which this field could grow with unlimited potential.

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