Value Of Robotics For Endovascular Procedures: What Does The Future Hold

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Scott’s parabola

The rise and fall of a Surgical Technique

Magellan Robot

Health Technology Assessment

- Safety
- Feasibility
- Efficiency
- Cost

Robotic technology in cardiovascular medicine

Current state in tracking and robotic navigation systems for application in endovascular aortic aneurysm repair

Johannes Bennett, Giorgio Vettore, Celia Riga, Guiseppe Waeli and Peer Steinhoff
CLINICAL EXPERIENCE - St Mary’s
116 patients, 150 targets

Technical success 97% (145/150)
Successful agent/device delivery 100% (82/82)
Median robotic set-up time 7min (6-9)
Median robotic navigation time 6min (3-18)
30d mortality 1.7% (2/116) (MI, Sepsis)
Neurology (Stroke/Paraplegia) 0
Access /device/path-related 1.7% (2/116) (sheath/closure device)
Follow-up 32 months (1-42)
Manual to Robot conversions 16% (18/116)

42% cases selected due to adverse anatomy

Safety & Feasibility
CLINICAL CASES – CAS

- Minimal arch manipulation
- Low CF
- No need for ECA wire
- Stability
- High risk, symptomatic cases

No strokes

CLINICAL CASES – ARCH TCD Hits

Rafii-Tari H, Riga CV, Payne CJ, Hamady MS, Cheshire NJ, Bicknell CD, Yang GZ

CLINICAL CASES – EVAR & FEVAR

- 24 EVAR
gate cannulations
- Comparable
- 14 robotic, 10 manual
- Experienced operators

- 24 FEVAR
renal cannulations
- Comparable
- 12 robotic, 12 manual
- Experienced operators

CLINICAL CASES – FEVAR

SMA Cannulation
(Smach)

SMA Stenting
(Smach)

SMA Cannulation
(Robotic)

SMA Stenting
(Robotic)

ADVANTAGES – STABILITY & LEARNING CURVES

Wire exchange: Loss of position during Landercort wire insertion

Riga CV et al JVIR 2012 Oct;23(10):1369-75 2012

Advanced catheter technology is the key answer to overcoming the long learning curve in complex endovascular procedures


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ROBOTICS & 3D NAVIGATION


Vandini A et al, MICCAI 2013

Optical Coherence tomography, Liang Zhao  MICCAI 2016,

ROBOTIC STENTGRAFT MANUFACTURING

MAGELLAN SYSTEM Conclusions

- Safety & Feasibility
- Early clinical effectiveness
- Valuable for complex tasks: FEVAR, CAS, embolizations
- Radiation exposure minimal
- Cost
- Limited to procedural stage
- No localization capabilities

Reengineering the Art of EVAR

NICE National Institute for Health and Care Excellence

- Image Integration
- Sensing
- Workflow
- Delivery of Therapy
- Materials
- Manufacturing