The Thoracic Hybrid OR Challenges Encountered Along the Way

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The Original Hybrid

- Greek-usually a creature with partial human and partial animal parts
  e.g. Minotauros- a monster with a human body and a bull’s head, kept in a maze and was ultimately slain by Theseus
The Hybrid Operating Room

- Cardiac surgery + catheter-based intervention
- Image based endovascular surgery combined with open surgery
How About Thoracic Surgery

- Open surgery - chest, neck, abdomen
- Thoracoscopic surgery
- Laparoscopic surgery
- Endoscopy (bronchoscopy/esophagoscopy)
- Endoscopic US (EUS, EBUS)
- Endoscopic therapy (laser, cryo, PDT)
- Image guided surgery (RFA, laser, etc)
What type of functions are needed to be integrated?

- Imaging - to define organ, lesion and margins
- Pathology
- Functionality and performance
- Robotics and other devices (NOTES)
New Imaging Technologies

- Fluoroscopy that can provide CT quality images
- Electromagnetic tracking for bronchoscopy and other image guided applications
- Ultrasound to direct pleural biopsies
- PET to define tumor margins
- Multiple surgical imaging modalities (endoscopes, bronchoscopes, thoracoscopes)
Pathology

- Interaction between surgeon and pathologist
  - Diagnosis
  - Margins
- Tumor banking
- Molecular pathology
  - Frozen section for diagnosis and margins
- Drug sensitivities
- Tumor markers
Organ Function

- Cardiac function: TEE
- Lung function
- Organ preservation
- Viability of conduit-esophagectomy
- Adequacy of esophageal function
  - Fundoplication
  - myotomy
The Thoracic Hybrid OR Concept Ideal Requirements

- State of the art patient care
- Team effort and cross training
- Introduction of imaging technologies
- Interaction with collaborators
- Image capture, storage and transmission
- Surgeon control
- Tie-in to pathology
- Education at all level
- Redefining Operating Room personnel
Configurations

- Size
- Flexibility
- Connectivity
- Plug and play principle
- Upgrade-ability: lease vs. purchase
- Control area
- IS/Storage
- Personnel: Team and learning
Interaction with Industry

- Development of new technology
- Trials using new technology
- Improvements upon current technology
- Clinical trials with new applications for existing technology
- Integration of data
Specific Challenges for the Next Step

- The room cannot sit idle, it should be useful as either an advanced room for several specialties or a standard room for Thoracic Surgery.
- Define partners for Thoracic Surgery based on instrumentations and functionality:
  - Oncologic Surgery
  - Orthopedic Surgery (Oncologic)
The AMIGO Project

- Designed to be the ‘second generation’ of image-guided surgery facilities

- Components include:
  - Multi-disciplinary procedure suite
  - Multi-modality imaging equipment
    - 3T MRI
    - PET/CT
    - Rotational angiography with CT like reconstruction
    - 2D and 3D diagnostic Ultrasound
    - Optical imaging
  - Image navigation and surgical guidance software
  - Therapy devices
    - Surgical robots
    - Endoscopes
    - Laser, RF, microwave, and cryo ablation equipment
Facilities Planning

- Flexible room setup
- Booms and light
- Infection control
- Shielding and EMI
- Control room
- Retractable/ceiling mounted imaging devices
Booms

- Lead shield
- 50” monitor
- Anesthesia boom
- Navigation monitor
- Navigation camera
- Cardiac ablation equipment

Lights x3
- Monitors x4
- Surgical support equipment