A Robotic Program for Aortic Surgery: How to be Safe, Valuable and Cost-Effective

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Disclosure
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Proctoring for Intuitive Surgical Inc.

Laparoscopic Aortic Surgery?

Occlusive Disease or Aortic Aneurysm
Expected benefit vs Open Surgery
- Faster Recovery
- Shorter Hospital stay
- Less Abdominal wall complications

Expected benefit vs Stenting
- Better long term outcomes
- TASC D, or stenting failure

Limitations
- 2D Imaging
- Restricted Motion
- Poor hand-eye coordination
- Poor Ergonomic Positioning
- Exhausting for complex procedures...
- Learning curve
- Durations:
  - Anastomosis
  - X Clamping
  - Procedure

Detrimental for Patients

Robotic Surgery

Robotic Program

- Robotic Surgical Program = Hospital Project
  - Shared Robot Da Vinci Si HD since 2014
    - Urology / Vascular / Gynecology / Thoracic / Visceral
  - Enthusiastic Nurse Team:
    - Progressive Formation to each Specialty

- Define Number of Indications = OR needs
  - 120 Aorto-iliac revascularization / year
  - 100 AAA / year
  - 20 to 30 / year = 2 / month
Surgeon’s Training = 2 Senior Aortic Surgeons
- « Console surgeon » Certification by Intuitive
- 2 Senior Surgeons / Procedure
- 2 first interventions with an Intuitive Proctor

Robotic Training

Robotic Aortic Surgery

Feb 2014 – Oct 2018
- 72 Aortic surgeries
  - 59 males / 61 ± 5 yo
- 68 Occlusive Diseases
  - Tasc C = 23 / Tasc D = 45
- 12 Infra-renal Aortic Aneurysms
  - 8 Associated diseases

Robotic Aortic Surgery

No Learning curve effect
- Docking = 8 min (5 to 12)

Robotic Aortic Surgery

Outcomes of Learning curve
- 2 conversions to OR
- 1 Colonic Ischemia / 1 Splenectomy
- In-Hospital Mortality = 1,4 %
- Median Hospital Stay = 7 (3 to 17)

Robotic Aortic Surgery

No Learning curve effect
- Procedure: 205 min (160 to 310)
  - Clamping: 52 min (35 to 89)
  - Anastomosis: 32 min (24 to 55)

Robotic Aortic Surgery

Cost Effectiveness
Case Control Study compared to OR
Discharge 3 days earlier

<table>
<thead>
<tr>
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<th>Robotic surgery</th>
<th>72 pt</th>
<th>% 50 OPEN</th>
<th>% P</th>
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<td>IH Mortality</td>
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<td>1.4</td>
<td>2</td>
<td>4</td>
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<td>Hospital stay (days)</td>
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<td>10</td>
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Conclusions

- Feasible & Reproducible
- Acceptable & Cost-Effective Learning curve
- 1st line treatment when OR is indicated
- Young Patients with low surgical risk factors
- Severe Lesions = Tasc C & D lesions / AAA

Robotic Aortic Surgery

**Conclusions**

- Routine procedures: 2/day every 2 weeks
- 1 Senior Surgeon + 1 Fellow + 1 Resident
- Increasing indications to iliacs and others:
  - Arcuate Ligament Syndrome x4
  - Splenic aneurysms x5
  - Transposition of the Genital Vein x2
  - Type 2 Endoleaks x2

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