

# Integrating Robotic Systems back into Vascular Surgery: Do not abandon them yet, we must be involved.

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Medical Director, Bookout Center for Robotics Imaging and Navigation

Disclosure: Siemens Consultant, Gore Consultant.



# No Disclosures

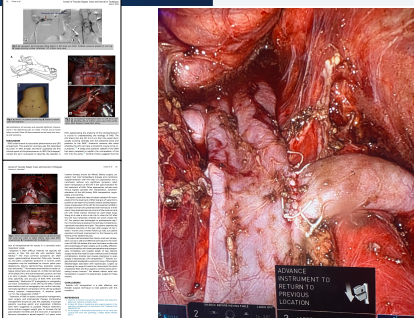


## 5 yrs ago.....

- Money, SR at SCVS
- "But I didn't do it"



**INNOVATIVE TECHNIQUES**  
Robotic-assisted left ventricle reconstruction as a novel approach for the treatment of myocardial infarction  
[The following text is partially obscured and difficult to read]



## Bleeding in the pelvis - need help!

- Called to OR

I can't do my job!



## Bleeding in the pelvis - need help!



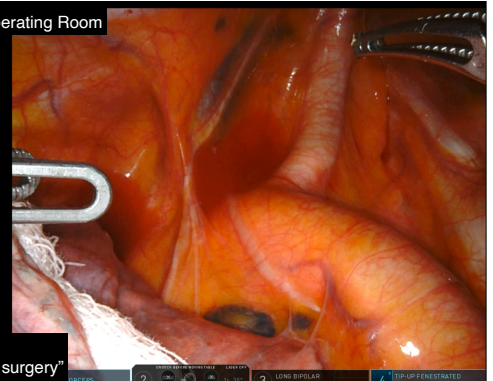
Jacob Watson  
Robotics Research Fellow  
2024-2025

**5<sup>th</sup> ANNUAL SYMPOSIUM: 2024**  
MAR 16-20  
WEST HILKLAND • SCOTTSBURGH, KY

**SIG12. Iatrogenic Injury Of The External Iliac Artery Requiring Emergent Robotic Assisted Laparoscopic Vascular Repair**  
Jacob Basit Watson, MD, Aparna B. Karnat, MD, Alan B. Lumsden, MD, Chandratta B. Bavare, MD.  
Houston Methodist Hospital, Houston, TX, USA.

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Jacob Watson, Chandratta Bavare, Aparna Karnat, Alan Lumsden  
Houston Methodist Hospital, Houston, TX

## A visit to a Thoracic Operating Room



Dr Min Kim  
"This is not laparoscopic surgery"

## What benefits the patient?

- Think: every operation as delivery system, core therapeutic component
- Open surgery
  - Core therapeutic component – excellent and proven
  - Delivery system – unacceptable
- Endovascular
  - Delivery system – excellent
  - Core therapeutic component – less durable
- Can robotics provide
  - Delivery system - excellent
  - Retain core therapeutic component as excellent

## Houston Methodist Resources: Uniquely positioned to tackle this problem

- Amazing collaborative blend of robotic experts across wide variety subspecialties
- MITIE resources with dedicated Xi robot, Intuitive and institutional support
- Vascular partner with open, endo, laparoscopic skills-
- Shoot first with your best gun
- If he can't do it it's not doable!
- “Bookout Center” for robotics, imaging and navigation

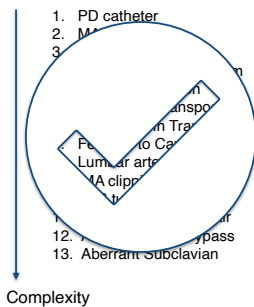


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Robotic Vascular Surgery Program Launches at Houston Methodist  
On 21-03-2022 - @HMCHealth

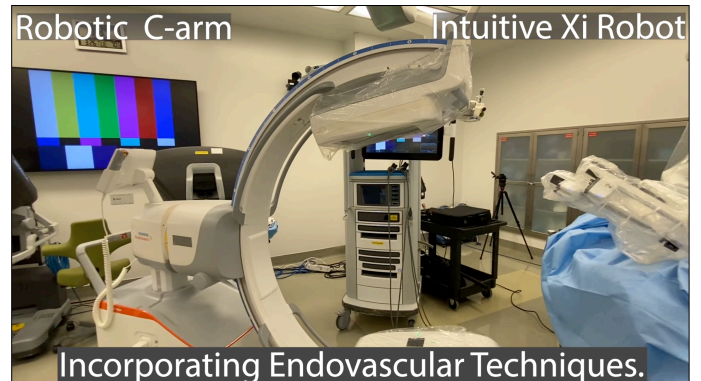
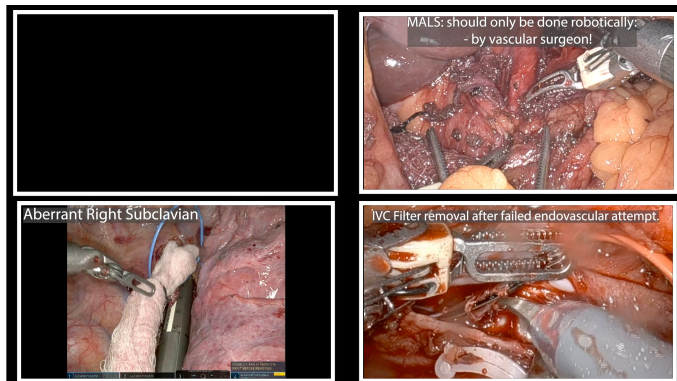
**Interprofessional Curriculum for Emergency Undocking within General Surgery Residency Training**  
Mary H. Oh, MD, Benjamin A. Benavides, Ray Chihara, MD, Min Kim, MD, Edward Y. H. Chan, MD  
Houston Methodist Hospital, Department of General Surgery

Background	Methods	Logistics	Evaluation												
<p><b>Cool idea</b></p> <p>Use simulation rooms with an interprofessional team to build skills to manage hemorrhagic emergencies during robotic surgery</p> <p><b>Need</b></p> <p>With the adoption of robotic surgery, management of robotic emergencies must be incorporated into training</p> <p><b>Rationale</b></p> <ul style="list-style-type: none"> <li>• There is a dearth of literature addressing training for robotic hemorrhagic emergencies</li> <li>• Simulation requiring emergency undocking is:                             <ul style="list-style-type: none"> <li>• Time sensitive</li> <li>• Not an ideal learning environment</li> <li>• Training for managing critical but rare procedures is best addressed with simulation</li> </ul> </li> <li>• To expose trainees to hemorrhagic robotic emergencies requiring undocking</li> <li>• To apply an emergency undocking protocol to safely manage the situation</li> <li>• To improve teamwork and effective communication through deliberate practice</li> </ul> <p><b>Participants</b></p> <ul style="list-style-type: none"> <li>• 25 General surgery residents</li> <li>• 30 OR nurses and scrub technologists per session</li> </ul>	<p><b>Format</b></p> <ul style="list-style-type: none"> <li>• Undocking and closed loop communication videos</li> <li>• Video review</li> <li>• Introduce protocol</li> <li>• Team members and roles</li> </ul> <p><b>Methods</b></p> <ul style="list-style-type: none"> <li>• Do and Receive feedback</li> <li>• Watch and Give feedback</li> <li>• Deliberate practice</li> </ul> <p><b>Debrief</b></p> <ul style="list-style-type: none"> <li>• Q&amp;A</li> <li>• Evaluation</li> </ul>	<p><b>Logistics</b></p> <ul style="list-style-type: none"> <li>• Monthly</li> <li>• 1.5 hours</li> </ul> <p><b>Simulation center</b></p> <p><b>Results</b></p> <p><b>Pilot Study</b></p> <table border="1"> <tr> <td>Pre</td> <td>Post</td> </tr> <tr> <td>2.3</td> <td>3.9</td> </tr> </table> <p>Confidence Score</p> <table border="1"> <tr> <td>1st Iteration</td> <td>2nd Iteration</td> </tr> <tr> <td>21.7</td> <td>24</td> </tr> </table> <p>Checklist Score</p> <table border="1"> <tr> <td>1st Iteration</td> <td>2nd Iteration</td> </tr> <tr> <td>213.7</td> <td>361</td> </tr> </table> <p>Time to completion (s)</p>	Pre	Post	2.3	3.9	1st Iteration	2nd Iteration	21.7	24	1st Iteration	2nd Iteration	213.7	361	<p><b>Accountability</b></p> <ul style="list-style-type: none"> <li>• Participation</li> <li>• Number of times lab is offered</li> <li>• Timing</li> </ul> <p><b>Knowledge</b></p> <ul style="list-style-type: none"> <li>• Checklist</li> <li>• Time to completion</li> <li>• Pre- and post lab survey</li> </ul> <p><b>Behavior</b></p> <ul style="list-style-type: none"> <li>• Checklist</li> <li>• Critical observation</li> <li>• Team dialogue</li> <li>• Other events</li> </ul> <p><b>Reaction</b></p> <ul style="list-style-type: none"> <li>• Post lab survey</li> </ul> <p><b>Potential Impact</b></p> <ul style="list-style-type: none"> <li>• Since exposure to these emergencies is rare, if the interprofessional curriculum proves to be effective, it could be incorporated into training for the following groups:                             <ul style="list-style-type: none"> <li>• General surgery and other surgical residents training in robotic surgery</li> <li>• Pediatric general surgery residents</li> <li>• OR nurses and scrub technologists</li> </ul> </li> </ul> <p><b>References</b></p> <ol style="list-style-type: none"> <li>1. Oh M, Chihara R, Benavides BA, Kim M, Chan EYH. The Role of Simulation in Training for Robotic Hemorrhagic Emergencies. <i>Journal of Endourology</i>. 2021;35(10):1155-1160.</li> <li>2. Oh M, Chihara R, Benavides BA, Kim M, Chan EYH. The Role of Simulation in Training for Robotic Hemorrhagic Emergencies. <i>Journal of Endourology</i>. 2021;35(10):1155-1160.</li> <li>3. Oh M, Chihara R, Benavides BA, Kim M, Chan EYH. The Role of Simulation in Training for Robotic Hemorrhagic Emergencies. <i>Journal of Endourology</i>. 2021;35(10):1155-1160.</li> </ol>
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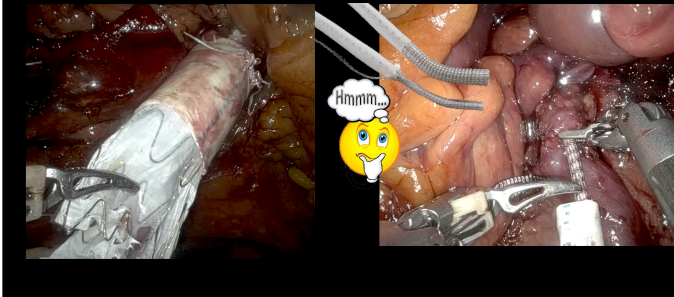
## Current to Concept.



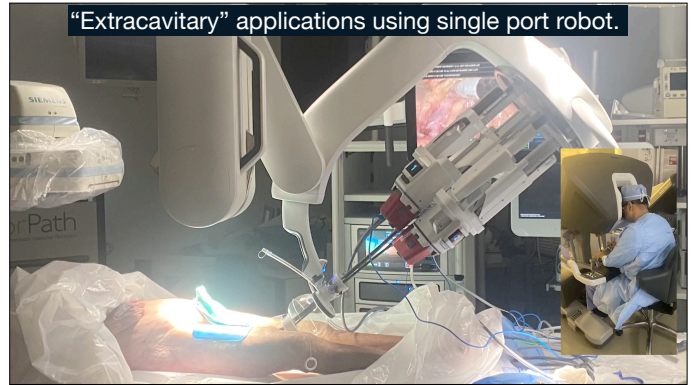
1. SVC bypass
2. Thoraco femoral graft
3. Aorto renal graft( passport)
4. Aorto hepatic graft( passport)
5. Ascending to Carotid/Subclavian
6. Ligation L Subclavian origin
7. Ligation Left Carotid origin
8. Central Venous Bypass
9. Renal denervation
10. Periaortic renal denervation
11. Lumbar/thoracic sympathectomy
12. Endovascular/Robotic hybrid procedures



Vascular Robotic Summit, Houston March 2024



“Extracavitary” applications using single port robot.



### Why has it not worked so far?

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- Obvious improvement in technology: Si to Xi.
- Vastly increased experience in other specialties.
- Leapt to Aortic applications too early.
- No damage( bleeding) bleeding control strategies.
- No endo/robotic integration.
- Lack of standard curriculum and training pathway.
- No Intuitive support - “off label”.

### What do we want to achieve?

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- “ The other guy’s Toolkit”
  - Other specialties vascular techniques
- How do Vascular Surgeons get trained and certified?
  - Faculty, fellows, integrated
- What level of expertise currently exists?
- What device development is required?
- Develop approach for incorporating fluoroscopy.
- Can we help Intuitive make a case for vascular indication?
- Can we create an interested “user’s consortium”?

