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ROBOTICS IN SURGERY - THE BIG PICTURE
A business term which refers to an innovation that creates a new market and value network and eventually disrupts an existing market and value network, *displacing* established market leading firms, products, and alliances.
Disruptive innovation happens all of the time – it is a process that is embedded in the field of medicine.

To be a Surgeon one must be constantly prepared for change – not just “waiting for something to happen” – but rather looking ahead to what is predictably going to happen.

A Surgeon’s best trait is adaptability. See the future and move toward it. Make changes early to prepare for what you know is around the corner.

A Surgeon’s worst enemy is fear. Fear equals negativity and paralysis. Paralysis leaves the surgeon behind.
Know Where You Are in History

- Read “The Century of the Surgeon” by Jurgen Thorwald ©1957
- What is General Surgery today? What was it in 1846? 1890? 1950? In 1990? In 2018?
- How has the history of increased knowledge and technological progress changed the General Surgeon and Surgery in general?
- What effect has the shedding of surgical specialties and subspecialties had on the role of the General Surgeon at the University? At the Private Urban Hospital? At the Community Hospital? WHAT is a General Surgeon today?
My personal experience since 1986:

GREAT open surgery training at IMMC that prepared me for literally anything.

The advent of new disruptive technology for laparoscopic surgery in 1990 at the start of my career created an open vista of possibilities.

A new field opened up – Bariatric Surgery – in 2000. We were ready and expanded to include it.

2010 Recognition that another disruptive technology - robotic surgery - had advanced to the point of broad application in General Surgery and had to be reckoned with.

BE READY! Something important will change the way you utilize your skills in the future.
How and when to operate using an open approach, a laparoscopic approach, a robotic approach, and (perhaps) an endoscopic approach. Unless you have chosen to confine your practice to a narrow niche you will need to be capable of all of these approaches to do the best surgery all the time as a General Surgeon. That means full facility with the instruments for each approach.
The FDA approved the DaVinci system 18 years ago; the first robotic case in the world was done 33 years ago (PUMA, AESOP, others). Robotics has been under development for a LONG TIME. And now...

- Visibility is superior. 3D
- Communication is superior. Microphones, multiple screens, verbal feedback from the instrument itself, monitor feedback on instruments.
- Instrumentation is vastly superior. Wristed.
- Its EASIER.
- The surgeon is in control of every instrument and the camera.
- The learning curve is short.
- Special added technologies keep coming – new instruments, new types of light, injectables that make tissue margins clear, haptic feedback, etc.
- It allows the surgeon to do cases that cannot be done with regular laparoscopy. This is a big deal for sick patients.
- It is as safe and efficient as regular laparoscopy for regular cases.
- Its better for the surgeon’s neck and back.

WHY ROBOTICS, AND WHY NOW?
GENERAL SURGERIES SUITED FOR ROBOTICS

- Ventral hernia, inguinal hernia, Spigelian hernia, hiatal hernia, diaphragm hernia, etc.
- Low anterior resection, total proctectomy, colon resection
- Adrenalectomy
- Splenectomy
- Partial liver resections
- Whipple, distal pancreatectomy
- Nissen fundoplication, Toupet fundoplication, Collis gastroplasty
- Heller Myotomy, esophageal diverticulectomy, esophagectomy
- Sleeve gastrectomy, gastric bypass, Bariatric revision, all other gastric procedures
- Cholecystectomy, common bile duct exploration, choledochoduodenostomy, other biliary bypass procedures
- Small bowel resections, adhesiolysis
- Complex revisions of previous surgeries
- Other: GYN, Urology, Thoracic, Cardiac, Neuro...
UNKNOWN ROLE FOR ROBOTICS

- Trauma
- C-Section  (just kidding, though I’ve been threatening...)


Train everyone on the General Surgery Team on the set-up and operation of the robotic instrument.

Plan to do every case on the robot if possible, easy ones first.

Have a robotic block time for surgery.

Discuss a plan with anesthesia and staff to reduce room turnover times. It should take 15 minutes to turn the room.

Use an assistant such as a P.A. on complex cases.

Maintain a data base of all cases. Enroll in NSQIP through the American College of Surgeons and document outcomes of all major operations, robotic or otherwise.

Case Review Conference is mandatory and should be paired up with NSQIP so that morbidities are monitored in real time and trends are identified early.
An advantage of NSQIP is that it can be applied to specific operations and specific surgeons to hone in on complication rates and areas for improvement. This data is specific to bariatrics.

<table>
<thead>
<tr>
<th>General Postoperative Occurrences</th>
<th>Site</th>
<th>ALL OPERATIONS</th>
<th>Comparison</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cases With Wound Occurrences</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Superficial Incisional SSI</td>
<td>1</td>
<td>0.4%</td>
<td>950 0.5%</td>
</tr>
<tr>
<td>Deep Incisional SSI</td>
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<td>0%</td>
<td>183 0.1%</td>
</tr>
<tr>
<td>Organ/Space SSI</td>
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<td>0.4%</td>
<td>539 0.3%</td>
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<tr>
<td>Wound Disruption</td>
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<td>0%</td>
<td>138 0.1%</td>
</tr>
<tr>
<td>Cases With Respiratory Occurrences</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pneumonia</td>
<td>0</td>
<td>0%</td>
<td>425 0.2%</td>
</tr>
<tr>
<td>Intraoperative OR Postoperative Unplanned Intubation</td>
<td>0</td>
<td>0%</td>
<td>252 0.1%</td>
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<tr>
<td>Pulmonary Embolism</td>
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<td>0%</td>
<td>208 0.1%</td>
</tr>
<tr>
<td>On Ventilator &gt; 48 hours</td>
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<td>0%</td>
<td>159 0.1%</td>
</tr>
<tr>
<td>Cases With Urinary Tract Occurrences</td>
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<td></td>
<td></td>
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<tr>
<td>Progressive Renal Insufficiency</td>
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<td>0%</td>
<td>108 0.1%</td>
</tr>
<tr>
<td>Acute Renal Failure</td>
<td>0</td>
<td>0%</td>
<td>119 0.1%</td>
</tr>
</tbody>
</table>
An annual report card from NSQIP – a SAR – comparing your surgical outcomes to other hospitals and surgeons across the nation.
NSQIP allows a data collector to compile 29 potential surgical complications as well as track readmissions, length of stay, operative time for surgery, postop follow-up appointments, and more. New data fields can be added.

My 2015-17 Most Common Procedures:

- Bariatric (All) 263 cases, 6 infections, 3 transfusions
- Anti-reflux Surgery (All) 95 cases, 0 complications
- Gall Bladder (All) 71 cases, 3 transfusions.
SIMPLE NISSEN FUNDOLPLICATION VIDEO
COLLIS GASTROPLASTY AND GIANT PARAESOPHAGEAL HERNIA REPAIR
REVISION GASTRIC BYPASS WITH LEFT ADRENALECTOMY AND HIATAL HERNIA
Robotics is the third wave of big developments in General Surgery in the past thirty years.

Robotics is the new frontier now but is rapidly becoming the ideal approach for many types of General Surgical procedures. Within five years it will be the first line for almost everything.

The more complicated the case, the higher the advantage for the robotic approach.

Expect further advancements in robotic technology and associated technologies that will allow for ever more precision in the performance of surgery. This will be particularly important in the field of Surgical Oncology and ANY area of General Surgery that requires finesse and detailed work.

Questions of how best to train the modern day surgeon in open, laparoscopic, and robotic technologies will gradually be resolved.
GREETINGS TO THE TSS FROM: SETH COSTER, KEVIN KOPELSON, DIANA ZENG COSTER, JENNY WEI COSTER, SAM COSTER, SAMPADA KANADE COSTER, ADAM COSTER, AND DAVID COSTER