

Laparoscopic surgery for colorectal cancer: Has the robot changed the paradigm??

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Disclaimer:

Caution.

Some of you *will* be
offended.

Disclosures

- None



Why did I get asked to deliver this address?

- I have been trained in Robotic surgery
- I have been known to tilt at windmills
- I want to destroy laparoscopic surgery
- Khaled Malboudy MD likes to challenge his friends or is he really my friend!!!!



Paul Goldberg MD

- “I am a maximally invasive surgeon”



Laparoscopic Revolution

- Cholecystectomy
- Advanced Gastrointestinal Procedures
- Colon Resection
- Splenectomy
- Adrenalectomy
- Spine exposure
- Almost every known procedure

Minimally Invasive Surgery

- Where have we been!
- What have we established today
- Why we are slowly getting there
- Tomorrow.

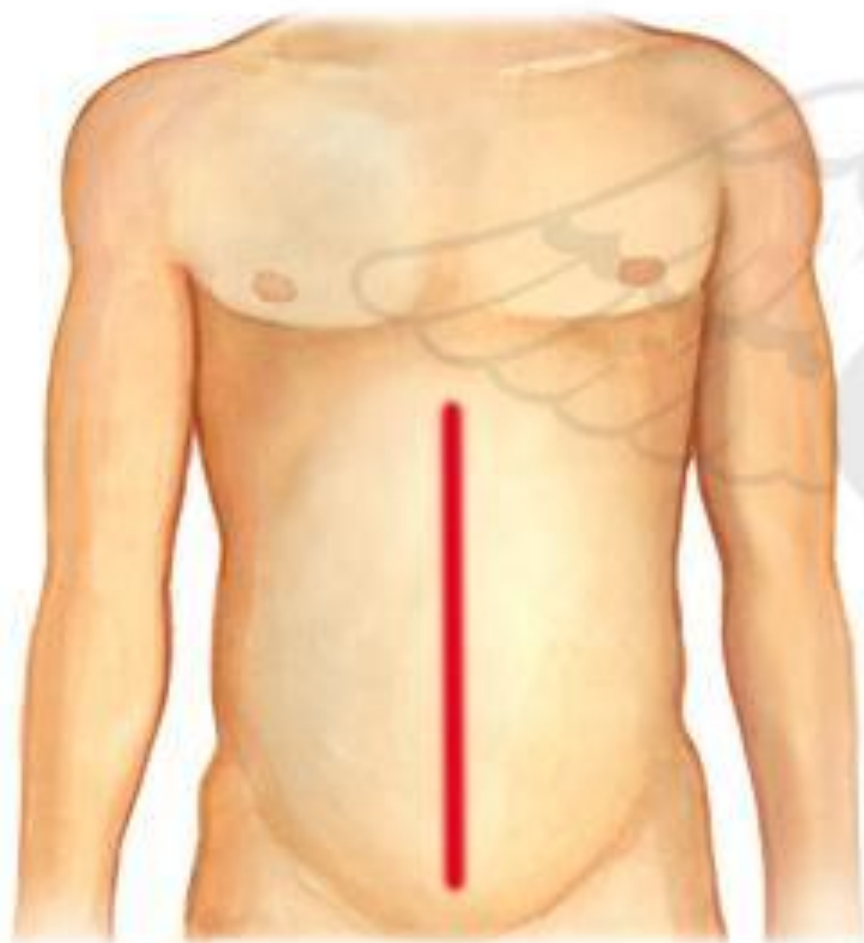
Laparoscopy and Colorectal Cancer: Quo Vadis

- First laparoscopic colon resection was performed over 24 years ago by Jacobs and Plasencia in Miami
- Advanced laparoscopic techniques have been developed to treat most surgical pathology- and have become standard of care
- Advanced laparoscopic skills are only partially translatable from open surgical skills and we don't know how they relate to robotic skills



Laparoscopy and Colorectal Cancer: What is a Laparoscopic Colectomy???

- Laparoscopic Colectomy
- Laparoscopic Assisted Colectomy
- Laparoscopic Assisted Colectomy with Hand Assisted Technology
- Laparoscopic Assisted Colectomy with a Very Long Incision
- Laparoscopic Assisted Colectomy with 2 Hands Assisting
- Laparoscopic Assisted Colectomy with 2 Hands Assisting and a Very Long Incision



Open colorectal
surgery incision



Robotic colorectal
surgery incisions



Outcome analysis: What is important?

- Short term outcomes
 - Length of stay
 - Cosmesis
 - Short term disability
- Long term outcomes
 - Disease recurrence: cancer
 - Functional outcome

**Does pressure to improve
short term outcomes
jeopardize long
term outcomes?**



Background

1. Are oncologic principles violated by this approach?
2. Is there a difference in pattern recurrence?
3. Is disease free survival compromised?



Long Term Outcomes

- Comparison of long-term outcome among the studies may be impaired because of:
 - lack of homogeneity in patient selection
 - radiation therapy
 - site and stage of tumor
 - violation of “intent to treat principle”



Long Term Outcomes

- When laparoscopic resections were compared with converted and standard open colectomies, there was no significant
 - difference in tumor margins or
 - numbers of nodes resected

Advantages of Laparoscopic Techniques

- Short term patient benefits- perioperative
- Long term patient benefits- adhesions, reduction in incidence in SBO, independent living status in geriatric patients
- Financial outcomes

Principles of Curative Colorectal Cancer Resection

- Full intra-abdominal assessment
- Identification/confirmation of visceral metastases
- Full mesenteric and nodal dissection
- Adequate margins – longitudinal/radial
- Safe creation of anastomosis or stoma

Position Statement



Laparoscopic Colectomy for Curable Cancer

- Laparoscopic colectomy for curable cancer results in equivalent cancer related survival to open colectomy when performed by experienced surgeons. **Adherence to standard cancer resection techniques including but not limited to complete exploration of the abdomen, adequate proximal and distal margins, ligation of the major vessels at their respective origins, containment and careful tissue handling, and en bloc resection with negative tumor margins using the laparoscopic approach will result in acceptable outcomes.** Based upon the COST* trial, pre-requisite experience should include at least 20 laparoscopic colorectal resections with anastomosis for benign disease or metastatic colon cancer before using the technique to treat curable cancer. Hospitals may base credentialing for laparoscopic colectomy for cancer on experience gained by formal graduate medical educational training or advanced laparoscopic experience, participation in hands-on training courses and outcomes.



Recurrence

- **COST Trial**
 - Laparoscopic vs. open colectomy for CA
 - n=872
 - **Cumulative incidence** of recurrence over 4.4 years did **not significantly** differ in both groups for any stage of cancer
 - **Time to recurrence** was **not significantly** different
 - No differentiation between local or distant recurrence was made

COST TRIAL, *N Engl J Med* 2004;350:2050-2059



Recurrence: Review of Literature

- ✓ **Comparative studies** have found equivalent recurrence rates
- ✓ Overall rate: 4.6% and 20% for both groups
- ✓ Local recurrences: 14.8% and 26%
- ✓ Distant recurrences:
 - 15% laparoscopic
 - 18.6% open group

Conclusions-Clinical/Oncologic

“The rates of recurrent cancer were similar after laparoscopic assisted colectomy and open colectomy, suggesting that the laparoscopic approach is an acceptable alternative to open surgery for colon cancer”

Cost trial, NIH study, DCR 2004

NIH Trial: Conclusions

- LAC for colon cancer results in
 - Shorter hospital stays
 - Less pain medication requirement
 - Comparable tumor recurrence rate and overall survival rate
- *“Our findings suggest that it is safe to proceed with laparoscopically assisted colectomy in patients with cancer”*

UK Trial

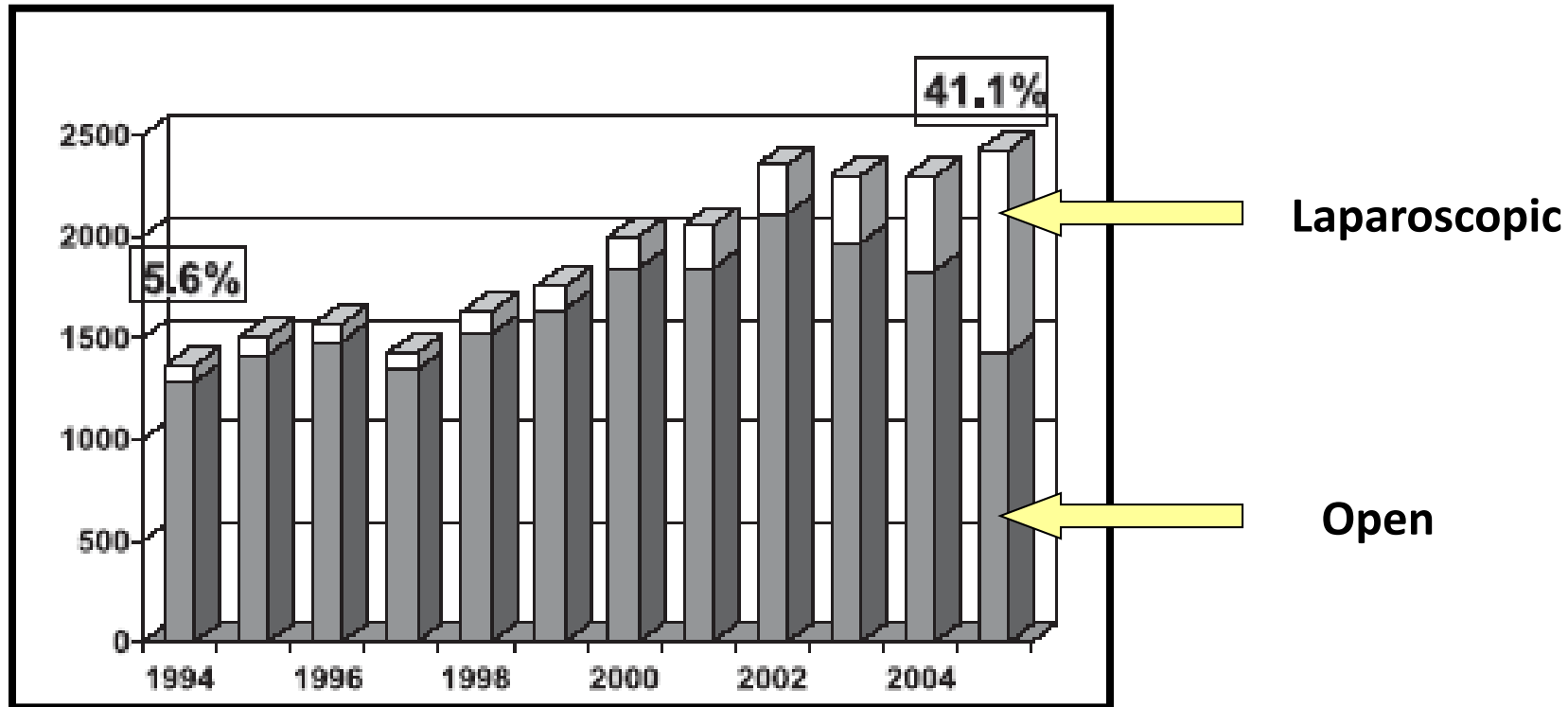
- **Conclusion:** *“For colon cancer, laparoscopic procedure is oncologically safe, local recurrence rates no higher than for open, and cancer-related survival no lower than after conventional resection”*



Myths: why are not all colorectal procedures performed laparoscopically?

- Big surgeries, big incisions, big surgeons: incisions heal side to side, not end to end
- Postoperative management paradigms difficult to shift based on level 3 data: bowel rest?, diet? ambulation?
- Practice of surgery was based on historical teaching, not evidence based – ie. 5 cm rule

Colon Resection for Cancer and Percent Performed Laparoscopically in Training Centers



Schoetz D. et al., J Am Coll Surg 2006;203:322-327

Open vs Laparoscopic vs Robot

A Colectomy is....

A Colectomy is....

A Colectomy is....

A Colectomy is...

Have you been injured by
robotic surgery????

Call 1-800-BAD-ROBOT

Don't be injured twice!!!!



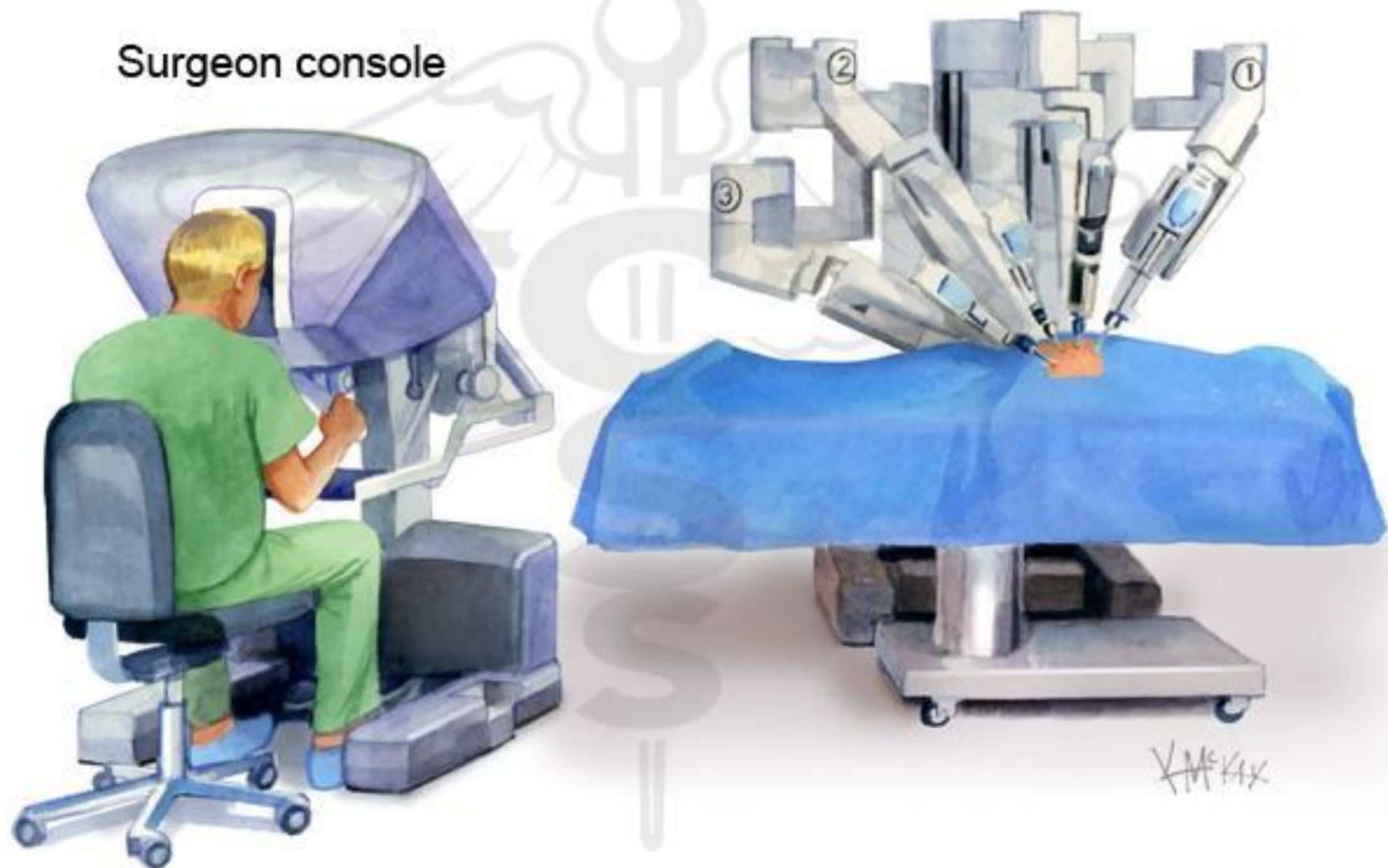


“Advance means progress to something better and not progress to something new.”

-Sir Heneage Ogilvie

Interactive robotic arms

Surgeon console



V. McKAY

Robotic Surgeon



*“To see the future,
one must experience
the past”*

Goethe

Robotic surgery

- Equipment- can cost upwards of 1,500,000 US dollars
- Maintenance contract also expensive
- Disposables can be expensive
- Can be marketing tool- company offers lectures to referring doctors so they can send patients to robot hospital even if not yours
- Driving change by company
- Don't be last hospital to own one

Robotic surgery

What I have been asked to do-

- Inguinal hernias
- Incisional hernias
- Cholecystectomies
- Gastrectomies
- Colectomies- right as well as left
- Rectal resections



What I have done?

- Hernias- NO
- Cholecystectomies- NO
- Gastrectomies- NO
- Right colectomy- NO
- Left colectomy- NO
- Rectal resection - YES

Robotic Training: Steep Learning Curve for elective colectomies

- **Long learning curve**
 - **multiple operations**
 - Total colectomy
 - Right colectomy
 - Left colectomy
 - Sigmoidectomy
 - LAR
 - APR





Robot Benefits

- Short term
 - Less post operative pain
 - Diminished length of ileus
 - Less blood loss
 - Shorter hospital stay
 - Favorable cosmetic result
 - smaller scars
 - Earlier return to work and normal daily activities
 - Immune function is better preserved with laparoscopic surgery
 - Reduced wound infections
- Long term
 - No difference in
 - Overall survival
 - Disease-free survival
 - Wound recurrences
 - Morbidity
 - mortality
 - Reduced incisional hernias and adhesions



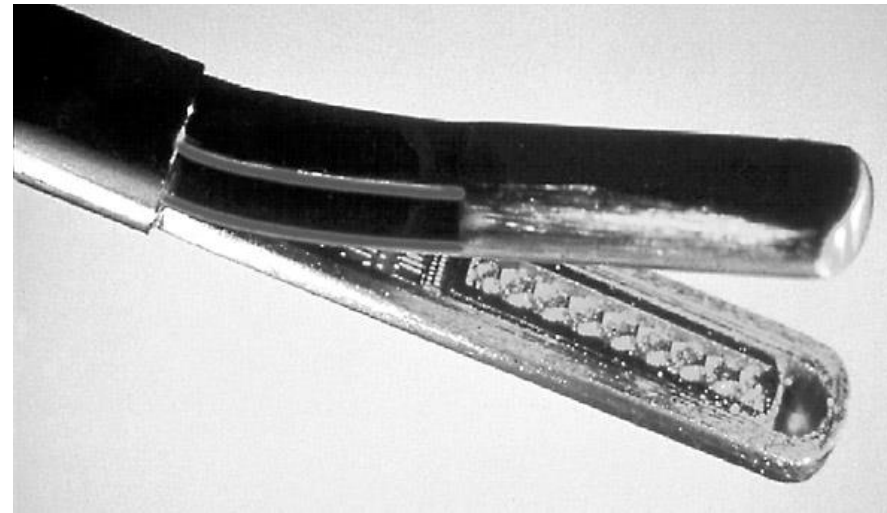
Technological Advances

- 360 degree- 3D camera view
- “Transparent Abdominal Wall”
- No incision- tissue extraction by morcelization
- Miniaturization of instruments
- Complex instrumentation- multi-hinge/multi task

Smart Instruments

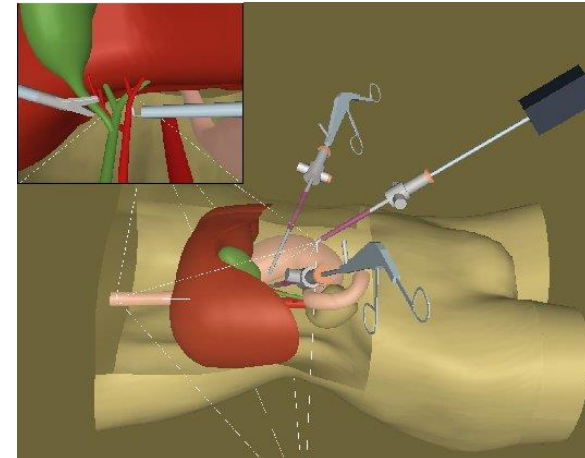
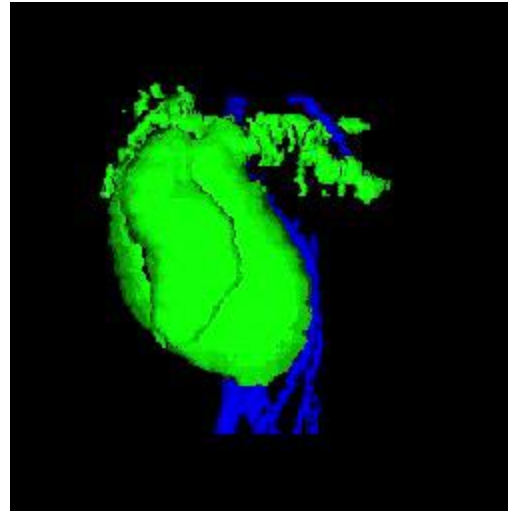
- Instruments

- Tactile Information
- “Force Feedback”
- Organ Composition
- Hardness, elasticity
- Vibro-tactile Sensors



Virtual Reality

“Collection of technologies that allow people to interact efficiently with 3D computerised databases in real time using their natural senses and skills”



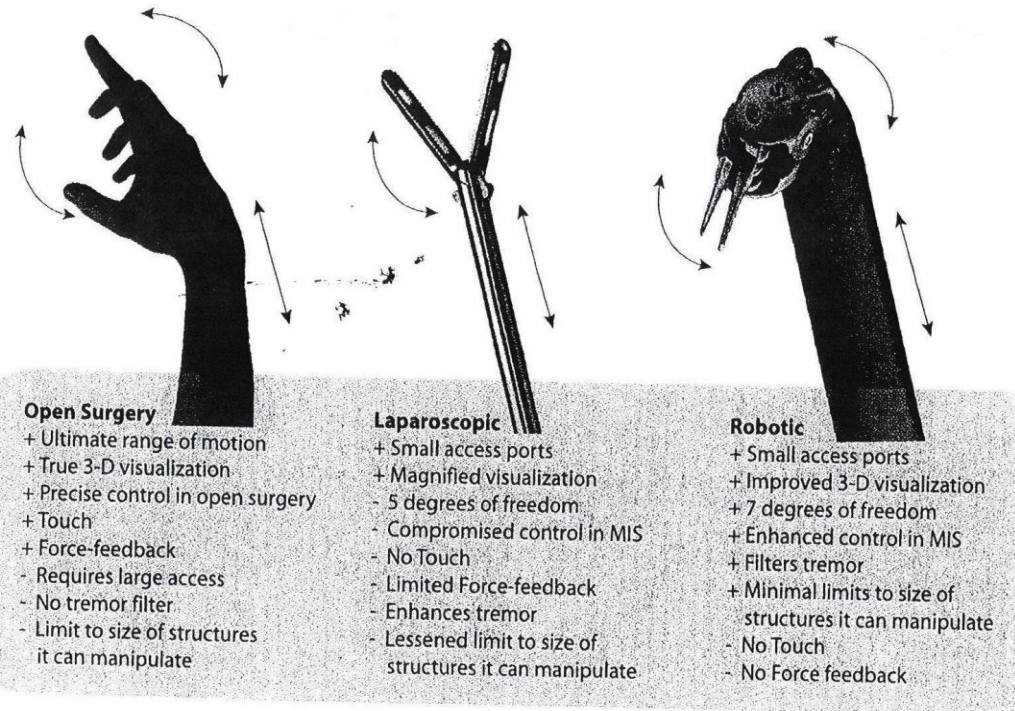
- Robotics

- Laparoscopic provides 4 DOF
- Arm & hand 7 DOF

BACK THEN

NOW

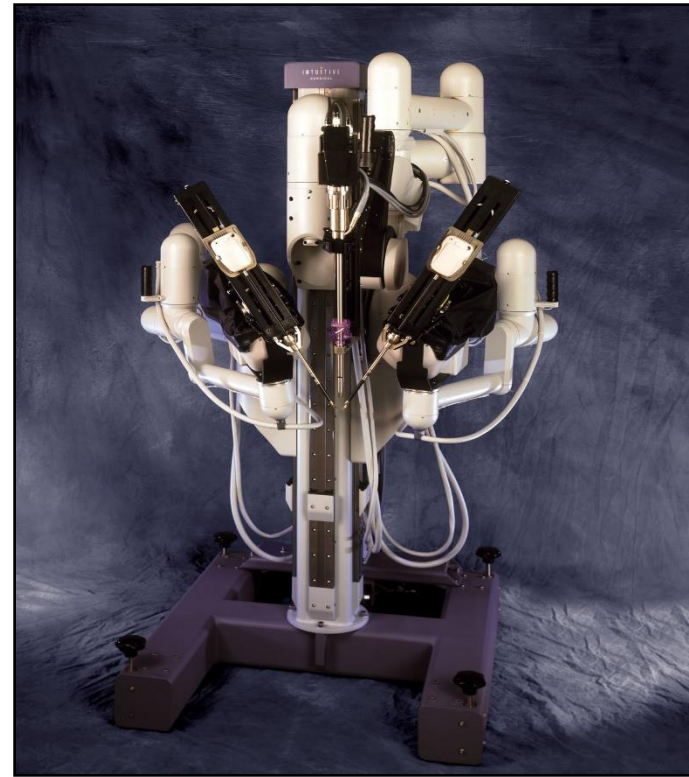
FUTURE



Da Vinci™ Surgical System Surgical Cart

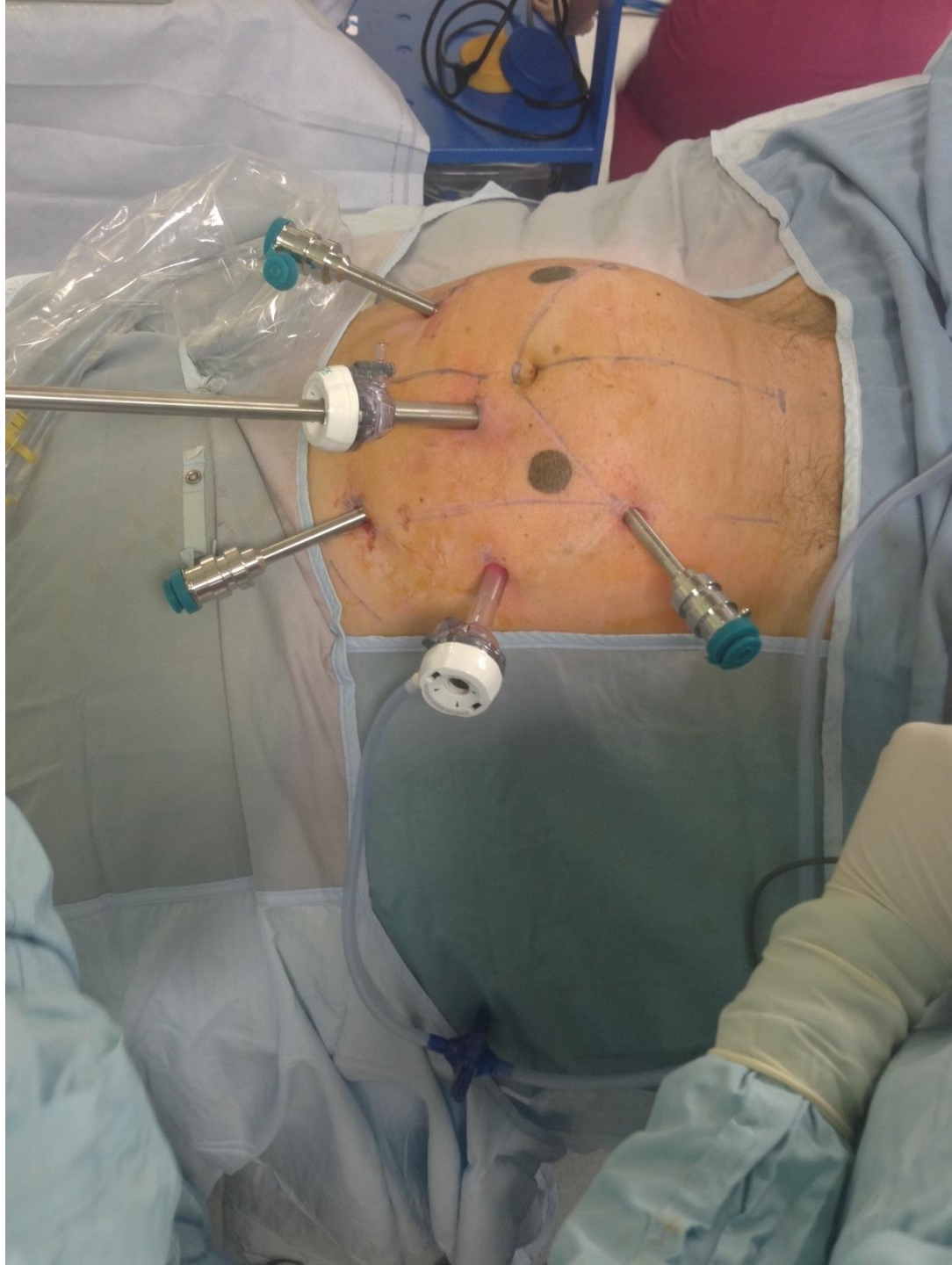


- 3-4 Instrument arms
- Multiple joints to access all anatomy
- One-piece design for quick set up



INTUITIVE
SURGICAL™





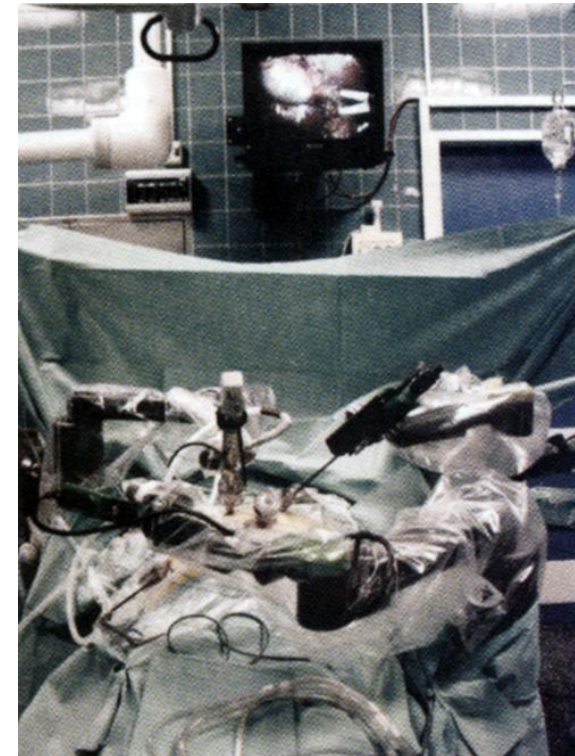
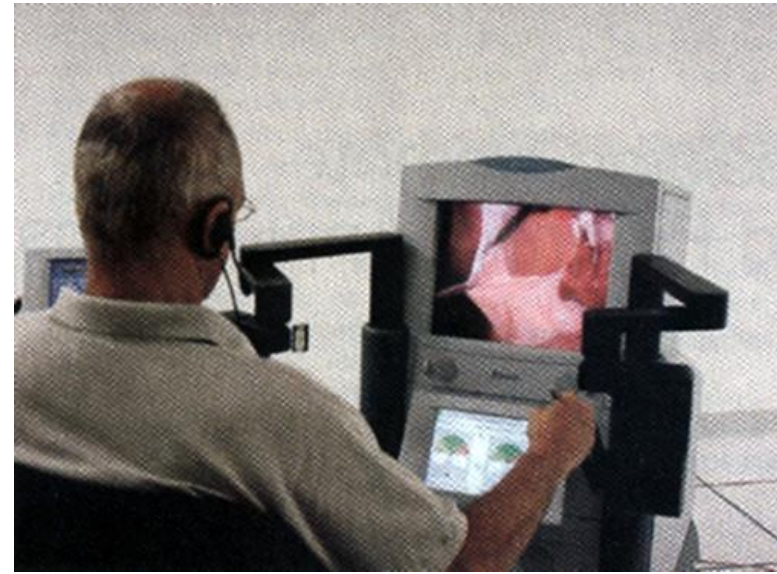
Robotic Surgery-How it works

- The surgeon's workstation controls surgical instruments on thin robotic arms
- Arms
 - Reduce hand tremor
 - Allow the surgeon to scale wide movements down to tiny ones inside the patient.
- Better surgery?
- Faster healing time



Robotics: Technical Advances

- Dexterity
- Enhanced 3-D Visualization
- Greater Surgical Precision
- Improved Access
- Increased Range of Motion
- Reproducibility



Benefits Of This Innovation

- Reduced trauma to the body
- Less anesthesia
- Less blood loss
- Less post-operative pain
- Less risk of infection
- Shorter hospital stays
- Faster recovery
- Less scarring

Conclusion

- No, we cannot imagine surgery without laparoscopy
- There is a promising future in laparoscopic surgery which will be enhanced by the development of new techniques to improve outcomes for the patients benefit
- As surgery advances, patients will demand newer and less invasive procedures
- Surgeons and industry need to be prepared

Future of Laparoscopic Surgery

- The future:
 - Surgery will no longer be about “blood and guts” but will be about “bits and bytes”
 - *Or not Surgery at all!!!*



Evidence Based Data

- Level 1, 2 and 3 studies have strongly supported the feasibility, patient safety and oncologic outcome for laparoscopic assisted surgery.
- Why is laparoscopic surgery not universally employed?
- No evidence for robotic surgery exists

Laparoscopy and Colorectal Cancer – Where's the Beef???

- There has **been** no such careful scrutiny of the “GOLD STANDARD” – OPEN SURGERY
- COLOR, CLASSIC, BARCELONA- all supply level one evidence of NO harm but must be experienced!
- There is clear level 1 evidence that one of the most important variables determining outcomes for cancer is SURGEON experience and technique
- NO evidence regarding rectum for either laparoscopy or robot

Robotic Colorectal Surgery

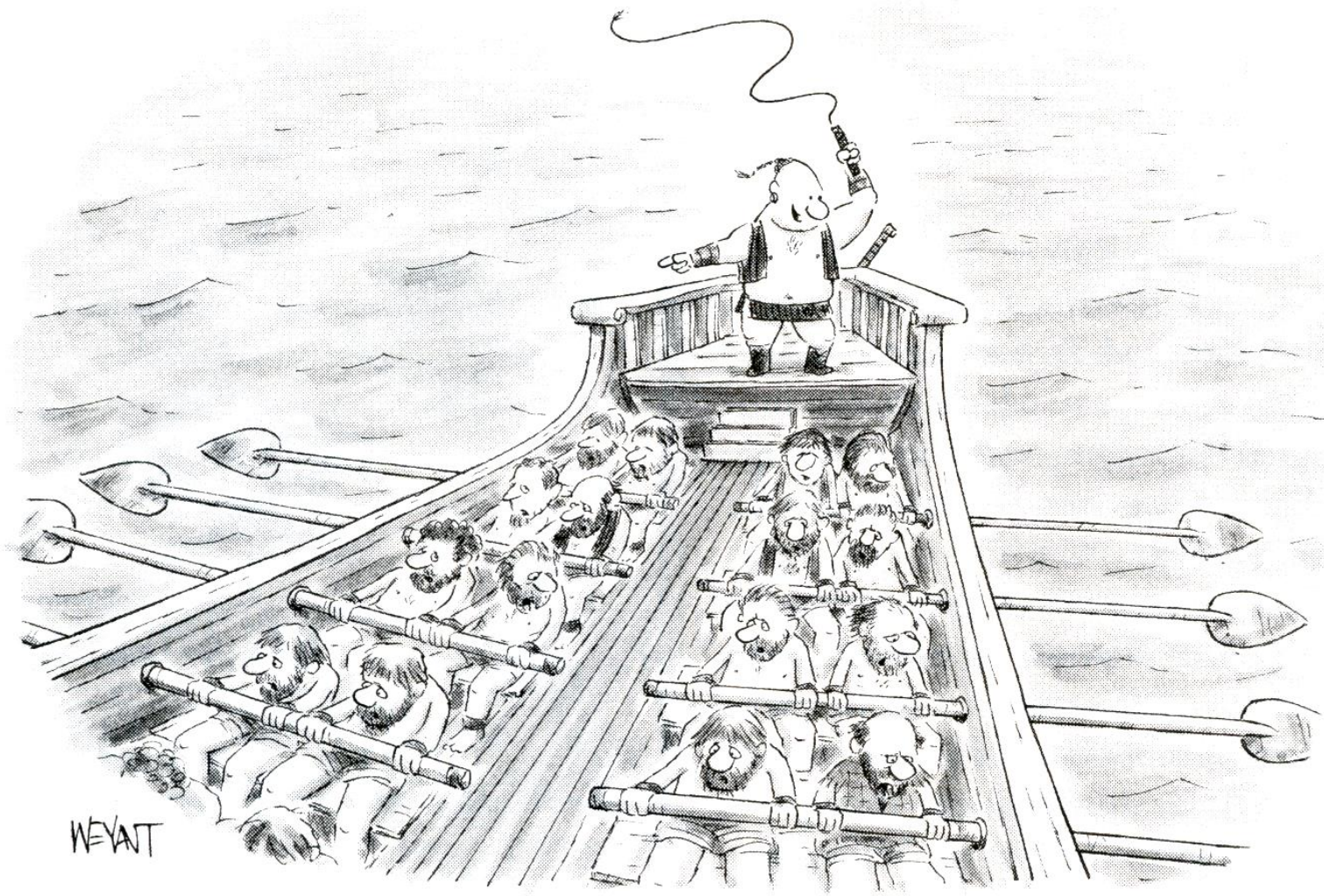
- Comparative systematic review of pub med and google databases from 2000 to 2011
- Only studies reporting outcomes identified and analyzed
- 41 studies: 21 case reports, 2 case controlled, 13 comparative studies, 1 prospective, 3 retrospective, 1 randomized
- 1681 patients, 191 major and minor complications with poor follow up, no path review
- WORTHLESS EVIDENCE

IT IS BETTER TO BE
PART OF THE BOWEL TEAM
THAN TO BE PART OF
THE BOWEL MOVEMENT

Philip F. Caushaj, MD, PhD







"Excellent. Now just the altos."

