3 de juny de 2016 · Palau de Congressos de Girona

8a JORNADA DE RECERCA DE L'INSTITUT CATALÀ DE LA SALUT

PARLEM D'OBESITAT I DIABETIS TIPUS 2

Cirurgia robòtica de l'Obesitat.

Ramon VILALLONGA, MD, PhD.

Assistant Professor of Surgery. Autonomous University of Barcelona

Endocrine, metabolic and bariatric Unit. General Surgery Department
Universitary Hospital Vall d'Hebron, Center of Excellence for the EAC-BC,
Barcelona, Spain.

CONFLICTS OF INTEREST

- None

- **trip** [1]

- 1. A going from one place to another; a journey.

Hotel Dieu

París, Francia
Abril, 1904

HISTORY

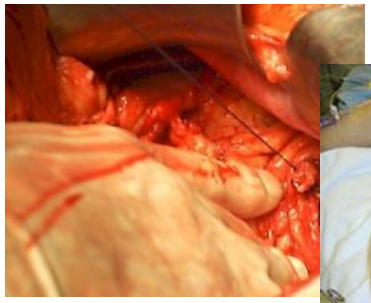
- Laparotomy (1842)

Ferrier i Gaillard Thomas (ginecolgist 1832-1903): "Exploratory laparotomy is as dangerous as far you bring your surgical trauma."

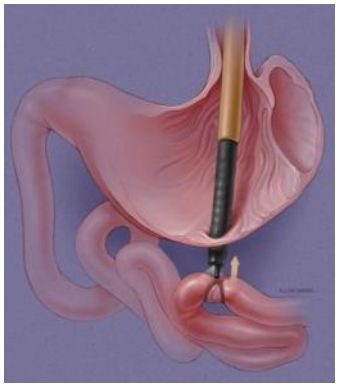
- Laparoscopy (end 80, s.XX)

- NOTES (animals) and 2004

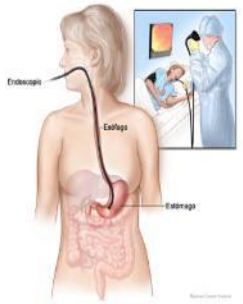
  (humans) 2007



Laparotomy
s.XIX

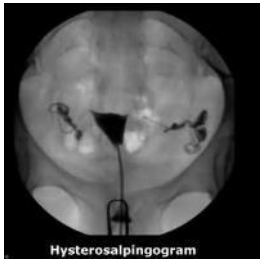


NOTES
s.XXI
SILS



Operation
Anubis

Laparoscopy
s.XX



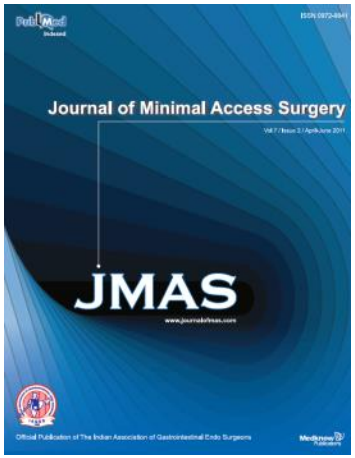
SILS

- Under review.
- Need more data

- However has become a boost for surgery.

Single incision laparoscopic surgery (SILS) cholecystectomy. A novel technique

R. Vilallonga[1], R.A. Stoica[2], A. Cotirlet[3], M. Armengol[1], N. Iordache[4]



Personal Viewpoint

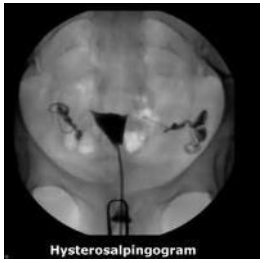
Single port access sleeve gastrectomy: Is it reasonable?

Ramon Vilallonga, Josep Rius[1], José Manuel Fort, Manuel Armengol

Department of General Surgery, Endocrine, Bariatric and Metabolic Unit, Universitary Hospital Vall d'Hebron, Barcelona, [1]Bariatric Surgery Unit, Hospital USP La Colina, Santa Cruz de Tenerife, Spain

Address for correspondence: Dr. Ramon Vilallonga, General Surgery Department, Universitary Hospital Vall d'Hebron, Passeig de la Vall d'Hebron, 119-129, 08035 Barcelona, Spain. E-mail: vilallongapuy@hotmail.com

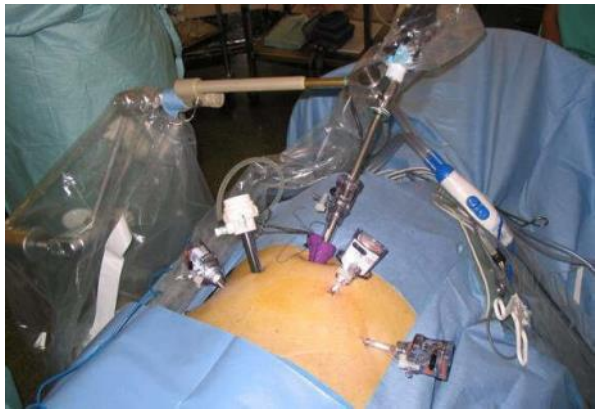
LAPAROSCOPY

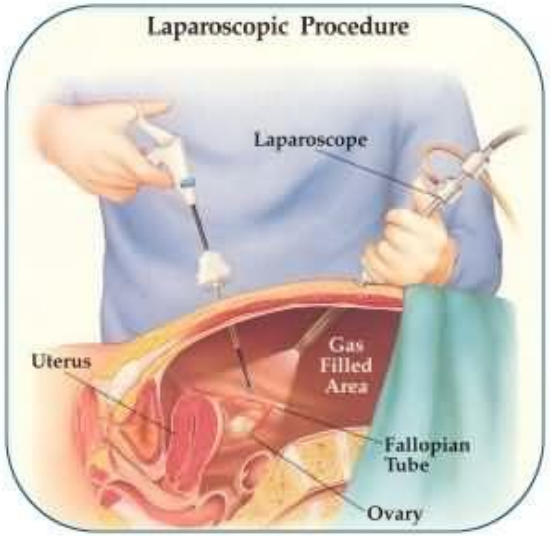


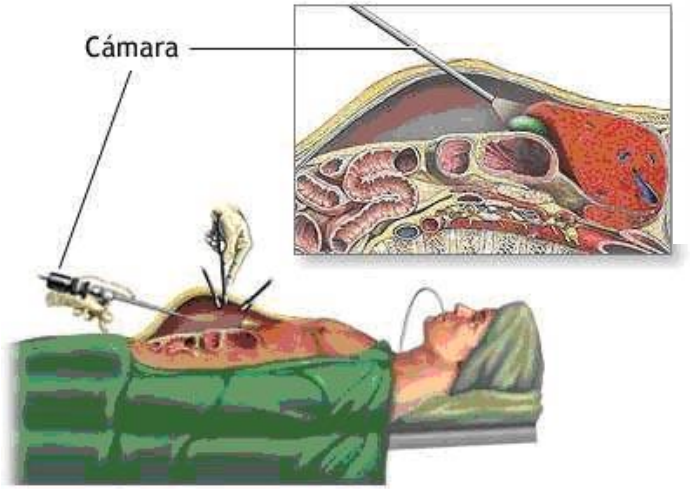
- "THE THIRD REVOLUTION IN SURGERY".

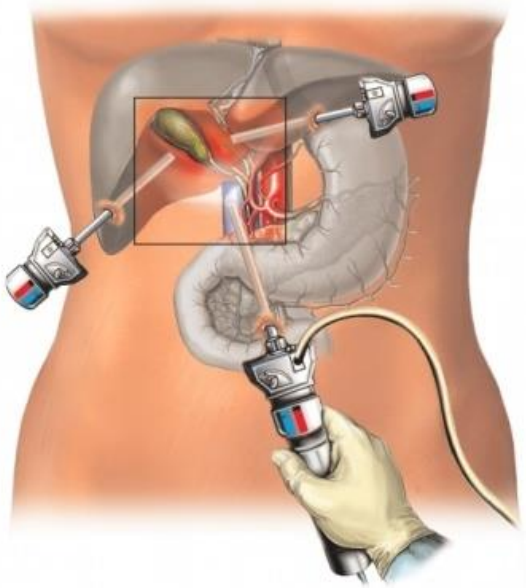
- 1º lap surgery of the gallbladder (1985): Eric Muhe; Germany

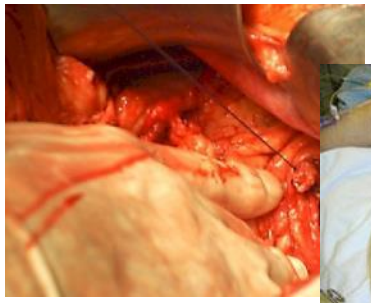
- France: Mouret, Dubois and Perissat.
  USA.: Mc Kernan, Reddick and Olsen (1989).




Laparoscopic Procedure
Laparoscope
Uterus
Gas Filled Area
Fallopian Tube
Ovary


Cámara



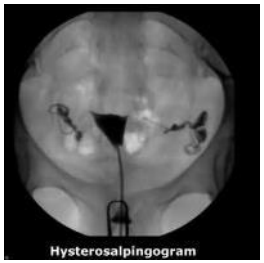


Laparotomia
s.XIX

NOTES
s.XXI
SILS

Operació Anubis

Laparoscopia
s.XX



Why Does MIS exist?

What We Want with Surgery

Patients want small or no incisions
Surgeons want easy operations
3rd Party Payors want low or no cost

Everyone wants perfect results
LEAST INVASIVE and SAFEST

The Day of Open Elective Surgery is Close to Over Because Patients Want Invisible or No Incisions

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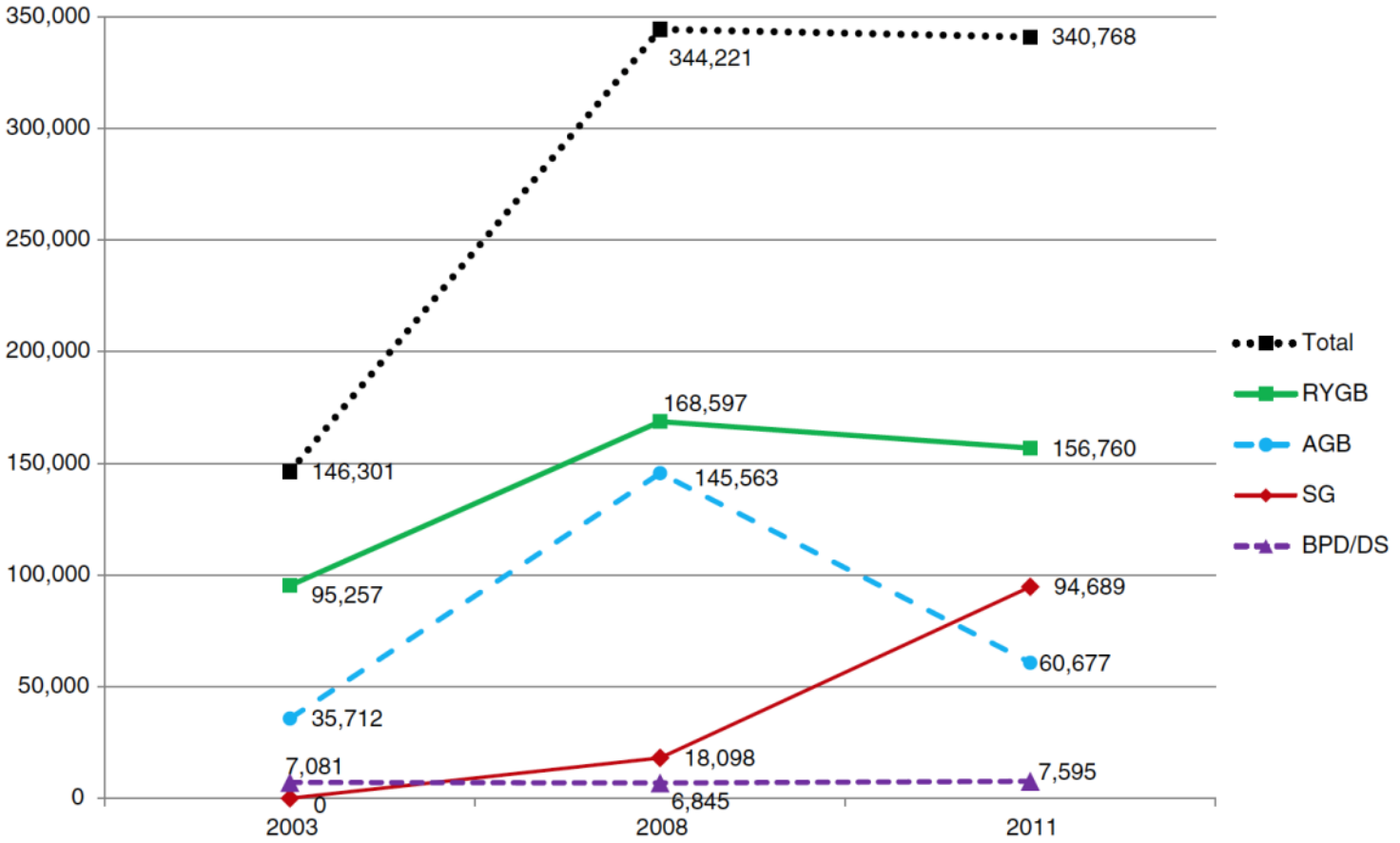
PARLEM D'OBESITAT I DIABETIS TIPUS 2

Until we offer the least invasive approach with the most minimal complications, we have ultimately failed as a surgical community.

Obesity trends….



SG 265898 GBP: 220000
AGB: <40000

Unpublished Data, 2016.
Worldwide Survey (2011-2014)

OBES SURG (2013) 23:427–436
DOI 10.1007/s11695-012-0864-0

RESEARCH

Metabolic/Bariatric Surgery Worldwide 2011

Henry Buchwald · Danette M. Oien

Evolution of techniques

	2011	2012	2013	2014
Total	158.000	173.000	179.000	193.000
RNY GBP	36.7%	37.5%	34.2%	26.8%
Band	35.4%	20.2%	14%	9.5%
Sleeve G.	17.8%	33%	42.1%	51.7%
BPD/DS	0.9%	1%	1%	0.4%
Revisions	6%	6%	6%	11.5%
Others	3.2%	2.3%	2.7%	0.1%

With the permission from Dr. K. Higa

Surgery is safe

. **Mortality rates following common operations in U.S. hospitals**

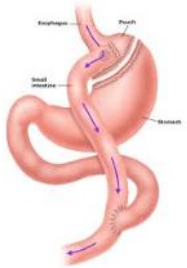
	Aortic Aneur	CABG	Craniot	Esophag Resect	Hip Replac	Panc	Ped. Heart Surgery
Number of Hospitals performing operation	2485	1036	1600	1717	3445	1302	458
National Average Mortality rate(%)	3.9	3.5	10.7	9.1	0.3	8.3	5.4
Average Hospital caseloads Median	30	491	12	5	24	8	4

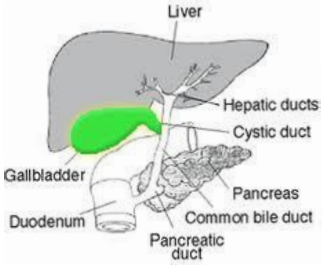
[i] Dimick JB, Welch HG, Birkmeyer JD. Surgical mortality as an indicator of hospital quality. JAMA 2004,292, 847-851

SRC: Bariatric Surgery Mortality 0.3% (55,567 patients)

Surgery is safe. In 2016

1) The safety profile of laparoscopic/metabolic surgery is compatible with that of laparoscopic cholecystectomy now.





Efficacy

Invasivity

Morbidity

Mortality

How should it be ?

Ideal bariatric Surgery ?

- Low (0) perioperative morbidity

- Reversible (dif. SG)

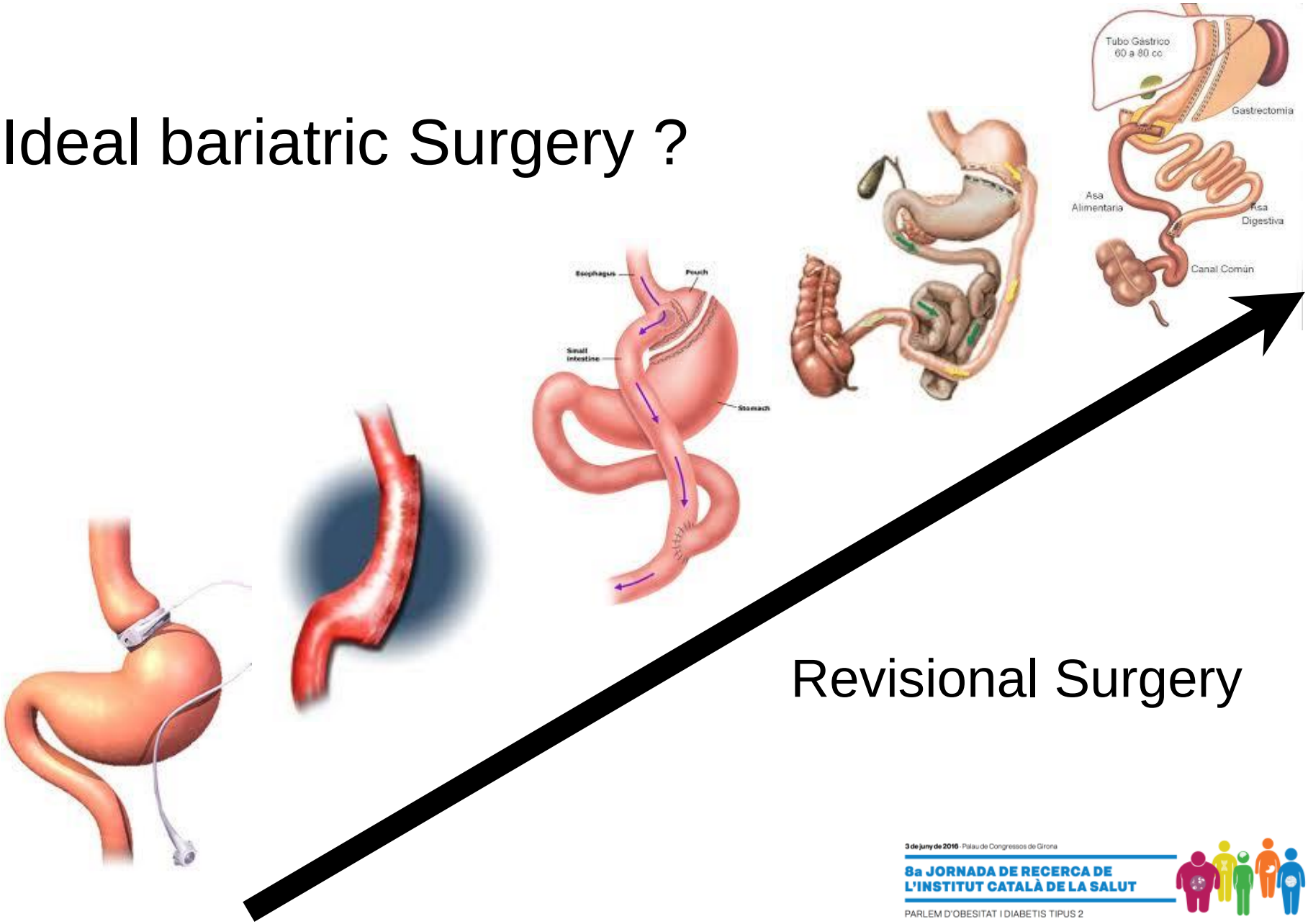
Dixon J, IFSO 2010

- No long-term effects (diabetes, GERD, malnutr.)

- (Excelent) results on the long term

How should it be ?

Ideal bariatric Surgery ?



Revisional Surgery

Why a robot ?

- ... "Developed to overcome minimally invasive surgery limitations and improve the capacity of open surgery approach" ...

La robótica y la cirugía al alcance de nuestras manos virtuales.
R. Vilallonga, M. López-Cano, M. Armengol.
Cir Esp. 2007;82(5):312-6.

Why robotic surgery?

- The concept of accuracy and precision manufacturing to medical applications

- Repeatability +
- + Predictability
- + Accuracy

- = Quality

Robotic Surgery

Eliminates

- Counter-intuitive motion
- Instrument tremor

Provides

- Improved ergonomics
- Hand / eye alignment
- 3 hands in 2

Transforms

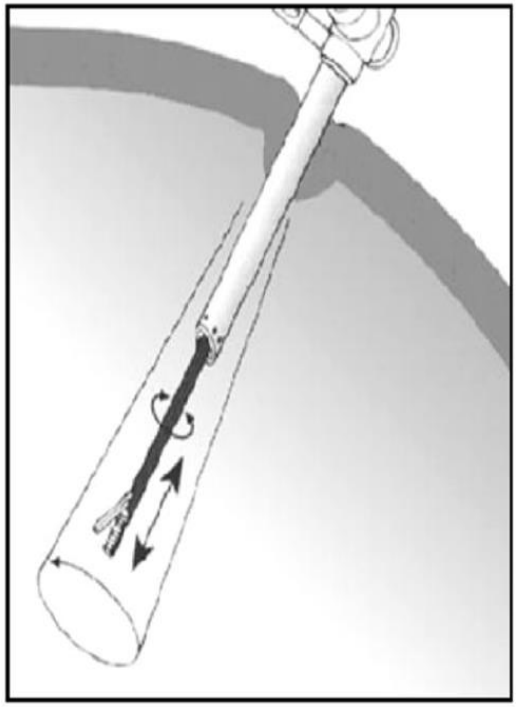
- 2-D vision to true 3-D
- 5 DOF instruments to 7 DOF

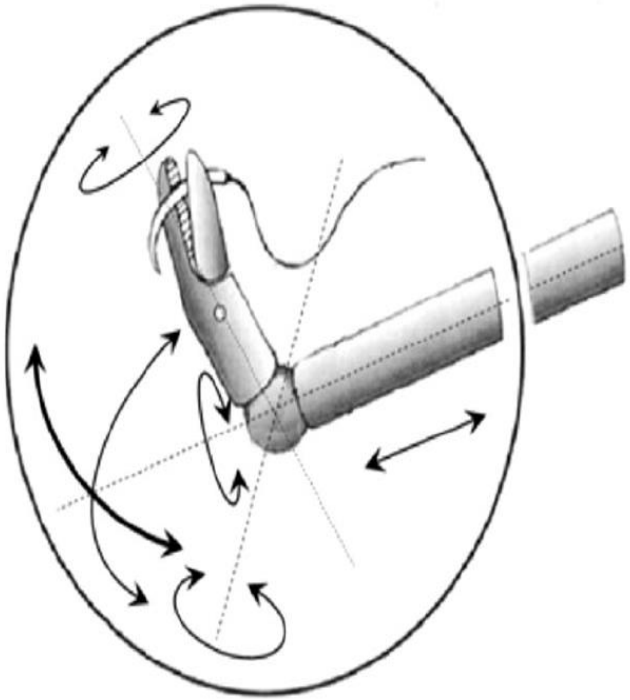
(greater endoscopic dexterity)

EndoWrist Instruments:

7 grades to freedom
180 ° of joint
540 ° rotation
Platforms from 5mm and 8mm.
Over 40 types of Instruments

da Vinci® Surgical System

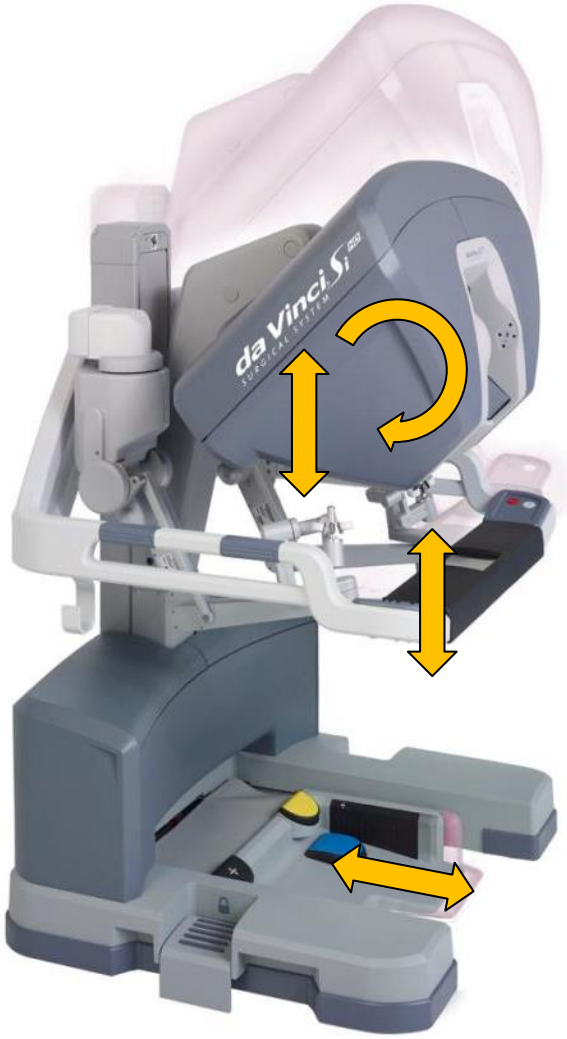




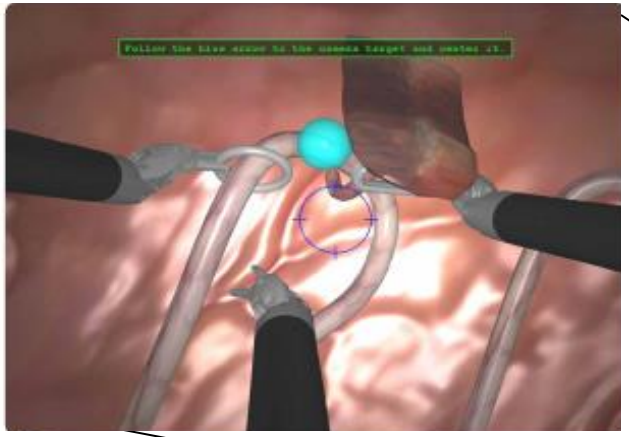
EndoWrist® Instrumentation

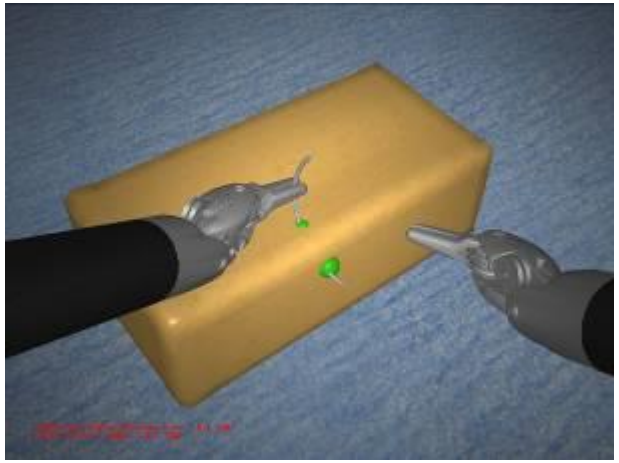
Surgeon Ergonomics
A New Push to Get Comfortable

- 4 ergonomic settings
- A. Park–"Laparoscopy is great for the patient, terrible for the surgeon."

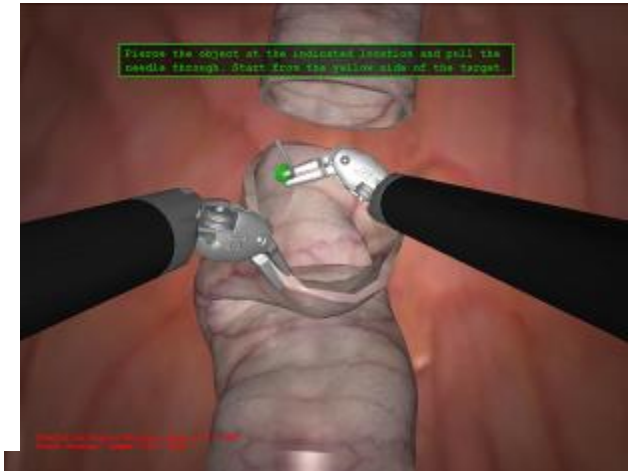


Simulator for the *da Vinci Si*





- System and Skills Training
  - EndoWrist Manipulation
  - Camera Control
  - Master Clutching
  - Needle Driving
  - 4th Arm Swapping



Surgical Collaboration - Today

In the OR

- Allow 2 da Vinci surgeons to operate in tandem
- Share same 3DHD surgical view
- Enhance teaching and proctoring experience
- Seamless exchange of instruments and control of endoscope


Vall d'Hebron
Hospital
Aula
A QUI S'ADREÇA
Curs dirigit a residents de 1er any de les especialitats: cirurgia general i aparell digestiu, cirurgia ortopèdica i traumatologia, cirurgia pediàtrica, cirurgia toràcica, obstetrícia i ginecologia i urologia.
Assistència obligatòria
CALENDARI I HORARI
Del 18 al 21 de gener de 2016
LLOC DE REALITZACIÓ
Aula 201 i Aula d'Habilitats
Mòdul Sud - UAB
(planta 1a Pavelló Docent) i
Àrea Quirúrgica
(planta -1 Àrea Maternoinfantil)
3er Curs pràctic d'iniciació a la CIRURGIA LAPAROSCÒPICA AMB SIMULADOR I ROBOT
Del 18 al 21 de gener de 2016
ORGANITZACIÓ
Per a més informació, us podeu adreçar a:
Aula Vall d'Hebron
Hospital Universitari Vall d'Hebron
Pl. 1a Pavelló Docent
aula@vhebron.net
Direcció del curs
Dra. Maria José Cerqueira Dapena
Directora de Docència
Dr. Ramon Vilallonga Puy
Facultatiu especialista. Servei de Cirurgia General i de l'Aparell Digestiu
Dr. Alberto Jauregui Abularach
Facultatiu especialista. Servei Cirurgia Toràcica
Generalitat de Catalunya
Departament de Salut
Institut Català de la Salut

Cadière and Himpens in 1998 did a robotic AGB.

Obesity Surgery, **9**, 206–209

Case Report

The World's First Obesity Surgery Performed by a Surgeon at a Distance

G. B. Cadiere, MD, PhD; J. Himpens, MD; M. Vertruyen, MD; F. Favretti, MD[1]

Department of Gastrointestinal Surgery, CHU Saint-Pierre, Brussels, Belgium; and [1]Department of Gastrointestinal Surgery, Ospedale S. Bortolo, Vicenza, Italy

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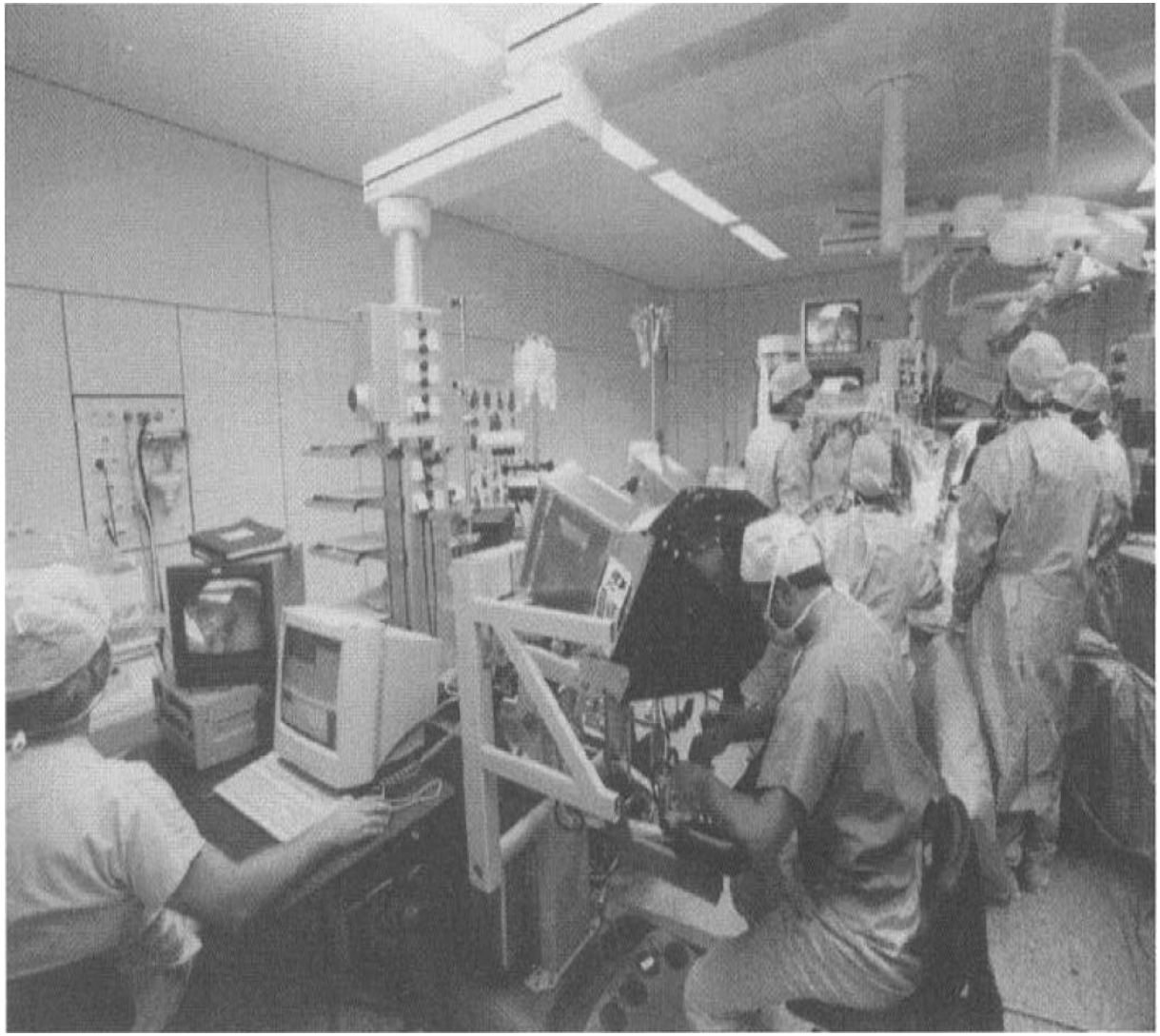
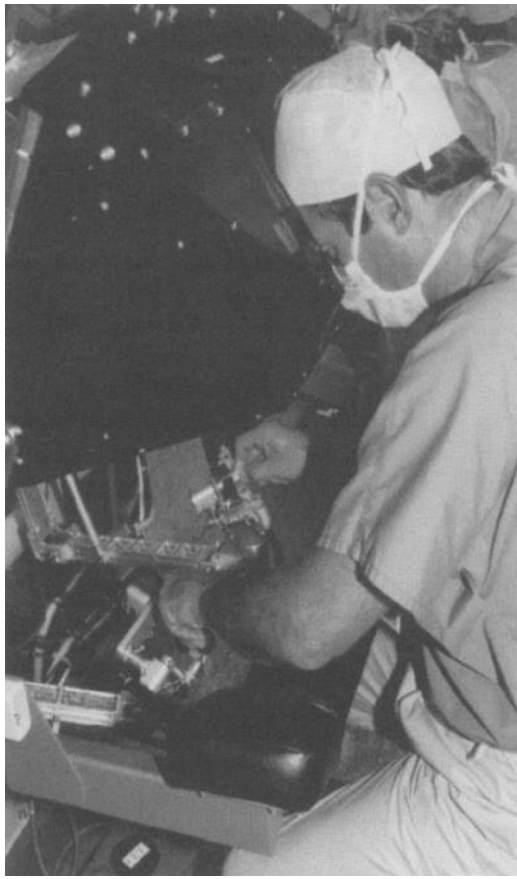
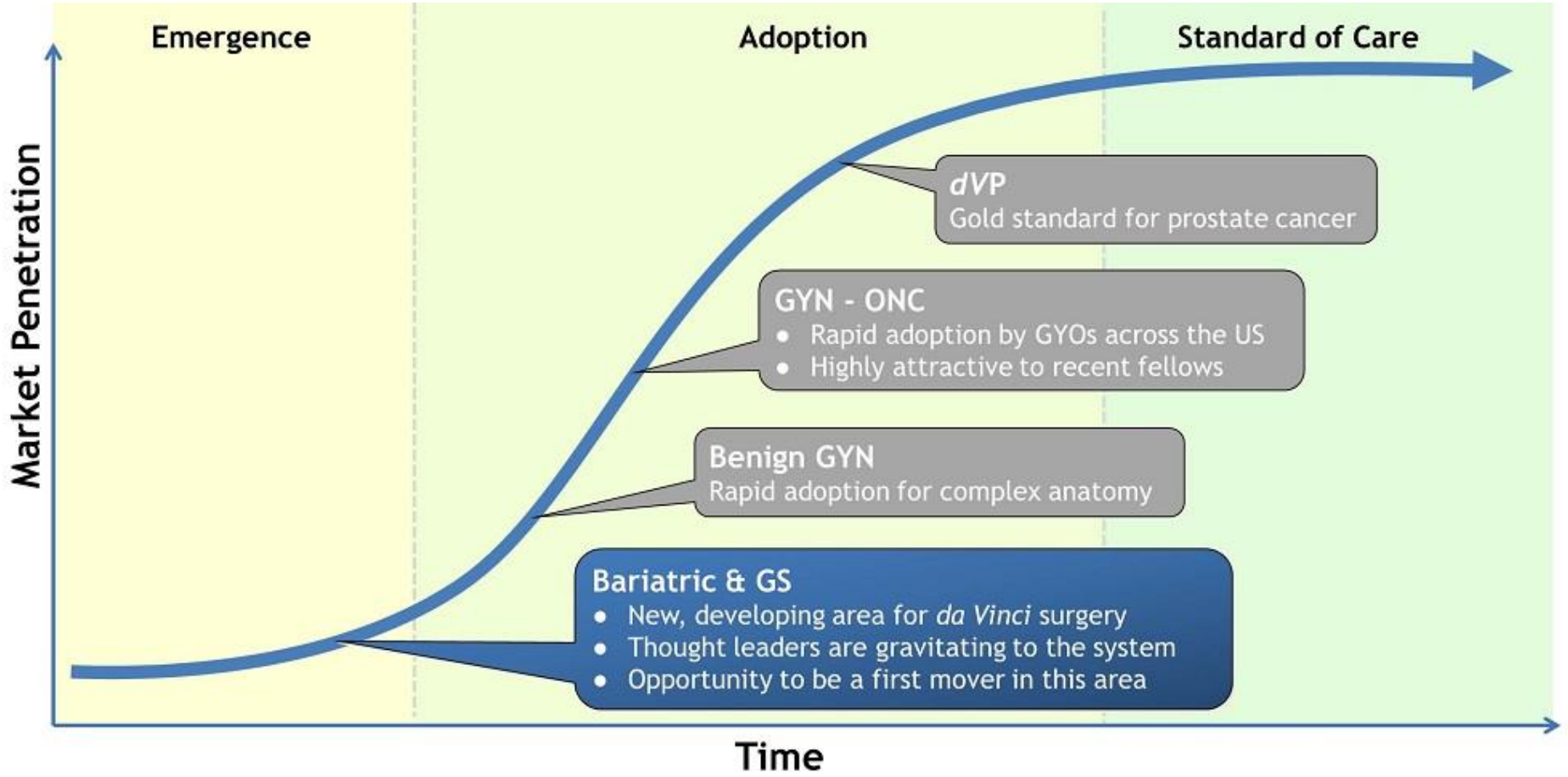




Where is *da Vinci*® for Bariatric and General Surgery?



Hospital Vall Hebron

- 7 robotic general surgeons + 4 urologist + 3 gynecologists + 1 MFS + 2 pediatic surgeons + cardiac surgery
- 800 robotic cases over 6 years
- ~180 cases/year

- 30% of our bariatric cases are robotic
- 4 year training center->8 teams trained
- Train 2-4 persons/year

How to do it, step by step?

- Execution phase
  - Initial design and implementation lead to the execution of clinical services. Program Design – Implementation.
- Maintenance phase
  - Goog overall results. Data collection. Evaluation of Economics – Training and education
- Growth phase
  - Maximize the benefits of the program –
  - Recruitment and traiing of surgeons.

My Biases

Bariatric surgery has become increasingly comprehensive in its procedures and services

Complications and conversions to open surgery will become less acceptable

Failures and revisions of bariatric surgery will continue to grow

Digital platforms are the future of elective surgery

- They make good surgeons more precise and more comfortable in difficult operations

Reported Challenges to Robotics

- Increased costs
- Only one company in the market
- Large footprint
- No haptic feedback
- Longer set-up times
- Longer operative times
- Limited in multi-quadrant procedures

Challenges to Robotics—What Can't It Do?

- Increased costs
- Only one company in the market
- Large footprint
- No haptic feedback
- ~~Longer set-up times~~
- ~~Longer operative times~~
- Limited in multi-quadrant procedures

The Questions

Is robotic surgery innovative?

If its innovative, why are general surgeons not adopting it?

Or are they?

Is it enabling? Does it change what you can do surgically?

Are the ergonomic advantages real?

Is robotic technology growing or dying?

Is robotic technology dangerous?

Is it better for patients, doctors, hospitals?

Is it disappointing that robotics is being driven by urology, gynecology, more significantly than by general surgery, bariatric surgery, thoracic surgery, surgical oncology and colorectal surgery?

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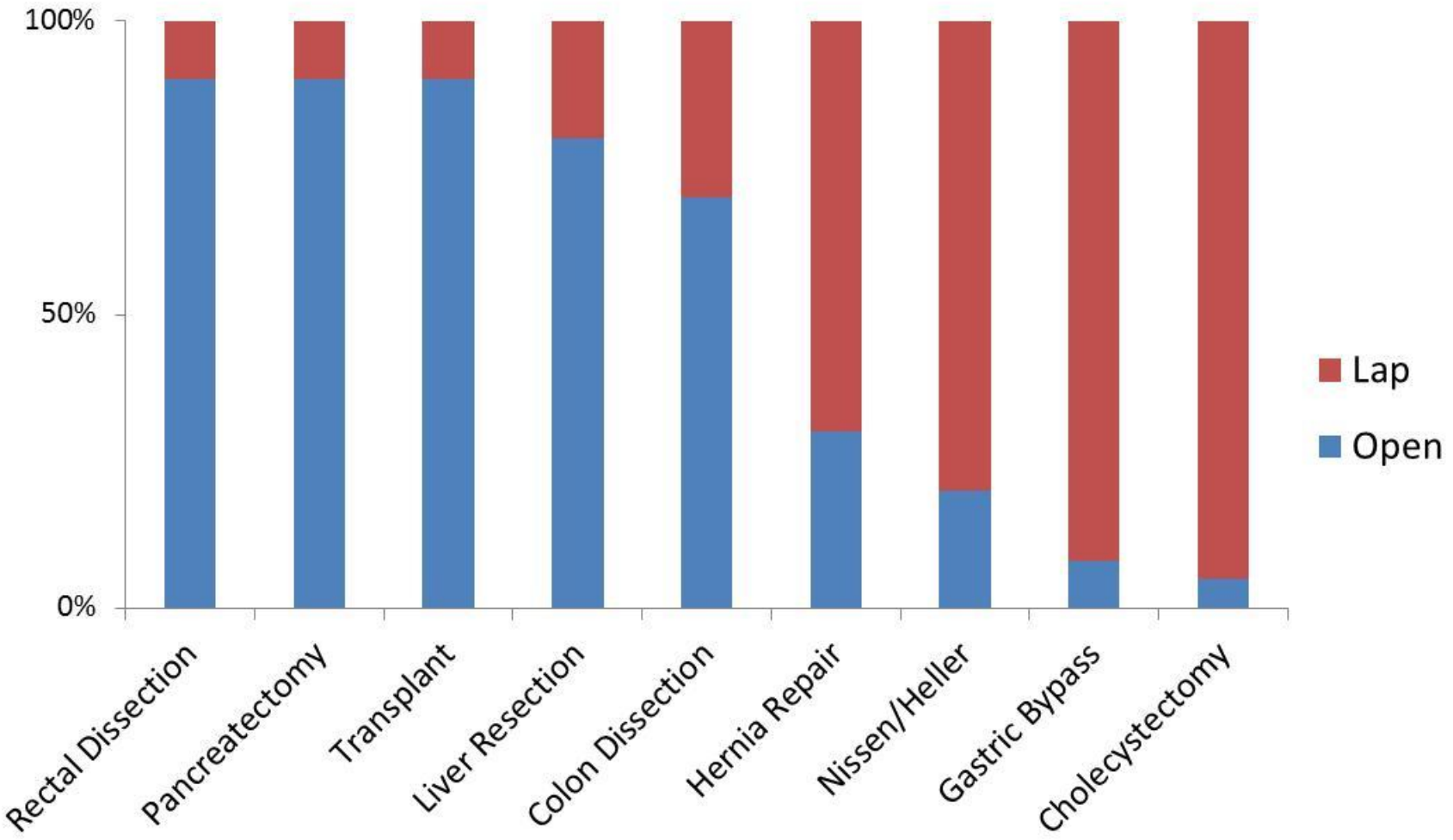
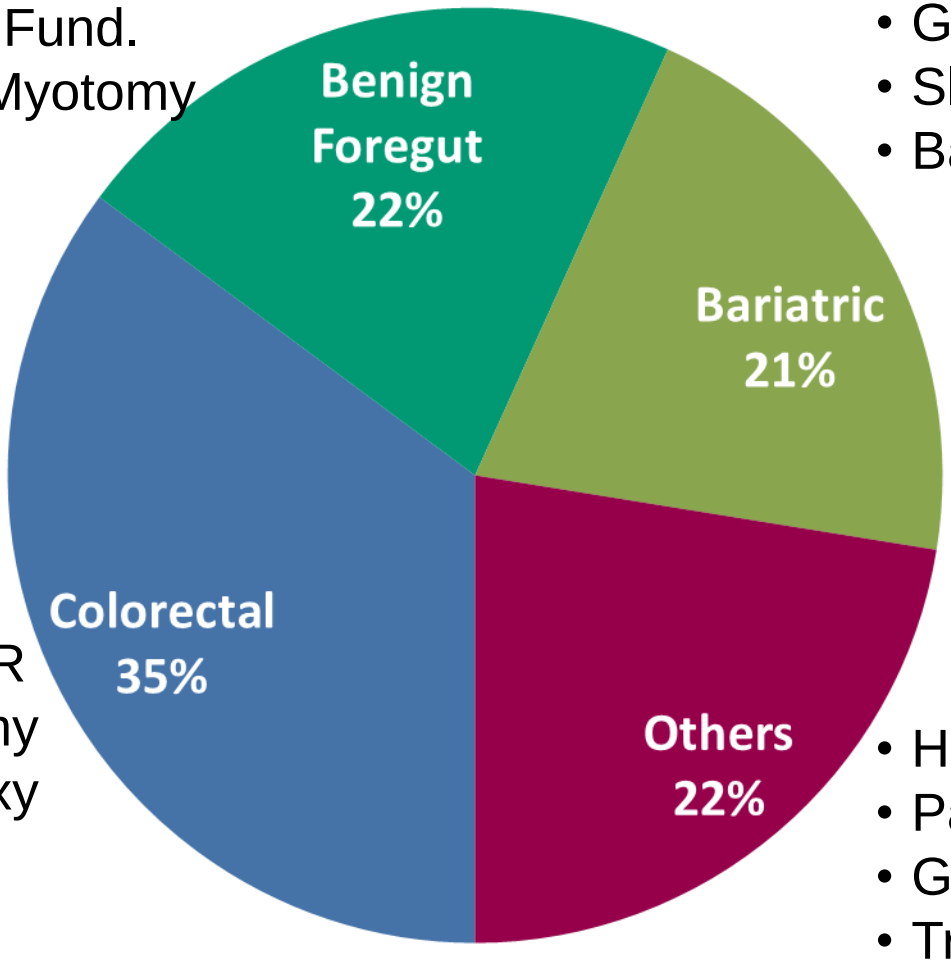
Penetration of Laparoscopy in General Surgery



Robotic General Surgery Procedures

- Cholecystectomy
- Nissen Fund.
- Heller Myotomy

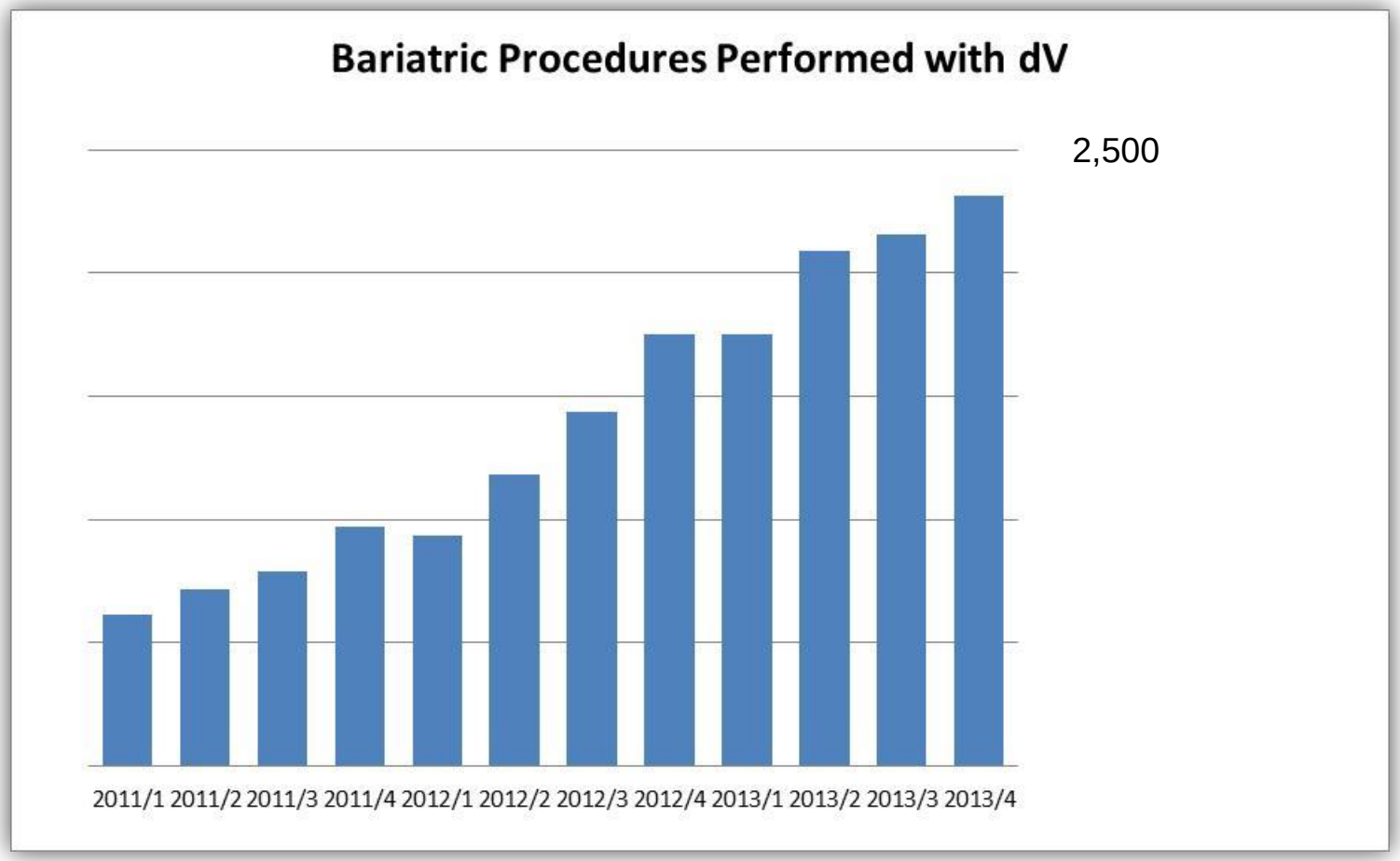


- Gastric Bypass
- Sleeve Gastrectomy
- Bands

- LAR, APR
- Colectomy
- Rectopexy

- Hernia
- Pancreas, Liver
- Gastrectomy
- Transplant

Bariatric Procedures with Robotics



Source: Intuitive Surgical Analysis as of July 1, 2014

OBES SURG (2013) 23:1324–1332
DOI 10.1007/s11695-013-0980-5

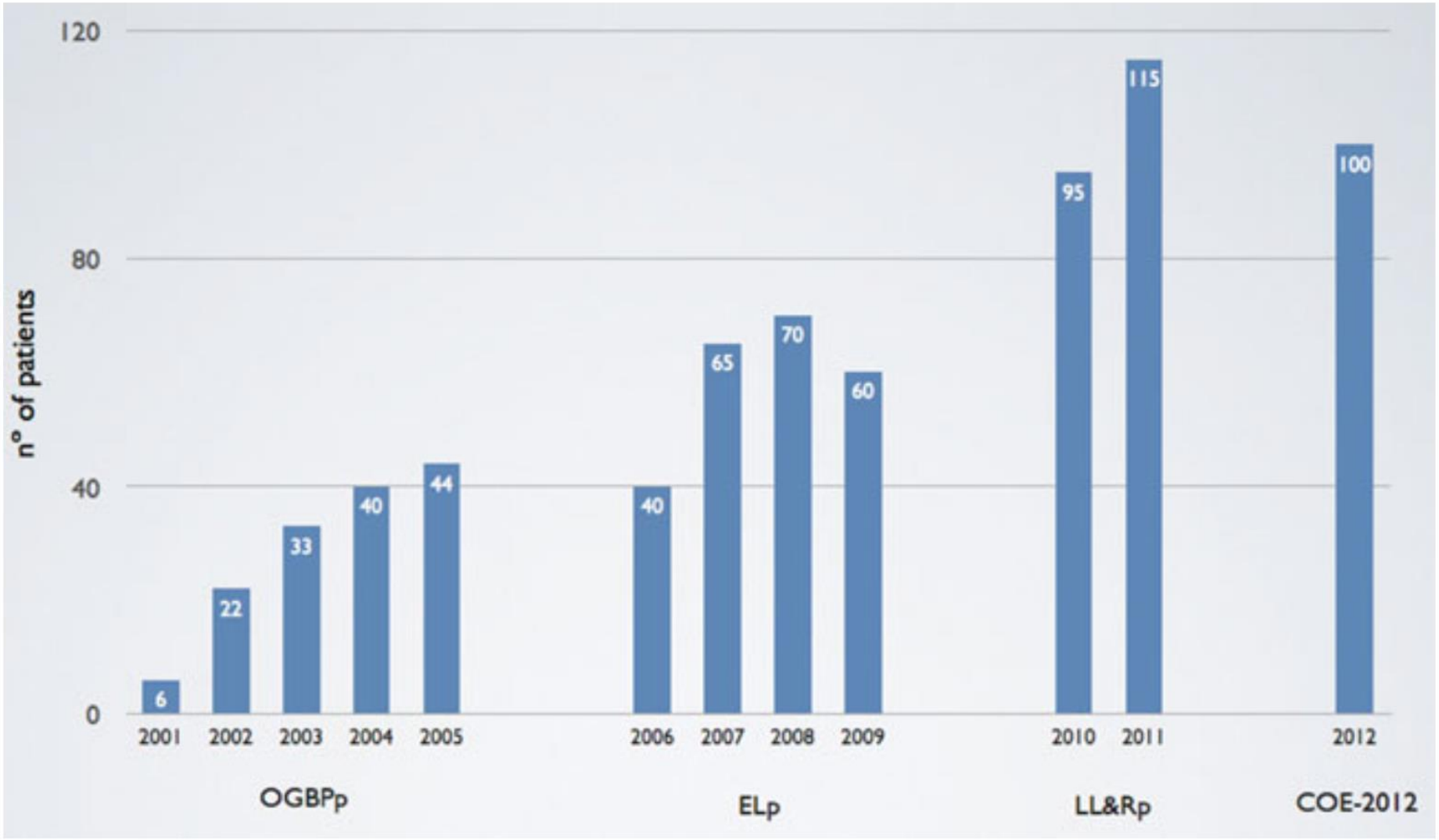
REVIEW

Bariatric Surgery Outcomes in a European Centre of Excellence (CoE)

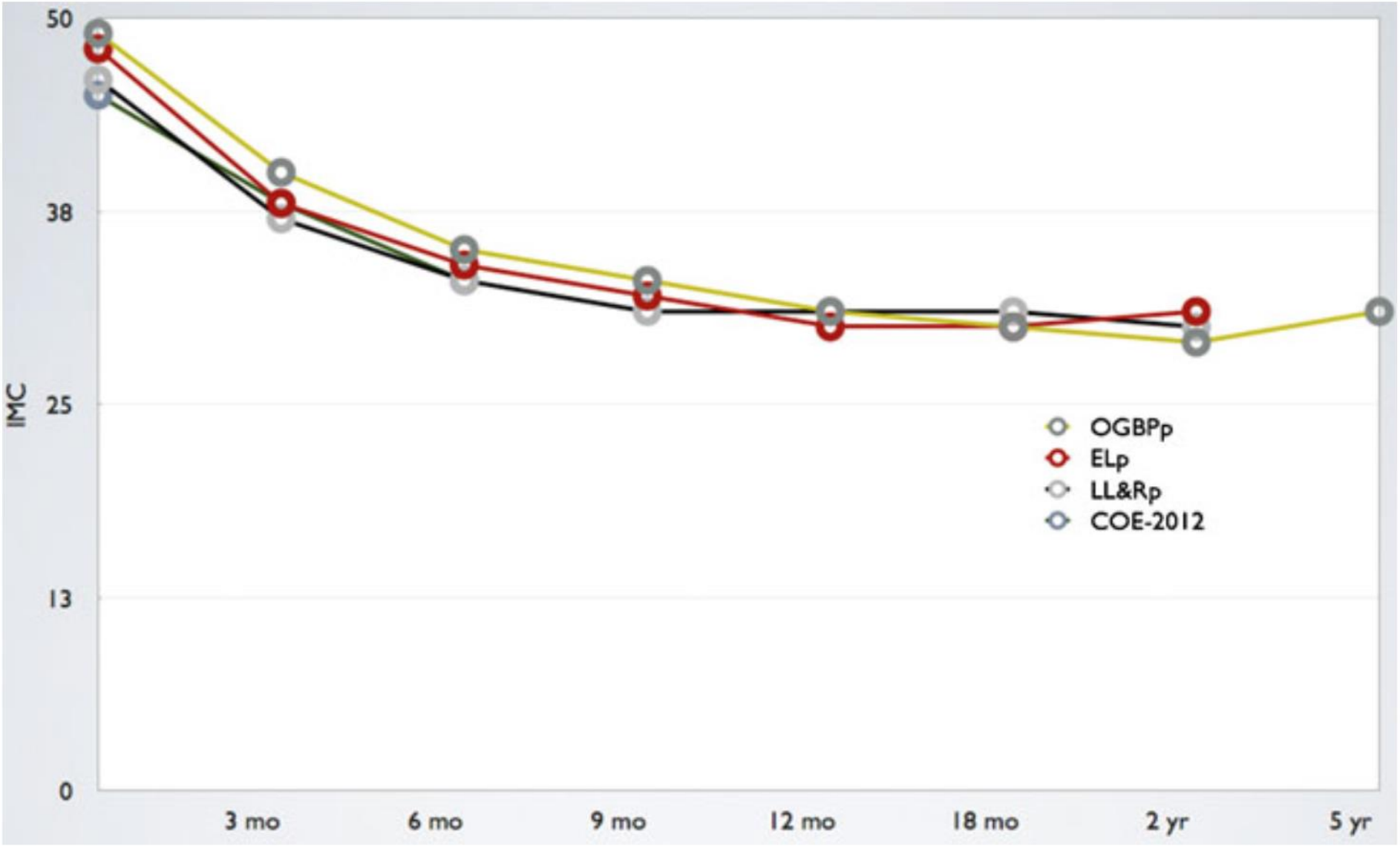
José Manuel Fort · Ramon Vilallonga · Albert Lecube · Oscar Gonzalez · Enric Caubet · Jordi Mesa · Manel Armengol

Period	Open gastric bypass period	Early laparoscopic period	Late laparoscopic–robotic period	Center of Excellence 2012 period	Chi-square test/ ANOVA, *p*
Demographics					
Number of patients	145	235	210	100	
Age	43±10	44±9	45±10.5	45±10.2	n.s.
Sex (female %)	79	76	75	74	n.s.
Weight (mean±SD)	131±20	127±20	120±22	121±20	0.000
BMI (mean±SD)	49±5	48±6	46±0.3	45±6	0.000
Comorbidities (%)					
Hypertension	50	45	47	44	n.s.
Type 2 DM	29	27	28	27	n.s.
OSAS with CPAP	47	57	57	39	0.005
Dyslipemia	31	34	34	35	n.s.
Osteoarthritis	52	42	44	41	n.s.
Cholelithiasis	35	27	18	24	0.002
Hiatal hernia	21	31	22	14	0.004
Procedure performed					
Open gastric bypass	145	–	–	–	–
Laparoscopic gastric bypass	–	208	78	24	–
Sleeve gastrectomy	–	25	59	37	–
Robotic sleeve	–	–	57	25	–
Robotic gastric bypass	–	–	4	7	–
Laparoscopic band	–	–	4	1	–
Redo surgery	–	–	8	8	–
Conversion to open	–	2	–	–	–

Vall Hebron Hospital Obesity Surgery Department.



Vall Hebron Hospital Obesity Surgery Department.



Robotic surgery for sleeve Technique.

OBES SURG
DOI 10.1007/s11695-013-1039-3

REVIEW ARTICLE

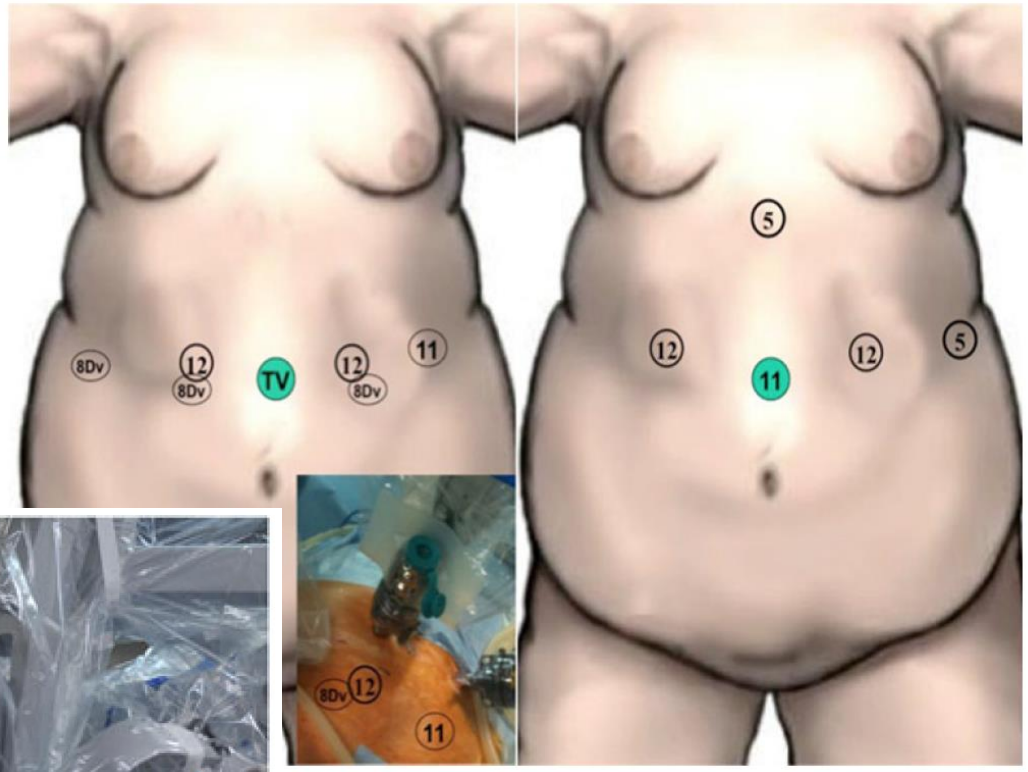
Robotic Sleeve Gastrectomy Versus Laparoscopic Sleeve Gastrectomy: a Comparative Study with 200 Patients

Ramon Vilallonga · José Manuel Fort · Enric Caubet · Oscar Gonzalez · Manel Armengol

	Robotic sleeve group (RS) (n=100) (Sep 2006–May 2012)	Laparoscopic sleeve group (LS) (n=100) (May 2010–Nov 2012)	p value
Age (mean, SD) years	44, 11	43, 11	NS
Gender (M/F)	21/79	36/64	NS
Preoperative weight (kg) (mean, SD)	124, 2	128, 2	NS
Preoperative BMI (kg/m^2) (mean, SD)	48, 8	47, 6	NS
Excess weight (kg) (mean, SD)	64, 5	65, 4	NS
Patients with comorbidities (n)			
– T2DM	25	27	NS
– HBP	48	46	
– CPAP	77	80	
– DLP	26	33	

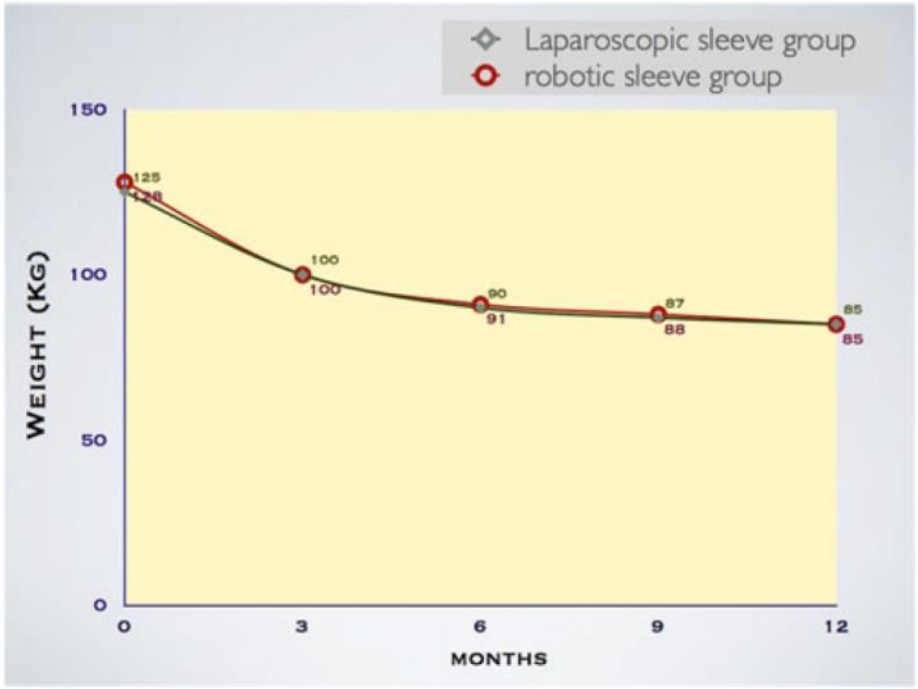
Vilallonga R et al. Robotic sleeve gastrectomy versus laparoscopic sleeve gastrectomy: a comparative study with 200 patients. Obes Surg. 2013 Oct;23(10):1501-7.

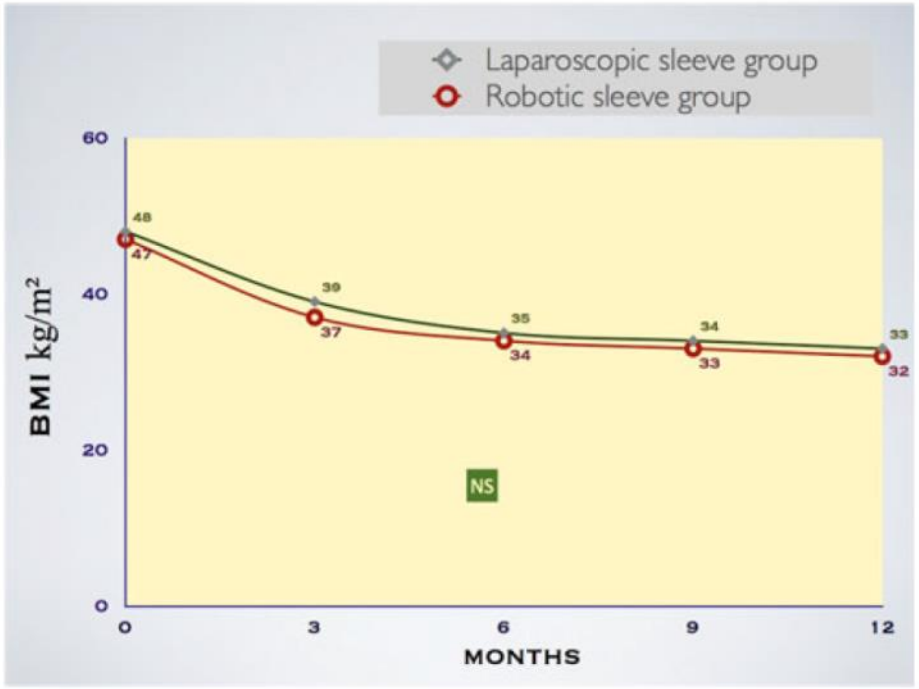
Robotic surgery for sleeve Technique.



Vilallonga R et al. Robotic sleeve gastrectomy versus laparoscopic sleeve gastrectomy: a comparative study with 200 patients. Obes Surg. 2013 Oct;23(10):1501-7.

Robotic surgery for sleeve Technique.





OBES SURG
DOI 10.1007/s11695-013-1147-0

Vilallonga R et al. Robotic sleeve gastrectomy versus laparoscopic sleeve gastrectomy: a comparative study with 200 patients. Obes Surg. 2013 Oct;23(10):1501-7.

Robotic surgery for sleeve Technique.

	Robotic sleeve group (n=100)	Laparoscopic sleeve group (n=100)	p value
– Operative time (min) (mean, SD)	108, 18	96, 18	<0.005
– Docking time (min) (mean, SD)	6, 1	–	–
Reinforcement performed (n)			
– Staple line suture	89	87	NS
– Seamguard® reinforcement	11	13	NS
Surgical complications (n) (intraoperative until 30 days)			
– Bleeding	2	4	0.78
– Leak	3	4	
– Phlebitis	0	2	
– DVT/PTE	0	0	
Hospital stay (days) (mean, SD)	4, 3	3, 5	0.34
Reoperations	1	2	NS
Postoperative BMI at 12 months follow-up (kg/m^2) (mean, SD)	32,7	33,2	NS
EWL (mean %)	66	67	NS
Weight (kg)	84,5	85,1	NS
Resolution of comorbidities (%)			
T2DM	86	84	NS
HBP	76	81	NS
CPAP	80	83	NS
DLP	67	33	NS

Vilallonga R et al. Robotic sleeve gastrectomy versus laparoscopic sleeve gastrectomy: a comparative study with 200 patients. Obes Surg. 2013 Oct;23(10):1501-7.

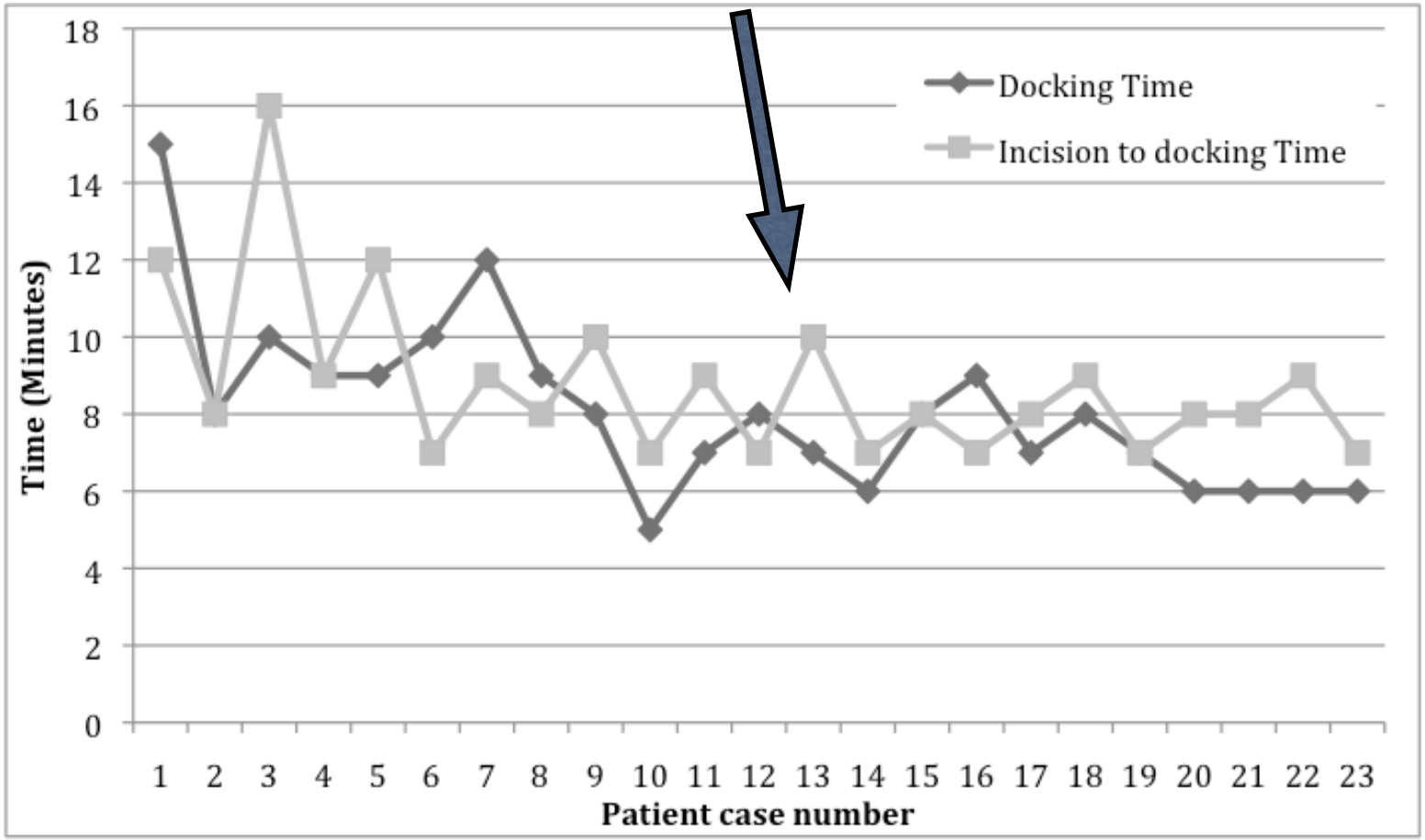
Training

Learning curve and robot set-up/operative times in singly docked totally **robotic** Roux-en-Y **Gastric bypass**.
Ayloo S, Fernandes E, Choudhury N.
Surg Endosc. 2014 Jan 3. [Epub ahead of print]
PMID: 24385247 [PubMed - as supplied by publisher]
Related citations

Early outcomes of the first Brazilian experience in totally **robotic** bariatric surgery.
Ramos AC, Domene CE, Volpe P, Pajecki D, D'Almeida LA, Ramos MG, Bastos EL, Kim KC.
Arq Bras Cir Dig. 2013;26 Suppl 1:2-7. English, Portuguese.
PMID: 24463890 [PubMed - as supplied by publisher] **Free Article**

TRAINING... AND FRIENDSHIP

Training

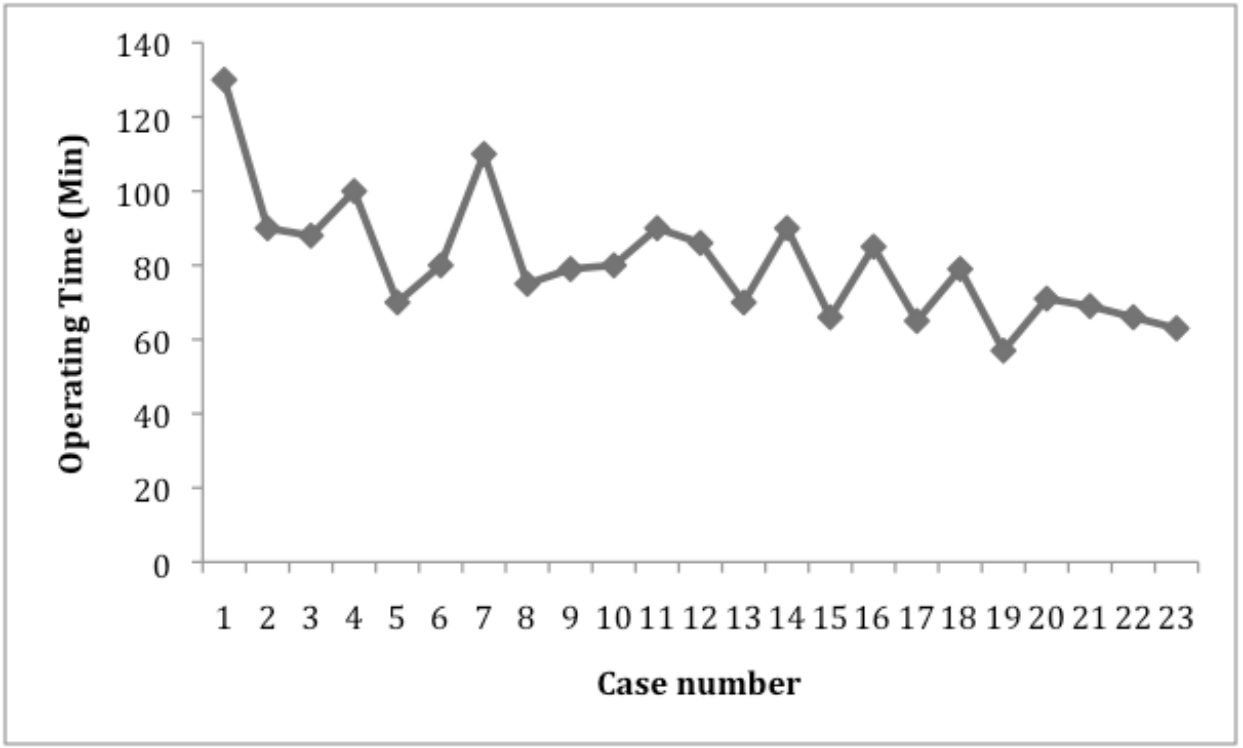


The Initial **Learning Curve** for Robot-Assisted Sleeve Gastrectomy: A Surgeon's Experience While Introducing the Robotic Technology in a Bariatric Surgery Department.

Vilallonga R, Fort JM, Gonzalez O, Caubet E, Boleko A, Neff KJ, Armengol M.

Minim Invasive Surg. 2012;2012:347131. doi: 10.1155/2012/347131. Epub 2012 Sep 17.

Training



Vilallonga R et al. The Initial Learning Curve for Robot-Assisted Sleeve Gastrectomy: A Surgeon's Experience While Introducing the Robotic Technology in a Bariatric Surgery Department. Minim Invasive Surg. 2012;2012:347131.

Open gastric bypass period	Early laparoscopic period	Late laparoscopic–robotic period	Center of Excellence 2012 period

Where are we now?

5th Period

Working in the gastric bypass learning curve
Some advanced revisional procedures under robot

- 6 revisonal cases.
- 125 robotic gastric by-pass. 3 learning curves for surgeons.
- Results under evaluation. Higher complication rate compared to late laparoscopic period. Better selection

6th Period

New technologies / New procedures / More revisional cases.

The Questions

Is robotic surgery innovative?

If its innovative, why are general surgeons not adopting it?

Or are they?

Is it enabling? Does it change what you can do surgically?

Are the ergnomic advantages real?

Is robotic technology growing or dying?

Is robotic technology dangerous?

Is it better for patients, doctors, hospitals?

Is it disappointing that robotics is being driven by urology, gynecology, ENT more signficantly than by general surgery, bariatric surgery, thoracic surgery, surgical oncology and colorectal surgery?

Why *da Vinci* for Roux-en-Y Gastric Bypass?

Surgical dexterity for precise two-layer hand-sewn GJ anastomosis[4]

Reduces gastrointestinal leaks and strictures[3,4]

Allows standardization of surgical technique regardless of BMI[4]

Significantly improves surgeon ergonomics, which minimizes physical strain[5]

"Show Me the Data"

2008 Robotic bypass vs lap bypass

0% leaks vs. 1.7% leaks—no mortality

2012 1700 consecutive robotic gastric bypasses

5 leaks or abscesses (0.3%)—no mortality

3 different centers--reproducible

2012 100 consecutive revisional gastric bypasses

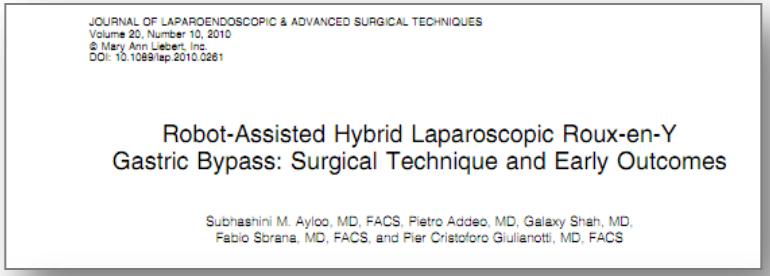
1 leak or abscess (1%)—no mortality

Surg Obes Relat Dis. 2013 Mar-Apr;9(2):284-8. doi: 10.1016/j.soard.2011.11.022. Epub 2012 Jan 16.

Robotic-assisted Roux-en-Y gastric bypass: update from 2 high-volume centers.

Tieu K, Allison N, Snyder B, Wilson T, Toder M, Wilson E.

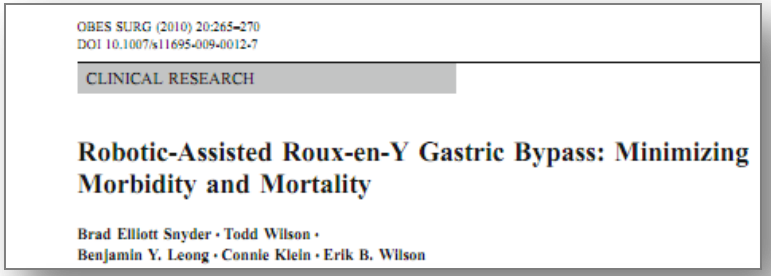
0.1% GI leaks in multiple studies, compared to 1-4% for conventional laparoscopy



JOURNAL OF LAPAROENDOSCOPIC & ADVANCED SURGICAL TECHNIQUES
Volume 20, Number 10, 2010
© Mary Ann Liebert, Inc.
DOI: 10.1089/lap.2010.0261

Robot-Assisted Hybrid Laparoscopic Roux-en-Y Gastric Bypass: Surgical Technique and Early Outcomes

Subhashini M. Ayloo, MD, FACS, Pietro Addeo, MD, Galaxy Shah, MD, Fabio Sbrana, MD, FACS, and Pier Cristoforo Giulianotti, MD, FACS

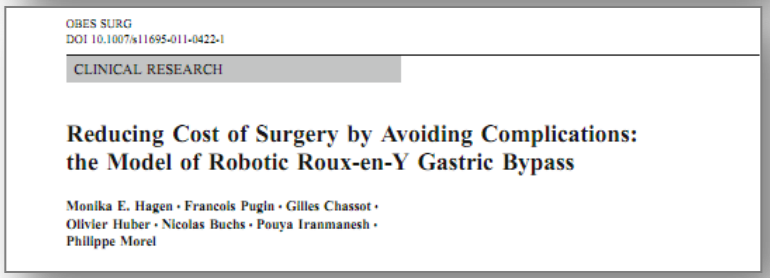


OBES SURG (2010) 20:265–270
DOI 10.1007/s11695-009-0012-7

CLINICAL RESEARCH

Robotic-Assisted Roux-en-Y Gastric Bypass: Minimizing Morbidity and Mortality

Brad Elliott Snyder · Todd Wilson · Benjamin Y. Leong · Connie Klein · Erik B. Wilson

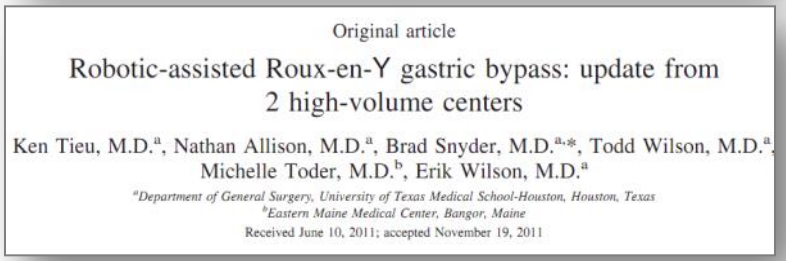


OBES SURG
DOI 10.1007/s11695-011-0422-1

CLINICAL RESEARCH

Reducing Cost of Surgery by Avoiding Complications: the Model of Robotic Roux-en-Y Gastric Bypass

Monika E. Hagen · Francois Pugin · Gilles Chassot · Olivier Huber · Nicolas Buchs · Pouya Iranmanesh · Philippe Morel



Original article

Robotic-assisted Roux-en-Y gastric bypass: update from 2 high-volume centers

Ken Tieu, M.D.[a], Nathan Allison, M.D.[a], Brad Snyder, M.D.[a,*], Todd Wilson, M.D.[a], Michelle Toder, M.D.[b], Erik Wilson, M.D.[a]

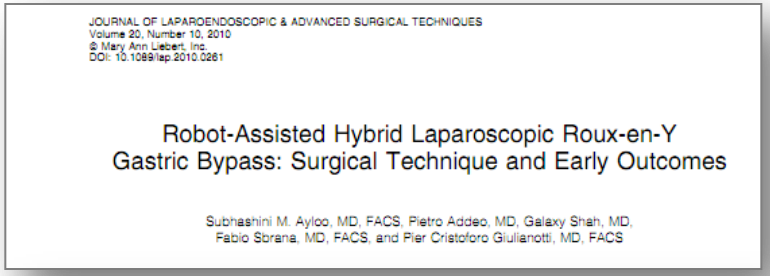
[a]*Department of General Surgery, University of Texas Medical School-Houston, Houston, Texas*
[b]*Eastern Maine Medical Center, Bangor, Maine*

Received June 10, 2011; accepted November 19, 2011

Roux-en-Y Gastric Bypass

	Laparoscopic		*da Vinci*®		*p* value
Study:	N	leaks (%)	N	leaks (%)	
Snyder (2010)[4]	356	6 (1.7%)	320	0 (0%)	.05
Ayloo (2010)[6]	n/a		80	0 (0%)	n/a
Hagen (2011)[3]	323	13 (4.0%)	143	0 (0%)	.03
Tieu (2012)[10]	n/a		1100	1 (.09%)	n/a

da Vinci® anastomotic stricture rates are lower than or comparable to conventional laparoscopy



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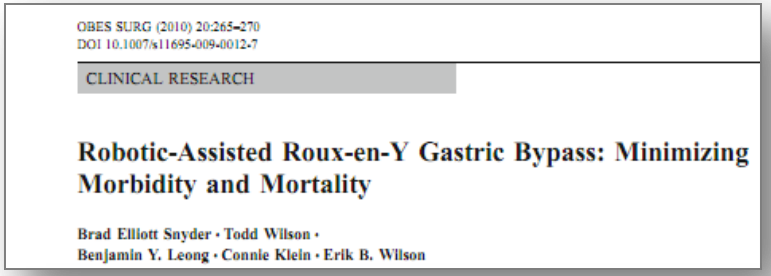

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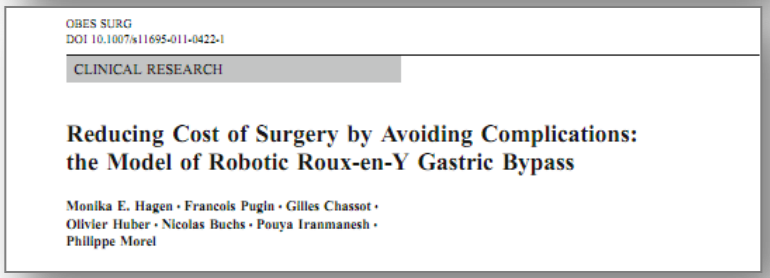

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DOI 10.1007/s11695-011-0422-1

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Original article

Robotic-assisted Roux-en-Y gastric bypass: update from 2 high-volume centers

Ken Tieu, M.D.[a], Nathan Allison, M.D.[a], Brad Snyder, M.D.[a,*], Todd Wilson, M.D.[a], Michelle Toder, M.D.[b], Erik Wilson, M.D.[a]

[a]*Department of General Surgery, University of Texas Medical School-Houston, Houston, Texas*
[b]*Eastern Maine Medical Center, Bangor, Maine*

Received June 10, 2011; accepted November 19, 2011

Roux-en-Y Gastric Bypass

	Laparoscopic		*da Vinci*		P-value
Study:	N	strictures (%)	N	strictures (%)	
Snyder (2010)[4]	356	8 (2.2%)	320	3 (0.9%)	.30
Ayloo (2010)[6]	n/a		80	0 (0%)	n/a
Hagen (2011)[3]	323	22 (6.8%)	143	0 (0%)	<.01
Tieu (2012)[10]	n/a		1100	7 (.63%)	n/a

The physical strain and demands placed on surgeons for bariatric cases should not be underestimated...

"With the increasing work volume of a bariatric surgeon owing to increased demands, robotics might be able to ***lessen the muscle strain and fatigue of the surgeon and allow more cases to be performed on a daily basis****"* (Sanchez, et al, 2005, Stanford University Medical Center)[8]

"The problems of ***ergonomics encountered with the massively obese were obviously solved*** *by placing the surgeon at a remote working console"* (Cadiere, et al, 2006, Centre Hospitalier Universitaire Saint-Pierre, Brussels)[9]

"In bariatric surgery, the da Vinci system improves surgeon ergonomics by not just allowing one to sit at the console but also by ***alleviating surgeon fatigue caused by the torque*** *created on the instruments and trocars by a thick abdominal wall"* (Yu, et al, 2006, The University of Texas Health Science Center Houston)[7]

Leading bariatric surgeons confirm that **the physical strain of bariatric cases is reduced** through *da Vinci's* improved ergonomics

If you do EVERY elective bariatric case laparoscopically…

And NEVER convert to open…

And while doing those cases, NEVER feel like you are making compromises in your dissection and reconstruction…

And you NEVER go home after a long OR day with back pain, shoulder pain or numbness…

THEN there MIGHT be no use for digital platforms in your practice.

What is going on ?

The main limitation of our analysis is due to the small number and low quality of the studies, the small sample size, heterogeneity of patients included and the lack of data on bariatric and metabolic outcomes.

The assumption that robotic surgery is superior in complex cases is not supported by the current evidence. Robotic surgery can greatly facilitate some surgical steps (jejunostomy and gastro-jejunostomy in gastric bypass Roux-en-Y gastric robotics or vertical gastrectomy resection in robotics).

European Association of Endoscopic Surgeons (EAES) consensus statement on the use of robotics in general surgery

Szold, R. Bergamaschi, I. Broeders, J. Dankelman, A. Forgione, T. Langø, A. Melzer, Y. Mintz, S. Morales-Conde, M. Rhodes, R. Satava, CN. Tang, **R. Vilallonga.** *Surg Endosc*. 2015 Feb;29(2):253-88.

SURGICAL ENDOSCOPY and Other Interventional Techniques

Obesity. Revisional surgery

The robotic group had fewer complications (0 vs. 14.3% for laparoscopy, vs. 10.7% for open; $P > 0.05$)

Longer operative time (352 vs. 270 vs. 250 minutes respectively; $P < 0.05$).

Int J Med Robot. 2013 Oct 24. doi: 10.1002/rcs.1549. [Epub ahead of print]

Robotic revisional bariatric surgery: a comparative study with laparoscopic and open surgery.

Buchs NC, Pugin F, Azagury DE, Huber O, Chassot G, Morel P.

Obesity. Revisional surgery

Technical advantages of robotic surgery result in a clinical value for procedures of advanced complexity such as Roux-en-Y gastric bypass and revisional bariatric surgery.

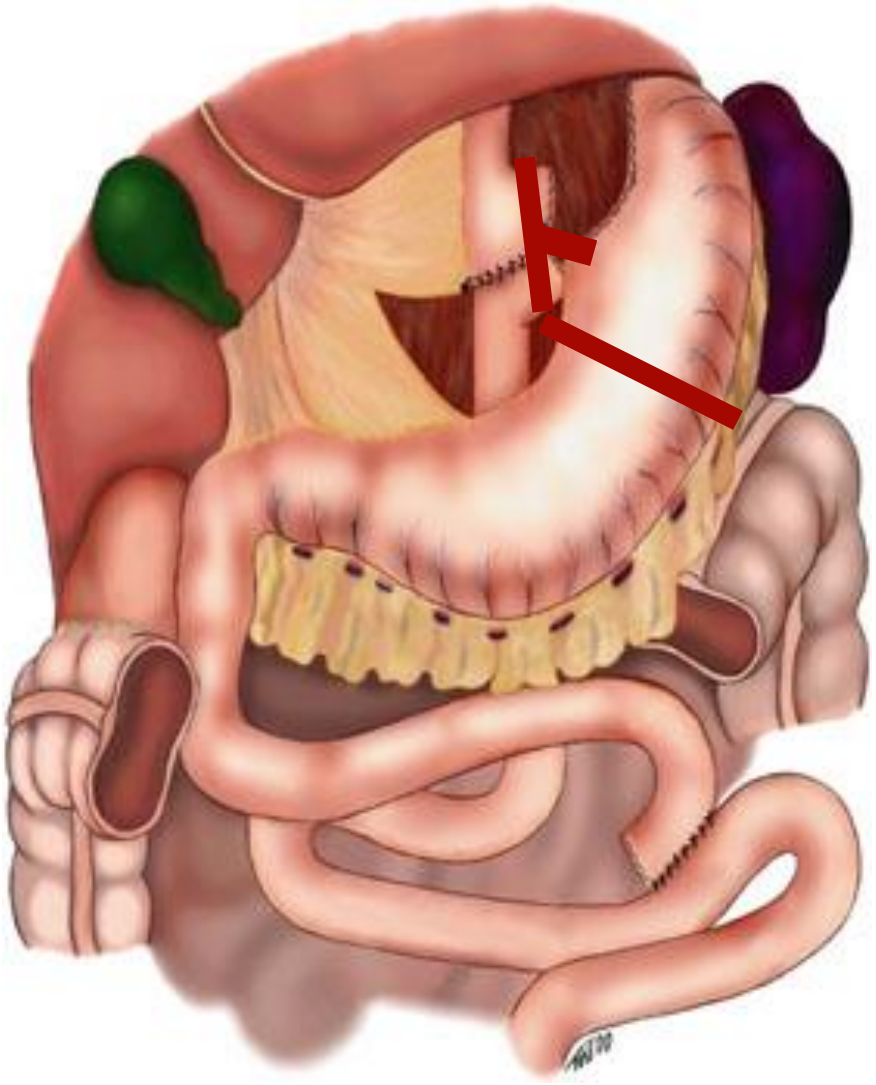
Ultimately, the digital interface of the robotic system with the option to integrate augmented reality and real-time imaging will allow advanced applications particularly in the field of gastrointestinal surgery for malignancies

Cancer J. 2013 Mar-Apr;19(2):177-82. doi: 10.1097/PPO.0b013e318289dd15.

Robotics in advanced gastrointestinal surgery: the bariatric experience.

Kim K, Hagen ME, Buffington C.

Simple Gastro-gastric fistulas



Large and complicated Gastro-gastric fistulas

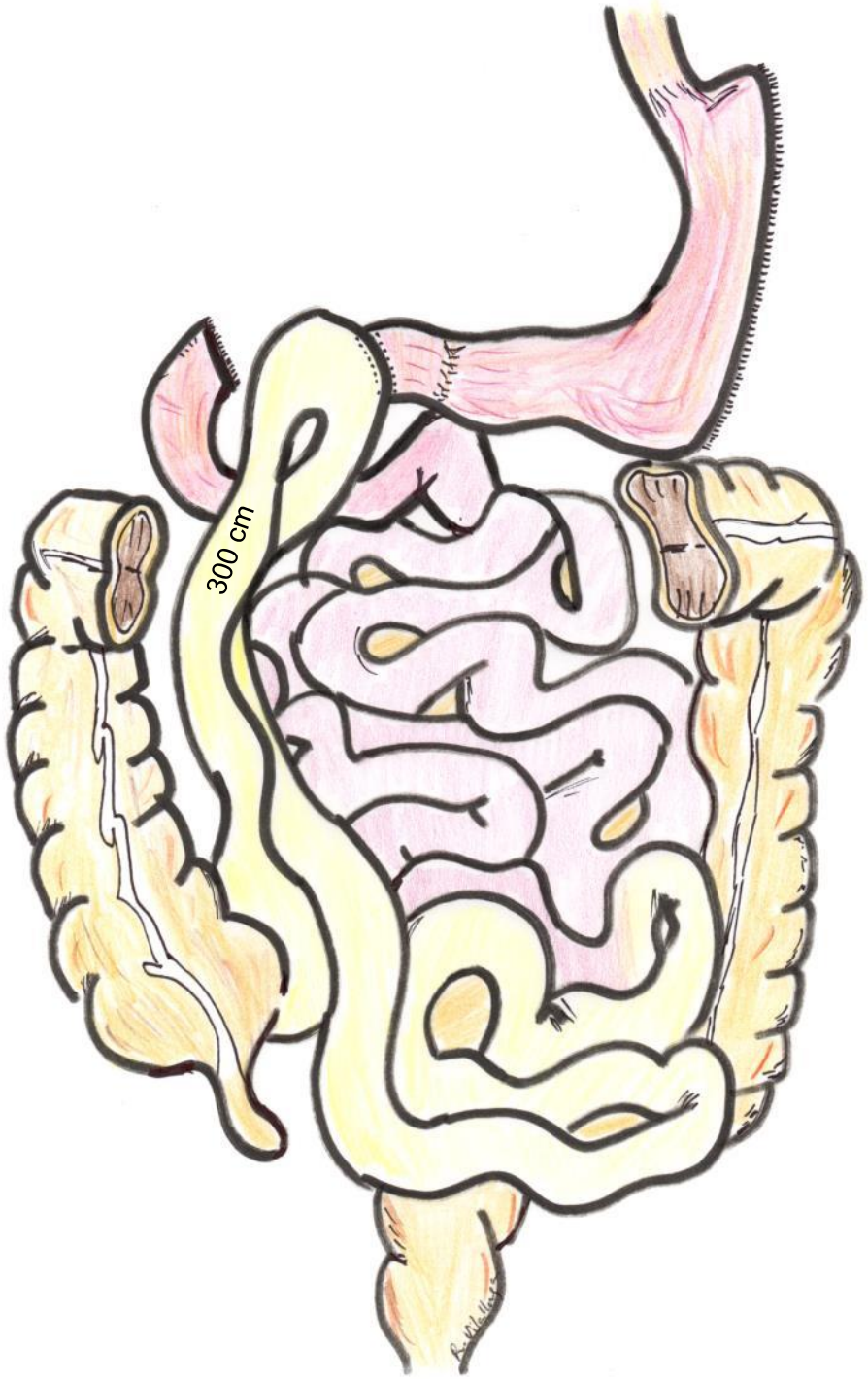
Future ?

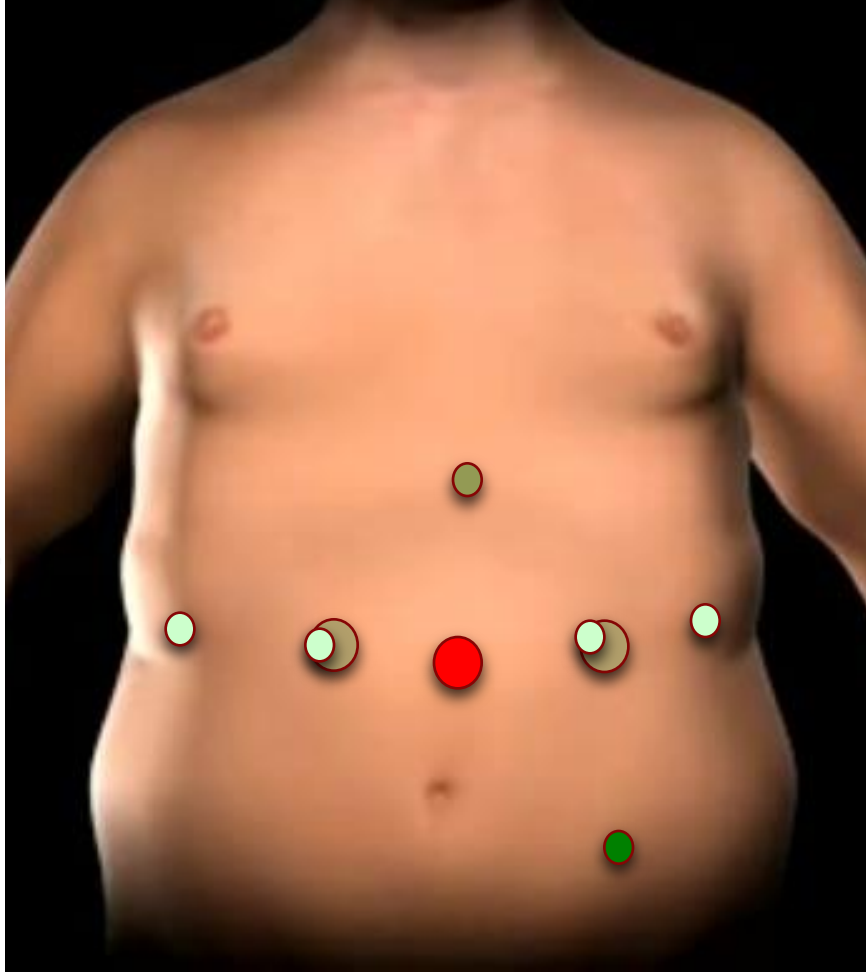
Hindawi Publishing Corporation
Journal of Obesity
Volume 2015, Article ID 586419, 6 pages
http://dx.doi.org/10.1155/2015/586419

Research Article

Robotically Assisted Single Anastomosis Duodenoileal Bypass after Previous Sleeve Gastrectomy Implementing High Valuable Technology for Complex Procedures

Ramon Vilallonga,[1] José Manuel Fort,[1] Enric Caubet,[1] Oscar Gonzalez,[1] José Maria Balibrea,[1] Andrea Ciudin,[2] and Manel Armengol[1]





Camera Trocar

8mm DaV Trocar

8mm DaV Trocar
on 12mm trocar

Liver retractor

5mm Trocar

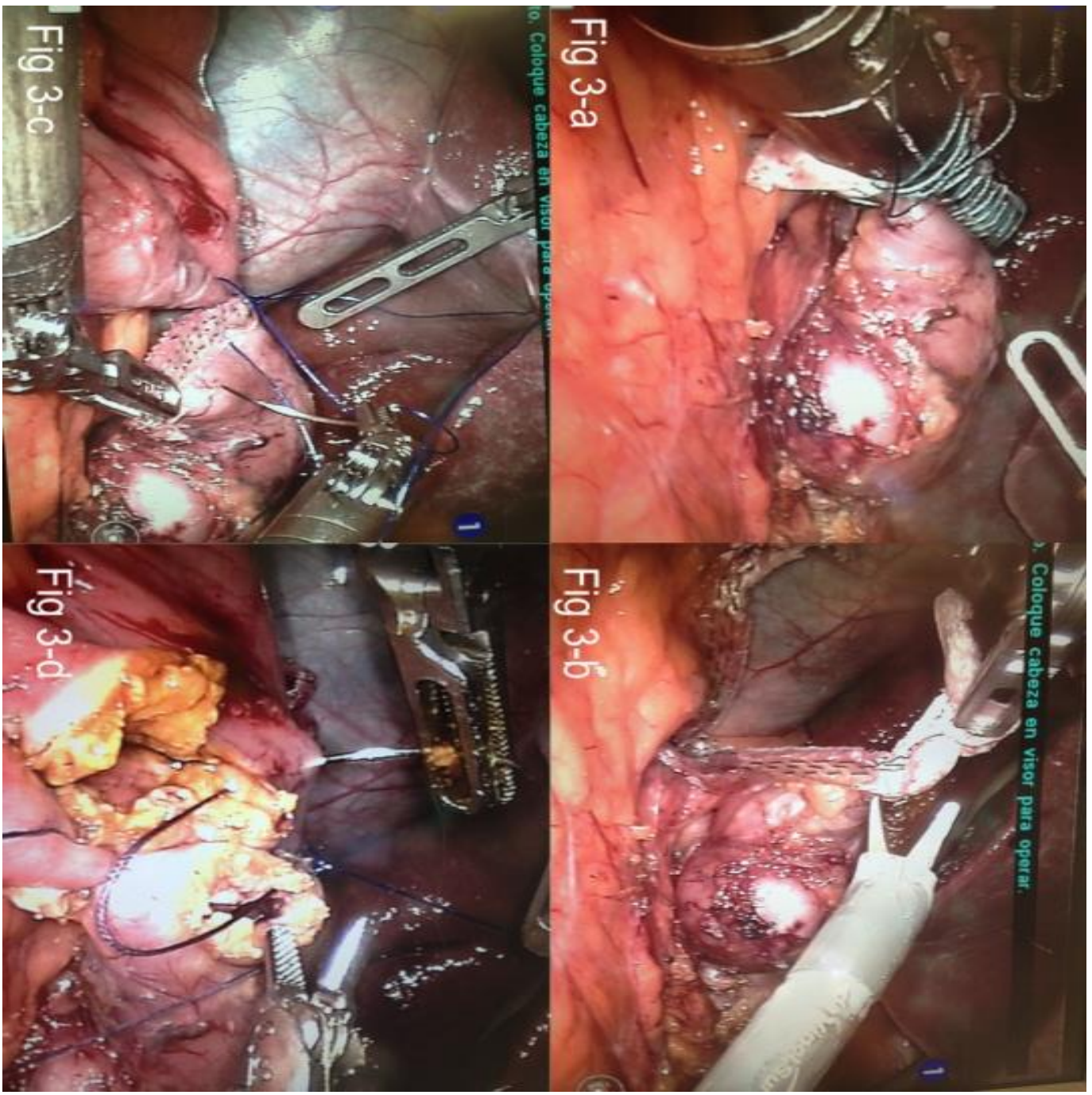


Fig 3-a
Fig 3-b
Coloque cabeza en visor para operar.
Fig 3-c
Fig 3-d

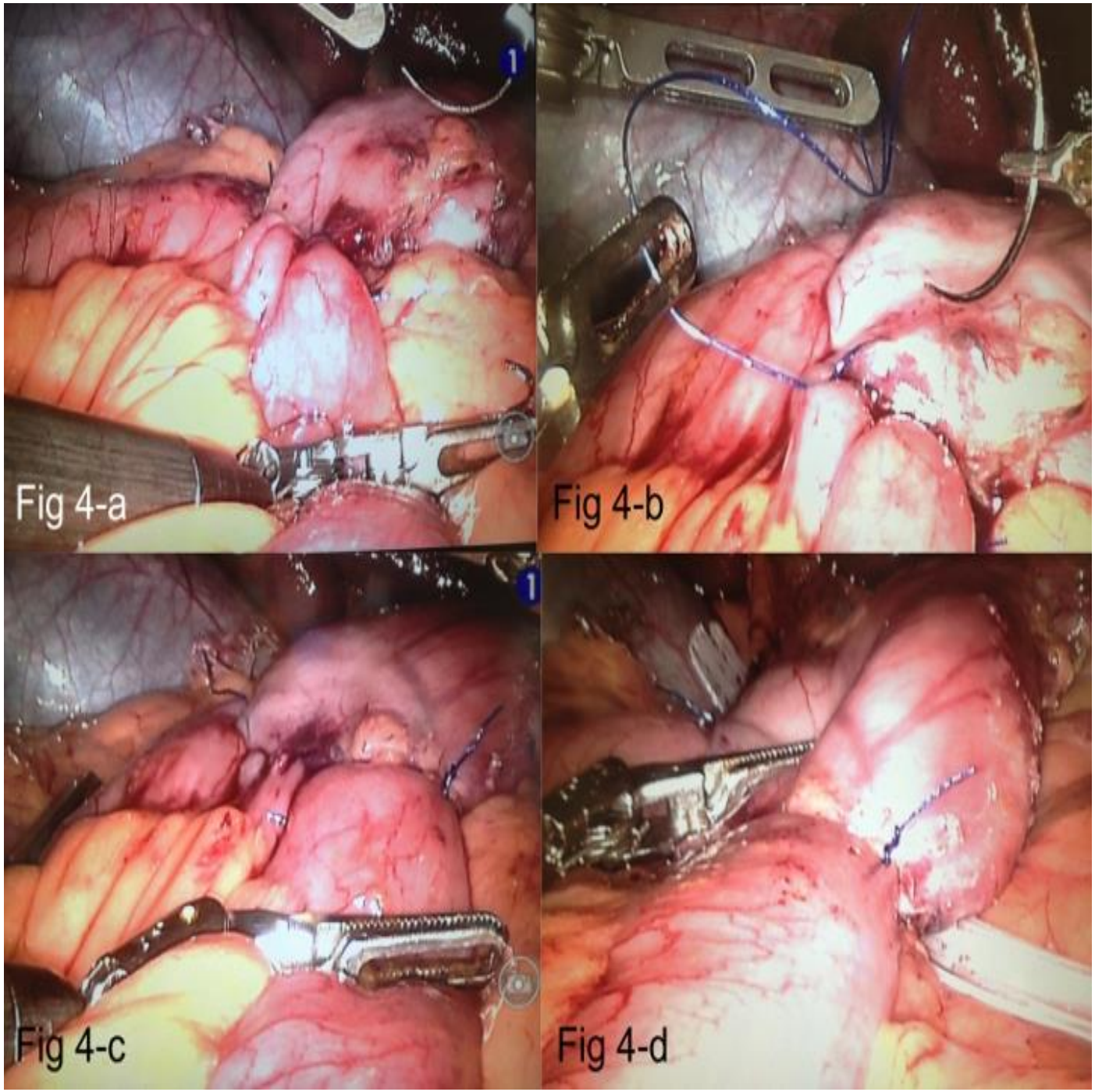
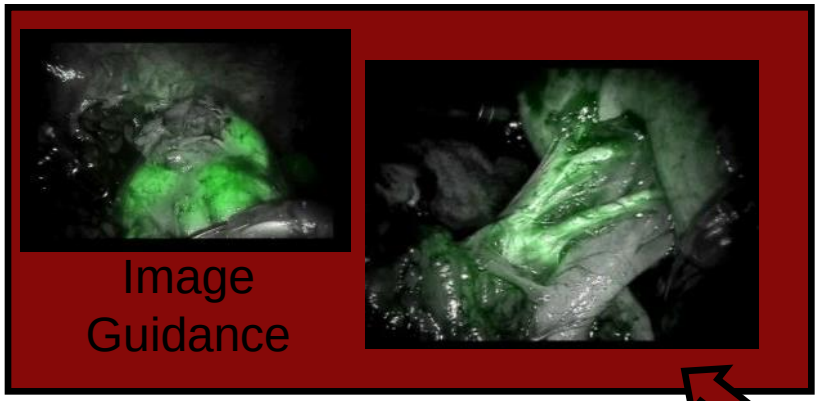
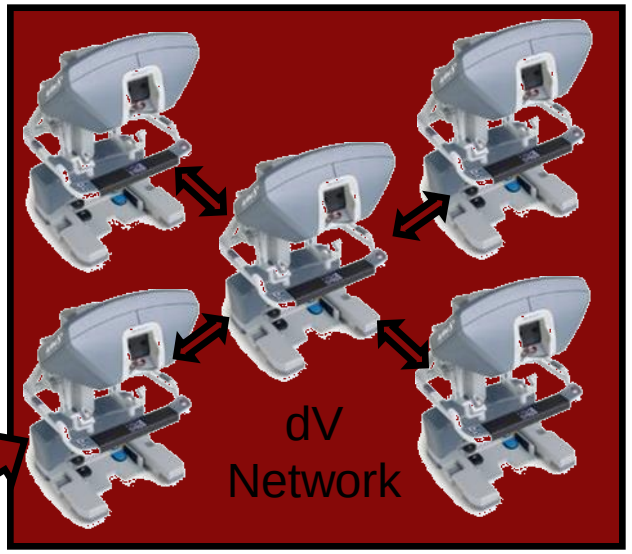
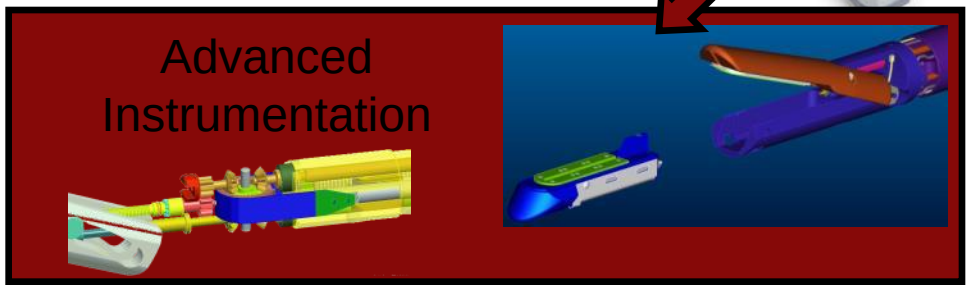


Fig 4-a
Fig 4-b
Fig 4-c
Fig 4-d

Surgical "Cockpit"







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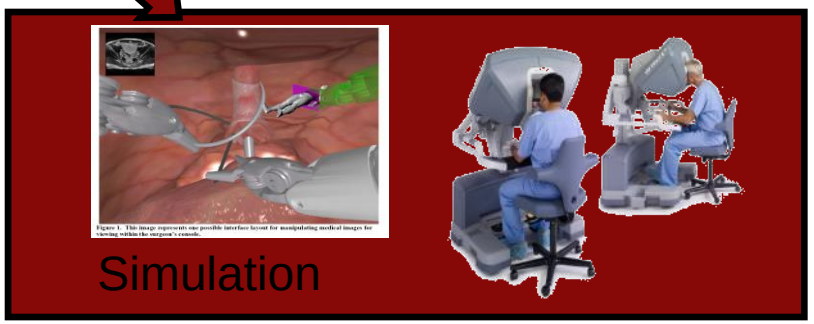


* Not FDA cleared

Digital Platforms as the Future

The Future of Surgery has Informational Technology as the Support Structure

Robot=information system with “arms”

Database=information system with “memory”

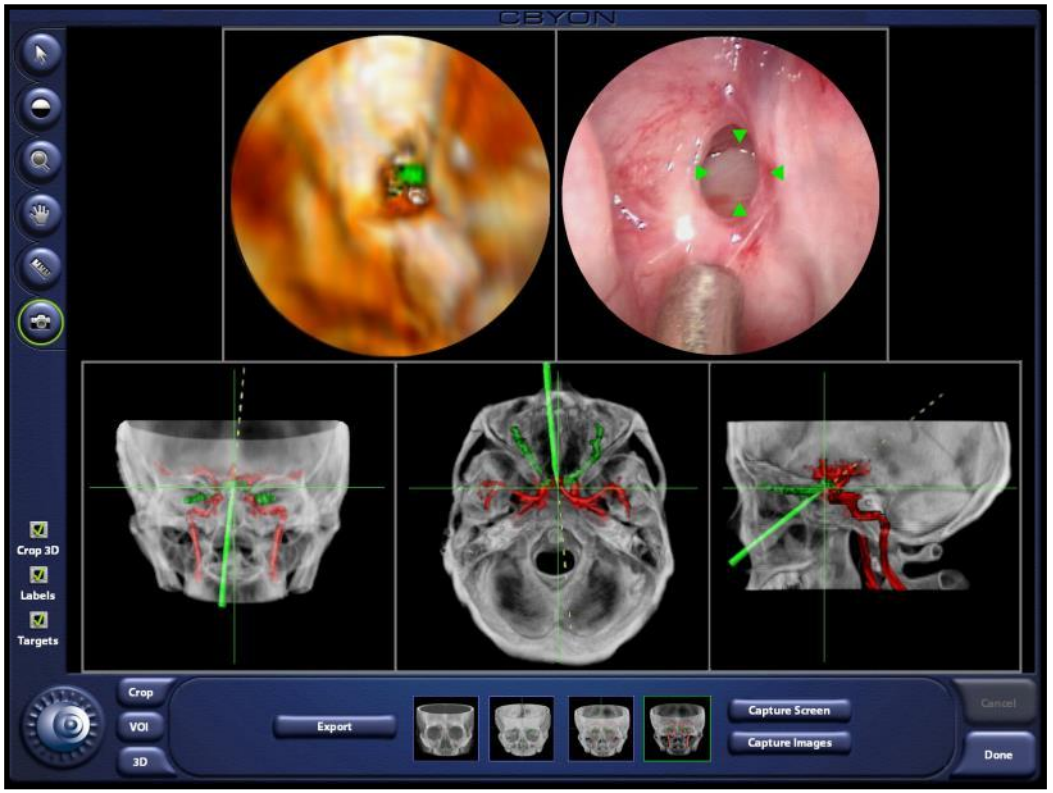
Digital Imaging=information system with “eyes”

Information systems can link

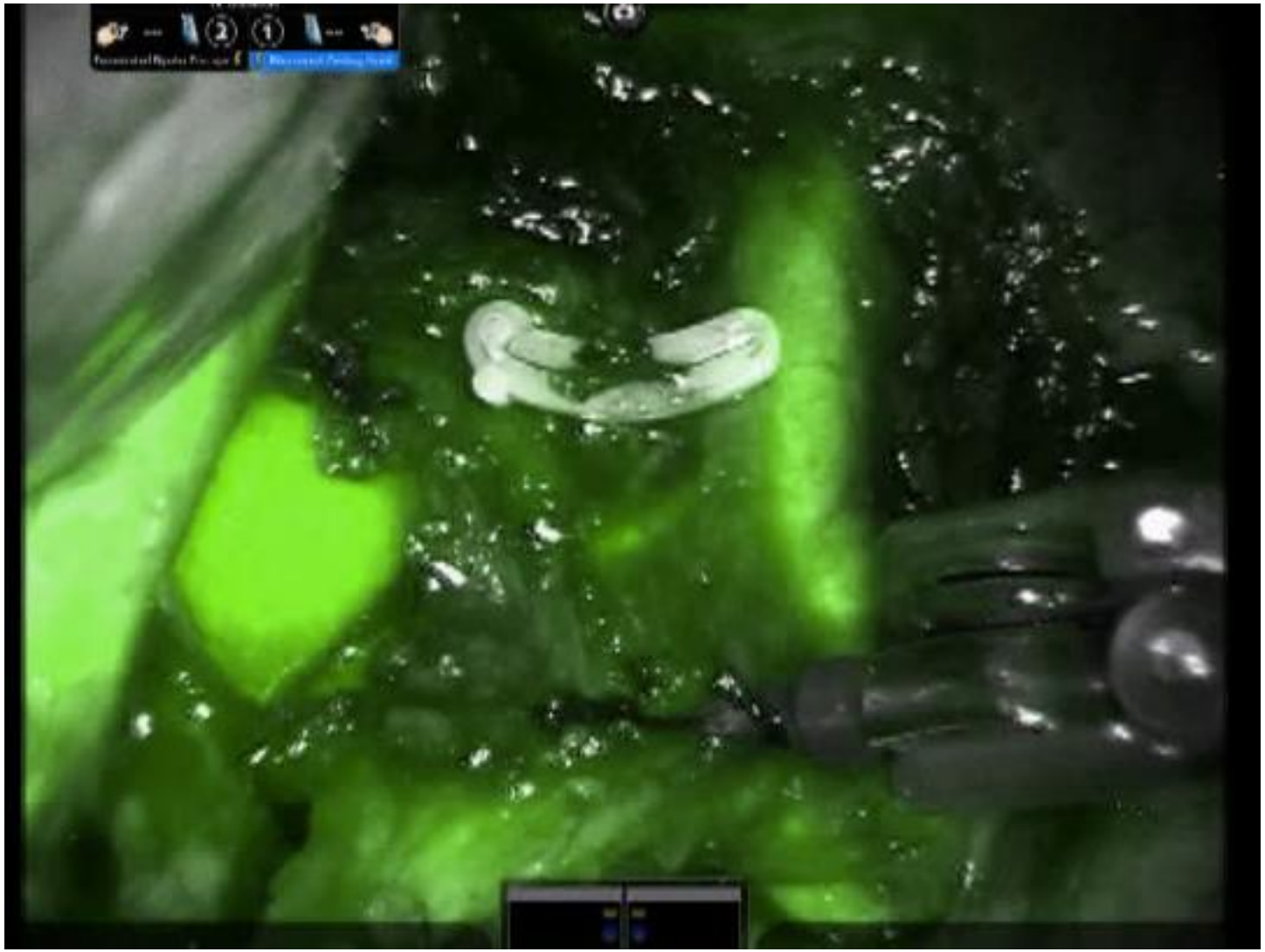
Thus, a Robot can talk to a CT scan but a laparoscopic instrument can’t

Augmented Reality/Image Guidance

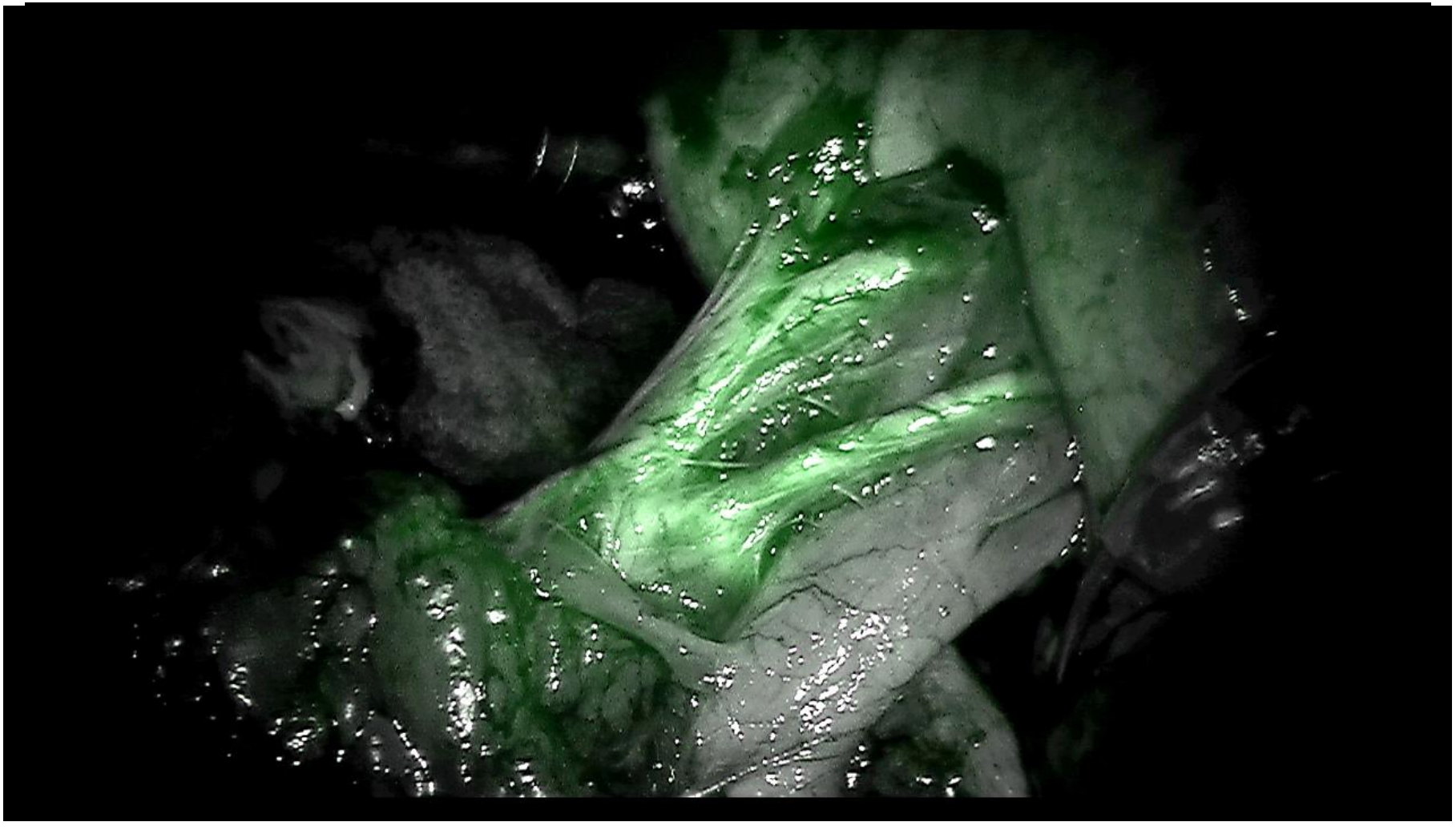
- Augment the 3D visual field with information that will improve patient and surgeon value
  - – High resolution pre-op images
  - – Image Overlay and Registration
  - – “No Fly” Zones



Biliary Anatomy with Fluorescence



Advantages of Da Vinci System



Eur Spine J. 2014 Feb;23(2):291-7. doi: 10.1007/s00586-013-2879-1. Epub 2013 Jun 26.

Robot-assisted and fluoroscopy-guided pedicle screw placement: a systematic review.

Marcus HJ, Cundy TP, Nandi D, Yang GZ, Darzi A.

Fluorescence Imaging for Colorectal Surgery Reduces Post-operative Anastomotic Leaks

	Fluorescence arm n=201	Control arm (no fluoro) n=201	*p*-value
Leaks in patients age ≤ 70	3% (3/107)	3.7% (4/107)	*NS*
Leaks in patients age ≥ 70	4.3% (4/94)	11.9% (11/94)	*p*=0.04
Overall Leak Rate	3.5% (7/201)	7.5% (15/201)	*NS*

Postoperative results: Anastomosis leak rate by age group and cohort[1]

***Note: This study did not utilize the *da Vinci* Surgical System or *Firefly* fluorescence imaging**

The cost to treat a post-operative leak after colon surgery is high: ~$100K[2]

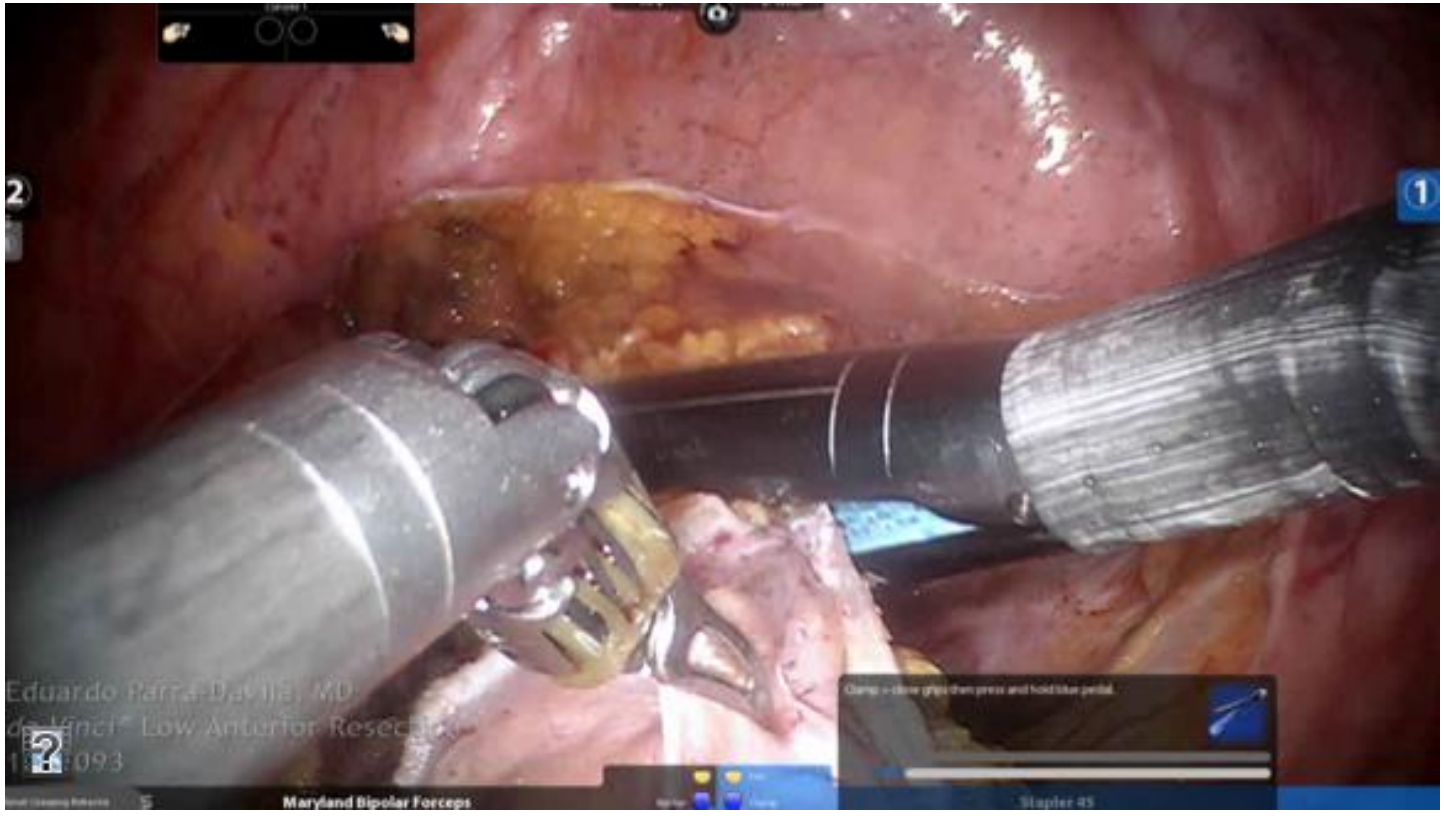
1. S Kudszus, C Roesel, A Schachtrupp, JJ Höer. Intraoperative laser fluorescence angiography in colorectal surgery: a noninvasive analysis to reduce the rate of anastomotic leakage. Langenbecks Arch Surg (2010) 395:1025–1030.

2. R. Vonlanthen, K. Slankamenac, S. Breitenstein, M Puhan, M Muller, D Hahnloser, DHauri, R Graf, P Clavien. The Impact of Complications on Costs of Major Surgical Procedures: A Cost Analysis of 1200 Patients. Published ahead of print. Annals of Surgery, 2011.

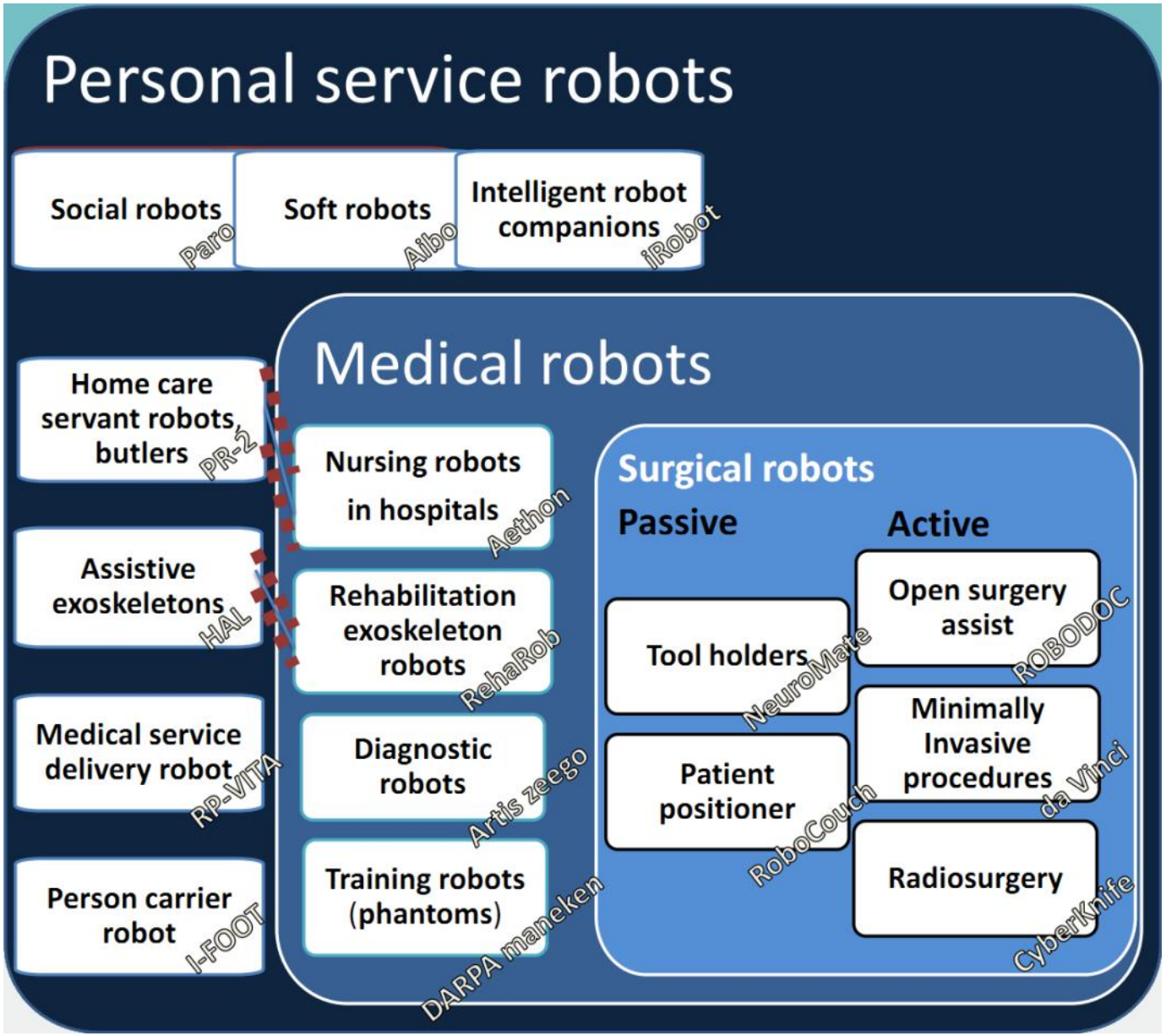
PN 875383 Rev B 3/12

Robotic Stapler

- 13 mm diameter
- *EndoWrist®*
- 45 mm reload
- green, blue
  reloads (white in dev.)



Future Robotic Architectures

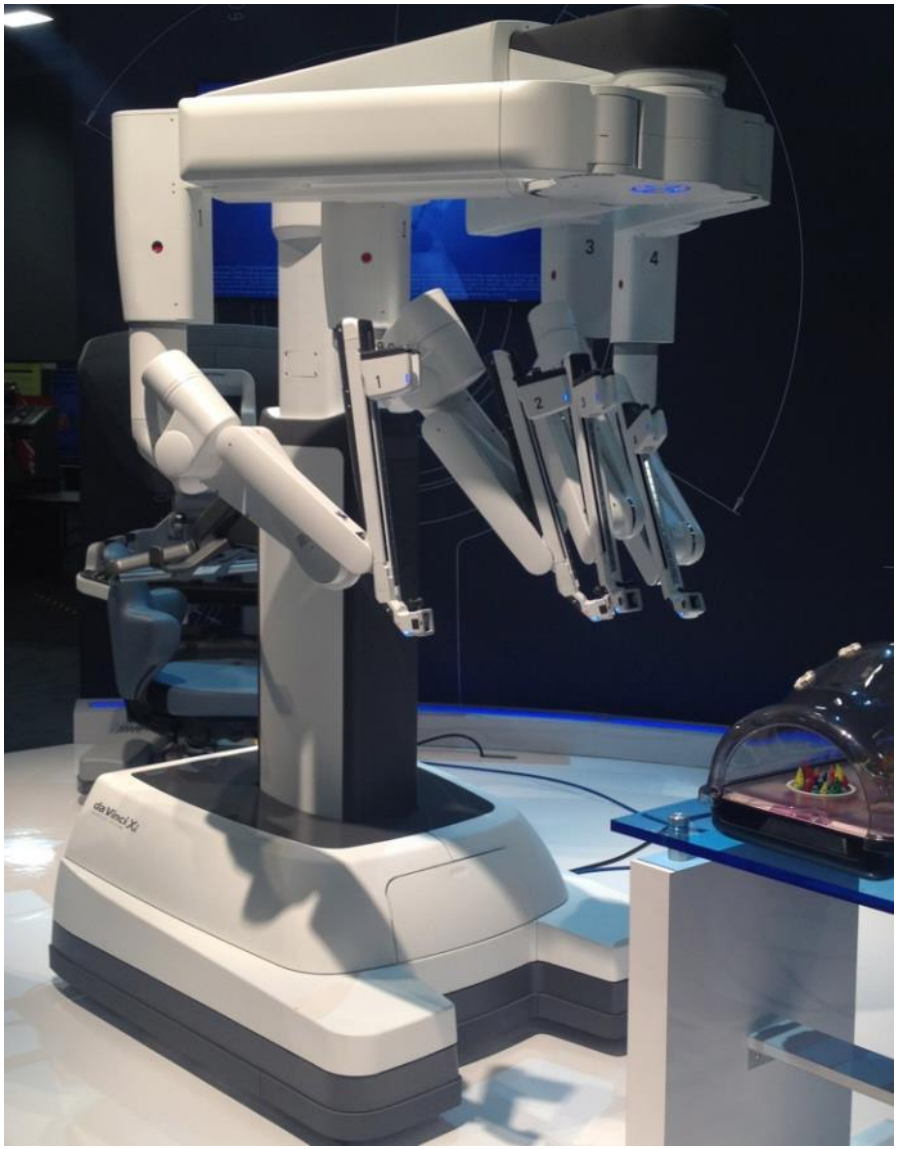


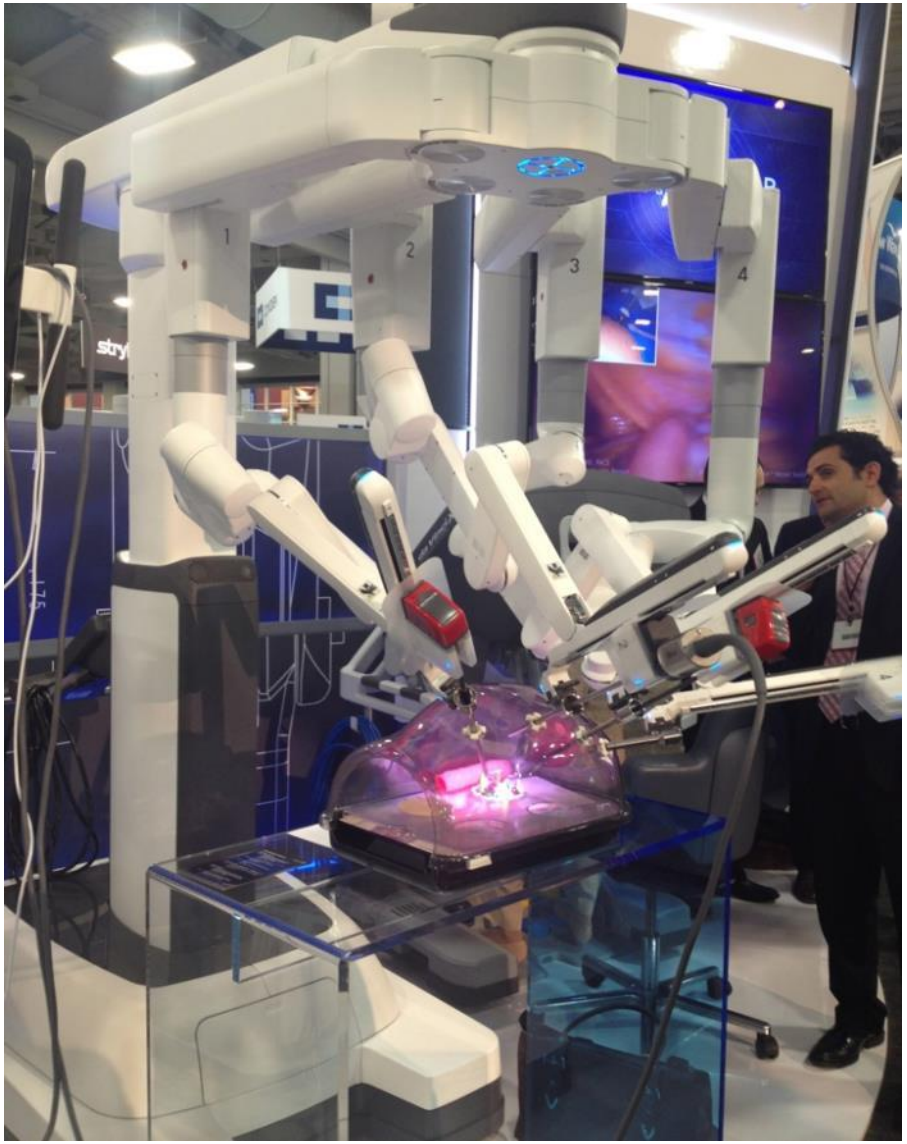
Future Robotic Architectures

Internet of Things and bariatric surgery follow-up: Comparative study of standard and IoT follow-up.
R. Vilallonga, A. Lecube, JM. Fort, MA. Boleko, M. Hidalgo, M. Armengol.
Minim Invasive Ther Allied Technol. 2013 Sep;22(5):304-11

Future here....

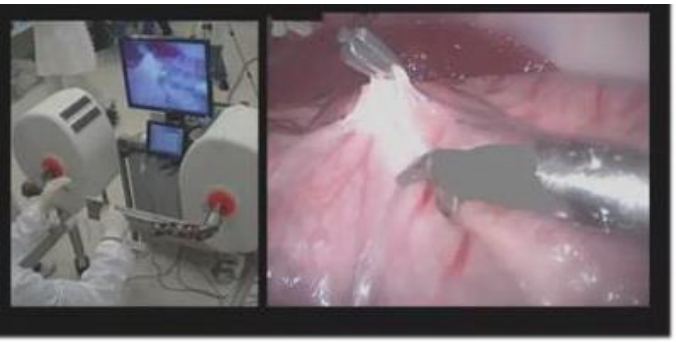
Vall d'Hebron Hospital





Future Robotic Architectures

- Other platforms
  - ALF-x Italy
  - Surgenius Italy



Future Robotic Architectures

- Other platforms
  - DLR Germany

Future Robotic Architectures

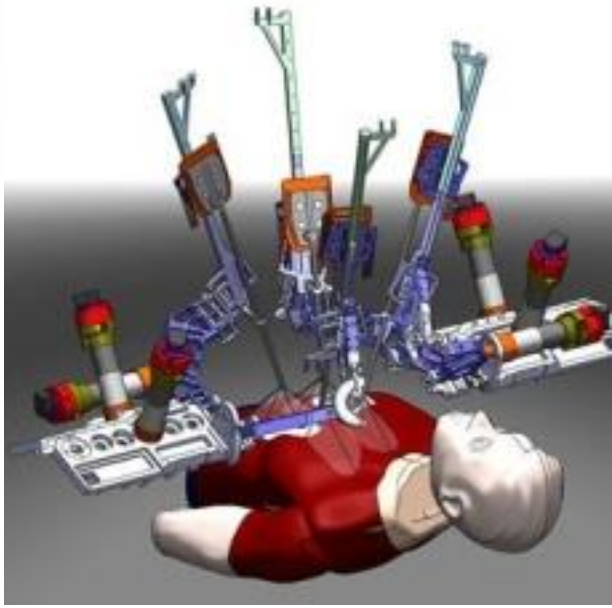
- Other platforms
  - Titan Medical Canada

Future Robotic Architectures

Paging Raven II, the open-source surgery robot

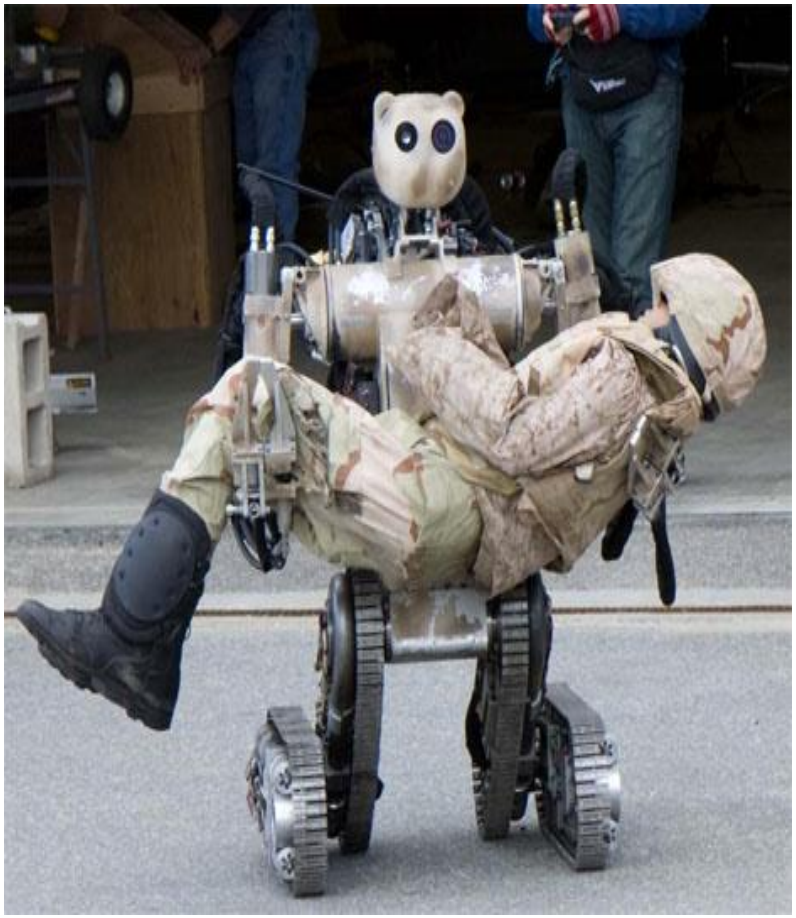
Developed at UC Santa Cruz and the University of Washington, the Raven II is being tested as a lightweight surgery robot.

Three of the Raven II surgical robots (Photo: UW)



Future ?

- SPA
- Telesurgery
- More minimal
- Endoscopy Hybrid
- Mini robots
- Magnets
- More complex procedures (Revisional)



Future?

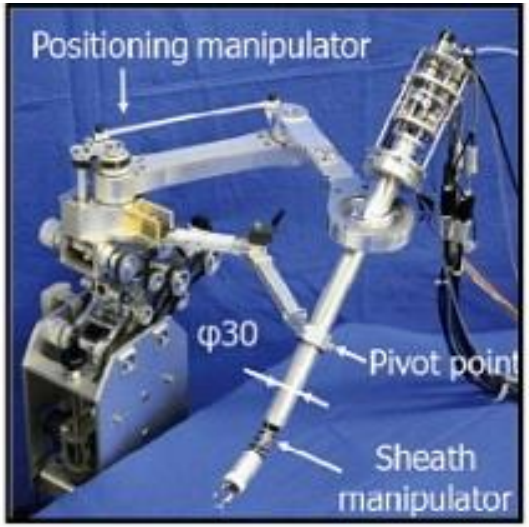
Single-port transumbilical laparoscopic cholecystectomy: A prospective randomised comparison of clinical results of 140 cases.

Vilallonga R, Barbaros U, Sümer A, Demirel T, Fort JM, González O, Rodriguez N, Carrasco MA.

J Minim Access Surg. 2012 Jul;8(3):74-8. doi: 10.4103/0972-9941.97586.

Future?

Minirobots



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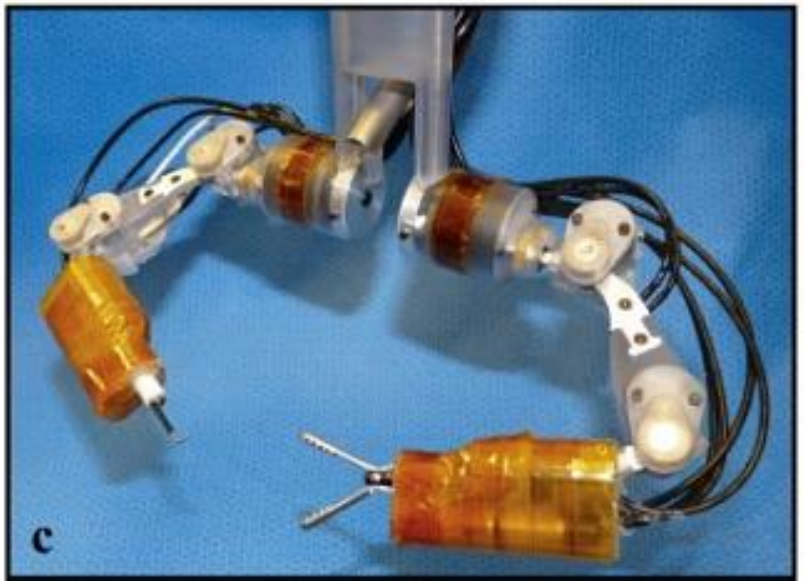
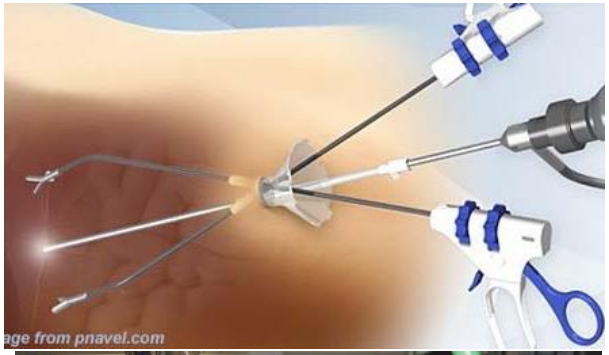


Laparoscopic Single Port vs. *Single-Site*™ for *da Vinci*® Surgery

Laparoscopic Single Port

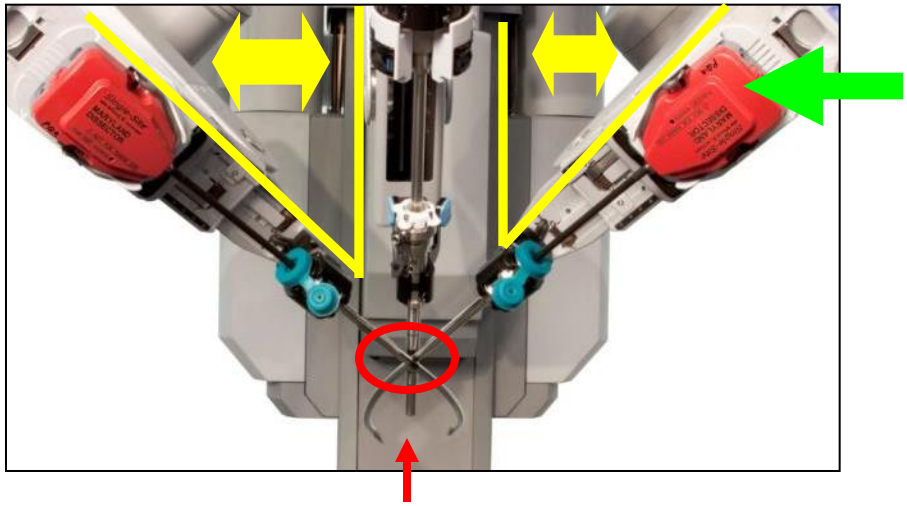
- Unstable, in-line optics
- Instrument crowding
- Lack of triangulation

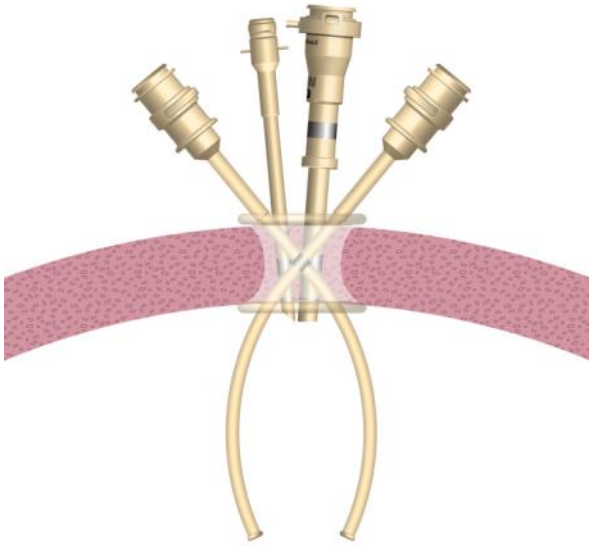


Single-Site™ for *da Vinci*®

- Stable, 3D HD visualization
- Precise, ergonomic control
- Maintains triangulation

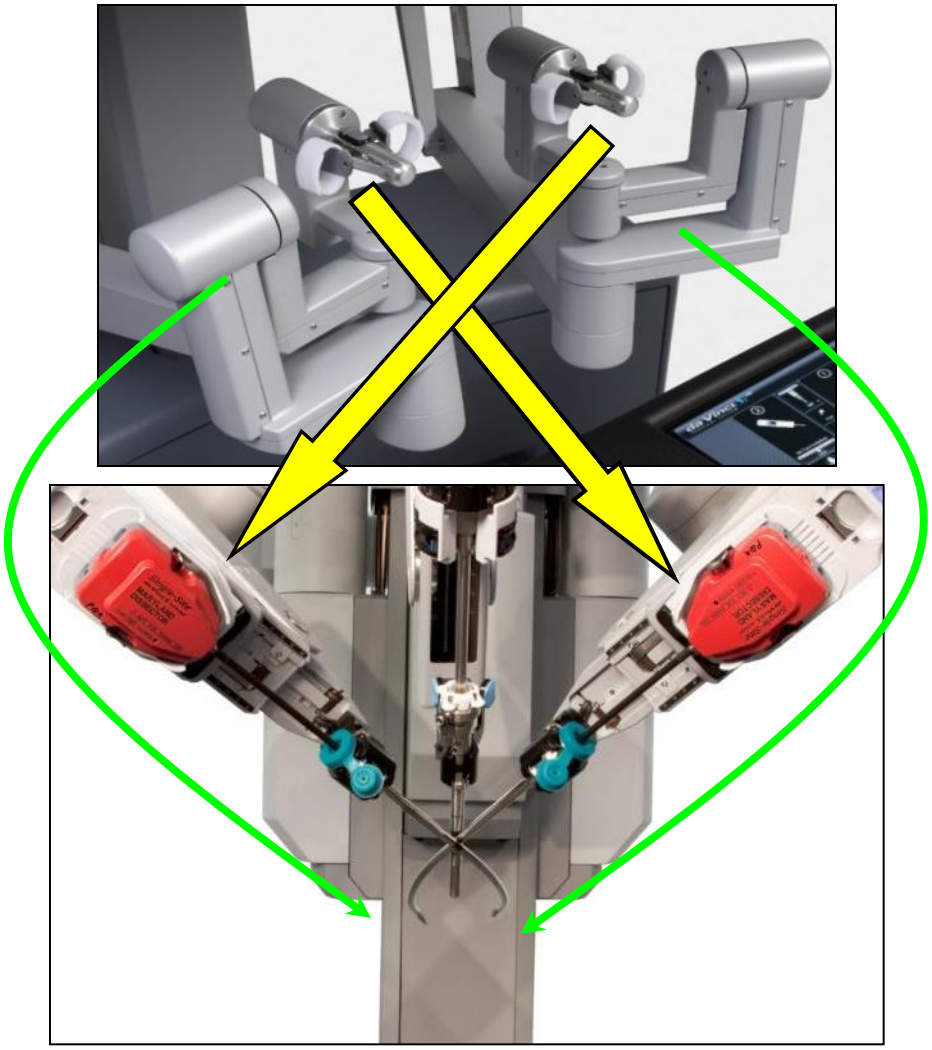
- da Vinci® Si™ System
- 8.5 mm Si Scope
- Curved instrument cannulae
- 5 mm, non-wristed, semi-rigid instruments
- Single-Site Port





Intuitive® Surgeon Control

- Left master controls screen left instrument
- Right master controls screen right instrument



Future ?

Future ?

- Mini robots
- Magnets

Why Would Hospitals Want It?

Every surgeon movement is recorded digitally and can be analyzed.

Analyzed to determine what movements masters have and what movements novices have.

What movements are associated with more complications.

What movements are associated with better outcomes

This allows for objective grading through simulation and procedure monitoring; i.e. Grading your surgeons

3 de juny de 2016 · Palau de Congressos de Girona
8a JORNADA DE RECERCA DE L'INSTITUT CATALÀ DE LA SALUT
PARLEM D'OBESITAT I DIABETIS TIPUS 2

Cost ?

Cost?

Surg Endosc (2014) 28:414–426
DOI 10.1007/s00464-013-3217-8

1,374 potentially relevant studies.
10 of these studies: 2,557 patients.

Robotic versus laparoscopic Roux-en-Y gastric bypass (RYGB) in obese adults ages 18 to 65 years: a systematic review and economic analysis

Jonathan G. Bailey · Jill A. Hayden · Philip J. B. Davis · Richard Y. Liu · David Haardt · James Ellsmere

The overall major and minor complications did not differ significantly between the robotic and laparoscopic groups.

The rates for anastomotic leak, bleeding, stricture, and reoperation did not differ significantly.

An economic analysis found that the expected costs for robotic RYGB ($15,447) were higher than for laparoscopic RYGB ($11,956).

Conclusion The complication rates did not differ significantly between robotic and laparoscopic RYGB, but the expected costs were greater for robotic RYGB. Further cost effectiveness analyses are recommended before adoption of a robotic approach to RYGB.

What's the Point of Robotic Bariatric Surgery?

- Its Enabling Technology; its laparoscopy with a digital platform that can change how you operate.
- It requires commitment and training to do it well; just like laparoscopy.
- Does anyone really think digital platforms are going to go away? For every robotic company that fails, how many more will be created? (600 startups in digital platforms)
- We are in the back of the bus of an innovative technology; do we wait until we are kicked off the bus altogether? Are you ready to follow rules of credentialing set up by gynecologists?

I would argue every surgeon in this room performs some cases where she/he would see a benefit of using a digital platform.

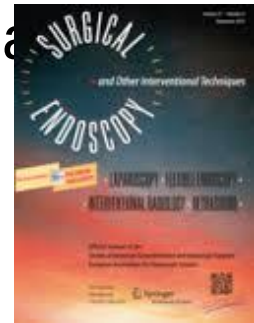
If you are convinced that robotics absolutely could NOT provide your patients ANY benefit or would be DANGEROUS in your hands, then you should not consider adoption.

Otherwise you owe it to your patients to learn and train and then help evolve this technology

Conclusions

- Current literature on robotic bariatric surgery has been applied in many different bariatric procedures including gastric banding, gastric bypass, sleeve gastrectomy, biliopancreatic diversion / duodenal switch in a safe and feasible way. (Gordon C)
- Current literature on robotic bariatric surgery has shown that robotic surgery confers several technical advantages, but this has not translated into real results in clinical practice. (Gordon C)
- Current literature on robotic bariatric surgery has shown different learning curves according to the procedure. The operating time and the cost is still two problems compa with laparoscopic surgery. (Go R C)

European Association of Endoscopic Surgeons (EAES) consensus statement on the use of robotics in general surgery
Szold, R. ... , CN. Tang, **R. Vilallonga.** *Surg Endosc*. 2015 Feb;29(2):253-88.

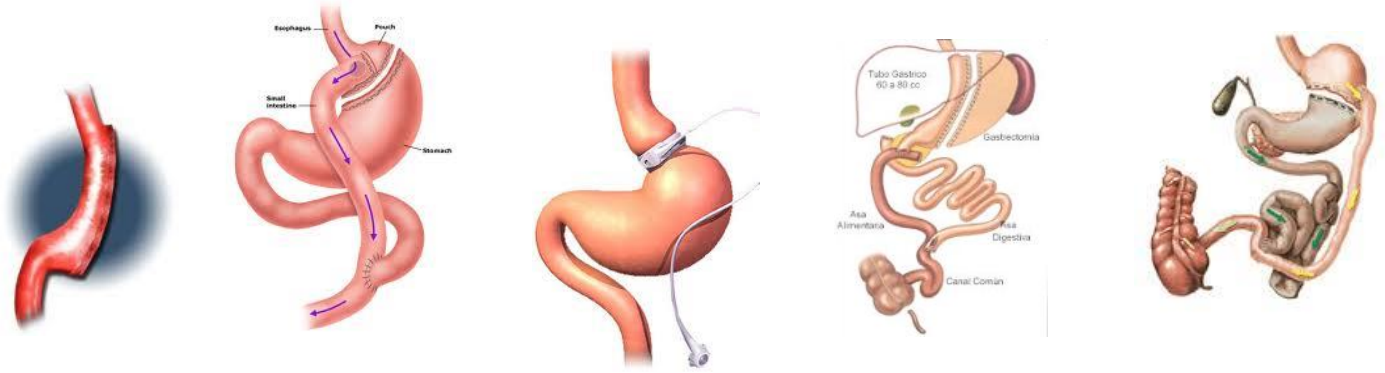


Future investigational developments

- In future controlled to accurately assess the clinical outcome and cost-effectiveness of bariatric procedures performed with robotic technology trials are needed.
- A longer follow-up would also help elucidate any long-term results with any differences with the use of robotics compared to traditional laparoscopy.

TAILORING SURGERY AND TREATMENTS

In the future, we will need to tailor better our surgeries…..



Surg Obes Relat Dis. 2016 Feb;12(2):357-62. doi: 10.1016/j.soard.2015.08.498. Epub 2015 Aug 24.

Bariatric surgery acutely changes the expression of inflammatory and lipogenic genes in obese adipose tissue.

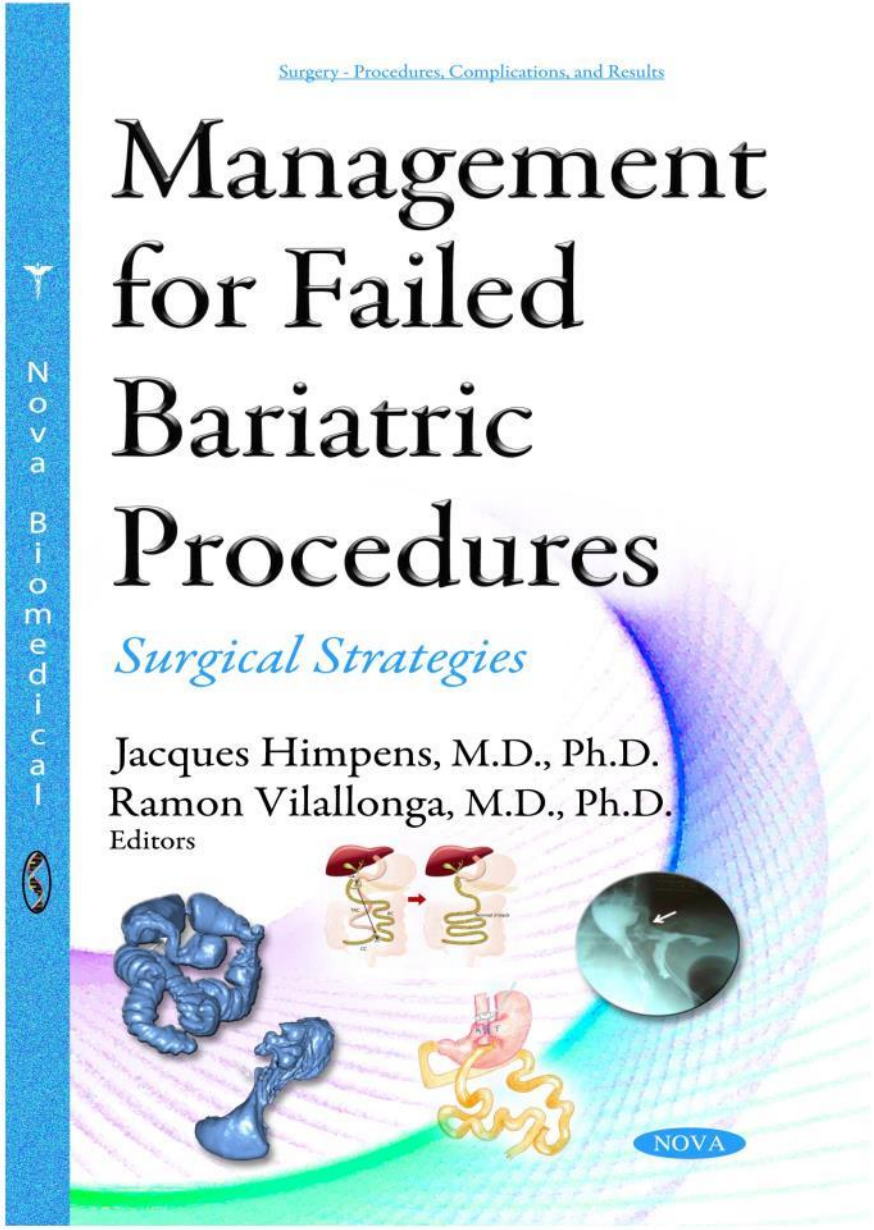
Ortega FJ[1], Vilallonga R[2], Xifra G[3], Sabater M[3], Ricart W[3], Fernández-Real JM[3].

SURGERY
A MONTHLY JOURNAL DEVOTED TO THE ART AND SCIENCE OF SURGERY

Commentary: Can we go further in the tailoring of bariatric operations?

Ramon Vilallonga, MD, PhD
General Secretary for the Spanish Society for Obesity Surgery (SECO), Endocrine, Metabolic, and Bariatric Unit, Vall d'Hebron University Hospital, Universitat Autònoma de Barcelona, Barcelona, Spain

Published Online: April 22, 2016



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Dr. J. Mesa
Dr. R. Simó
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Sra. Neus Castillejos

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Vall d'Hebron Hospital

IFSO European Chapter
Bariatric and Centre of Excellence Metabolic Surgery
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