Surrenectomia Laparoscopica

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Introduction

- 1992, first laparoscopic adrenalectomy[1]
- Case-control studies (level 3b) favour laparoscopic adrenalectomy (grade B)[2]
- Only one RCT laparoscopic *vs*. open adrenalectomy, for pheocromocitoma (level 1)[3]
- Large tumors and malignancies?

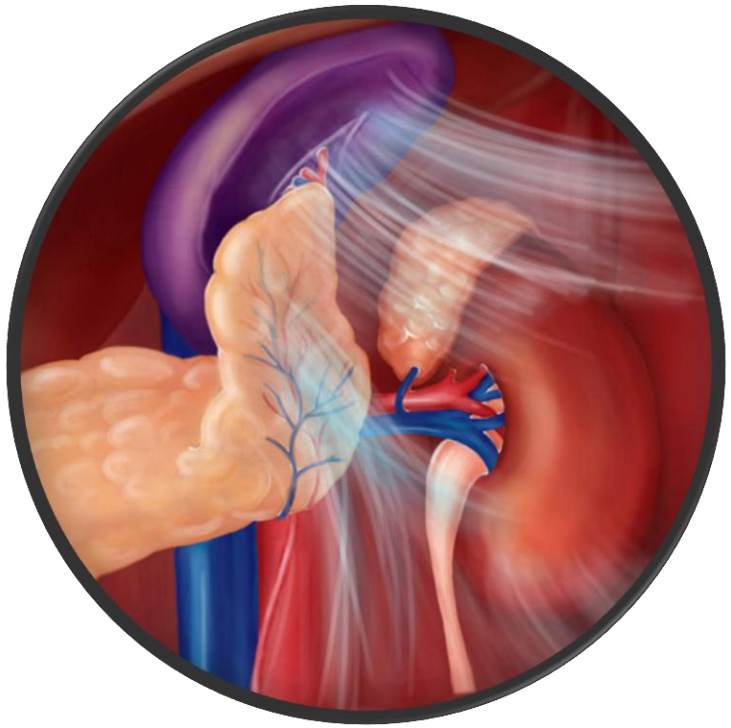
[1] Gagner M et al. *N Engl J Med* 1992
[2]Assalia A et al. *Br J Surg* 2004
[3]Tiberio GAM et al. *Surg Endosc* 2008

Outline

- Advantages and disadvantages
- Indications (large tumors, malignancies?)
- Approach (transabdominal vs. retroperitoneal)
- Future perspectives (robotic, SILS?)

Pros

- Intraoperative blood loss ↓[1]
- Morbidity ↓[2]
- Hospital stay ↓[2]
- More rapid return to work[3]
- Patient satisfaction ↑[3]
- Incisional hernia ↓[3]



[1] Imai et al. *Am J Surg* 1999
[2] Lee J et al. *J Am Coll Surg* 2008
[3]Thompson et al. *Surgery* 1997

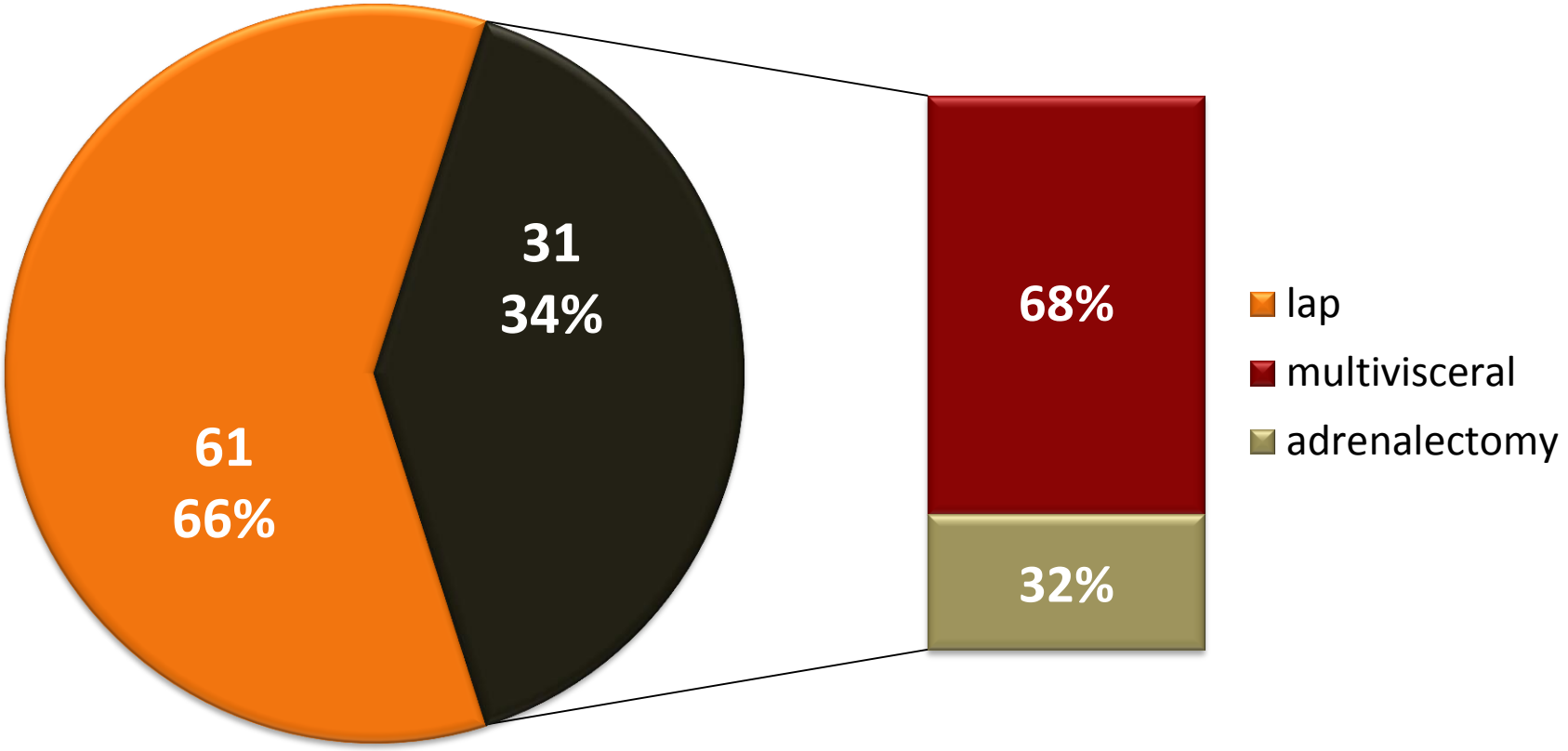
Cons

- Inadequately extensive resection
- Capsular tumor disruption with spillage of tumor cells
- Port-site or peritoneal metastases

Ushiyama T et al. *J Urol* 1997, Holfe G et al. *Horm Res* 1998
Hamoir E et al. *Ann Chir* 1998, Deckers S et al. *Horm Res* 1999
Foxius A et al. *Surg Endosc* 1999, Gonzalez RJ et al. *Surgery* 2005

Adrenalectomies

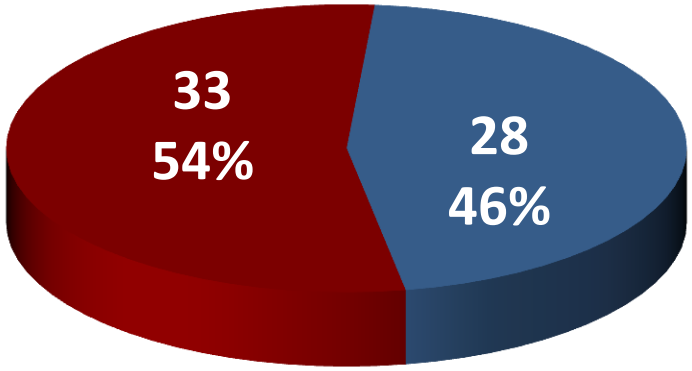
N=92



Patients and tumors

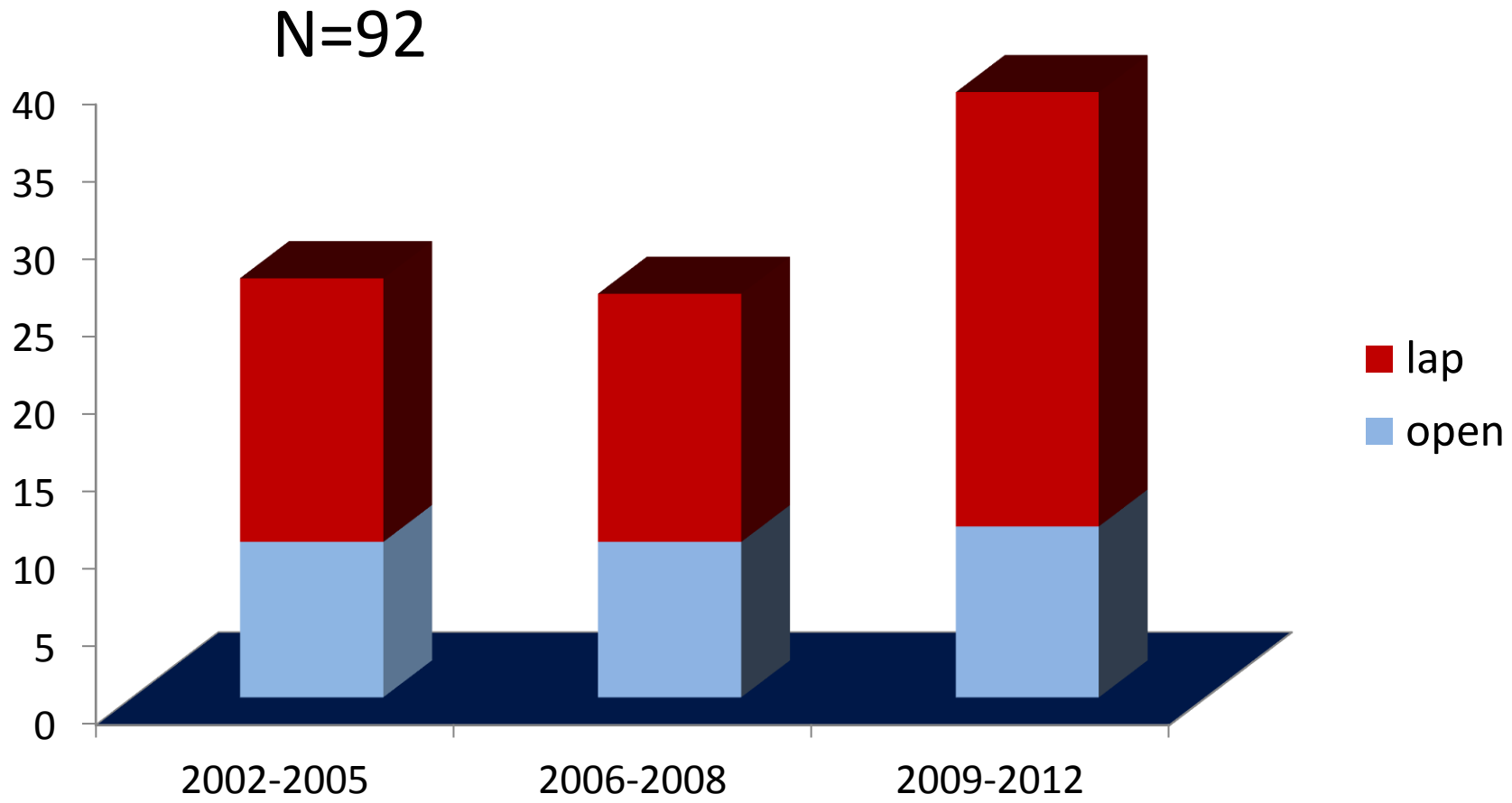
Lap adrenalecomies

N=61

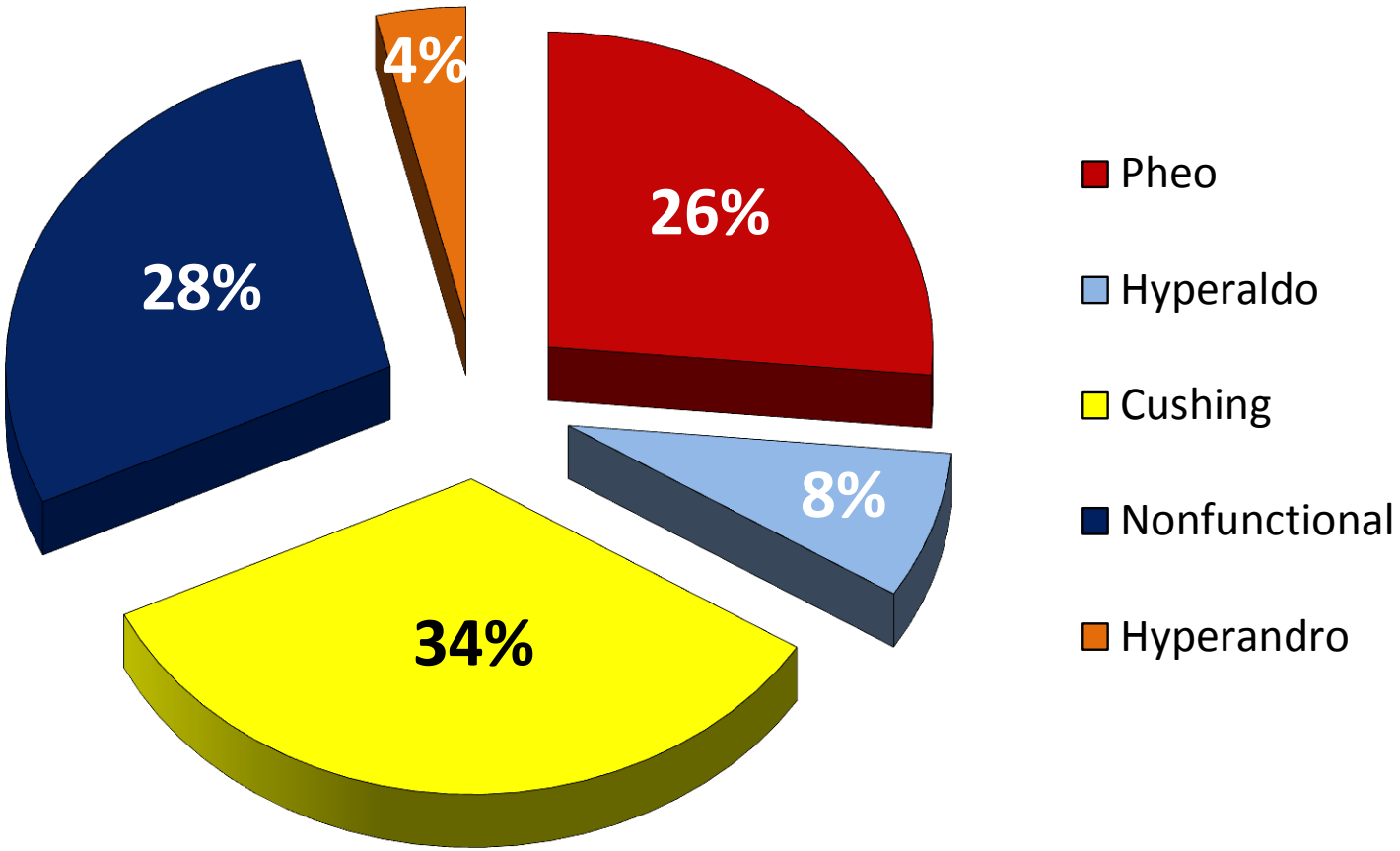


- Age 58 ± 15 years (19-81)
- 36 ♀ (59%) | 25 ♂ (41%)
- Size 3.4 ± 1.8 cm (1-9)
- Op time 120 min (50-295)
- LOS 4.0 days (2-12)

Distribution



Indications



Is laparoscopic adrenalectomy safe and effective for adrenal masses larger than 7 cm?

Giovanni Ramacciato · Paolo Mercantini · Marco La Torre · Fabrizio Di Benedetto · Giorgio Ercolani · Matteo Ravaioli · Micaela Piccoli · Gianluigi Melotti

Variable	Outcome (N=18)
Mean tumor size	8.3 cm (7-13)
Mean operative time	137 min (70-285 min)
Mean blood loss	182 mL (100-550 mL)
Rate of intraoperative complications	17% (3/18 patients)
Rate of conversion to open surgery	17% (3/18 patients)

- Safe and feasable technique
- Perioperative morbidity ↓
- Controindicated if evidence of periadrenal tissue infiltration

Ramacciato G et al. *Surg Endosc* 2008

Malignant tumors

- Primary adrenocortical carcinoma (ACC) or pheocromocytoma, metastasis
- ACC incidence rate in the US 0.72 per million[1]
- 5-year survival rates 12-38%[1,2]
- Complete surgical resection only form of cure

[1]Kebebew E et al. *World J Surg* 2006
[2]Paton BL et al. *Surgery* 2006

Table 1 Summary of 11 series of laparoscopic adrenalectomies for primary adrenal malignancies published after 2002

Author	Total laparoscopic adrenalectomy	Total primary malignant adrenal neoplasms	Median/mean tumor size	Median/mean follow-up (months)	Recurrence	Port-site/ peritoneal metastasis	Survival
Henry, 2002	233	6 ACC	7.4 cm	47	1 distant	0	5 alive, DF 1 dead of disease
Porpiglia, 2004	205	5 ACC 1 myxoid ACC	6.9 cm	30	0	0	5 alive, DF 1 dead CVA
Corcione, 2005	100	2 ACC	8.5 cm	13.6	1 local	0	1 alive, DF 1 alive, w/disease
Gonzalez, 2005	6	6 ACC	5.3 cm	28	6 local and distant	5 peritoneal	2 alive, w/dis 4 dead of dis.
Gill, 2005	250	6 ACC 1 malignant pheochromocytoma	5 cm[a]	26	2 local 1 distant	0	3 alive, DF 1 alive, w/dis. 2 - dead of dis 1 dead at 1 mo., unknown disease status
Palazzo, 2006	391	3 ACC	6.8 cm	34	1 distant	0	2 alive, DF 1 dead of disease
Lombardi, 2006	79	4 ACC 3 malignant pheochromocytoma	5.9 cm[a]	23	1 local 1 distant	0	4 alive, DF 2 alive, with disease 1 dead of liver failure
Schlamp, 2007	1 case	ACC	7.5 cm	4	local	0	Alive with disease
Liao, 2006	210 (with hand-assist)	4 ACC	6.2 cm	39	1 local and distant 2 distant	0	1 alive, DF 1 alive, with disease 2 dead of disease
Ramacciato, 2007	107	2 ACC	8.5 cm	45	0	0	2 alive, DF
Nocca, 2007	131	4 ACC	8.5 cm	34	1 distant	0	3 alive, DF 1 dead of disease
Totals	1713 LA	48 primary adrenal malignancy			19 recurrences	5	26 alive, DF 8 alive, with disease 11 dead of disease 3 dead OC

ACC, adrenocortical carcinoma; CVA, cerebrovascular accident; DF, disease free; LA, laparoscopic radical adrenalectomy.

[a] Indicates that size includes all tumor types for these series.

McCauley LR et al. *Curr Opin Urol* 2008

Table 1 Selected studies evaluating laparoscopic adrenalectomy (LA) versus open adrenalectomy (OA) for ACC that have been published since

Leboulleux et al. [10]	2010	64	Increased peritoneal carcinomatosis risk after LA:	35	Small LA group
		58 OA	27% OA		
		6 LA	67% LA		
Gonzalez et al. [11]	2005	160	Tumor bed as initial site of recurrence:	28	Small LA group
		154 OA	35% OA		Selection bias—referral center
Porpiglia et al. [8]	2010	43 (stages 1 and 2 only)	No differences	OA, 38	Stage 3 patients and others excluded
		25 OA		LA, 30	
		18 LA			
Brix et al. [9]	2010	152	No differences	OA, 32	Selection bias—referral center. Most patients had recurrence at the time of registration (54–61%)
		117 OA		LA, 64	Resection status is unknown in 37%
		35 LA		p=0.002	
					seen prior to recurrence
		82 OA	19.2 OA (p=0.005)		High rates of positive margins or tumor spill; no laparoscopic operations done at main center
		31 LA	9.6 LA		LA tumors are significantly smaller, but the outcome is worse
			Positive margins:		
			18% OA (p=0.01)		
			50% LA		

OA open adrenalectomy, *LA* laparoscopic adrenalectomy

Porpiglia F et al. *Horm Canc* 2011

Lap approach for ACC

- Lap adrenalectomy for ACC is feasible, safe and effective but:
  - Should be limited to referral centers performing >20 procedures per year;
  - Sound oncologic principles (preservation of tissue planes, no tumor vioaltion, no fragmentation during extraction)
- Disease-free rate 43%

Porpiglia F et al. *Horm Canc* 2011

NCCN Guidelines Version 1.2012
Adrenal Gland Tumors

- Hyperaldosteronism suspect malignant (irregular/ inhomogenous, lipid-poor, no wash-out, >3 cm, >1 hormone)
  → ***Open adrenalectomy***

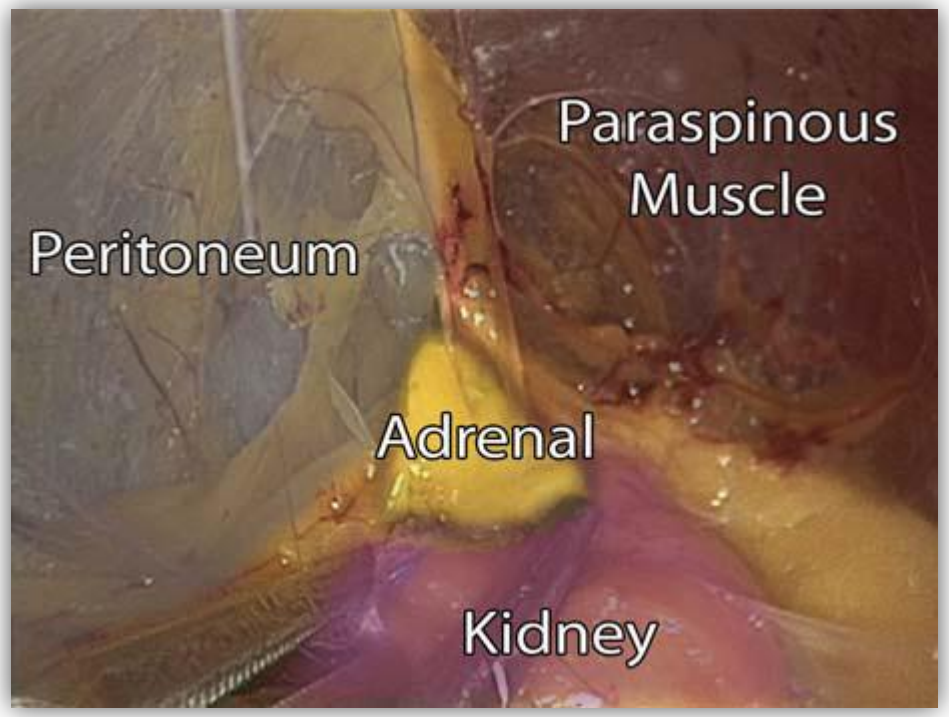
- ACTH independent Cushing's syndrome (>5 cm or inhomogenous, irregular margins, local invasion)
  → ***Adrenalectomy*** (laparoscopic generally not appropriate)

- Non-functioning tumor 4-6 cm
  → ***Adrenalectomy*** for suspected carcinoma (if resectable by laparoscopy may explore with planned conversion for local invasion)

- Non-functioning tumor > 6 cm
  → ***Open adrenalectomy*** (may require removal of adjacent structures, increased local recurrence and peritoneal seeding by laparoscopy)

Lap approach

- Transperitoneal
  - Lateral
  - Anterioir
- Retroperitoneal
  - Posterior
  - Lateral



Pros and Cons

	Transperitoneal	Retroperitoneal
Entry in peritoneal cavity	Adhesions	Avoided
Effects of pneumoperitoneum	Hemodynamic, respiratory	Avoided
Anatomic view	Excellent	At time disorienting
Working space	Adequate	Limited
Large tumors	Easier	More difficult
Operative time	80-120 min	↓
Postoperative pain	(no RCTs) ↑	↓
Incisional hernia	Possible	Nonexisting
Hemostasis	Good	Improved
Bilateral adrenalectomy	Repositioning	No repositioning
Learning curve	More familiar	Challenging

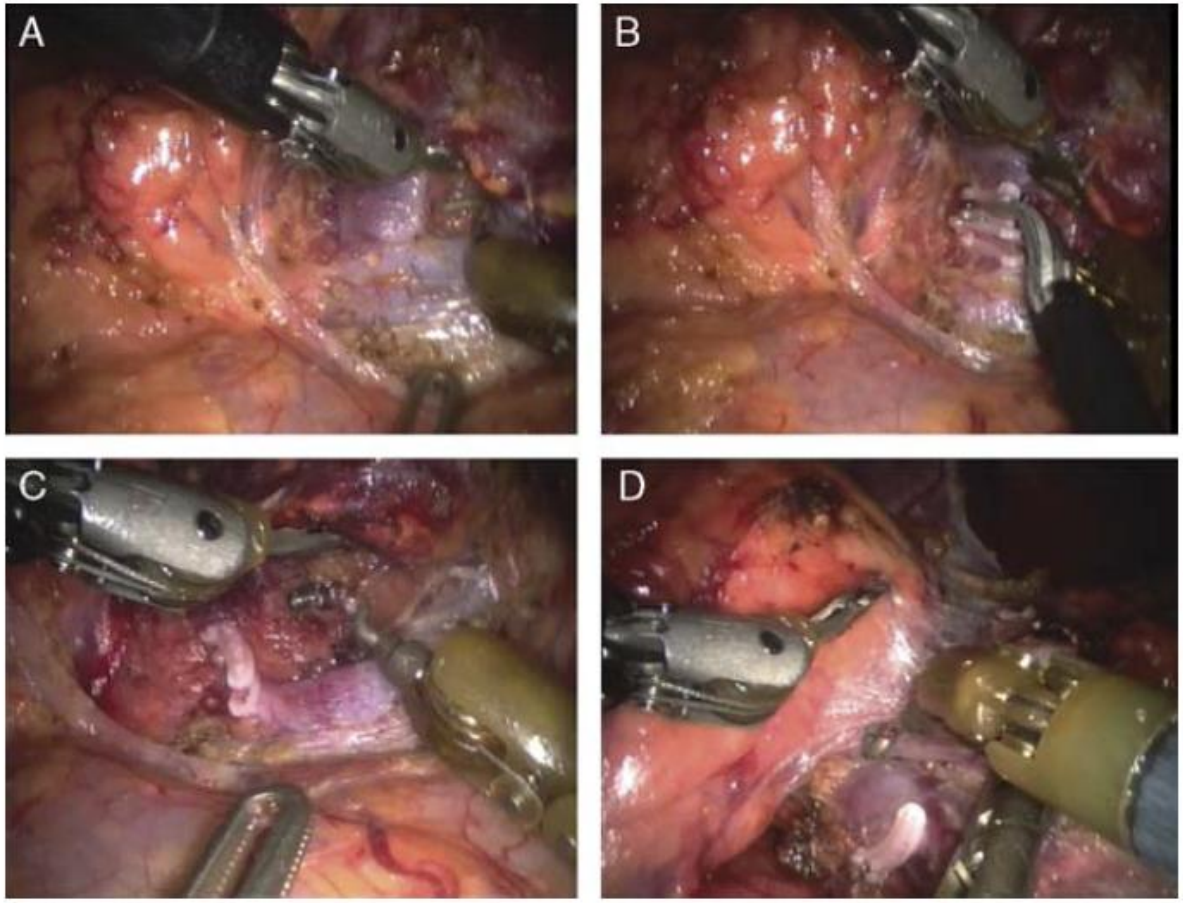
Karanikola E et al. *Tohoku J Exp Med* 2010
Shonkwiler RJ et al. *Surg Laparosc Endosc Percutan Tech* 2011

Robotic surgery

- 3-dimensional display (depth perception)
- Confortable seated position
- Eye, hand, and target are in line
- Instruments with «wrist» joint (improved dexterity)

http://www.intuitivesurgical.com/products/

Robotic adreanlectomy



Brunaud L et al. *Surg Laparosc Endosc Percutan Tech* 2011

Robotic adreanlectomy

TABLE 1. Studies Evaluating Robotic-assisted Transabdominal Lateral Adrenalectomy (With More Than 20 Patients)

Study	Year	Patients	Operative time (min)	Conversion rate (%)	Morbidity (%)
Nordenström et al[6]	2011	100	113	7	13
Giulianotti et al[18]	2011	41	118	0	4.8
Brunaud et al[16]	2008	100	95	5	8
Brunaud et al[11]	2008	50	104	8	10
Winter et al[10]	2006	30	185	0	7
Hanly et al[17]	2004	30	—	0	—

- Feasable and safe technique
- Perioperative morbidity ↔
- Costs ↑

Brunaud L et al. *Surg Laparosc Endosc Percutan Tech* 2011

SILS

SILS™ | Single Incision Laparoscopic Surgery

SILS adrenalectomy

Data	Surgical procedure		*p* Value
	SILS adrenalectomy	Conventional laparoscopic adrenalectomy	
No. of patients	20	20	
Men/women	8/12	5/15	NS
Age (years) [mean (range)]	63 (43–78)	50 (32–70)	NS
Duration of operation (min) [mean (range)]	95 (75–125)	80 (65–100)	NS
Blood loss <10 ml [No. (%)]	20 (100)	20 (100)	NS
Conversion to open surgery (No.)	None	None	NS
Intraoperative complications (No.)	None	None	NS
Postoperative complications (No.)	None	None	NS
Postoperative pain (VAS) [median (25th–75th percentile)]	3 (2–6)	4 (3–7)	NS
Oral intake after surgery <24 h [No. (%)]	20 (100)	20 (100)	NS
Tumor size (cm) [median (range)]	3 (1.5–4)	3 (2–4)	NS
Length of hospital stay (days) [mean (range)]	3 (2–4)	2.5 (2–3)	NS
Pathologic diagnosis			
Conn's syndrome	8	6	NS
Cushing's adenomas	6	6	NS
Nonfunctioning adrenal tumors	6	8	NS

VAS visual analog score; *NS* not significant

Vidal O et al. *Surg Endosc* 2012

Conclusions

- Laparoscopic adrenalectomy is the gold standard for treatment of small sized (≤6 cm) adrenal lesions (level B)
- Laparoscopic adrenalectomy for malignancy can be performed at experienced centers, in appropriately selected cases for localized, noninvasive tumors (stage I-II)
- Retroperitoneal adrenalectomy is safe and effective, an excellent option in carefully selected patients with proper patient positioning and surgical technique
- Robotic adrenalectomy may be of benefit in difficult situations (large tumors, partial adrenalectomies)
- SILS adrenalectomy is safe and feasable but with no apparent clinical advantage