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INTRODUCTION & OBJECTIVES

Standard laparoscopy adrenalectomy (LA) is the gold standard procedure for benign adrenal tumors. However, single-site LA has been proposed as a feasible and safe alternative potentially because of minimal invasiveness, improved cosmetics, less pain and shorter hospital stay compared with multi-port LA. The objective of this study is to evaluate and compare our results using transumbilical approach for laparoendoscopic single-site adrenalectomy or standard LA for adrenal tumors.

MATERIALS & METHODS

Between March 2009 and April 2017, 98 adrenal glands from 91 patients underwent transperitoneal LA: 58 (59.2%) underwent standard multi-port LA (group 1) and 40 (40.8%) underwent transumbilical single-site LA (group 2). All single-site LA were performed by one surgeon. Gathered data included demographics, tumor characteristics, perioperative data, surgical complications, pathology and follow-up. A retrospective observational study was completed, using IBM SPSS Statistics 23, with a $p < 0.05$.

RESULTS

Demographic Data	Group 1	Group 2	p
Gender (♂/♀)	39.7%/60.3%	37.5%/62.5%	NS
Age (years)	59.6±15.2	48.5±14.0	p<0.001
Cardiovascular comorbidities	20.7%	2.5%	p:0.009
Type II Diabetes Mellitus	25.9%	7.5%	p:0.02

Table 1: Comparison of demographic data between groups NS: non-significant.

Lesion data	Group 1	Group 2	p
Side (L/R)	62.1%/37.9%	60.0%/40.0%	NS
Presentation			p:0.02
Incidental	51.7%	32.5%	
Arterial Hypertension	36.2%	37.5%	
Cushing	5.2%	25.0%	
Metastasis	0%	2.5%	
Pain	6.9%	2.5%	

Hormone Producers	Group 1	Group 2	p
NF	48.3%	25%	p:0.001
Aldosterone	12.1%	35%	
Catecholamines	29.3%	12.5%	
Cortisol	8.6%	27.5%	
Sexual androgens	1.7%	0%	

Functioning Adenoma? (Y/N)	Group 1	Group 2	p
Mean preoperative imagiologic tumors diameter (mm)	48.4 ± 30.6	27.13 ± 14.4	p<0.001
Mean preoperative tumors diameter > 40 mm	57.4%	15.6%	p<0.001
Mean pathology tumors diameter (mm)	42.3 ± 27.3	26.40 ± 16.5	p<0.001

Table 2: Comparison of lesions data between groups. L: left; R: right; NF: non-functioning; Y: yes; N: no; NS: non-significant.

Perioperative Data	Group 1	Group 2	p
Mean operative time (min.)	91.9 ± 41.0	92.6 ± 44.8	NS
Hemorrhagic losses	35.5 ± 153.8	24.3 ± 88.2	NS
Drainage (Y/N)	74.2%/25.9%	15%/85%	p<0.001
Need to conversion to open surgery	1%	0%	NS

Absence of surgical plans in a lesion that revealed to be a melanoma metastasis.

Perioperative Complications	Group 1	Group 2	p
3 diaphragm injuries and 1 postoperative retroperitoneal hematoma	0		

Postoperative opioid analgesic requirement (non-opioids vs opioids)	Group 1	Group 2	p
Hospital stay (days)	4.2 ± 2.5	3.5 ± 1.5	NS
Time to resume normal diet (days)	1.6 ± 0.8	1.0 ± 0.2	p<0.001

Table 3: Comparison of perioperative data between groups Y: yes; N: no; NS: non-significant.

The tumour side did not influence the choice of laparoscopic technique or influence surgical morbidity.

Reoperations  Perioperative mortality 

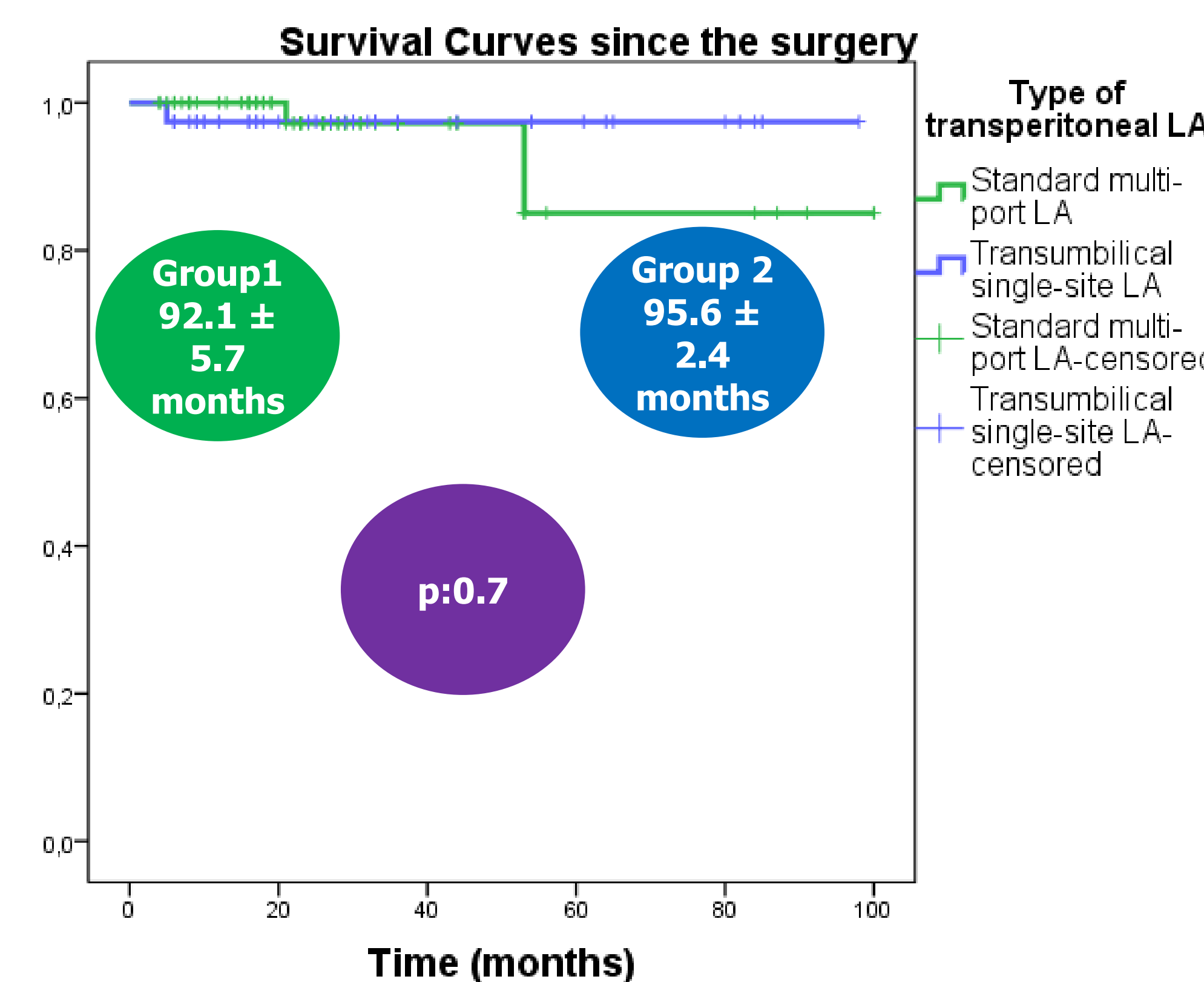
Good post-operative cosmetics 

Pathology	Group 1	Group 2	p
Adenoma	40.4%	50%	p:0.02
Malignant pheo	7.0%	0%	
Intermediate pheo	1.8%	2.5%	
Benign pheo	21.1%	12.5%	
Myelolipomas	7.0%	0%	
Ganglioneuroma	0%	2.5%	
Cavernous Hemangioma	1.8%	0%	
Cortical Hyperplasia	0%	17.5%	
Cysts	3.5%	0%	
Carcinoma	10.5%	5.0%	
Metastatic lesion	1.8%	5.0%	
Normal	5.3%	5.0%	

Table 4: Comparison of pathology studies between groups. pheo - pheochromocytomas

Hormone-Producing	Pathology	Group	Time until metastazition (months)	Associated Procedure	Other notes	Death
NF	Adenoma	1	5	Left nephroureterectomy	Bladder tumor under surveillance	No
NF	Adenoma	1	9	Left Radical Nephrectomy	Prostate Cancer in Remission	No
Catecholamines	Malignant pheo	1	38		Supraclavicular and peritoneal lymph node metastasis	No
NF	Cavernous Hemangioma	1	18		Bladder tumor under surveillance	Yes
NF	Carcinoma	1	1		Metastatic lymph node, liver, bone and lung metastasis	Yes
NF	Carcinoma	2	0	Excision of lung metastasis		Yes

Table 5: Metastazition cases (excluding cases of adrenal metastasis *ab initio*); NF: non-functioning



Graph 1: Comparison of survival curves by Kaplan-Meier method between groups

CONCLUSIONS

- Our series shows:
- similar operative time, analgesic requirement and length of stay.
 - lower hemorrhagic losses in transumbilical single-site LA.
 - no perioperative complications nor need to conversion to open surgery in transumbilical single-site LA group.
 - The vast majority of patients of transumbilical single-site LA group did not require drainage and resume normal diet earlier.
 - metastazition in 6 cases: 5 submitted to standard multi-port LA.