

ROBOTIC VS LAPAROSCOPIC RIGHT COLECTOMY: A COMPARATIVE STUDY OF CLINICAL OUTCOMES AND COSTS-EFFECTIVENESS

Núñez-Alfonse J¹; Valentina Ferri², Benedetto Ielpo², Hipólito Durán², Eduardo Díaz², Isabel Fabra², Riccardo Caruso²; Yolanda Quijano² Emilio Vicente².

¹Fundación de Investigación HM Hospitales, ²HM Hospitales

OBJECTIVES

- The costs involved in performing robotic surgery present a critical issue which has not been well addressed yet.
- The aim of this study was to compare clinical and cost-effective outcomes of robotic (ROB) versus laparoscopic (LAP) surgery for right-sided colon cancer

METHODS

- Design: This is a clinical and cost-effectiveness analysis within a prospective comparative study of ROB and LAP conducted at HM Sanchinarro University Hospital from June 2015 to June 2018.
- Costs (€) from payers perspective, QALYs and incremental-cost-effectiveness-ratios (ICER) were calculated.
- ICER was estimated using overall costs of the ROB and LAP procedures and QALYs derived from patient interviews, in order to find the incremental cost per QALY gained.
- QALYs were used to measure effectiveness. QALYs were estimated for 1 year following the procedure for each patient using the medical outcomes study SF-36 questionnaire.
- The cost-effectiveness plane was used to represent all pairs of solutions of the model.
- A cost-effectiveness acceptability curve was computed, which plots the probability that the ROB was cost-effective relative to LAP.
- A willingness-to-pay of 20,000€ and 30,000€ per QALY was used as a threshold to recognize which treatment was most cost-effective.
- A multivariate sensitivity analysis was performed by 5000 Monte Carlo Simulations.

RESULTS

Table 1: Patients Baseline Characteristics

	Robotic (n=25)	Laparoscopic (n=25)	p-value
Sex			
Male	18	15	0.31
Female	7	10	
Age (range)	69.6 (55-83)	68.2(32-84)	0.21
ASA score			
I	2	2	
II	18	17	0.52
III	1	6	
IV	0	0	
BMI Kg/m2, mean (range)	23(19-31)	25(20-34)	0.11
Tumour size, cm, (range)	3.3 (2.4-8)	3.2(0.3-10)	0.95

Table 2: Financial Data Stratified by Approach

	Robotic (n=25)		Laparoscopic (n=25)	
	Mean (€)	CI 95% (Lower;Upper) (€)	Mean (€)	CI 95% (Lower;Upper)
Hospitalization Cost	2,446.87	1,963.07; 2,930.65	2,940.6	1,952.90; 3,928.45
Operative Cost	6,423.77	5,267.42; 7,580.11	4,415.2	3,849.35; 4,981.04
Laboratory Cost	529.48	327.04; 731.90	780.06	359.28; 1,200.84
Radiology Cost	55.02	22.14; 87.89	91.56	31.22; 151.88
TOTAL COST	9,455.14	7,868.44; 11,041.82	8,227.5	6,437.86; 10,017.13
Utility				
Qaly	0.826	0.769; 0.883	0.721	0.663; 0.779
Incremental Results				
Incremental Cost (€)	1,227.64 (95% CI 1,200.14 - 1,255.13)			
Incremental Utility (Qaly)	0.105 (95% CI 0.1044 - 0.10555)			
ICER (€/Qaly)	11,691.81			

Figure 1: Cost-Effectiveness plane

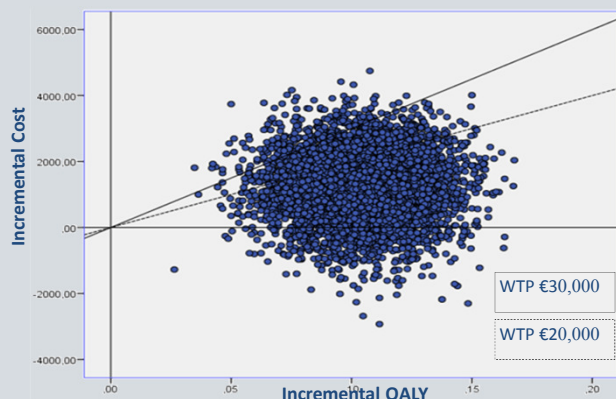
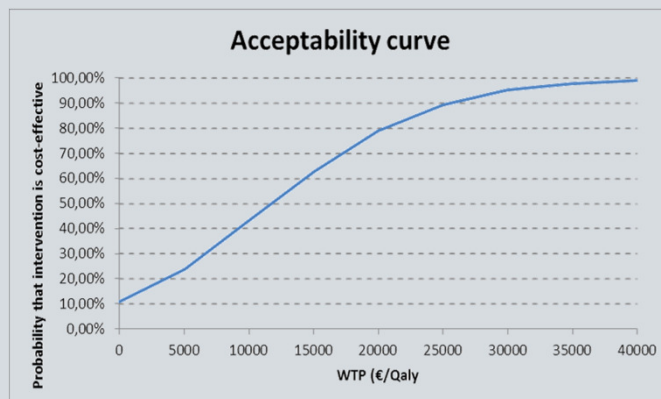


Figure 2: Acceptability curve



CONCLUSIONS

- Robotic right colectomy approach appears to be cost-effective compared with laparoscopic approach.
- Probabilistic sensitivity analysis estimated by Monte Carlo simulations demonstrated that the probability that the robotic approach was cost-effective was 78.78% and 95.04%, respectively, at a WTP threshold of 20,000€ and 30,000€ per QALY gained.

REFERENCES

1. Park JS, Choi GS, Park SY, Kim HJ, Ryuk JP. Randomized clinical trial of robot-assisted versus standard laparoscopic right colectomy. Br J Surg. 99:1219-26.
2. Fornisano G, Misitano P, Giuliani G, Calamati G, Salvicchi L, Bianchi PP. Laparoscopic versus robotic right colectomy: technique and outcomes. Updates Surg. 68:63-9.
3. Polat F, Willems LH, Dogan K, Rosman C. The oncological and surgical safety of robot-assisted surgery in colorectal cancer: outcomes of a longitudinal prospective cohort study. Surg Endosc. doi: 10.1007/s00464-018-06653-2.
4. Khorgami Z, Li WT, Jackson TN, Howard CA, Scialbas GM. The cost of robotics: an analysis of the added costs of robotic-assisted versus laparoscopic surgery using the National Inpatient Sample. Surg Endosc. 2019 Jul;33: 2217-2221.
5. Dindo D, Demartines N, Clavien PA. Classification of surgical complications: a new proposal with evaluation in a cohort of 6336 patients and results of a survey. Annals of surgery 2004; 240: 205-13.
6. Gemma Vilagut et al. El Cuestionario de Salud SF-36 Español: Una Década de Experiencia y Nuevos Desarrollos. Gaceta Sanitaria, 2005, https://doi.org/10.1157/13074369.
7. Health National Institute for and Excellence Care. NICE Process and Methods Guides. In: Developing NICE Guidelines: The Manual, 2014, https://www.nice.org.uk/process/pmg20/chapter/introduction-and-overview.
8. Liu D, Li J, He P, Tang C, Lei X, Jiang Q, Li T. Short- and long-term outcomes of totally robotic versus robotic-assisted right hemicolectomy for colon cancer: A retrospective study. Medicine 98:e15028.
9. D'Annibale A, Pernazza G, Morpurgo E et al (2010) Robotic right colon resection: evaluation of first 50 consecutive cases for malignant disease. Ann Surg Oncol 17:2856-2862.
10. Kang J, Park YA, Baik SH et al (2016) A comparison of open, laparoscopic, and robotic surgery in the treatment of right-sided colon cancer. Surg Laparosc Endosc Percut Tech 26:497-502.
11. Blumberg D. Robotic colectomy with intracorporeal anastomosis is feasible with no operative conversions during the learning curve for an experienced laparoscopic surgeon developing a robotics program. J Robot Surg. 13(4):545-555.