Index cost comparison of laparoscopic vs robotic surgery in colon and rectal cancer resection: a retrospective financial investigation of surgical methodology innovation at a single institution

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BACKGROUND

Robotic assisted colorectal cancer resection (R-CR) has become increasingly commonplace in contrast to traditional laparoscopic cancer resection (L-CR). The aim of this study was to compare the total direct costs of R-CR to that of L-CR and to compare the groups with respect to costs related to LOS.

METHODS

Patients who underwent colon and/or rectal cancer resection via R-CR or L-CR instrumentation between January 1, 2015 and December 31 2018, at our institution, were evaluated and compared. Primary outcomes were overall cost, supply cost, operating time and cost, postoperative length of stay (LOS), and postoperative LOS cost. Secondary outcomes were readmission within 30 days and mortality during the surgery.

RESULT

Two hundred forty R-CR (mean age 64.9 ± 12.4 years) and 258 L-CR (mean age 66.4 ± 15.5 years) patients met the inclusion criteria. The overall mean direct cost between R-CR and L-CR was significantly higher ($8756 vs $7776 respectively, p=0.001) as well as the supply cost per case ($3789 vs $2122, p < 0.001). Operating time was also higher for R-CR than L-CR (224 min vs 187 min, p = 0.066) but LOS was slightly lower (5.08 days vs 5.55 days, p = 0.113).

Table 1

Characteristics/ Demographics	Robotic CR (n=254)	Laparoscopic CR (n=313)	P-value	Total (n=567)
Age, years (mean +/- SD)	65.0 +/- 12.6	66.6 +/- 15.7	0.186	65.9 +/- 14.4
Sex	Male: 134 (52.8%) Female: 120 (47.2%)	Male: 135 (43.1%) Female: 178 (56.9%)	**0.028**	Male: 269 (47.4%) Female: 298 (52.6%)
Race/Ethnicity	White/Caucasian: 193 (76%) Black or African/American: 35 (13.8%) Asian: 5 (2.0%) Other: 20 (7.9)	White/Caucasian: 245 (78.3%) Black or African/American: 51 (16.3%) Asian: 7 (2.2%) Other: 10 (3.2%)	0.88	White/Caucasian: 438 (77.2%) Black or African/American: 86 (15.2%) Asian: 12 (2.1%) Other: 30 (5.3%)

Table 2

OR Cost Data	Robotic CR (n=249)	Laparoscopic CR (n=310)	P-value	Total (n=559)
Total Direct Cost	$9170	$9720	0.227	$9475
Supplies Direct Cost	$3789	$2122	< 0.001	$2865
OR time direct cost	$1074	$1129	0.211	$1,104
OR cost per minute	$5.3	$7.8	0.001	$6.7

Table 3

Surgery type	Robotic CR (n=254)	Laparoscopic CR (n=313)	Total (n=567)
Hemicolectomy or greater	84 (33.1%)	157 (50.2%)	241 (42.5%)
Less than hemicolectomy	80 (31.5%)	106 (33.9%)	186 (32.8%)
Total proctectomy	25 (9.8%)	9 (2.9%)	34 (6.0%)
Partial proctectomy	61 (24%)	36 (11.5%)	97 (17.1%)
Proctocolectomy	4 (1.6%)	5 (1.6%)	9 (3.2%)

Table 4

OR time and Hospital LOS	Robotic CR	Laparoscopic CR	P-value
Average time per case (minutes)*	224	187	0.027
LOS per case (days)	6.2	7.7	0.033
Post-op LOS cost per case*	$1716	$3717	0.052

CONCLUSION

Cost is the main obstacle to easy and widespread use of the platform at this junction, though new developments and competition could very well reduce costs. Supply cost was the main reason for increased costs with robotic resection.

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