Colorectal cancer surgery in rural Australia can match outcomes in metropolitan hospitals: a 14-year study

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The incidence of colorectal cancer in Australia is among the highest in the world.[1] About 29% of Australians live in rural or remote areas. We have previously reported that colorectal cancer surgery in rural hospitals is safe and that short term outcomes are good.[2]

This report is based on prospectively collected data for 311 patients treated for stages 1 to 3 colorectal cancer by four surgeons in rural South Australia (Mount Gambier Hospital, with 110 beds and a six-bed high dependency unit) during 1 February 2006 – 31 January 2020. The follow-up parameters, intervals between follow-up examinations, and data analysis tools have been reported previously.[2] Briefly, data were analysed in SigmaStat 3.5 (Systat). Survival was analysed by single-group and log-rank testing; survival differences between groups were assessed by pairwise multiple comparison (Holm–Šídák). Group data were compared in *t*, rank sum, and χ^2 tests; correlations of covariates and cancer-specific survival were assessed by multiple logistic regression. The Central Adelaide Local Health Network Human Research Ethics Committee approved our study (reference, 12041).

One hundred of 311 patients (32%) had Union for International Cancer Control (UICC) stage 1, 110 (35%) stage 2, and 101 (33%) stage 3 colorectal cancer. The median age of the patients was 71 years (interquartile range [IQR], 63–78 years); 172 (55%) were men. Of the 311 procedures, 277 were elective (89%); 113 were laparoscopic (36%) and 198 laparotomies (64%). Median hospital length of stay was 7 days (IQR, 4–10 days); 30-day mortality was 1.3% (four deaths), 90-day mortality 1.6% (five deaths). The proportion of deaths at 30 days after emergency colorectal cancer surgery (three of 34 patients, 9%) was significantly greater than following elective surgery (one of 277, 0.4%; $P = 0.002$). Leakage occurred in 13 of 259 procedures with anastomosis (5%). The median number of lymph nodes resected was 14 (IQR, 10–20).

Overall 5-year survival of patients (stages 1–3) was 79%, 10-year survival was 45%. Cancer-specific 5-year survival was 86% and 10-year survival 79% (Box). Multivariate analysis included patient sex, age, intra-operative blood loss, laparoscopic surgery, American Society of Anesthesiologists (ASA) score, and UICC stage as covariates. More advanced tumour stage (stages 1/2 *v* stage 3: odds ratio [OR], 2.01; 95% confidence interval [CI], 1.39–2.90) and higher age (< 70 years *v* ≥ 70 years: OR, 2.28; 95% CI, 1.11–4.71) were significantly associated with lower overall survival. Cancer-specific survival was significantly reduced by more advanced tumour stage stages 1/2 *v* stage 3: OR, 4.76; 95% CI, 2.53–8.94).

Our follow-up program included quarterly blood tests (carcinoembryogenic antigen, carbohydrate antigen 19.9, full blood cell count) and clinical examination during the first two years, semi-annual tests during the next three years, and annual blood tests and clinical examinations thereafter. Throughout follow-up, annual computed tomography and colonoscopy were offered to all patients, and additional investigations initiated in response to changes in clinical or laboratory findings. This intense follow-up program, based on that used at the University of Munich in Germany, was adopted when the current surgical unit was established in Mount Gambier. It is being reviewed and will be adjusted to current Australian recommendations. Recurrent disease was detected in a total of 52 patients (17%), and 13 patients (4%) underwent curative resection.

The primary treatment for colorectal cancer is surgical removal. Surgical care should be provided in an adequately staffed and equipped hospital. We found that such surgery can be provided safely and with good long term oncological outcomes in a rural centre. Overall 5-year survival in our study exceeded the most recent reported value for Australia (2011–2015: 69.9%),[3] and contrasts with a Californian study which found that rural residence was associated with poorer cancer-specific mortality.[4] Published

Five- and 10-year survival of patients undergoing curative resection for colorectal cancer at Mount Gambier Hospital, February 2006 – January 2020

	5-year survival		10-year survival	
	Overall	Cancer-specific	Overall	Cancer-specific
All	79%	86%	45%	79%
Union for International Cancer Control (UICC) stage				
Stage 1 (pT1/pT2)	91%	99%	58%	99%
Stage 2 (pT3/pT4)	82%	87%	51%	85%
Stage 3 (any T, node positive)	55%	74%	39%	55%
American Society of Anesthesiologists (ASA) physical status classification				
1	100%	—	100%	—
2	84%	—	58%	—
3	70%	—	32%	—
4	62%	—	0	—
Age				
< 70 years	86%	—	72%	—
70–79 years	76%	—	32%	—
≥ 80 years	60%	—	7%	—

pT = primary tumour staging. ◆

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data on outcomes beyond 10 years after colorectal cancer surgery are limited. Our overall 10-year survival rate of 45% is similar to that reported by an earlier study in Fremantle (44%).[5] Our findings confirm that tumour stage and age at diagnosis are significant predictors of death following curative surgery for colorectal cancer.

We found that colorectal cancer surgery in a non-metropolitan surgical centre is safe and associated with low 30- and 90-day mortality rates. Oncological results at 5 and 10 years compare well with the results of other groups. Surgery can be provided close to the patients' homes and families in adequately staffed and equipped centres and can match outcomes in capital city hospitals.

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