DE LEESTAFEL

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Een Maandelijkse Selectie van Wetenschappelijke GE-nieuws

Coloproctologie

LARS score in de algemene bevolking

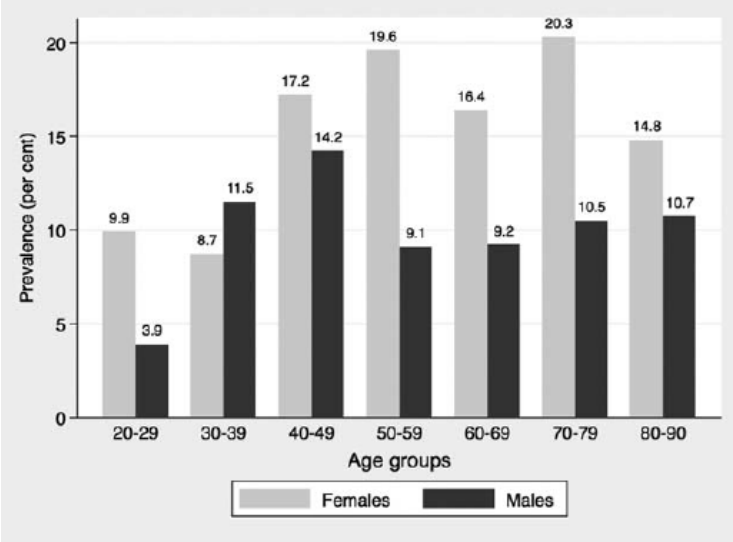
Normative Data for the Low Anterior Resection Syndrome Score (LARS Score). T Juul et al. of Surgery: June 2019 - Volume 269 - Issue 6 - p 1124–1128
Pubmed ID: 31082911

OBJECTIVE: To provide normative data for the Low Anterior Resection Syndrome (LARS) score.

BACKGROUND: The LARS score is a validated and frequently used tool measuring bowel dysfunction after sphincter sparing surgery for rectal cancer. The interpretation of LARS score results has previously been limited by the lack of normative data.

METHODS: An age and sex-stratified random sample of 3440 citizens from the general population was drawn from the Danish civil registration system (age range 20-89 years, 50% females). A brief questionnaire including the LARS score and health-related items were distributed electronically or by post.

RESULTS: A total of 1875 (54.5%) responded, 54.0% were females. In the age group 50 to 79 years, relevant for most rectal cancer studies, the response rate was 70.5% (n = 807). In this specific age group, 18.8% of the females and 9.6% of the males had a LARS score ≥30, corresponding to the LARS score category "major LARS" (P = 0.001), and the median (interquartile range) LARS score was 16 (7-26) and 11 (4-22), respectively (P < 0.001). Responders with physical disease had a statistically significant higher risk of a LARS score ≥30, compared with responders without any physical disease (odds ratio 2.2, 95% confidence interval 1.6-2.9, P < 0.001).



CONCLUSIONS: A LARS score ≥30 (major LARS) is common in the general population, especially in the age group 50 to 79 years. Normative data for the LARS score are now available and can be taken into account when interpreting LARS score results in scientific studies of bowel function after rectal cancer treatment.

Lokale excisie T2 rectumcarcinoom na neoadjuvante chemoradiatie?

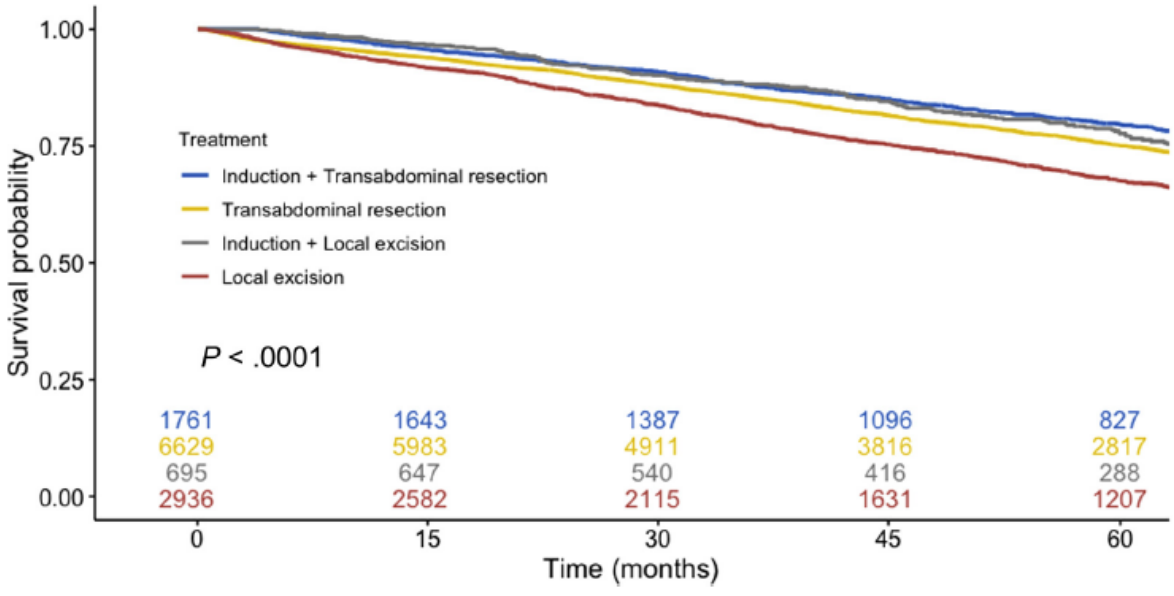
Neoadjuvant chemoradiation followed by transanal local excision for T2 rectal cancer confers equivalent survival benefit as traditional transabdominal resection. OK Jawitz et al. Surgery: June 2019 – Volume 165 – Issue 6 – p 1193-1198.
Pubmed ID: 30904173

BACKGROUND: Despite clinical guidelines classifying T2 rectal cancer as a contraindication for transanal local excision attributable to unacceptably high rates of local recurrence, it is a practice that persists clinically. Recent clinical trials have suggested that transanal local excision in addition to neoadjuvant chemoradiation is an acceptable alternative in select patients.

METHODS: The 2004-2015 National Cancer Database was queried for patients with clinical stage T2N0M0 rectal adenocarcinoma who underwent surgical intervention. Patients were stratified by treatment with transabdominal resection or transanal local excision, both with and without neoadjuvant chemoradiation. Propensity matching was performed, and, using the Kaplan-Meier and Cox proportional hazard models, survival was compared between the groups.

RESULTS: A total of 12,021 patients met inclusion criteria, including 1,761 and 6,629 patients who underwent transabdominal resection with and without neoadjuvant chemoradiation, respectively, and 695 and 2,936 patients who underwent local transanal excision with and without neoadjuvant chemoradiation, respectively. In unadjusted analysis, patients undergoing induction therapy followed by transabdominal resection or local excision had equivalent survival. Similarly, on multivariate Cox proportional hazard regression after propensity matching, local excision was not an independent predictor of patient mortality compared with transabdominal resection (hazard ratio 0.93, 95% confidence interval 0.75-1.16).

CONCLUSION: Local transanal excision in addition to neoadjuvant chemoradiation may provide comparable survival benefit to transabdominal resection for patients with clinical stage T2N0M0 rectal cancer. Therefore, patients who refuse or are poor candidates for transabdominal resection should be considered for neoadjuvant therapy followed by transanal local excision.



UPPER GI

Meta-analyse: verbeterde langetermijn functie na maagresectie met pouch

Pouch Versus No Pouch Following Total Gastrectomy: Meta-analysis of Randomized and Non-randomized Studies. NL Syn et al. Surgery: May 2019 – Volume 165 – Issue 5 – p 946-952.
Pubmed ID: 31082900.

OBJECTIVE: The aim of the study was to assess the impact of pouch reconstruction on perioperative outcomes, postprandial symptoms, nutritional and anthropometric parameters, and overall quality of life after total gastrectomy for gastric malignancy.

SUMMARY BACKGROUND DATA: The short-term perioperative risks and longer term functional value of creating a small-bowel reservoir after total gastrectomy are contended.

METHODS: A search for randomized and non-randomized studies comparing reconstruction with or without a pouch was conducted. Treatment effects were computed using pairwise random-effects meta-analysis and meta-regression, and the systematic review was conducted in accordance with PRISMA and MOOSE guidelines.

RESULTS: A total of 17 randomized trials and 8 observational studies involving 1621 participants were included. Pouch creation is associated with an increased operation time [259.3 vs 235.8 min; weighted mean difference (WMD) 23.5, 95% confidence interval (CI) 9.8-37.2], but not hospitalization duration. There was no difference in overall postsurgical complications, including anastomotic leak and abdominal abscess. Pouch formation markedly reduces the risk of dumping syndrome at 3 to 6 months [8.1% vs 32.4%; risk ratios (RR) 0.36, 95% CI, 0.21-0.60] and 12 to 24 months (2.8% vs 23.6%; RR 0.27, 95% CI, 0.16-0.46). The functional advantages of pouch reconstruction persist at 1 to 2 years, with aggregated data indicating considerably lower risks of esophagitis and heartburn (63% relative reduction), dumping syndrome (73% relative reduction), and food intake disturbance (50% relative reduction). At 12 to 24 months, albumin levels (40.5 vs 37.9 g/L; WMD 2.59, 95% CI, 1.35-3.84) and body mass index (22.2 vs 20.9 kg/m; WMD 1.28, 95% CI, 0.61-1.94) are significantly higher among participants with a pouch.

CONCLUSIONS: Pouch creation improves long-term functional and nutritional outcomes after total gastrectomy, without greater perioperative morbidity.

Nieuwe predictor overall survival slokdarmcarcinoom?

Impact of pathologically assessing extranodal extension in the thoracic field on the prognosis of esophageal squamous cell carcinoma. N Okada et al. Surgery: June 2019 – Volume 165 – Issue 6 – p 1203-1210
Pubmed ID: 30850155

BACKGROUND: This study aimed to elucidate the impact of extranodal extension, pathologically assessed according to new diagnostic criteria, on the prognosis of esophageal squamous cell carcinoma. Extranodal extension has been shown to be a prognostic indicator for head and neck cancers; however, its utility in esophageal squamous cell carcinoma has not been demonstrated.

METHODS: We enrolled 174 consecutive esophageal squamous cell carcinoma patients who had undergone esophagectomy with lymph node dissection in the three fields. Extranodal extensions from all metastatic lymph nodes were pathologically classified into grades 1-3. Then, relationships

between extranodal extension and clinicopathologic factors, including overall survival and recurrence-free survival were examined. Recurrence patterns in the thoracic and abdominal fields were also examined.

RESULTS: Kaplan-Meier analyses showed that patients with grades 2 and 3 extranodal extension showed significantly poorer recurrence-free survival compared with those with intranodal involvement of esophageal squamous cell carcinoma cells (P = .0041 and P = .0011, respectively). Patients with pN3b (newly defined in this study as including at least one lymph node with grade 2-3 extranodal extension regardless of region or number of metastatic lymph nodes) was associated with significantly shorter overall survival and recurrence-free survival (P < .001). Moreover, multivariate analyses indicated that patients with grades 2-3 extranodal extension showed significantly reduced recurrence-free survival in the thoracic but not in the abdominal field (thoracic: P = .047; abdominal: P = .15).

CONCLUSION: This study suggests that the extranodal extension grading system proposed in this study is a novel predictor of overall survival and recurrence-free survival in esophageal squamous cell carcinoma.

HPB

Definitie van vroeg en laat recidief na resectie pancreascarcinoom

Defining and Predicting Early Recurrence in 957 Patients With Resected Pancreatic Ductal Adenocarcinoma. VP Groot et al. Annals of Surgery: June 2019 - Volume 269 - Issue 6 - p 1154–1162.

Pubmed ID: 31082915

OBJECTIVE: To establish an evidence-based cut-off to differentiate between early and late recurrence and to compare clinicopathologic risk factors between the two groups.

SUMMARY BACKGROUND DATA: A clear definition of “early recurrence” after pancreatic ductal adenocarcinoma resection is currently lacking.

METHODS: Patients undergoing pancreatectomy for pancreatic ductal adenocarcinoma between 2000 and 2013 were included. Exclusion criteria were neoadjuvant therapy and incomplete follow-up. A minimum P-value approach was used to evaluate the optimal cut-off value of recurrence-free survival to divide the patients into early and late recurrence cohorts based on subsequent prognosis. Potential risk factors for early recurrence were assessed with logistic regression models.

RESULTS: Of 957 included patients, 204 (21.3%) were recurrence-free at last follow-up. The optimal length of recurrence-free survival to distinguish between early (n = 388, 51.5%) and late recurrence (n = 365, 48.5%) was 12 months (P < 0.001). Patients with early recurrence had 1-, and 2-year post-recurrence survival rates of 20 and 6% compared with 45 and 22% for the late recurrence group (both P < 0.001). Preoperative risk factors for early recurrence included a Charlson age-comorbidity index ≥4 (OR 1.65), tumor size > 3.0 cm on computed tomography (OR 1.53) and CA 19-9 > 210 U/mL (OR 2.30). Postoperative risk factors consisted of poor tumor differentiation grade (OR 1.66), microscopic lymphovascular invasion (OR 1.70), a lymph node ratio > 0.2 (OR 2.49), and CA 19-9 > 37 U/mL (OR 3.38). Adjuvant chemotherapy (OR 0.28) and chemoradiotherapy (OR 0.29) were associated with a reduced likelihood of early recurrence.

CONCLUSION: A recurrence-free interval of 12 months is the optimal threshold for differentiating between early and late recurrence, based on subsequent prognosis.

Robot Whipple en ERAS: synergie?

A Combination of Robotic Approach and ERAS Pathway Optimizes Outcomes and Cost for Pancreatoduodenectomy. SJ Kowalsky et al. Annals of Surgery: June 2019 - Volume 269 - Issue 6 - p 1138–1145.
Pubmed ID: 29462006

OBJECTIVE: To determine the impact of enhanced recovery after surgery (ERAS) pathway implementation on outcomes and cost of robotic and open pancreatoduodenectomy.
BACKGROUND: ERAS pathways have shown benefit in open pancreatoduodenectomy (OPD). The impact of ERAS on robotic pancreatoduodenectomy (RPD) is unknown.
METHODS: Retrospective review of consecutive RPD and OPDs in the pre-ERAS (July, 2014–July, 2015) and ERAS (July, 2015–July, 2016) period. Univariate and multivariate logistic regression was used to determine impact of ERAS and operative approach alone, or in combination (pre-ERAS + OPD, pre-ERAS + RPD, ERAS + OPD, ERAS + RPD) on length of hospital stay (LOS) and overall cost.

Supplemental Table 1. Major components of ERAS pancreatoduodenectomy pathway at UPMC.

	ERAS Pathway
Pre-operative Office Education	-Introduction to ERAS pathway diet and activity expectations -Nutrition counseling -Emphasize pre-operative exercise -Encourage smoking cessation
Pre-Operative Preparation	-No solid oral intake from 2200 on day before surgery -Clear liquid diets allowed until 2 hours before surgery
Pre-operative multi-modal anesthesia	-1000 mg oral acetaminophen -600 mg oral gabapentin (400 mg if age ≥ 65 years) -400 mg oral celecoxib (200 mg if age > 65 years or renal insufficiency)
Intra-operative management	-100-200 mcg intra-thecal morphine (unless contraindicated) -Goal-directed fluid resuscitation -Avoidance of IV opioids -IV lidocaine infusion
Immediate post-operative management	-Remove nasogastric tube -Clear liquid diet -Low volume IV fluids (40 cc/h) -PRN oral oxycodone -PRN IV hydromorphone for breakthrough pain
Post-operative day 1	-Remove foley catheter -Full liquid diet -Ambulate -Asses drain amylase level
Post-operative day 3	-Assess drain amylase level -Remove drain if amylase level < 3x serum amylase level -Post gastrectomy diet
Post-operative day 5-6	-Discharge

RESULTS: In all, 254 consecutive pancreatoduodenectomies (RPD 62%, OPD 38%) were analyzed (median age 67, 47% female). ERAS patients had shorter LOS (6 vs 8 days; P = 0.004) and decreased overall cost (USD 20,362 vs 24,277; P = 0.001) compared with non-ERAS patients, whereas RPD was associated with decreased LOS (7 vs 8 days; P = 0.0001) and similar cost compared with OPD. On multivariable analysis (MVA), RPD was predictive of shorter LOS [odds ratio (OR) 0.33, confidence interval (CI) 0.16–0.67, P = 0.002), whereas ERAS was protective against high cost (OR 0.57, CI 0.33–0.97, P = 0.037). On MVA, when combining operative approach with ERAS pathway use, a combined ERAS + RPD approach was associated with reduced LOS and optimal cost compared with other combinations (pre-ERAS + OPD, pre-ERAS + RPD, ERAS + OPD).

CONCLUSION: ERAS implementation is independently associated with cost savings for pancreatoduodenectomy. A combination of ERAS and robotic approach synergistically decreases hospital stay and overall cost compared with other strategies.

LEVERCHIRURGIE

Gebruik van levers van ouderen donoren voor transplantatie al gerechtvaardigd?

Assessment of Trends in Transplantation of Liver Grafts From Older Donors and Outcomes in Recipients of Liver Grafts From Older Donors, 2003-2016. CE Haugen et al; JAMA Surg. 2019;154(5):441-449

Pubmed ID: 30758494

IMPORTANCE: In light of the growing population of older adults in the United States, older donors (aged ≥70 years) represent an expansion of the donor pool; however, their organs are underused. Liver grafts from older donors were historically associated with poor outcomes and higher discard rates, but clinical protocols, organ allocation, and the donor pool have changed in the past 15 years.

OBJECTIVE: To evaluate trends in demographics, discard rates, and outcomes among older liver donors and transplant recipients of livers from older donors in a large national cohort.

DESIGN, SETTING AND PARTICIPANTS: Prospective cohort study of 4127 liver grafts from older donors and 3350 liver-only recipients of older donor grafts and 78 990 liver grafts from younger donors (aged 18-69 years) and 64 907 liver-only recipients of younger donor grafts between January 1, 2003, and December 31, 2016, in the United States. The Scientific Registry of Transplant Recipients, which includes data on all transplant recipients in the United States that are submitted by members of the Organ Procurement and Transplantation Network, was used.

EXPOSURES: Year of liver transplant and age of liver donor.

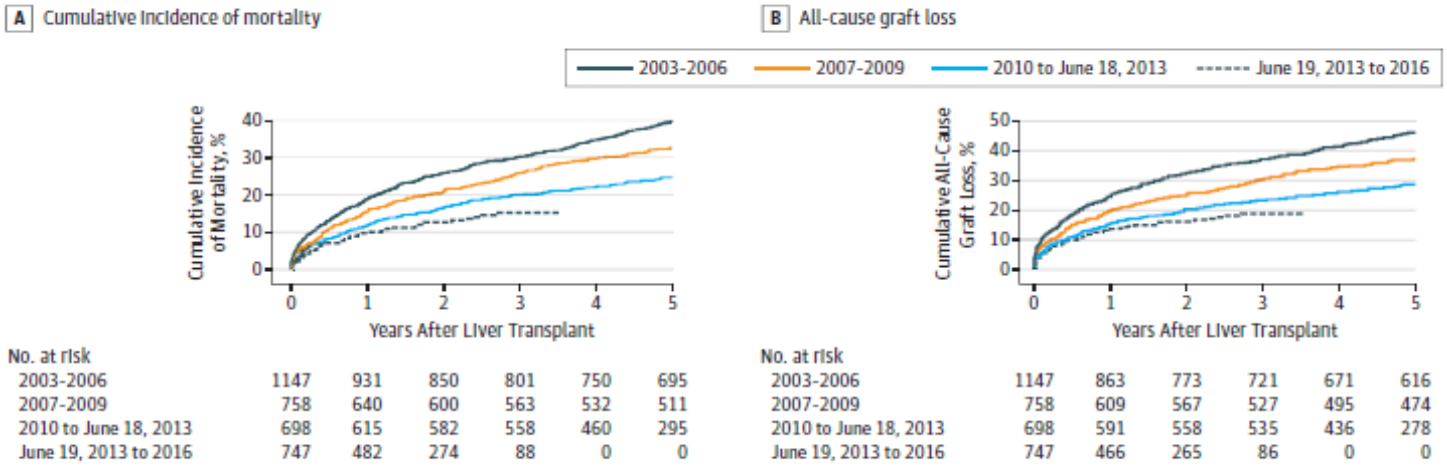
MAIN OUTCOMES AND MEASURES: Odds of graft discard and posttransplant outcomes of all-cause graft loss and mortality.

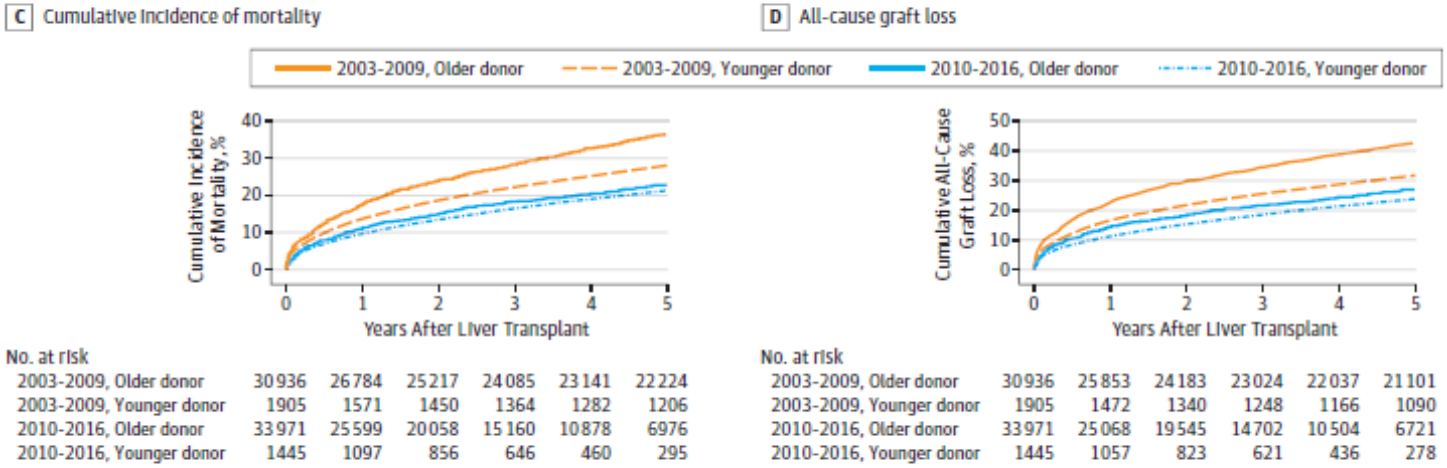
RESULTS: In this study, 4127 liver grafts from older donors were recovered for liver transplant across the study period (2003-2016); 747 liver grafts from older donors were discarded, and 3350 liver grafts from older donors were used for liver-only recipients. After adjusting for donor characteristics other than age and accounting for Organ Procurement Organization–level variation, liver grafts from older donors were more likely to be discarded compared with liver grafts from younger donors in 2003-2006 (adjusted odds ratio [aOR], 1.97; 95% CI, 1.68-2.31), 2007-2009 (aOR, 2.55; 95% CI, 2.17-3.01), 2010-2013 (aOR, 2.04; 95% CI, 1.68-2.46), and 2013-2016 (aOR, 2.37; 95% CI, 1.96-2.86) (P <

.001 for all). Transplants of liver grafts from older donors represented a progressively lower proportion of all adult liver transplants, from 6.0% (n = 258 recipients) in 2003 to 3.2% (n = 211 recipients) in 2016 (P = .001). However, outcomes in recipients of grafts from older donors improved over time, with 40% lower graft loss risk (adjusted hazard ratio, 0.60; 95% CI, 0.53-0.68; P < .001) and 41% lower mortality risk (adjusted hazard ratio, 0.59; 95% CI, 0.52-0.68; P < .001) in 2010 through 2016 vs 2003 through 2009; these results were beyond the general temporal improvements in graft loss (interaction P = .03) and mortality risk (interaction P = .04) among recipients of liver grafts from younger donors.

CONCLUSIONS AND RELEVANCE: These findings show that from 2003 to 2016, liver graft loss and mortality among recipients of liver grafts from older donors improved; however, liver graft discard from older donors remained increased and the number of transplants performed with liver grafts from older donors decreased. Expansion of the donor pool through broader use of liver grafts from older donors might be reasonable.

Figure 3. Cumulative Incidence of Mortality and All-Cause Graft Loss





The most recent time periods were split at June 18, 2013, after the allocation policy implementation of Share 35.[24]

Prognostische factoren voor *conditional and overall survival* na resectie van colorectale lever metastasen veranderen met de tijd

Prognostic Factors Change Over Time After Hepatectomy for Colorectal Liver Metastases. A Multi-institutional, International Analysis of 1099 Patients. GA Margonis et al. Annals of Surgery: June 2019 - Volume 269 - Issue 6 - p 1129–1137
Pubmed ID: 31082912

OBJECTIVE: To evaluate the changing impact of genetic and clinicopathologic factors on conditional overall survival (CS) over time in patients with resectable colorectal liver metastasis.

BACKGROUND: CS estimates account for the changing likelihood of survival over time and may reveal the changing impact of prognostic factors as time accrues from the date of surgery.

METHODS: CS analysis was performed in 1099 patients of an international, multi-institutional cohort. Three-year CS (CS3) estimates at the "xth" year after surgery were calculated as follows: CS3 = CS (x + 3)/CS (x). The standardized difference (d) between CS3 rates was used to estimate the changing prognostic power of selected variables over time. A $d < 0.1$ indicated very small differences between groups, $0.1 \leq d < 0.3$ indicated small differences, $0.3 \leq d < 0.5$ indicated moderate differences, and $d \geq 0.5$ indicated strong differences.

RESULTS: According to OS estimates calculated at the time of surgery, the presence of BRAF and KRAS mutations, R1 margin status, resected extrahepatic disease, patient age, primary tumor lymph node metastasis, tumor number, and carcinoembryonic antigen levels independently predicted worse survival. However, when temporal changes in the prognostic impact of these variables were considered using CS3 estimates, BRAF mutation dominated prognosis during the first year (d = 0.48), whereas surgeon-related variables (ie, surgical margin and resected extrahepatic disease) determined prognosis thereafter ($d \geq 0.5$). Traditional clinicopathologic factors affected survival constantly, but only to a moderate degree ($0.3 \leq d < 0.5$).

TABLE 2. Prognostic Factors Assessed at the Time of Surgery and 3 Years After Surgery Using Multivariable Survival Analysis

	At Surgery			3 Years Postsurgery		
Characteristic	Hazard Ratio	95% CI	*P*	Hazard Ratio	95% CI	*P*
Age						
<65 yr	Ref.	–	–	Ref.	–	–
≥65 yr	1.25	1.03–1.51	0.021	1.53	1.08–2.17	0.016
Lymph node metastases						
No	Ref.	–	–	Ref.	–	–
Yes	1.35	1.11–1.65	0.003	1.43	1.01–2.01	0.042
Extrahepatic disease						
No	Ref.	–	–	Ref.	–	–
Yes	1.79	1.33–2.43	<0.001	2.75	1.22–6.18	0.015
Prehepatectomy chemotherapy						
No	Ref.	–	–	Ref.	–	–
Yes	1.37	1.10–1.70	0.005	1.45	0.95–2.22	0.088
Prehepatectomy CEA						
≤7.6 ng/mL	Ref.	–	–	Ref.	–	–
> 7.6 ng/mL	1.34	1.07–1.67	0.011	1.52	1.08–2.14	0.015
KRAS						
Wild-type	Ref.	–	–	Ref.	–	–
Mutation	1.43	1.19–1.74	<0.001	1.22	0.85–1.77	0.284
BRAF						
Wild-type	Ref.	–	–	Ref.	–	–
Mutation	2.22	1.40–3.51	0.001	0.44	0.10–1.89	0.260
Tumor number						
Single	Ref.	–	–	Ref.	–	–
Multiple	1.38	1.14–1.66	<0.001	1.23	0.89–1.71	0.216
Margin						
R0	Ref.	–	–	Ref.	–	–
R1	1.65	1.26–2.16	<0.001	2.31	1.37–3.90	0.002
Posthepatectomy chemotherapy						
No	Ref.	–	–	Ref.	–	–
Yes	0.70	0.58–0.84	<0.001	0.93	0.64–1.35	0.690

CONCLUSIONS: The impact of genetic, surgery-related, and clinicopathologic factors on OS and CS3 changed dramatically over time. Specifically, BRAF mutation status dominated prognosis in the first year, whereas positive surgical margins and resected extrahepatic disease determined prognosis thereafter.

BARIATRISCHE CHIRURGIE

Bariatrische chirurgie verlaagt mortaliteit bij ernstige obesitas

Mortality of the Severely Obese. A Population Study. OM Moussa et al. Annals of Surgery: June 2019 - Volume 269 - Issue 6 - p 1087–1091.
Pubmed ID: 31082906

OBJECTIVE: This study aimed to analyze the Clinical Practice Research Datalink to identify the prognostic factors of all-cause mortality in the severely obese.
BACKGROUND: Patients who are severely obese [body mass index (BMI) ≥35 kg/m2] are at increased risk of all-cause mortality as a result of metabolic sequelae including hyperlipidemia, hypertension, and diabetes. Bariatric surgery has been shown to reduce the severity of the metabolic complications of obesity.
METHODS: A case-controlled analysis was carried out of patients with a BMI of 35 kg/m2 or more from the Clinical Practice Research Datalink, a UK database of primary care clinics. Clinicopathological characteristics at baseline diagnosis were extracted. Cases of all-cause mortality were identified as a clinical endpoint. A Cox proportional hazard model was used to calculate hazard ratios (HRs) for different patient factors. A P value less than 0.050 was defined as significant.
RESULTS: A total of 187,061 records were identified for analysis. Median follow-up time was 98.0 months (range: 3.0–1095.0). A total of 8655 (4.6%) were identified as having died during the study period. The median time from baseline obesity diagnosis until death was 137.0 months (range: 3.0–628.7). Multivariate analysis found bariatric surgery to be associated with reduced risk of all-cause mortality (HR: 0.487; P < 0.001). The following were associated with increased risk of death: male sex (HR: 1.805; P < 0.001), BMI of 60 or greater (HR: 2.541; P < 0.001), hypertension (HR: 2.108; P < 0.001), diabetes (HR: 2.766; P < 0.001), and hyperlipidemia (HR: 1.641; P < 0.001).
CONCLUSIONS: Factors such as high BMI, diabetes, hyperlipidemia, and hypertension at first diagnosis of severe obesity were each independently associated with an increased risk of death. Bariatric surgery was shown to be associated with reduced risk of all-cause mortality. Improving access to bariatric surgery and public health campaigns can improve the prognosis of severely obese patients.

OVERIGE

Systematic video recording waardevolle toevoeging op het operatieverslag?

Comparison of Systematic Video Documentation With Narrative Operative Report in Colorectal Cancer Surgery. FW van de Graaf et al; JAMA Surg. 2019;154(5):381-389.

Pubmed ID: 30673072

IMPORTANCE: Despite ongoing advances in the field of colorectal surgery, the quality of surgical treatment is still variable. As an intrinsic part of surgical quality, the technical information regarding the surgical procedure is reflected only by the narrative operative report (NR), which has been found to be subjective and regularly omits important information.

OBJECTIVE: To investigate systematic video recording (SVR) as a potential improvement in quality and safety with regard to important information in colorectal cancer surgery.

DESIGN, SETTING AND PARTICIPANTS: The Imaging for Quality Control Trial was a prospective, observational cohort study conducted between January 12, 2016, and October 30, 2017, at 3 centers in the Netherlands. The study group consisted of 113 patients 18 years or older undergoing elective laparoscopic surgery for colorectal cancer. These patients were case matched and compared with cases from a historical cohort that received only an NR.

INTERVENTIONS: Among study cases, participating surgeons were requested to systematically capture predefined key steps of the surgical procedure intraoperatively on video in short clips.

MAIN OUTCOMES AND MEASURES: The SVRs and NRs were analyzed for adequacy with respect to the availability of important information regarding the predefined key steps. Adequacy of the reported information was defined as the proportion of key steps with available and sufficient information in the report. Adequacy of the SVR and NR was compared between the study and control groups, with the SVR alone and as an adjunct to the NR in the study group vs NR alone in the control group.

RESULTS: Of the 113 study patients, 69 women (61.1%) were included; mean (SD) age was 66.3 (9.8) years. In the control group, a mean (SD) of 52.5% (18.3%) of 631 steps were adequately described in the NR. In the study group, the adequacy of both the SVR (78.5% [16.5%], P < .001) and a combination of the SVR with NR (85.1% [14.6%], P < .001) was significantly superior to NR alone. The only significant difference between the study and historical control groups regarding postoperative and pathologic outcomes was a shorter postoperative mean (SD) length of stay in favor of the study group (8.0 [7.7] vs 8.6 [6.8] days; P = .03).

Table 3. Number of Adequate Steps

	Adequate Steps/Total Steps, No./Total No. (%)				
		Study Cases			
Procedure Steps	Historical Control, NR	SVR	SVR and NR	*P* Value[a]	*P* Value[b]
1. Introduction of trocars under vision	46/109 (42.2)	93/110 (84.5)	94/110 (85.5)	<.001	<.001
2. Exploration	205/326 (62.9)	255/321 (79.4)	284/321 (88.5)	<.001	<.001
3. Vascular control	103/153 (67.3)	110/147 (74.8)	123/147 (83.7)	.69	.045
4. Mobilization and resection	91/259 (35.1)	212/266 (79.7)	224/266 (84.2)	<.001	<.001
5. Creation of anastomosis	124/252 (49.2)	201/264 (76.1)	219/264 (83.0)	<.001	<.001
6. Closure	62/107 (57.9)	83/105 (79.0)	90/105 (85.7)	.009	<.001
Total	631/1206 (52.3)	954/1213 (78.6)	1034/1213 (85.2)	<.001	<.001

CONCLUSIONS AND RELEVANCE: Use of SVR in laparoscopic colorectal cancer surgery as an adjunct to the NR might be superior in documenting important steps of the operation compared with NR alone, adding to the overall availability of necessary intraoperative information and contributing to quality control and objectivity.

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