Surgical Management of Metastatic Colon Cancer: analysis of the Surveillance, Epidemiology and End Results (SEER) database

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The authors report nothing to disclose
• Objectives

• Methods

• Results

• Conclusions
Background

Surgical management of metastatic colon cancer

Somasundar et al. Lymph node involvement in colon cancer patients decreases with age; a population based analysis. EJSO 2014 Jul 3.
Objectives

- Proportion of stage IV patients undergoing metastatectomy—by age at diagnosis

- Proportion of regional node-positive stage IV patients with adequate lymph node staging at primary resection

- **Main survival endpoint**: Overall survival (OS)
Methods

• Data source: Surveillance, Epidemiology and End Results database

• Covers >98% incidence cancer cases in 18 geographic areas in the USA

• ~28% of the US population

• Records demographic and cancer registry data: histology, stage, survival outcomes (until December 2010)

• Treatment: surgery, radiotherapy—no chemotherapy records
Case selection

Initial SEER database query:

• Malignant tumors of the colon (excluding rectum)

• Histology: adenocarcinoma (ICD-O-3: 8140-8389, excluding carcinoid tumors)

• Year of diagnosis: 2000-2010

• Active follow-up by registry (excluding autopsy cases)

• Age at diagnosis ≥ 20 years
Definition of lymph node resection

- Data derived from the main colon resection pathology report (even after pre-operative treatment)

- Number of REGIONAL lymph nodes examined:
  - nodes removed and examined by the pathologist

- Number of REGIONAL nodes positive:
  - nodes examined by the pathologist that were found to contain metastases

- Adequate nodal staging:
  - At least 12 nodes examined according to the pathology report
Data Analysis

- Descriptive analysis:
  - OS by age group and regional nodal status—among patients who underwent metastatectomy

- Comparative analysis:
  - OS in patients who underwent metastatectomy or not (Cox models)

- Statistical methods:
  - Interaction test for subsets: interaction between resection of metastasis and age group (or nodal status)
  - Multivariable Cox models in each subgroup, adjusting for other variables: age, nodal status, sex, race, year of diagnosis and adequate nodal staging.

- All tests report two-sided $P$ values and/or 95% confidence intervals
Surgical management of metastatic colon cancer

- Objectives
- Methods
- Results
- Conclusions
Results

Initial SEER database query:
Malignant tumors of the colon (excluding rectum)
Age > years at diagnosis
Histology: adenocarcinoma (ICD-O-3: 8140-8389, excluding carcinoid tumors)
Active follow-up by registry (excluding autopsy cases)

N = 232,640

AJCC stage IV
N = 41,590

At least partial colectomy:
N = 27,812

Resection of a metastasis
N = 4,506

Surgical management of metastatic colon cancer
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- No surgery (N=13,427)
- Primary resection only (23,657)
- Primary + metastatectomy (4,155)
- Metastatectomy only (351)
Stage IV patients undergoing Colectomy, by age group

<table>
<thead>
<tr>
<th>Age</th>
<th>No</th>
<th>%</th>
<th>Yes</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>20-49y</td>
<td>1,224 (27.2)</td>
<td>3,280 (72.8)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>50-64y</td>
<td>3,773 (30.1)</td>
<td>8,749 (69.9)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>65-74y</td>
<td>3,302 (31.7)</td>
<td>7,119 (68.3)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>75-84y</td>
<td>3,680 (36.3)</td>
<td>6,450 (63.7)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>85+</td>
<td>1,799 (44.8)</td>
<td>2,214 (55.2)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>13,778 (33.1)</td>
<td>27,812 (66.9)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

χ² P<0.0001

Surgical management of metastatic colon cancer
Patients with ≥ 12 examined lymph nodes in the colectomy specimen, by age.

<table>
<thead>
<tr>
<th>Age</th>
<th>No</th>
<th>Yes</th>
<th>N</th>
<th>%</th>
<th>N</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N</td>
<td>%</td>
<td>N</td>
<td>%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>20-49y</td>
<td>1,221</td>
<td>37.2</td>
<td>2,059</td>
<td>62.8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>50-64y</td>
<td>3,715</td>
<td>42.5</td>
<td>5,034</td>
<td>57.5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>65-74y</td>
<td>3,404</td>
<td>47.8</td>
<td>3,715</td>
<td>52.2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>75-84y</td>
<td>3,241</td>
<td>50.3</td>
<td>3,209</td>
<td>49.8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>85+</td>
<td>1,118</td>
<td>50.5</td>
<td>1,096</td>
<td>49.5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>12,699</td>
<td>45.7</td>
<td>15,113</td>
<td>54.3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

\( \chi^2 \ P < 0.0001 \)
Patients with nodal metastases in the colectomy specimen (if ≥12 lymph nodes examined, N=15,133)

<table>
<thead>
<tr>
<th>Age</th>
<th>Negative</th>
<th>Positive</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N</td>
<td>%</td>
</tr>
<tr>
<td>20-49y</td>
<td>249</td>
<td>12.1</td>
</tr>
<tr>
<td>50-64y</td>
<td>745</td>
<td>14.8</td>
</tr>
<tr>
<td>65-74y</td>
<td>586</td>
<td>15.8</td>
</tr>
<tr>
<td>75-84y</td>
<td>587</td>
<td>18.3</td>
</tr>
<tr>
<td>85+</td>
<td>211</td>
<td>19.3</td>
</tr>
<tr>
<td>Total</td>
<td>2,378</td>
<td>15.7</td>
</tr>
</tbody>
</table>

χ² P<0.0001

Surgical management of metastatic colon cancer
Patients undergoing metastatectomy or not \((N=41,590)\)

<table>
<thead>
<tr>
<th>Age</th>
<th>No</th>
<th>Yes</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N</td>
<td>%</td>
</tr>
<tr>
<td>20-49y</td>
<td>3,761</td>
<td>83.5</td>
</tr>
<tr>
<td>50-64y</td>
<td>10,895</td>
<td>87.0</td>
</tr>
<tr>
<td>65-74y</td>
<td>9,353</td>
<td>89.8</td>
</tr>
<tr>
<td>75-84y</td>
<td>9,309</td>
<td>91.9</td>
</tr>
<tr>
<td>85+</td>
<td>3,766</td>
<td>93.9</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>37,084</td>
<td>89.2</td>
</tr>
</tbody>
</table>

\(\chi^2 P<0.0001\)

Surgical management of metastatic colon cancer
Overall survival with or without metastatectomy ($N=41,590$)
Overall survival after metastatectomy: by age group

<table>
<thead>
<tr>
<th>Age</th>
<th>N</th>
<th>OS at 3 years</th>
<th>Median OS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>%</td>
<td>95% CI</td>
<td>Years</td>
</tr>
<tr>
<td>20-49</td>
<td>743</td>
<td>44% (40-48)</td>
<td>2.7</td>
</tr>
<tr>
<td>50-64</td>
<td>1,627</td>
<td>39% (37-42)</td>
<td>2.3</td>
</tr>
<tr>
<td>65-74</td>
<td>1,068</td>
<td>32% (29-35)</td>
<td>1.8</td>
</tr>
<tr>
<td>75-84</td>
<td>821</td>
<td>19% (16-22)</td>
<td>1.0</td>
</tr>
<tr>
<td>≥85</td>
<td>247</td>
<td>6% (3-10)</td>
<td>0.3</td>
</tr>
<tr>
<td>All</td>
<td>4,506</td>
<td>33% (31-34)</td>
<td>1.8</td>
</tr>
</tbody>
</table>

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## Association of metastatectomy with overall survival in age subgroups

*P* for interaction < 0.0001

<table>
<thead>
<tr>
<th>HR</th>
<th>95% CI</th>
<th>Age group</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.67</td>
<td>(0.61-0.75)</td>
<td>&lt; 50 years</td>
</tr>
<tr>
<td>0.70</td>
<td>(0.65-0.75)</td>
<td>50-64 years</td>
</tr>
<tr>
<td>0.71</td>
<td>(0.66-0.77)</td>
<td>65-74 years</td>
</tr>
<tr>
<td>0.77</td>
<td>(0.71-0.84)</td>
<td>75-84 years</td>
</tr>
<tr>
<td>0.94</td>
<td>(0.82-1.08)</td>
<td>≥ 85 years</td>
</tr>
<tr>
<td>0.72</td>
<td>(0.70-0.75)</td>
<td>All patients</td>
</tr>
</tbody>
</table>

Surgical management of metastatic colon cancer
Overall survival after metastatectomy: by nodal status

<table>
<thead>
<tr>
<th>Nodal status</th>
<th>N</th>
<th>OS at 3 years</th>
<th>Median OS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>%</td>
<td>95% CI</td>
</tr>
<tr>
<td>N0</td>
<td>774</td>
<td>48%</td>
<td>(44-52)</td>
</tr>
<tr>
<td>N1</td>
<td>1,359</td>
<td>40%</td>
<td>(37-43)</td>
</tr>
<tr>
<td>N2</td>
<td>1,843</td>
<td>27%</td>
<td>(24-39)</td>
</tr>
<tr>
<td>Nx *</td>
<td>530</td>
<td>14%</td>
<td>(11-18)</td>
</tr>
<tr>
<td>All</td>
<td>4,506</td>
<td>33%</td>
<td>(31-34)</td>
</tr>
</tbody>
</table>

* Nx: no lymph node evaluation, or number of positive nodes not stated in the pathology report
Objectives

Methods

Results

Conclusions
Limitations of SEER database

- We cannot compare patients with resection to those who did not have.
- Reason for resection
- No data on systemic treatment
- Disease specific survival is not available
Conclusions

- Overall Survival advantage of metastatectomy in ages up to 85 years.

- Adequate nodal resection favorably correlates with overall survival

- Older patients are more likely to have node negative cancer
Thank You