Regionalization of Hepatobiliary Surgery in Ontario: The Impact on Our System

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Many studies look at volumes of complex surgery and outcomes.

For complex HPB surgery, 12 trails up to 2005
None RTC, all retrospective studies
11 trails for pancreatic resection and volume outcomes: all showed a relationship between volume and mortality.
   number cut off varied (2 cutoff >20, most were 5-10 range)
1 trail for liver resection and volume outcomes (<15, >15)

Ontario study showed a difference in mortality with increasing pancreatic cases. Simunonvic 2010
Number:  <3  3-6  >6
Mortality: 14.4  12.8  3.4
In 1999 ICES reported a wide variation in post op mortality among Ontario Hospitals over a 7 year period in the CMAJ. This led to CCO convening an expert panel to review. A standards document was created and volumes set at 10 pancreatic and 25 total HPB cases.

A decrease in the number of hospitals doing complex cases and decreased in mortality was observed. But it was still above 5% and still numerous hospitals were doing major cases and not meeting volumes.

To continue improvement, CCO with the program in evidenced-based care (PEBC) convened an expert panel and created the new standard document of 2006. Outlined requirements for surgeon, hospital, resources and volumes.
Surgeon: fellowship in HPB, transplantation or surgical oncology with HPB focus
Hospital: two surgeons, affiliation with regional cancer program, 24 hr OR, full 24 hr diagnostics, therapeutic endoscopy 24 hrs, ICU, nutrition service (TPN)
Volumes: 50 index HPB cases per year with 20 being Whipple procedures (liver transplant not an index case)
Outcome: mortality <5% for Whipple and <3% liver resection

“50 HPB cases is the number expected to be generated from a population of 1 million”
“Funding of procedures is a hospital based decision, and outside the mandate of the PEBC and the expert panel”
Many jurisdictions have different volumes requirements for indexed cases but the focus should be on a comprehensive program for the diseases of the pancreas and liver guided by not only mortality but robust outcome measurements and CQI derived from the prospective data.
By 2011, only 11 hospitals doing HPB in the province and 6 were meeting volume targets.

Number of factors contributed to the regionalization
standard document
surgical training and the increase in sub-specialization
renuneration

Whipple  $1785.00
Cholecystectomy $475 x4= $1912
Ontario

Mortality has decreased in Ontario from 2004 to 2011 for Whipples from 4% to 3.2% and for liver resection from 3.6 to 3.5%.

Number of cases of pancreatic and liver surgery in Ontario has increased over the years.

Pancreas
2004-377
2009-545

Liver
2004-529
2009-818
In our region (LHIN 1,2,3) London, Windsor and Kitchener were all doing cases in 2011, with London meeting volumes.

In 2012, Windsor lost the support for their program and the volume has been absorbed in London.
6 Surgeons
- 1 HPB Surgeon
- 1 Pancreas Surgeon
- 4 HPB and Liver Transplant Surgeons
- 2 surgical endoscopist- ERCP/duodenal stents
- All expected to performed general surgery duties
Laparoscopic Liver Resections have increased from 3 to 5% between 2009 and 2013.
Biliary Surgery 2009 - 2013

- BD Cancer
- Radical CCT
• 55 to + 86 liver resections in 5 years
• 36 to 64 Whipple in 5 years

• Great increase due to:
  – GI DST-MCC
  – HPB Rounds, Neuroendocrine Rounds
  – Windsor closure
  – Improvement in therapies for metastatic colon cancer and more cases referred for surgical assessment
  – Novel aggressive liver surgery (ALLPS)
Liver Transplantation

![Liver Transplantation Chart]

- LDLT
- Liver Tx


Graph shows a decrease in LDLT and Liver Tx from 2009 to 2013.
Challenges

Keeping up with increasing cancer volumes without new resources. Current YTD volumes is over target for our CSA

We are absorbing Windsor volume (oncology and non-oncology) without new resources.

39% of our index oncology case volume from ESC (LHIN 1), up from 24% in 2011

Currently meeting wait time targets.

Putting more stress on imaging.
As with most HPB centers, we are faced with increased benign cases that can use up ++++ resources (severe pancreatitis, pancreatic trauma, complex stone disease, hemobilia, gastric outlet obstruction, palliative surgery/endoscopy) These cases do not come with extra funding for our institution.

This is side effect of regionalization of cancer care and subspecialty training that de-skills the local surgeons

Increased surgical advances, more laparoscopic surgery increase OR cost and time limits access to OR as cases take longer Advantage to patient and IP unit

Retirement and recruitment
MCC with Windsor and other community partners.

Nurse Navigator-just started

Nurse Practitioner for HPB- ? hired

Prospective data collection-? soon

Funding increase for oncology cases-LHINs and hospitals negotiations: require new funding for additional surgeon (new OR time, beds, clinic, imaging, pathology etc)
Funding increase for non oncology cases-??

Surgical Oncology SRF for HPB surgeons

Fellow funding- prior only transplant fellowship now combined transplant/HPB fellowship
With regionalization we are at <4% mortality for a Whipple. Unfortunately, we are not impacting overall survival from pancreatic cancer. Still only 5% five year survival for pancreatic 4th leading cause of cancer-related death in North America. Only curative therapy is complete surgical resection, known as pathological R0 resection.
Five-year relative survival for the most fatal cancers, Ontario, 2003–2007

- Prostate (97%)
- Female breast (88%)
- Colon and rectum (65%)

Source: Cancer Care Ontario (Ontario Cancer Registry, 2010)

Notes:
*Mesothelioma is a type of cancer that develops in the protective lining covering the body's internal organs, most commonly the pleura, which surrounds the lungs. Relative survival compares how long people live after their diagnosis to how long people of the same age in the general population are expected to live. Age-specific survival estimates were weighted using the International Cancer Survival Standard weights (Corazziari et al., 2004). The period approach was used to estimate relative survival (Brenner et al. 1997).

Citation: Cancer Care Ontario. Cancer Fact: The most fatal cancers in Ontario. April 2011. Available at [http://www.cancercare.on.ca/cancerfacts](http://www.cancercare.on.ca/cancerfacts).
Prepared by surveillance staff in Prevention and Cancer Control.
Pancreatic Adenocarcinoma

R0 resection often not possible as patients often present with advanced disease

Survival benefit of surgery is minimal in patients in whom an R0 resection cannot be achieved
Newest literature suggests neoadjuvant chemotherapy for this group in order to maximize the rate of R0 resection and well as minimize the number of patients with very aggressive tumors undergoing major surgical interventions with minimal benefit and potentially significant morbidity[5].
# Demographics and OR Resectability

<table>
<thead>
<tr>
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<th>N (%)</th>
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<tbody>
<tr>
<td><strong>Total</strong></td>
<td>122</td>
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<tr>
<td><strong>Gender M:F</strong></td>
<td></td>
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<tr>
<td>Male</td>
<td>65 (53.3%) Male</td>
</tr>
<tr>
<td>Female</td>
<td>57 (46.7%) Female</td>
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<td><strong>Age (mean±SD)</strong></td>
<td>65.4y (±9.3y)</td>
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<td><strong>CT Analysis</strong></td>
<td>83 (68.0%)</td>
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<tr>
<td><strong>Operation</strong></td>
<td></td>
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<tr>
<td>Whipple</td>
<td>77 (63.1%) Whipple</td>
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<tr>
<td>Bypass</td>
<td>45 (36.9%) Bypass</td>
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Results

Rate of R0 Resection

\[ \frac{46}{77} = 59.7\% \]

Success rate of R0 resection for curative intent procedures
Results

![Graph showing cumulative survival rates for Whipple and Bypass procedures. The graph indicates that Whipple procedures show a higher survival rate compared to Bypass procedures during the 5-year period.]
Results

Survival by R0 Resection

- **R0 Resection**
- **Non-R0 Resection**

Survival rates over time for R0 and Non-R0 resections.
Results

Overall Survival
• R0: 45 months (95%CI 35-55)
• Non-R0: 16 months (95%CI 13-21 months)

Disease Free Survival
• R0: 20 months in the R0 group (95%CI 3-14 months)
• Non-R0: 12 months (95%CI 10-14 months)
Results

Resectability and R0 Resection

- Resectable
- Borderline
- Unresectable

Non-R0
R0
Success of CT Ratings

- PPV “Resectable”:
  \[ \frac{22}{45} = 48.9\% \]

- PPV “Unresectable”:
  \[ \frac{6}{7} = 85.7\% \]
Borderline

- 31 pts identified radiographically by criteria
- 8 achieved R0 resection (25.8%)
- 13 underwent bypass/palliative resection (41.9%)
- 10 underwent attempted curative resection, but were unable to achieve pathologic R0 resection (32.3%)
- 1 pt received neoadjuvant chemo, achieved R1
Conclusions

Despite sophisticated staging, imaging information and surgical care, curative resection remains a challenging endeavor in pancreatic cancer.

Standardized radiographic reporting may assist in the identification of patients with unresectable tumors, however radiographically resectable appearing tumors are not reliably found to be so at laparotomy.
GI-DST project underway for standardized reporting of imaging for pancreatic cancer

GI-DST project underway for neo-adjuvant treatment of borderline resectable pancreatic cancer.

Maybe all pancreatic cancers should have neoadjuvant. We need to think outside the box.

We need to continue to improve our comprehensive multi-disciplinary program for the diseases of the pancreas and liver guided by not only mortality but robust outcome measurements and CQI derived from our prospective data.