

Cost Effectiveness of Treatment Strategies for Primary Operable Pancreatic Head Adenocarcinoma: Do We Have More Scientific Evidence to Call for Further Centralization of Care?

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According to recent statistics from the American Cancer Society the number of newly diagnosed pancreas cancer cases was 45,000 in 2010. The annual number of patients succumbing to this disease continues to nearly equal the number of newly diagnosed cases. Despite a number of improvements in the diagnosis and treatment of these patients, overall survival from pancreas cancer remains poor. While certain centers of excellence have reported 5-year survival rates up to 36 % in highly selected patients in the setting of curative intent resection, survival curves using data from large population based datasets reflect a substantially worse outcome.^{1,2}

Currently accepted treatment modalities for pancreas cancer include surgery, chemotherapy, radiation, or palliative care/no treatment. The only potential chance for cure or long-term survival for patients with pancreatic malignancies is a curative intent resection.³ The majority of patients with newly diagnosed operable disease will require a Whipple procedure. While the safety of these operations has come a long way in the past few decades, pancreaticoduodenectomies are still complex operations with a chance for perioperative morbidity and mortality.⁴ Adverse postoperative events are known to substantially increase medical costs.

Some papers in the literature reported survival of non-surgically treated patients diagnosed with pancreas cancer. Chemotherapy with radiation can result in survival rates in the 12 months range in the nonmetastatic setting upon presentation.⁵ This overall survival is only a few months

shorter than survival reported from major US centers following curative intent surgery.^{6,7}

With rising health-care cost in our country and increasing scrutiny from insurance companies of how health care is delivered, examining the cost-benefit ratio of various treatment modalities implemented in pancreas cancer treatment could not be timelier.

In this issue of the *Annals of Surgical Oncology*, Abbott et al.⁸ compare the cost effectiveness of various treatment strategies for primary operable pancreatic head adenocarcinoma. To our knowledge, this is the first study to compare costs and outcomes associated with various treatment strategies for pancreas cancer. Their decision model compared six strategies: no treatment, radiation therapy only, chemotherapy only, chemotherapy plus radiation, surgery alone, and surgery plus adjuvant therapy. Outcomes and probabilities were identified using the National Cancer Data Base and the ACS National Surgical Quality Improvement Program, in addition to the literature. Costs were estimated using Medicare payments. Low- and high-performing hospitals were selected using the following variables: perioperative mortality, overall complications, “unresectable at operation,” margin positivity rate, and median survival.

While the paper has the usual shortcomings of working with large datasets, the authors have to be commended for their efforts. Not surprisingly, surgery plus adjuvant therapy, chemotherapy alone, or no treatment were the only viable strategies with regard to cost effectiveness. The elevated cost of surgery plus adjuvant therapy was largely due to poor outcomes associated with this best treatment available. While the cost of postsurgical complications was considered, the cost of complications related to nonsurgical treatment modalities was not measured. Most importantly, increased survival of patients undergoing curative intent

operations had the greatest impact on the cost-effectiveness of surgical intervention. Treatment in low-performing centers was more expensive compared with treatment in high-performing centers.

We agree with the authors' conclusions: while surgery plus adjuvant therapy is costly, this treatment combination could result in long-term survival or potential cure, especially if postoperative adverse events are minimized. We also agree that our society should be willing to pay threshold for potentially curative interventions over other treatment modalities that have never been shown to result in long-term survivors. Based on results from this paper, further improvement in cost effectiveness with the following strategies should be implemented and routinely monitored in every hospital performing Whipple operations for pancreas cancer (percentages in parenthesis are data from the paper that we consider too high or too low):

- (1) Consider decreasing the rate of preoperative biliary stenting as there is high level of scientific evidence for this intervention to significantly increase postoperative complications (67 %) [9]. While this might not be feasible in patients presenting with obstructive jaundice in the rural/small town setting, as surgical care is not immediately available, high-volume centers should have the capacity to perform surgery in a more timely fashion.
- (2) Improve patient selection for curative intent operation via high-quality preoperative workup, including dedicated pancreas protocol computed axial tomography (CAT) scan read by well-trained radiologists and surgeons, to decrease nontherapeutic laparotomies (unresectable at operation: 17 %).
- (3) Increase truly margin negative resection rate (84 % in this paper, which in real life is likely lower as careful examination of the retroperitoneal resection margin is still not standard in many hospitals) via: proper surgical technique, careful skeletonization of superior mesenteric artery, appropriate orientation of the surgical specimen including the retroperitoneal margin, and liberal use of intraoperative frozen sections on pancreas and bile duct margins interpreted by well-trained gastrointestinal pathologists.
- (4) Decrease major surgical complication rates that significantly increase treatment cost (hospital reimbursement for uncomplicated resection DRG 407: \$23,430; for major complication following resection DRG 405: \$54,460) and likely significantly contribute to delaying or completely omitting adjuvant therapy (41 %) via high-quality surgical and postoperative care in dedicated surgical units with experienced nursing staff [8].
- (5) Consider decreasing the rate of adjuvant radiation for early-stage pancreas cancer resected with truly negative surgical margins (see No. 3), as the added cost of radiation is substantial with unclear benefits (stage I–IIa: 81 % radiation rate for early-stage margin negative pancreas cancer and 85 % for margin positive ones) (pancreaticoduodenectomy surgical reimbursement \$3057, radiation treatment reimbursement \$8582).^{8,10}

We believe these are modifiable perioperative variables, and continuous monitoring of the aforementioned “performance measures” by every hospital is crucial. This would likely lead to improved cost effectiveness in the multidisciplinary treatment of primary operable pancreas cancer. This optimized care may be more achievable in high-performing centers, resulting in significant savings of diminishing health care dollars.

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