**CLINICAL VIGNETTE**

# A Surgical Stalemate

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## *Introduction*

The prevalence of cardiovascular disease and malignant disease has been increasing as the proportion of elderly individuals in the population increases.[1] Patients with both cardiovascular disease that requires surgery and a surgically resectable malignancy are typically treated in a staged strategy depending upon the clinical priority. We present the case of a patient presenting at a community hospital, illustrating the dilemma of reconciling different opinions as to that priority, and review the recent suggestion of a more novel potential approach.

## *Case Presentation*

A 77-year-old male with longstanding hypertension, hyperlipidemia, and adult-onset diabetes presented to the emergency department with retrosternal chest discomfort of 45 minutes duration, relieved with sublingual nitroglycerine. He had a prior history of asymptomatic mild aortic stenosis and left bundle branch block. An initial troponin level was normal. The ECG showed an unchanged left bundle branch block. A bedside echocardiographic study performed to assess regional wall motion revealed normal global and segmental left ventricular systolic function but severe concentric left ventricular hypertrophy and severe aortic stenosis with a calculated aortic valve area of 0.8 square centimeters. A second troponin level had risen from 0.06 to 0.18 ng/ml. He was admitted for further evaluation of a presumed acute coronary syndrome. Admission laboratory studies showed a hemoglobin of 9.1 g/dl and hematocrit of 28.4%. Three months previously, he had been admitted to another hospital with leg weakness. A comprehensive neurologic evaluation at that time was unrevealing; however, he was found to be anemic with an iron level of 15 mcg/dl and an iron binding capacity of 308 mcg/dl. He was started on iron supplementation with no further evaluation. Ten years previously, there had been a pontine lacunar infarct resulting in chronic mild left sided weakness.

The troponin level peaked at 0.45 ng/ml. There were brief recurrent episodes of chest discomfort relieved with sublingual nitroglycerine. On hospital day 2, he underwent cardiac catheterization, which showed high-grade stenosis of the mid left anterior descending, first obtuse marginal and proximal right coronary arteries. Given the echocardiographic findings suggestive of severe aortic stenosis and coronary anatomy requiring surgical revascularization, it was decided not to cross the aortic valve at the time of catheterization. The hemodynamics recorded at right heart catheterization showed a pulmonary capillary wedge pressure of 8 mm Hg, a pulmonary artery pressure of 38/14 mm Hg and a thermodilution cardiac output of 5.0 L/min.

On hospital day 3, he was seen in consultation by cardiac surgery. It was felt that coronary bypass graft surgery and aortic valve replacement would be in the patient's best interest. A complete gastrointestinal evaluation was recommended given the iron deficiency anemia, presumed to be on the basis of occult gastrointestinal blood loss. He was seen in GI consultation, and on hospital day 4, he underwent EGD and colonoscopy, notable for a large cecal mass with no evidence for obstruction. Biopsy of the mass showed a moderately differentiated adenocarcinoma. On hospital day 5, a CT of the chest, abdomen and pelvis showed no evidence for local extension of the cecal mass, suspicious adenopathy or metastatic disease. The cardiac surgical consultant felt that abdominal exploration and partial colectomy should be performed prior to cardiac surgery. The general surgery consultant as well as a second opinion general surgical consultant felt that cardiac surgery should be performed prior to abdominal surgery given the high risk of perioperative cardiac complications. The patient was turned down for cardiac surgery, abdominal surgery was deferred, and the patient was discharged on medical therapy.

The patient was referred for a second cardiac surgical opinion at another local community hospital. The cardiac surgeon there agreed with the assessment of the general surgeons, and 17 days following his initial presentation with chest pain, he underwent coronary bypass surgery with a left internal mammary graft to the left anterior descending, and separate saphenous vein grafts to the circumflex marginal and posterior descending coronary arteries, with concomitant aortic valve replacement using a 21 mm Edwards Intuity "sutureless" bioprosthesis. The postoperative course was complicated by transient worsening of his chronic left sided weakness, which eventually returned to baseline. There was no overt GI bleeding despite intraoperative high dose heparinization and post-operative dual antiplatelet therapy. Fifty-two days following heart surgery, the patient underwent laparoscopic partial colectomy with a 9 cm proximal margin of terminal ileum and 15 cm distal margin of ascending colon. The tumor mass was 4 centimeters in diameter with invasion into the submucosa but not involving the muscularis propria. Surgical margins were clear of tumor and resected lymph nodes were negative for metastatic disease. The

postoperative course was uneventful and two weeks later, when seen in the office, the patient appeared fully recovered and asymptomatic.

***Discussion***

Prioritizing the timing and order of staged surgical procedures in the context of coexistent cardiac disease and resectable malignancy presents a difficult management challenge and clinical opinions to approach may vary. Unfavorable issues to be considered in the case presented here are several. Performing heart surgery prior to addressing an underlying colonic neoplasm could carry a risk of massive gastrointestinal bleeding at the time of high dose unfractionated heparin administration during cardiopulmonary bypass. There is a risk that the untreated cancer may progress during the interval prior to the second operation. There is also the potential risk of a clean-contaminated operation increasing the incidence of postoperative infection, wound infection, mediastinitis and prosthetic valve infection. In addition to these considerations, there is a prevailing opinion that patients with cancer, in general, have poor outcomes following cardiac surgery. On the other hand, if gastrointestinal surgery is performed first, there may be potential for catastrophic or fatal complications in the setting of significant untreated cardiac disease,[2] particularly in this presented case with a risk of hemodynamic instability due to aortic stenosis and the risk of complications related to myocardial ischemia in the context of severe three vessel coronary artery disease.

The decision, in this case, to proceed with cardiac surgery followed by gastrointestinal surgery was based on the compelling nature of the untreated cardiac disease, the absence of prior overt gastrointestinal bleeding related to the cecal mass, the preoperative imaging appearing to exclude locally extensive or metastatic disease, and the lack of data supporting worse outcomes following cardiac surgery in patients with malignancy. In a retrospective study of over 2,000 cardiac surgical procedures using cardiopulmonary bypass at a single center, no significant increase in morbidity and mortality was found in cancer patients, even in an active stage, in comparison with the normal population.[3] After discussion with the patient, he felt that proceeding with the cardiac surgical procedure prior to addressing his colonic malignancy was preferable to accepting an anticipated high risk of cardiovascular complication with untreated cardiac disease.

Advances in anesthesia, surgical techniques and perioperative management have led to several studies of concurrent operations in patients with surgical cardiac disease and resectable malignancy, most of them involving pulmonary resection and cardiac operation.[4-6] A simultaneous approach would be attractive for such patients as this would limit them to a single exposure to anesthesia and one recovery period. A case report published in 2010 documented successful simultaneous surgery for aortic stenosis and gastric cancer.[7] It is assumed that the prolonged operative time and more extensive surgical invasiveness of simultaneous operation must increase the surgical morbidity and mortality. A series of 15 cases of simultaneous cardiac surgery (coronary bypass surgery in 7, aortic valve replacement in 5 and mitral valve replacement in 3) and resection of gastrointestinal malignancy (gastric in 11 and colon in 4), out of a total of 3,664 elective cardiac operations at a university hospital in Japan, reported a hospital mortality of 6.6% (one patient), postoperative morbidity of 33.3% (five patients) and a 69.2% cumulative survival rate at 5 years.[8] Of note, there were no intraoperative complications, no immediate postoperative complications related to gastrointestinal resection and reconstruction, and no incidence of mediastinitis. Cardiac surgery (all through a median sternotomy) was performed first in all but one case (colectomy followed by coronary bypass surgery) with heparin reversed to prevent excessive surgical bleeding. There was no incidence of surgical site infection in these cases. For comparison, a study of colectomy and primary anastomosis for colon cancer in 5,853 Veteran Affairs patients demonstrated a morbidity rate of 28% and 30 day mortality rate of 5.7%,[9] similar outcomes to that reported in the series of simultaneous operations.

***Summary***

Fortunately, our strategy of staging sequence was successful in this case. It is interesting that the order of operations in our case is the same as that performed in the context of the reported simultaneous operations. This case illustrates the issues to be considered with the potential alternative approaches. The decision was a difficult one, involving a careful and comprehensive preoperative workup. In the future, depending upon the case selection, surgical advances, and progress in postoperative care, consideration of simultaneous procedures may be prove to be an alternative to staged intervention for management of coexistent cardiac disease and gastrointestinal malignancy.

**REFERENCES**


1. **Miniño AM, Murphy SL, Xu J, Kochanek KD.** Deaths: final data for 2008. *Natl Vital Stat Rep.* 2011 Dec 7;59(10):1-126. PubMed PMID: 22808755.
2. **Mangano DT, Browner WS, Hollenberg M, Li J, Tateo IM.** Long-term cardiac prognosis following noncardiac surgery. The Study of Perioperative Ischemia Research Group. *JAMA.* 1992 Jul 8;268(2):233-9. PubMed PMID: 1608143.
3. **Carrascal Y, Gualis J, Arévalo A, Fulquet E, Flórez S, Rey J, Echevarría JR, Di Stefano S, Fiz L.** [Cardiac surgery with extracorporeal circulation in cancer patients: influence on surgical morbidity and mortality and on survival]. *Rev Esp Cardiol.* 2008 Apr;61(4):369-75. Spanish. PubMed PMID: 18405517.
4. **Brutel de la Rivière A, Knaepen P, Van Swieten H, Vanderschueren R, Ernst J, Van den Bosch J.** Concomitant open heart surgery and pulmonary resection for lung cancer. *Eur J Cardiothorac Surg*. 1995;9(6):310-3; discussion 313-4. PubMed PMID: 7546803.
5. **Rao V, Todd TR, Weisel RD, Komeda M, Cohen G, Ikonomidis JS, Christakis GT.** Results of combined pulmonary resection and cardiac operation. *Ann Thorac Surg.* 1996 Aug;62(2):342-6; discussion 346-7. PubMed PMID: 8694588.
6. **Hosoba S, Hanaoka J, Suzuki T, Takashima N, Kambara A, Matsubayashi K, Asai T.** Early to midterm results of cardiac surgery with concomitant pulmonary

resection. *Ann Thorac Cardiovasc Surg*. 2012;18(1):8-11. Epub 2011 Sep 15. PubMed PMID:21921358.

7. **Zielinski J, Jaworski R, Pawlaczyk R, Swierblewski M, Kabata P, Jaskiewicz J, Rogowski J.** Simultaneous surgery for critical aortic stenosis and gastric cancer: a case report. *World J Gastroenterol*. 2010 Mar 7;16(9):1161-4. PubMed PMID: 20205291; PubMed Central PMCID: PMC2835797.
8. **Komokata T, Fukueda M, Kaieda M, Ueno T, Iguro Y, Imoto Y, Sakata R.** Simultaneous operation for cardiac disease and gastrointestinal malignancy. *World J Gastrointest Surg*. 2014 Aug 27;6(8):146-50. doi: 10.4240/wjgs.v6.i8.146. PubMed PMID: 25161762; PubMed Central PMCID: PMC4143969.
9. **Longo WE, Virgo KS, Johnson FE, Oprian CA, Vernava AM, Wade TP, Phelan MA, Henderson WG, Daley J, Khuri SF.** Risk factors for morbidity and mortality after colectomy for colon cancer. *Dis Colon Rectum*. 2000 Jan;43(1):83-91. PubMed PMID: 10813129.

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