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Influence of internal medicine perioperative consult team on vascular surgical patients

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Abstract

Background: In 2015, an Internal Medicine Perioperative Consult Team (IMPCT) was created in our hospital. We sought to determine whether they improve perioperative care without unnecessarily delaying surgery.

Objectives: To evaluate the IMPCT service on vascular surgery patient outcomes and course in hospital.

Methods: Using a prospectively maintained database, we compared vascular surgery patients who received a preoperative IMPCT consult with age, sex, co-morbidities, and surgical intervention matched patients who received no IMPCT consult. The outcomes of interest were post-operative complications, delays in surgery, and length of stay.

Results: From 2015-2017, 71 IMPCT and 129 control patients were identified. The average age (73.7 vs. 74.5 years, p=0.57) and male gender (66% vs.70%, p=0.60) between the two groups were similar. Deaths in the IMPCT and control groups were not different, 4 vs. 5, p=0.57. Post-operative complications occurred in 59% of IMPCT patients compared with 19% of control patients (p<0.01) due to more cardiac, renal and delirium issues, p<0.01. Delays in surgery occurred in 62% of IMPCT and 40% control patients, p<0.01. The need for medical optimization in IMPCT (34%) versus control (6%) patients was the primary reason for delay, p<0.01. However, the average days of delay to OR was not different (4.9 vs. 4.9, p=0.97) between the two groups, nor was the average length of stay for the two groups, (16.2 vs. 9.5 days, p=0.16).

Conclusion: More postop complications and delays to surgery were seen in patients who had an IMPCT consult compared with matched controls. In-hospital death, average days of delay to surgery and length of stay was not different.

Background

Surgical interventions carry risks due to the prevalence of co-morbidities, urgency, magnitude, type, and duration of the procedure.1,2 For older patients, having a thorough medical workup prior to non-cardiac surgery by a multidisciplinary team with internal medicine or hospitalists specialists working with surgeons may benefit patient outcomes but could also delay surgery and remains controversial.3 A study on patients undergoing hip and knee procedures showed that a co-management team of hospitalists and orthopedic surgeons had fewer complications compared with orthopedic surgeons with medical consultation .4

Vascular surgery patients though are typically older, have more severe co-morbidities, and higher postoperative risk. Two trials to address early medical identification and treatment for high risk patients prior to vascular surgery failed to show benefit in decreasing early or late mortality.5,6 Nonetheless, a recent study suggested that a co-management model of hospitalists and vascular surgeons decreased patient complications including death.7

Recently, across Canada, Internal Medicine Perioperative Consult Teams (IMPCT) have appeared. Their purpose was to optimize medical conditions and initiate interventions to decrease perioperative risk. In 2015, a new IMPCT service was created in our hospital. Prior to this our standard practice of perioperative care was by surgeons with the resident staff and medicine specialist consultation when necessary. As this was a change to our standard practice, we sought to assess the impact of this new service and hypothesised that the IMPCT service would change the rate of adverse post-op complications following major vascular surgery. The specific objectives were to determine the impact of IMPCT on post-op complications, delays to surgery and length of stay.

Methods

Data collection

A three year retrospective review of a prospectively maintained database of vascular surgery patients admitted to the Vancouver General Hospital (VGH) from January 1, 2015 to December 31, 2017 was undertaken. VGH is Canada's second largest academic teaching hospital with approximately 1000+ bed capacity.

Data was extracted from medical records into an encrypted Excel spreadsheet. Demographics, past medical history, recommendations from the IMPCT consult, type of surgery performed, lab and imaging tests ordered, postop outcomes including delays in surgery, reason for delays, postoperative complications, and length of stay were collected. Postoperative cardiac complications included myocardial infarction,

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myocardial injury after noncardiac surgery (or MINS), and new onset congestive heart failure (CHF) or atrial fibrillation. Ethics approval was provided by the University of British Columbia Research Ethics Board (REB H17-00840).

We assembled two cohorts for comparative purposes. For the IMPCT cohort, patients had to be admitted during 2015-2017 and received an IMPCT consult preoperatively. An IMPCT consult could be requested by any of the following: an anesthetist in the pre-admission clinic, the attending surgeon or resident. All inpatients who received a preoperative IMPCT consult during this period were included. A second group of matched patients from the same period based on age, sex, co-morbidities, and surgical intervention were identified from the hospital database and served as control. The primary outcomes of interest were postoperative complications, delays to surgery, and length of stay

Statistical analysis

Categorical and continuous data were collected and compared between the two groups using the chi-square test for categorical data and unpaired t-tests for continuous data. SPSS software (SPSS Statistics 27, IBM) was used for all calculations. Significance was assumed if $p<0.05$ (two tailed).

Results

Pre-operative characteristics

For the period 2015-2017, all 74 patients who had an in-hospital preoperative IMPCT consult were identified. One patient was excluded from the analysis because they did not have surgery while in hospital. An additional two patients were excluded because they did not receive IMPCT consults preoperatively. Based on the 71 IMPCT patients who underwent operations, a matched control group of 129 patients from the same period was identified and compared. The average age (73.7 vs. 74.5 years, p=0.57) and male gender (66% vs.70%, p=0.60) between the two groups were not different. Co-morbidities including current or past tobacco use, coronary artery disease, congestive heart failure, atrial fibrillation, hypertension, diabetes, dyslipidemia, end stage renal disease or dialysis, and dementia were the same for both groups (Table 1).

Types of operations

Overall, 200 primary operations were performed, 71in the IMPCT group and 129 in the control group. There were a number of concomitant procedures, e.g. angioplasty during hybrid procedures and minor amputations, in each group. Femdistal bypasses and angioplasty (with or without stenting) were the most common procedures in each group. The type and number of procedures for each group is displayed in Table 2.

Table 1. Preoperative characteristics

VARIABLE	IMPCT (%)	CONTROL (%)	*P* value
Male Sex	66	70	0.29
Age, years, mean	73.7	74.5	0.57
Coronary Artery Disease	36 (50.7)	62 (48.7)	0.09
Congestive Heart Failure	11 (15.5)	8 (6.2)	0.09
Atrial Fibrillation	21 (29.6)	25 (19.3)	0.09
ESRD or Dialysis	10 (14.1)	14 (10.9)	0.09
Hypertension	57 (80.3)	106 (82.2)	0.09
Diabetes	36 (14.8)	42 (9.1)	0.09
Dyslipidemia	37 (50.7)	82 (32.6)	0.09
Dementia	4 (5.6)	8 (6.2)	0.09
Current or past tobacco user	32 (45.1)	99 (57.5)	0.09

Table 2. Number and type of operations performed in IMPCT and Control groups

Operation	IMPCT (No.)	Control (No.)
Endovascular		
EVAR	11	20
Angioplasty	13	20
Open		
AAA	6	15
Femdistal	14	29
CEA	8	20
Iliofem	1	4
Other	18	21
Total	71	129

EVAR = endovascular aneurysm repair, AAA = abdominal aortic aneurysm, CEA = carotid endarterectomy, other = amputation, debridement, and skin graft

Table 3. Complication rates of IMPCT and Control Patients

COMPLICATION	IMPCT (%)	CONTROL (%)	*P* value
Death	4 (6%)	5 (4%)	0.57
Cardiac	22 (31%)	13 (10%)	0.01
Respiratory	6 (8%)	5 (4%)	0.17
Renal	26 (37%)	14 (11%)	0.01
Delirium	12 (17%)	5 (4%)	0.01
Sepsis	1 (1%)	4 (3%)	0.46

Postoperative complications

A total of 114 complications occurred in both groups combined. For the IMPCT group, 42 patients had complications (42/71, 59%) compared with 25 patients (25/129, 19%, $p<0.01$) in the control group. Nine patients died before discharge, 4 (6%) in the IMPCT group and 5 (4%) in the control group, p=0.57. The IMPCT group had significantly more cardiac abnormalities including MI, MINS, new onset CHF and atrial fibrillation (31% vs. 10%, $p<0.01$), renal injuries (37% vs. 11%, $p<0.01$), and delirium (17% vs. 4%, $p<0.01$). Sepsis occurred in 1 (1%) patient from the IMPCT group and 4 (3%) patients from the control group, p=0.46 (Table 3).

Delays in surgery

There were a number of reasons why inpatients who required surgery could be delayed. These included the requirement for additional imaging, patient related issues such as consent, timing of hospital admission (morning or night), status of OR booking (immediate or urgent), and need for additional medical consults with resultant investigations or management, e.g. BP control. The net result is that one or more of these factors may delay the timing of surgery.

Delays in surgery occurred in 62% of IMPCT and 40% control patients, $p<0.01$. The need for medical optimization in IMPCT (34%) versus control (6%) patients was the primary reason for delay, $p<0.01$. Other reasons including neurology referral, OR booking, patient related issues, imaging, and overnight admission were not different (Table 4). However, the average days of delay to OR was not different (4.9 vs. 4.9, p=0.97) between the two groups

Length of stay

For the entire group, the average length of stay was 12.8 days. The IMPCT group had a higher length of stay, 16.2 days, although this was not significantly different than the control group, 9.5 days (p=0.16).

Table 4. Reasons for Delay to Surgery

Reasons for Delay	IMPCT (%)	CONTROL (%)	*P* value
Medical optimization	24 (33%)	8 (6%)	0.01
Neurology consult	4 (6%)	9 (7%)	0.71
OR booking	5 (7%)	6 (5%)	0.48
Patient related	3 (4%)	5 (4%)	0.9
Imaging	3 (2%)	4 (3%)	0.68
Overnight admission	7 (5%)	20 (15%)	0.26

Discussion

For vascular patients, the main cause of surgical mortality and morbidity is cardiac with event rates of 5-15% [1-9]. The recognition of the high prevalence of coronary artery disease in peripheral artery patients has led to strategies of preoperative revascularization [10,11] and stratification models [12-16] to identify and treat high risk patients. Additional preoperative testing, however, carries the risk of delaying timely surgery and increases cost [17]. Two randomized studies examined the need for preoperative cardiac revascularization prior to vascular surgery and failed to show benefit [5,6]. Despite these trials, revascularization for high-risk noncardiac surgery continues preoperatively in 5% of patients [18,19].

Recognizing that preoperative revascularization may benefit high risk patients who can delay surgery for one year or more, does a co-management team lead to improved outcomes or does it unnecessarily delay time to surgery and hospital discharge? A meta-analysis of co-management of surgical patients by either internal medicine physicians or hospitalists, showed that having a co-management team did not alter length of stay but may benefit in-hospital mortality although the evidence for this was poor. Of the 14 suitable studies only one was a randomized clinical trial and further studies were recommended [3]. For vascular surgery, Iberti, *et al.* showed that the introduction of a co-management model of hospitalists and vascular surgeons over two years led to a mortality decrease from 2.0% to 1.0%, p=0.049, but the length of stay and readmission rates were unchanged [7].

Unlike the Iberti, *et al.* study which had no concurrent control group, this study using matched controls over a three-year period, had opposite findings. Patients who had IMPCT consults had significantly more cardiac, renal, and delirium complications, and increased delay to surgery primarily due to medical optimization compared with control patients. In addition, in-hospital deaths between the two groups were not different unlike the Iberti, *et al.* study. However, length of stay and days delayed to surgery was similar to Iberti's findings.

These differences may be explained by two observations, the low event rate and potential selection bias. For the former, over a similar time period, from 2015 to 2018, for 1176 elective open arterial procedures, the perioperative mortality and MI rate was 1.3% and 2.3%, respectively These outcomes were achieved with standard medical care and few IMPCT consults. For the latter, all patients who had an IMPCT consult during this period were included. Although request for an IMPCT consult came from a surgeon, resident or anesthetist, approximately 24% of all inpatients had IMPCT consults as many surgeons continued to practice their standard care of treating patients with surgical residents and timely referral to medical specialists. Even though controls were carefully matched by age, sex, co-morbidities and type of operation, a selection bias may still exist as this was a non-randomized study. Future randomized controlled trials should be conducted to answer this issue.

Limitations

There are a number of limitations. First, it was retrospective although the data was from a prospectively entered database. Second, matched controls (age, sex, co-morbidities, and surgical procedure) were used and although there did not appear to be any major differences between the groups, matching is no substitute for a randomized comparison. Third, selection bias as explained above may have occurred as IMPCT was called upon for certain but not all high risk patients. Fourth, the sample size was small. Fifth, these results apply to only to our service and may not apply to other services in other hospitals. Sixth, no post-discharge outcomes or costs were collected and this should be included in future studies.

Conclusion

Three years following its introduction, patients seen by the IMPCT team had more complications and delayed surgeries compared with standard care. Future prospective studies to verify these findings should also include long term outcomes and cost analyses.

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