Himat Vaghadia MB BSC MHSC FRCPC FFARCS,*†
Louis Scheepers MD,*
Pamela M. Merrick BSN*

Readmission for bleeding after outpatient surgery

Purpose: To examine the frequency of readmission due to surgical bleeding after ambulatory surgery.

Methods: A retrospective review of hospital records for patients readmitted to the same hospital after surgery in our Daycare centre was conducted for January 1984 to December 1992. The charts of all patients readmitted to hospital within 48 hr of surgery were examined. Readmissions for bleeding were studied with respect to demographics, time when bleeding occurred after arrival in PACU (latent interval) and treatment. Matched controls were identified and a case-control analysis performed to identify factors associated with an increased risk of readmission from bleeding.

Results: There were 172,710 outpatient procedures and 64 readmission for bleeding (0.04%). Gynaecological and urological surgery accounted for the highest number of bleeders (86%). Most patients who bled excessively in the OR continued to bleed in PACU. Those who bled in the PACU alone had a latent interval of 54 ± 77 min. Those who bled both in the OR and PACU had a latent interval of 20 ± 7 min. Those who bled mainly at home had a latent interval of 104 ± 68 min. A majority of bleeders could have been identified if they had been observed for 30-45 min. Logistic regression of case-control matches did not identify any risk factor likely to increase the risk of readmission in bleeders.

Conclusions: Bleeding after outpatient surgery is uncommon and discharge criteria need to be re-examined in order to take this into account and permit appropriate fast tracking of outpatients.

Objectif : Examiner la fréquence de réadmission à l'hôpital causée par des saignements suivant une chirurgie ambulatoire.

Méthode : Une revue rétrospective des dossiers de patients réadmis au même hôpital, entre janvier 1984 et décembre 1992, après une chirurgie à notre Centre de jour a été réalisée. On a examiné les dossiers de tous les patients réadmis à l'hôpital 48 heures ou moins après une chirurgie. La réadmission pour saignements a été étudiée en tenant compte des données démographiques, du temps de survenue des saignements après l'arrivée à la salle de réveil (intervalle latent) et du traitement. Des patients témoins ont été appariés et des analyses comparatives ont été réalisées pour déterminer les facteurs associés à un accroissement du risque de réadmission pour saignements.

Résultats : Il y a eu 172 710 interventions et 64 réadmissions pour saignements (0,04 %). Les chirurgies gynécologiques et urologiques présentaient le plus grand nombre de saignements (86 %). La plupart des patients qui avaient d'importants saignements en salle d'opération en avaient aussi à la salle de réveil. Ceux qui ont eu des saignements à la salle de réveil seulement ont connu un intervalle latent de 54 ± 77 min. Chez ceux pour qui le saignement s'est produit autant en salle d'opération qu'à la salle de réveil, l'intervalle latent a été de 20 ± 7 min. Enfin, l'intervalle latent pour ceux qui ont eu des saignements surtout après le retour à la maison a été de 104 ± 68 min. On aurait pu identifier une majorité de patients qui ont eu des saignements si on les avait observés pendant 30-45 min. La régression logistique de l'appariement des patients de l'étude et des patients témoins n'a pas permis de préciser des facteurs susceptibles d'accroître le risque de réadmission pour saignements.

Conclusion : Les saignements à la suite d'une chirurgie ambulatoire sont rares et les critères qui servent à accorder au patient son congé de l'hôpital doivent être revus afin d'en tenir compte et de permettre un dépistage rapide et approprié des patients ambulatoires.

From the Departments of Anaesthesia* (Division of Ambulatory Anaesthesia), Health Care and Epidemiology,† Vancouver Hospital and Health Sciences Centre, University of British Columbia, Vancouver, BC, Canada.

Address correspondence to: Dr. Himat Vaghadia, Department of Anaesthesia, LSP2, Room 2449, Vancouver Hospital and Health Sciences Centre, 855 West 12th Avenue, Vancouver, BC, V5Z 1M9 Canada. Phone: 604-875-4575; Fax: 604-875-5344; E-mail: hvaghadi@van-hosp.bc.ca

Accepted for publication 4 August 1998

SURGICAL bleeding is one of the most important reasons for readmission after outpatient surgery with a rate between 18-41% of all readmissions.^{1,2} As the volume of outpatient procedures increases it will be necessary for recovery rooms (PACU) to become more efficient and implement fast track programs. Unfortunately, even though modern anaesthetics such as propofol result in a faster recovery, improvements in PACU efficiency have not resulted from their use because many facilities have minimum stay requirements³ which may be as long as 60 min regardless of anaesthetic or surgery.⁴ If the time at which complications such as bleeding were likely to occur were known, it would enable more precise prediction of the appropriate duration of PACU stay.

The purpose of this retrospective review was to study readmission for surgical bleeding after outpatient surgery at the Vancouver General Hospital.

Methods

After institutional approval a retrospective review was undertaken of all surgical day care procedures performed at the Vancouver General Hospital Surgical Daycare Centre from January 1984 until December 1992 inclusively. Patient information was obtained using the Prism Abstracting System (Prism Hospital Software, Coquitlam, BC, Canada). Procedures were coded using the ICD-9-CM method.⁵ The charts of all patients readmitted to the hospital within 48 hr of surgery were examined. Readmission was defined as return to the hospital or readmission directly from the SDCC with admission as an inpatient either directly to the ward, or via the emergency room or operating room and subsequent discharge home. Return visits were linked under the Prism Abstracting System to the initial ambulatory surgery. Data collected included: age, sex, preoperative history of anticoagulant or analgesic use, history of diabetes, hypertension or bleeding, reason for readmission, readmission time, type of anaesthetic, type and length of original surgery, presence of abnormal bleeding in the operating room as identified from the surgeon's summary of the procedure, presence of bleeding in the PACU as identified from the PACU records, time bleeding occurred in the PACU and the type of treatment received in the PACU. The latent interval (defined as time from arrival in PACU to the first clear documentation in the records of occurrence of bleeding) was also recorded. In this regard it is important to note that examination of the charts of patients who bled abnormally at home revealed that there was in fact clear documentation of bleeding in the PACU nurses notes. In these cases we therefore used the time when this occurred to calculate

FIGURE Scatter plot of latent interval (min) in bleeders by location where bleeding occurred.

the latent interval. Treatment received was classified as: observation only, surgical re-exploration, medical (volume expansion with blood products or crystalloids), or combined surgical and medical. Duration of hospital stay after readmission was also recorded.

All readmission for bleeding (cases) were then matched with patients who underwent outpatient surgery but were not readmitted (controls). Controls were matched by type of surgery, sex, and date (year) of surgery. An individual matched case-control design was used to identify factors associated with an increased risk of readmission for bleeding. The records of two controls were excluded because of an error in matching by type of surgery.

All data were analysed with the Number Cruncher Statistical System (NCSS) version 5.03. Data for bleeders was described with descriptive statistics. Multiple and univariate logistic regression analysis were used to determine risk factors in the matched case-control data. Bleeders *vs* controls were compared for between-group differences using Mann-Whitney test for age, t-test for haemoglobin concentration and Chi-square test or Fischer's exact test for all the other variables. Odds ratios were calculated for the variable where a significant difference was found. Kruskal-Wallis tests were used to test for relationships between latent interval and anaesthesia and surgery type. Mann-Whitney tests were used for latent interval and sex, and correlation was used for latent interval and age.

Results

During the study period there were 172,710 day care procedures performed, resulting in 64 readmissions for bleeding (incidence = 0.04%). Demographic data for bleeders and controls are summarized in Table I. The 64 patients re-admitted for bleeding had a median age

of 38 yr (range 17 - 73), and included 28 women (43%), and 36 men (57%). The duration of surgery was < one hour in 56 patients (87%). A majority of bleeders received general anaesthesia (81%). Gynaecological and urological procedures were responsible for 86% of bleeding complications (Table II).

The median duration of hospital stay following bleeding was two days (range 1-2) and all were readmitted on the day of surgery. The latent intervals for all patients are sub-classified in terms of location where bleeding occurred. A majority of patients who were noted to exhibit excessive bleeding in the OR were found to have bleeding upon arrival in the PACU and were, by definition, assigned a latent interval of zero. Patients who did not have unusual bleeding in the OR but then went on to bleed in the PACU (18/64) had a latent interval of 54 ± 77 min. A majority (12/18) of these patients bled within 30 min of arrival in PACU. Patients who bled at home (29/64) had a latent interval of 104 ± 68 min and 2/29 had evidence of bleeding within 30 min of arrival in

PACU. A minority (5/64) bled abnormally in the OR and PACU and their latent times were 20 ± 7 min. A scatter plot of latent interval by location where bleeding occurred is shown in Figure 1. Management of bleeders (Table III) included observation only in 36 (57%), surgical re-exploration in 10 (15%), medical (transfusion of crystalloids and/or blood products) in 11 (15%), and combined surgery and medical in 7 (11%). The use of blood and crystalloids is summarized in Table IV. Nine patients (14%) received packed red cells and 6 (9%) received crystalloids.

Logistic regression of case-control matches did not identify any significant risk factor likely to increase the risk of readmission in bleeders.

Discussion

A nine year retrospective review of 172,710 outpatients at the Vancouver General Hospital demonstrated that only 64 patients (0.04%) required readmission for bleeding. Twelve of these bleeders (18%) were identified in the OR because of unusual bleeding during surgery and a further 18 (28%) bled in the PACU. A majority, 29 (45%) bled at home. Thirty one of the 64 patients were identified within 30 min of arrival in the PACU.

Analysis of matched case-control data did not identify anticoagulant or chronic analgesic use, diabetes,

TABLE I Demographic data

	Bleeders (n = 64)	Controls (n = 62)
Age-yr (mean, range)	38(17-73)	39(14-76)
Gender: M/F	36/28	36/26
Haemoglobin (g·L ⁻¹):	136 ± 14	135 ± 13
Anticoagulant use: yes/no	2/62	0/62
Chronic analgesic use: yes/no	5/59	2/60
Diabetes: yes/no	1/63	0/62
Haematological disease:yes/no	1/63	0/62
Hypertension: yes/no	8/56	6/56
Duration of surgery: <1 hr	56	53
1-2 hr	5	8
>2 hr	3	1

TABLE II Anaesthetic management and operations in bleeders.

<i>Type of anaesthesia:</i>	
General anaesthesia	52
Regional	7
Local only	3
Monitored anaesthesia care	2
<i>Type of operation:</i>	
Gynaecological	33 (Therapeutic abortions)
Urological	23 (Transurethral prostatectomy)
Plastic	2
General	2
Ear/nose/throat	2
Vascular	1
Dental	1

TABLE III Treatment for bleeding

	Observation	Surgery	Medical*	Both†
All Patients (n = 64)	36	10	11	7
Bled in OR only (n = 12)	8	1	2	1
Bled in PACU (n = 18)	7	0	7	4
Bled in OR+PACU (n = 5)	3	1	0	1
Bled at Home (n = 29)	18	8	2	1

* Treatment with volume expansion using blood transfusion or crystalloids

† Treatment with a combination of surgery and medical management

TABLE IV No of patients who required crystalloids and blood products according to where bleeding occurred

	Packed red cells	Crystalloids
Bled in OR	3	2
Bled in PACU	4	4
Bled in OR+PACU	1	0
Bled at home only	1	0

hypertension, haematological disease or surgery duration as important risk factors for bleeding. These findings are in agreement with univariate analysis in other outpatients which failed to identify common medical problems such as hypertension and diabetes as increasing the risk of readmission.² Previous reports have, however, demonstrated an almost fourfold increase in risk of readmission when surgery duration was > one hour.² Thus, factors other than bleeding are probably responsible for readmission after prolonged surgery.

The overall rate of bleeding (0.04%) in the present study is comparable with a rate of 0.07% reported from our institution in a previous study⁶ and compares well with rates of 0.5%, 0.3% and 0.2% reported from other institutions.¹⁻³ It is possible that not all bleeding patients from our outpatient unit presented to our hospital. Some may have presented at other local hospitals and would therefore be missed in a retrospective study such as this. However, such under-reporting is a limitation of all retrospective studies.

Gynaecological and urological patients comprised the majority, 51% and 36%, respectively, of those patients readmitted for bleeding, with plastic surgery, ENT, and general surgery 3% each, and dental and vascular surgery 1% each. There were no patients readmitted for bleeding after orthopaedic or ophthalmological surgery. Our data are comparable with other studies¹ where dental, plastic and orthopaedic surgery reported a return patient visit rate of 1.7%, and where gynaecological and urological surgery were responsible for the majority of readmission.^{3,6} Dilatation and curettage, particularly for termination of pregnancy, is three times as likely to result in return hospital visits for bleeding.¹

Interestingly, the annual rate of readmission for bleeding in our Daycare unit was about 3-5 cases a year between 1984 and 1988.⁶ After 1989, this rate doubled when the urology service commenced performing transurethral prostatectomy on an outpatient basis. Thus, it appears that surgery within body cavities where bleeding is a feature of the operation deserves special attention.⁷ Recently, Twersky *et al.* suggested that guidelines for what constitutes serious bleeding and what does not, may help reduce return hospital visits for bleeding.¹ Our data also support these recommendations because most of the patients in this study bled at home, were treated conservatively after admission and were discharged within two days. It is also important to note that we were able to compute latent intervals in those who bled at home because their charts revealed that bleeding was documented while these patients were in the PACU. However, the attending surgeons decided to discharge

these patients, presumably because the bleeding was not significant in their opinion. Clinical decisions such as these are difficult and very much dependent upon physician experience and type of surgery. Many of our patients had prostatectomy or therapeutic abortions where bladder irrigation and perineal drainage are often positive for blood for some period after surgery. In such cases, discharge becomes at the discretion of the physician and may not follow a set of predetermined criteria.

The results of this study may help in planning suitable management strategies in different ways. As shown in Figure 1 most patients who develop bleeding in the PACU (Phase I) do so within 30 min. Thus, with this knowledge, a facility may consider patients suitable for discharge home or to a pre-discharge observation lounge (Phase II) if they do not bleed within 30 min of arrival in the PACU and meet the other discharge requirements. If a 30 min cut-off had been implemented in our unit, we would have been able to identify 31/64 (48%) of all bleeders (12/12 who bled in the OR, 5/5 who bled in the OR and PACU, 12/18 who bled in the PACU alone and 2/29 who bled at home). Another alternative would be to consider a total recovery time (Phase I and II) of 45 min. This would have identified 36/64 (56%) of all bleeders (12/12 who bled in the OR, 5/5 who bled in the OR and PACU, 12/18 who bled in the PACU alone and 7/29 who bled at home). Increasing the observation times beyond 30 or 45 min would increase the yield at the expense of decreasing the efficiency of the PACU and does not seem warranted from our data - patients who bleed both at home and in the PACU are very few and do not justify the prolonged periods of PACU stay required to identify them. A further argument in support of this approach is that most of those who bled at home were treated conservatively after readmission. Thus, appropriate education of nurses and patients may help minimize delays in discharge as well as unnecessary readmission.

Our data also indicate that a prospective randomized study of abbreviated versus standard PACU stay and their influence on re-admissions for bleeding is not warranted and would be prohibitively expensive and unlikely to yield information of epidemiological and statistical value. A large recent study of 17,638 outpatients at the Toronto Hospital also confirms our observation that bleeding in outpatients is not epidemiologically important. The incidence of bleeding was 0.01/100 surgeries in the OR, 0.06/100 surgeries in the PACU and 0.09/100 surgeries in the ASU (Ambulatory surgical unit).⁸ Our suggestion would be to implement a total (Phase I and II) recovery time of 30 min for all patients

except those where bleeding associated with a body cavity procedure (*e.g.* bladder and uterus) is a major feature of the procedure. The latter patients could be observed for a total time of 45 min.

In conclusion, this study shows that surgical bleeding after outpatient surgery is uncommon and re-admission due to bleeding is infrequent. Most bleeders can be identified within 30-45 min of arrival in PACU. Extending the postoperative observation period beyond 30 or 45 min to prevent return to hospital due to bleeding is not justified, if the patient is otherwise ready for discharge. Patients who bled at home did not experience major morbidity and were readmitted for 1-2 days. The need for packed cell transfusions and further surgical intervention was infrequent. We suggest that discharge criteria be re-examined, taking the results of this study into consideration, in order to permit appropriate fast tracking of outpatients.

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