Cancer Care Ontario Guidelines for radical prostatectomy: striving for continuous quality improvement in community practice

Todd M. Webster, MD, FRCSC;[*] Christopher Newell;[†] John F. Amrhein, MSc, MStat, PStat;[§] Ken J. Newell, MD, PhD, FRCPC[†]

[*]Department of Urology, Grey Bruce Health Services, Owen Sound, ON; [†]Department of Pathology, Grey Bruce Health Services, Owen Sound, ON; [§]McDougall Scientific Ltd., Toronto, ON

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Abstract

Objective: Cancer Care Ontario has published an evidence-based guideline on their website "Guideline for Optimization of Surgical and Pathological Quality Performance for Radical Prostatectomy in Prostate Cancer Management: Surgical and Pathological Guidelines." The evidentiary base for this guideline was recently published in *CUAJ*. The CCO guideline proposes the following: a positive surgical margin (PSM) rate of <25% for organ-confined disease (pT2), a perioperative mortality of <1%, a rate of rectal injury <1%, and a blood transfusion rate <10% in non-anemic patients. The objective of this study was to review the radical prostatectomy practice at the Grey Bruce Health Services, an Ontario community hospital, and to compare our performance in relation to the Cancer Care Ontario guideline and the literature.

Methods: We conducted a retrospective review of all radical prostatectomies performed at the Grey Bruce Health Services from January 1, 2006 to December 31, 2007. The following data were obtained from clinical records and pathology reports: patient age, pre-biopsy prostate-specific antigen, biopsy Gleason score, resected prostate gland weight, radical prostatectomy Gleason score, surgical margin status, pathological tumour stage (pT), lymph node dissection status, perioperative incidence of transfusion of blood products and if the patient was anemic (hemoglobin <140 g/L) preoperatively, incidence of rectal injury, and perioperative mortality within 30 days following surgery.

Results: Using the method proposed by D'Amico, most patients undergoing radical prostatectomy were intermediate risk (62%), with a minority of low-risk (24%) and high-risk (14%) patients. The overall PSM rate was 37%. The rate of PSMs in organ-confined disease (pT2) was 26%. There was a statistically significant trend between increasing D'Amico risk category and increasing rate of PSM (Cochran-Armitage trend test, $p = 0.023$). There was a strong correlation between the pathological tumour stage and the rate of PSM (Cochran-Armitage trend test, $p = 0.0003$). The rate of blood transfusion in non-anemic patients was 6%. There was 1 patient (0.8%) who experienced a rectal injury. There were no perioperative deaths in our study group.

Conclusion: Our results show that a community hospital group can appropriately select patients to undergo radical prostatectomy, as well as achieve an acceptable rate of PSMs. We believe that ongoing critical appraisal and reflective practice are essential to improving surgical outcomes and providing quality care.

Background

The incidence and prevalence of prostate cancer have been steadily increasing in Canada due in large part to increased public awareness; more and more men are being screened for prostate cancer using prostate-specific antigen (PSA) and digital rectal examination. Cancer Care Ontario (CCO) projects that there will be about 13 500 new cases of prostate cancer, that will ultimately result in nearly 3000 radical prostatectomies (RPs) in Ontario in 2010. In an attempt to improve the quality of care provided by urologists and pathologists involved in RPs, CCO, in collaboration with its Expert Working Panel on Prostate Cancer Surgery and Pathology, published an evidence-based guideline on their website "Guideline for Optimization of Surgical and Pathological Quality Performance for Radical Prostatectomy in Prostate Cancer Management: Surgical and Pathological Guidelines."[1] The evidentiary base for this guideline was recently published in the *CUAJ*.[2]

The CCO guideline stratifies patients diagnosed with prostate cancer using the approach proposed by D'Amico, into low risk (PSA <10, biopsy Gleason score ≤6, and clinical stage T1 or T2), intermediate risk (PSA 10 – 20, and/or biopsy Gleason score 7) and high-risk (PSA >20, biopsy Gleason score ≥8, or clinical stage ≥T3) for treatment failure. The CCO document defines a positive surgical margin (PSM) at RP as the presence of tumour involving an inked margin. The CCO guideline proposes the following: a PSM rate of <25% for organ-confined disease (pT2), a perioperative mortality

of <1%, a rate of rectal injury <1%, and a blood transfusion rate <10% in non-anemic patients.

The identification of a PSM at RP has been shown to be an independent predictor of biochemical failure and local recurrence.[3-7] Many factors may contribute to PSM, including patient-related factors, PSA level, tumour stage and grade, surgical technique and surgeon, as well as pathological technique and pathologist. Surgical and pathological technique are modifiable factors.[8,9] Surgical experience, the individual surgeon and surgical approach all may play a role in the incidence of PSM.[10] Several technical modifications for RP have been described that have aided in decreasing the PSM rate.[11,12]

The objective of this study was to review the RP practice at the Grey Bruce Health Services (GBHS) and to compare our performance in relation to the CCO guideline and the literature.

Methods

The GBHS is a 240-bed community hospital in rural Ontario with a catchment population of 165 000. There are 3 urologists and 3 pathologists at our institution. All are active participants in providing urological services for the men in Grey and Bruce counties.

The pathology database at the GBHS was searched from January 1, 2006 to December 31, 2007. There were 133 RPs performed during this 2-year period, and all of the RPs were included in this study. Nerve-sparing was routinely attempted for organ-confined disease, and a wide resection with limited nerve-sparing was performed for advanced and high-grade disease. Patients, however, are informed preoperatively that when the neurovascular bundles are easily mobilized from the superficial fascia they will be preserved; if they are stuck or difficult to free up, the neurovascular bundles may be sacrificed. None of the RPs performed at the GBHS were salvage operations following the failure of a previous treatment. Also, none of the patients had had neoadjuvant hormonal or radiation therapy. The resected specimens were assessed pathologically in a similar fashion, according to the technique described by Epstein.[13] The prostate glands were submitted in toto, except for those prostate glands heavier than 100 g (n = 8). Prostate gland biopsies and prostatectomies were reported using a synoptic report adapted from the templates developed by the College of American Pathologists (CAP). The synoptic reports used at the GBHS meet the criteria established by CCO for the reporting of prostate gland biopsies and RPs.

The following data were obtained from clinical records and pathology reports: patient age, pre-biopsy PSA, biopsy Gleason score, resected prostate gland weight, RP Gleason score, surgical margin status, pathological tumour stage (pT), lymph node dissection status, whether or not blood products were used during the patient's RP hospital stay and if the patient was anemic (hemoglobin <140 g/L) preoperatively, whether or not rectal injury occurred during RP, and patient survival for at least 30 days after the RP. All RPs with a positive margin were reviewed by one pathologist (KJN) to confirm the presence of a positive margin and to identify the anatomical location(s) of the positive margin(s). A positive surgical margin was defined as invasive tumour involving an inked margin of resection.

All of the data were compiled in an Excel spreadsheet. Statistical analyses were performed using SAS9 software. The inferential statistical method used in this study was selected to determine whether a trend existed between PSM proportions and Gleason scores at biopsy and RP, as well as tumour stage as a means to compare the RP practice at the GBHS to the CCO evidentiary base literature. Given that the literature establishes an increasing trend of PSM proportions according to Gleason scores and tumour stage, the null hypothesis for our tests was that no, or a decreasing, trend exists. The alternative hypothesis was that an increasing trend exists, giving rise to a one-sided test. The Cochran-Armitage test for trend is a well-established test appropriate for detecting trends of binomial proportions across levels of an ordinal covariate.[14]

Results

Most of the patients undergoing RP at the GBHS were intermediate risk (62%), with smaller numbers of low-risk (24%) and high-risk (14%) patients (Table 1). The average age of patients undergoing RP was 63.4 ± 7.2 years. As per the risk stratification method, men with high-risk cancers had higher PSA levels compared to intermediate- and low-risk groups. The average weight of the resected prostate glands was 49.6 ± 28.6 g. There was no statistically significant difference in the weight of the resected prostate glands, according to risk group (Kruskal-Wallis test, $p = 0.39$).

The overall surgical margin positivity rate was 37% (Table 1). There was a statistically significant trend between increasing risk category and rates of PSM (Cochran-Armitage trend test, $p = 0.023$). A statistically significant trend was also noted between increasing biopsy Gleason score and PSM (Cochran-Armitage trend test, $p = 0.03$), as well as between RP Gleason score and PSM (Cochran-Armitage trend test, $p = 0.0002$) (Table 2). There was a strong correlation between the pathological tumour stage and the rate of RP PSM (Cochran-Armitage trend test, $p = 0.0003$) (Table 3).

There was a PSM in 49 of 133 patients who underwent RP. A review of the cases with PSM identified that a significant proportion of the patients with PSM involved multiple anatomical locations (29%) (Table 4). The incidence of unilocational apical or posterolateral margin positivity was identical at 33% (Table 4).

Table 1. Characteristics of risk stratification groups and their RP PSM rates

Risk category	n	Age (years)	PSA (ng/mL)	Gland weight (g)	Number with PSM
High	19	63.6 ± 6.3	11.3 ± 11.3	58.7 ± 34.6	11 (58%)
Intermediate	82	64.7 ± 6.5	6.3 ± 2.8	49.5 ± 30.3	29 (35%)
Low	32	60.7 ± 8.1	5.2 ± 2.0	43.6 ± 16.7	9 (28%)
Totals	133	63.4 ± 7.2	6.2 ± 2.9	49.6 ± 28.6	49 (37%)

RP: radical prostatectomy; PSM: positive surgical margin; PSA: prostate-specific antigen.

Most patients (89%) had pelvic lymph node dissection at the time of RP (Table 5). All high-risk patients underwent lymphadenectomy. Metastatic tumour involving pelvic lymph nodes was a rare event and was observed in only 2 high-risk patients (1.6%). The overall rate of blood transfusion at the time of RP was 10%. The rate of blood transfusion in non-anemic patients was 6%. There was 1 patient (0.8%) who experienced a rectal injury at the time of RP. There were no perioperative deaths in the GBHS study group.

Discussion

Most patients undergoing RP at the GBHS were intermediate risk (62%), using the risk stratification method proposed by D'Amico and endorsed by the CCO. This result suggests that the patients being offered RP at the GBHS had preoperative characteristics that put them at significant risk for disease progression. Unfortunately, there is no data in the literature, or readily available from CCO, to compare the risk categorization in our group with the literature.

The CCO evidentiary base showed an overall PSM rate ranging from 4.0% to 45.2% in 39 papers (43 658 patients).[1,2] Nine papers showed an increasing PSM rate according to Gleason score in the resection specimen as follows: Gleason score 2 – 6, 4.2% to 31%; Gleason score 7, 9.8% to 41%; Gleason score 8 – 10, 17.7% to 71.4%. Twelve studies showed an increasing PSM rate with increasing pathological tumour stage as follows: pT2, 0% to 24%; pT3a, 24.2% to 64.3%; pT3b, 27.1% to 80.0%. Our data also showed that there were statistically significant trends between risk stratification category, biopsy Gleason score, RP Gleason score, pathological tumour stage (pT) and rates of PSM. These results are in agreement with data from the literature. Our findings suggest that the study population was likely a representative sample that was comparable to that reported in the literature.

Table 2. Biopsy and RP Gleason scores and rates of PSM in RPs

	Gleason score		
	GS 6	GS 7	GS ≥8
Biopsy GS number with PSM at RP	11/37 (30%)	27/77 (35%)	11/19 (58%)
RP GS number with PSM	10/37 (27%)	28/82 (34%)	11/14 (79%)

RP: radical prostatectomy; PSM: positive surgical margin; GS: Gleason score.

The overall rate of PSM in this study was determined to be 37%. Further analysis revealed that the rate of PSM for pT2 disease was 26% and for pT3 disease was 51%. Our results for PSM compared favourably with the PSM rates reported in 2005 by CCO, according to Local Health Integration Network where PSM was reported to varied from 16% to 42% for pT2 disease, and 42% to 83% for pT3 disease.[1] It would appear that the urologists at GBHS are performing adequately compared to their peers. Regardless, the rate for pT2 disease of 26% in this study is at the upper limit of acceptable when compared to the CCO-proposed target of 25% for pT2 disease. This latter finding suggests that there are significant opportunities for improvement with respect to PSM at the GBHS.

Two of the most important histological factors that determine prognosis are pathologic stage (pT) as determined by presence of extraprostatic extension of tumour and PSM. Both of these factors are determined during the histopathological examination of the resected prostate gland. The first and only study to assess variability in the reporting of these parameters among expert urological pathologists was reported by Evans and colleagues in 2008.[15] This study showed that there was good-to-excellent agreement among 12 expert urological pathologists when assessing factors that determine pT and PSM. As a follow-up to this study, Evans and colleagues have assessed the performance of 23 Ontario community pathologists using the same study set that was sent to the group of 12 expert urological pathologists.[16] This

Table 3. RP pathological stage and PSM rates

	Pathological stage		
	pT2	pT3a	pT3b
N	74	48	11
No. with PSM	19 (26 %)	22 (46 %)	8 (73 %)
CCO evidentiary base	0 – 24%	24.2 – 64.3%	27.1 – 80%

RP: radical prostatectomy; PSM: positive surgical margin; CCO: Cancer Care Ontario.

Table 4. Anatomical locations of PSM in RPs

Site of positive margin	No. positive	% positive of total
Apex	16	33%
Posterolateral	16	33%
Bladder neck	2	4%
Anterior	1	2%
Multiple anatomical sites	14	29%

RP: radical prostatectomy; PSM: positive surgical margin.

follow-up study showed that the Ontario community hospital pathologists compared well with the expert urological pathologists in their assessment of extraprostatic assessment and PSM. The conclusion of this latter study was that urologists and oncologists should be re-assured that community hospital pathologists are capable of accurate assessment of extraprostatic extension (pT) and PSM. Given these results, it is unlikely that there is significant error in the rates of PSM reported by the community hospital pathologists for this study.

Ten studies in the CCO evidentiary base showed the PSM rates according to anatomical location were: apical, 8% to 58%; posterior, 8% to 40%; bladder neck, 4% to 20.9%; base, 2% to 19%; anterior, 1.2% to 15%. Our analysis showed that in cases with a PSM the apical margin was involved in 47% of cases and the posterolateral margin was involved in 53% of cases.[1,2] Modification in surgical technique with focus on the apical and posterolateral margins, especially in cases with preoperative factors associated with increased rates of PSM (increased PSA and increased Gleason score at biopsy) may decrease the incidence of PSM. We acknowledge that the aggressiveness of nerve sparing may contribute to the somewhat higher incidence of PSM in organ-confined disease in our series (26%), but it was not possible to clearly identify the percentage of bilateral and unilateral nerve sparing due to the retrospective nature of this review. The aim of this study was to glean from the data what the incidence of PSM was at our institution and we hope to use this information to improve our results going forward. A follow-up study is anticipated.

Conclusion

We applaud the effort and intentions of the CCO and the Expert Working Group in attempting to set out guidelines for optimizing the surgical management for patients undergoing RP for prostate cancer. The CCO guideline has spurned our group at the GBHS to review the RP practice being provided to the men of Grey and Bruce counties in Ontario. Our results show that a community hospital group can appropriately select patients to undergo RP, as well as achieve an acceptable rate of PSM for organ-confined and non-organ confined disease. Since this is the first Canadian study to report outcomes for RPs in a community hospital setting, we hope that it can serve as a resource for additional Canadian community hospital urologists and pathologists who might undertake a similar review. We believe that ongoing critical appraisal and reflective practice are essential to improving surgical outcomes and providing quality care.

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Correspondence: Dr. Todd Webster, Department of Urology, Grey Bruce Health Services, 1800 8th St. East, Owen Sound, ON N4K 6M9; fax: 519-372-0731; twebster@gbhs.on.ca