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Dinesh J. Telang

Brian J. Miles

Riad N. Farah

Ray H. Littleton

Aaron K. Kirkemo

See next page for additional authors

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Authors

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Radical Surgery in the Treatment of Localized Carcinoma of the Prostate

Dinesh J. Telang, MD,* Brian J. Miles, MD,† Riad N. Farah, MD,* Ray H. Littleton, MD,* Aaron K. Kirkemo, MD,* James O. Peabody, MD,* David A. Burks, MD,* Caleb Fleming, MD,* and Joseph C. Cerny, MD*

New methods of early detection combined with recent advances in surgical techniques have resulted in more patients undergoing radical surgery for treatment of localized carcinoma of the prostate. Over 350 radical prostatectomies have been performed by our group since January 1987. We review the role of radical prostatectomy in the treatment of prostate cancer and our experience with 100 patients undergoing radical retropubic prostatectomy since the advent of nerve-sparing techniques to preserve potency. (Henry Ford Hosp Med J 1992;40:108-10)

The first reported operation for prostate cancer was a partial perineal prostatectomy for tumor performed by Theodor Billroth in 1867. Leisrink undertook the first reported total perineal prostatectomy in 1883; unfortunately, the patient died of "exhaustion" in the early postoperative period. In 1904 Hugh Hampton Young, with the help of Halstead, planned and performed the first radical perineal prostatectomy. Young reviewed four cases in 1905 and noted that a small nodule may be an early sign of carcinoma of the prostate. He advised open biopsy and, if positive, subsequent perineal radical prostatectomy. Millen advocated the retropubic approach to radical prostatectomy in 1947, stating that exposure to the gland was superior (1).

Five-year survival after radical prostatectomy for prostate cancer was 50% until 1941 when the discovery that prostate carcinoma was androgen-dependent coincided with the advent of hormonal therapy. Clearly the lack both of accurate staging and of diagnosis until tumors became symptomatic resulted in diagnosis of the disease at an advanced (or at least locally advanced) stage. This may explain the poor survival statistics and in part the lack of enthusiasm for radical surgery for prostate cancer until the last decade.

As a result of the recent developments in early diagnosis, particularly prostate-specific antigen (PSA) and transrectal ultrasonography (TRUS), we are diagnosing more cases of prostate cancer, of which a significant proportion are clinically confined to the prostate. Whether the use of screening PSA and TRUS will ultimately result in earlier diagnosis and decreased mortality from carcinoma of the prostate, as screening mammography has done for breast cancer, is yet unknown. Recent advances in surgical techniques have diminished blood loss, limited incontinence, and allowed sparing of the cavernous nerves responsible for erection. Consequently, the number of radical retropubic prostatectomies performed at our institution has increased from

less than 25 per year in the 1970s to more than 350 since January 1987.

We reviewed our experience with the nerve-sparing prostatectomy in an attempt to answer the following questions: Does sparing of the neurovascular bundle (NVB) contribute to positive surgical margins? Should the NVBs be resected routinely in patients with poorly differentiated tumors? Are we effective at preserving potency, and do we have an acceptably low incidence of urinary incontinence and other complications?

Methods

We reviewed the records of the first 100 Henry Ford Hospital patients who underwent nerve-sparing radical prostatectomy done by a single staff urologist (BJM) and assessed margin status, tumor grade, potency, continence, and complications. Patients ranged in age from 52 to 74 years (mean 66 years). Nerve-sparing prostatectomy was planned in all patients; criteria for resecting the NVB included preoperative impotence or clinical suspicion of involvement of the NVB. The NVBs were not routinely resected in patients with poorly differentiated carcinoma.

Clinical staging was based on digital rectal examination, bone scan, and computed tomography of the pelvis. All patients had normal levels of prostatic acid phosphatase.

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*Department of Urology, Henry Ford Hospital.

†Formerly Department of Urology, Henry Ford Hospital. Currently Desert Valley Medical Group, Apple Valley, CA.

Address correspondence to Dr. Cerny, Department of Urology, Henry Ford Hospital, 2799 W Grand Blvd, Detroit, MI 48202.

Specimens were graded as well, moderately, or poorly differentiated corresponding to Gleason scores of 2 to 4, 5 to 7, and 8 to 10, respectively. Specimens were evaluated for margin status and location of tumor, specifically whether margins were clear and whether there was capsular involvement, extracapsular disease, and seminal vesicle or lymph node involvement.

Results

Of the 100 patients, 52 had organ-confined disease. Margins were clear in 70 patients. Of the 70, 16 had capsular penetration without transgressing the capsule; two of these had periprostatic extension of tumor yet had surgically clear margins. A total of 27 patients had histologic evidence of locally advanced carcinoma with positive surgical margins; 12 of these patients had seminal vesicle invasion. Three patients had microscopic stage D1 disease found on permanent section of pelvic lymph nodes despite negative frozen sections at the time of surgery. All three of these patients had positive surgical margins; two had extensive seminal vesicle invasion.

Patients with poorly differentiated cancers were more likely to have positive margins. Of all tumors, 14% were poorly differentiated. A total of 38% of the patients with poorly differentiated cancer had positive margins whereas 26% of those with well or moderately differentiated tumors (Gleason score 2 to 7) had positive margins.

Fourteen patients had one or both NVBs resected because of clinically suspicious margins. Ten of these patients had positive margins. None appeared to benefit pathologically from wide excision of the NVB. Most patients with positive margins had extracapsular tumor at multiple sites, making the NVB status irrelevant. Two patients had positive margins laterally (where the NVB was spared) as the single point of margin positivity. These patients may have benefited from wide resection of the NVB on the involved side. Follow-up is too short at this time (mean 2 years) to adequately address progression or survival in our series.

A total of 66 patients were potent preoperatively. Of these, 61 had at least one NVB left intact at surgery. A total of 35 (57%) of these patients regained potency. This compares favorably with the overall potency rates of 63% and 72% reported by Catalona and Bigg (2) and Walsh (3), respectively. Walsh et al (4) reported recovery of potency in 69% of patients after unilateral nerve-sparing procedures. Catalona (5) reported a 39% incidence of preservation of potency after unilateral sacrifice of an NVB. Our own experience is not as encouraging; only one of nine patients who had a single NVB left intact regained erectile function.

Margin status did seem to correlate with preservation of erectile function. Patients with surgically clear margins had an excellent rate of recovery of potency, with 64% regaining erectile function. Those with surgically positive margins did not fare as well; only 8 (42%) of 19 remained potent. Several hypotheses may be considered: Is there neuropraxia from the procedure along with impaired healing in the face of local persistence of disease? Is there local invasion of the NVB by carcinoma? Do patients who undergo adjuvant radiation therapy sustain addi-

tional damage to the NVB? Are there psychological confounding factors associated with incompletely resected cancer, lack of libido, etc.?

Complications

Incontinence was uncommon in the patients studied. Only 4% had moderate-to-severe incontinence (two or more pads per day), with another 5% experiencing minimal stress incontinence with strenuous exercise or activity. Incontinence was independent of margin status in our series.

Other complications were uncommon as well. Bladder neck contractures have occurred in five patients; four have resolved with a simple dilatation or transurethral resection. The fifth patient has a recalcitrant vesical neck contracture despite three resections and multiple dilatations.

Deep venous thrombosis occurred in two patients despite universal use of sequential compression devices; one patient subsequently developed a pulmonary embolus and required placement of a Greenfield filter. One patient had a wound infection followed by dehiscence. One patient died at home of unknown causes three weeks postoperatively.

Discussion

Since the anatomic approach to radical retropubic prostatectomy was described by Walsh et al (6), there has been considerable debate about whether the sparing of the NVB limits the effectiveness of the operation to attain the primary objective: complete extirpation of localized carcinoma of the prostate. The secondary objective is to preserve potency, ideally with minimal morbidity and mortality.

Advantages realized by the technique of Walsh (7) include a more anatomic dissection resulting in improved rates of potency and continence as well as decreased blood loss with improved control of the dorsal vein complex. Potential disadvantages include concerns about compromising the cancer control aspects of the operation with increased risk of having positive margins.

In 1987 Walsh (3) reviewed pathological differences between the radical perineal prostatectomy, the standard radical retropubic prostatectomy, and the nerve-sparing radical retropubic prostatectomy. Walsh found at that time that the standard approaches did not routinely or reliably excise the NVB, that more periprostatic tissue could be resected retropubically, and that identification of the NVB allowed a wider anatomic resection of the periprostatic tissue when clinically indicated.

Catalona and Bigg (2) reviewed 250 patients who underwent nerve-sparing radical retropubic prostatectomy and concluded that sparing the NVBs did not compromise the adequacy of tumor excision in the majority of patients. While patients with larger or poorly differentiated tumors may be at higher risk for leaving a positive margin by sparing an NVB, there was no evidence that wide excision of an NVB was of any benefit. Patients with large or poorly differentiated tumors were unlikely to be cured with any form of radical prostatectomy, as 78% of poorly differentiated tumors had capsular penetration, positive surgical margins, or both.

In a pathologic study of radical prostatectomy specimens, Villers et al (8) concluded that 50% of prostate cancers escape the prostate along the perineural spaces. Based on observations that 48% of positive margins in theoretically curable cases occur at the apex, Stamey and colleagues (9) stated that high-positive margin rates could be improved by careful apical dissection and wide bilateral resection of the NVBs in all patients with apical tumors regardless of the side of the nodule.

In summary, the nerve-sparing radical retropubic prostatectomy is an excellent anatomic procedure for prostate cancer in selected patients. In our series, 70% of 100 patients had pathologically clear margins. This is comparable to the 57% to 77% reported in series by Catalona and Bigg (2) and Stamey et al (9). Margin status was compromised histologically in two of 100 patients by sparing an NVB; the remainder of the patients with positive margins had multiple sites or large areas which were unclear. While there was a higher positive margin rate with poorly differentiated tumors (38% versus 26% in well or moderately differentiated cancer), we believe that this reflects the limitations of radical prostatectomy in the treatment of localized carcinoma of the prostate. Only two of 30 patients with positive margins in our series may have benefited from wide resection of the NVB; neither patient has evidence of recurrence to date. No clear-cut evidence exists in our experience to indicate that wide

resection of the NVBs would be of any benefit. Finally, the morbidity and mortality of the nerve-sparing prostatectomy are acceptably low with good expectations of preservation of potency.

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