Education

Éducation

Dr. Hassouna is Associate Professor of Surgery, University of Toronto, Toronto, Ont. Dr. Heaton is Professor of Urology, Department of Urology, Department of Pharmacology and Toxicology, and Human Sexuality Group, Queen's University, Kingston, Ont.

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The members of the Prostate Cancer Alliance of Canada, an umbrella group formed to carry out the recommendations of the 1997 National Prostate Cancer Forum, are pleased to support the intent to inform both health care professionals and lay people about the detection, diagnosis and treatment of prostate cancer through this 13-part series.

Series editors: *Dr. Neill A. Iscoe, Medical Oncologist, Toronto–Sunnybrook Regional Cancer Centre, and Dr. Michael Jewett, Professor and Chairman, Division of Urology, University of Toronto, Toronto, Ont.*

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Clinical basics

Prostate cancer: 8. Urinary incontinence and erectile dysfunction

Magdy M. Hassouna, MD, PhD; Jeremy P.W. Heaton, MD

The case

A 68-year-old sexually active man is referred to a urologist for consideration of radical prostatectomy following diagnosis of prostate cancer. Rectal examination has revealed a single nodule confined to the prostate, and the Gleason score is 6. The patient has talked to friends and has done some reading and is very concerned about the possibility of urinary incontinence and erectile dysfunction after the surgery.

EDITORS' NOTE: Readers of this series know that earlier papers, those on surgical treatment[1] and radiation therapy[2], have covered the complications of these treatments. However, because urinary incontinence and erectile dysfunction are such important problems, in terms of both frequency and effects on patients' quality of life, we felt that they merit more detailed discussion. Separate articles on these common side effects of radiation therapy and prostatectomy make up the eighth part of the Clinical Basics series on prostate cancer.

Urinary incontinence*

The age-adjusted rate of radical prostatectomy increased almost sixfold between 1984 and 1990.[3] At the same time as the number of procedures is increasing, surgeons are acquiring more expertise in maintaining the continence mechanism without compromising the surgical goal of extirpating the localized cancer.

The apical dissection of the prostate remains the key issue. Some surgeons prefer limited dissection of the puboprostatic ligaments.[4] Others advocate dissection of the preprostatic vein plexus and placement of traction sutures in the urethral stump early in the procedure. With the preservation of the bladder neck[5] and retention of the normal anatomic structure of the sphincteric mechanisms and their nerve supply, the prevalence of return of continence after radical prostatectomy is now approaching 70% at 1 year after surgery.[6]

Anatomic structure of bladder outlet

Because of the location of the gland, prostatic surgery necessarily affects the structures that regulate continence. Thus, knowledge of the anatomic structure of the bladder outlet is essential to an understanding of the continence mechanisms.

*This section by Dr. Magdy M. Hassouna.

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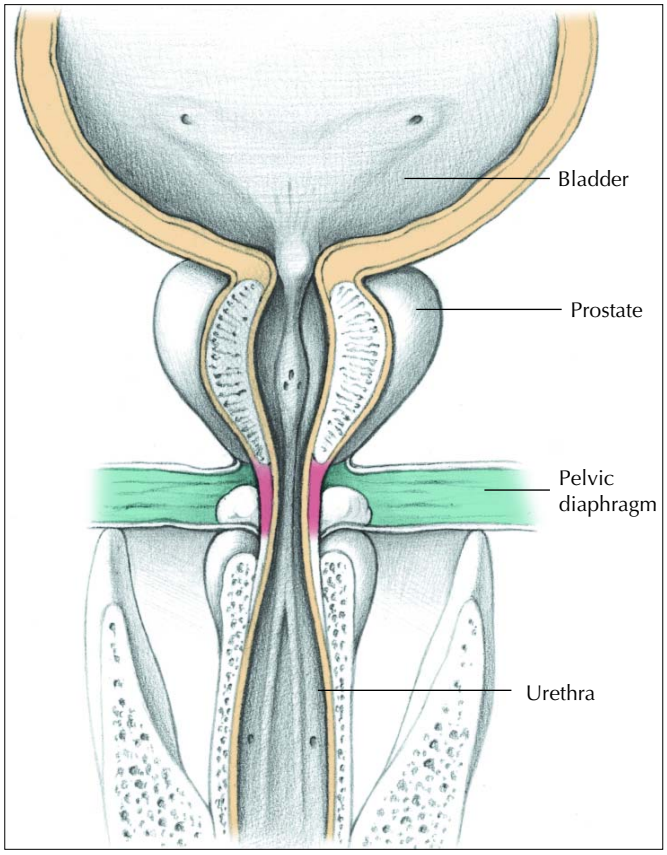
The inferolateral surfaces of the prostate are related to the anterior parts of the levator ani muscle (Fig. 1). The apex of the prostate is directed toward the external sphincter complex (consisting of the sphincter urethrae and transversus perinei profundus muscles), and the anterior surface of the prostate is connected to the pubic bones by condensation of the pelvic fascia, called the puboprostatic ligaments. The urethra emerges from the surface a little above and in front of the apex. It is important to locate these anatomic landmarks during surgical removal of the prostate.

The external sphincter complex is composed of external and internal skeletal muscle fibres. The external fibres arise from the transverse perineal ligament and sweep backward on both sides of the urethra. The deep (rhabdosphincter) fibres encircle and blend into the wall of the urethra and extend upward to blend into the capsule of the prostate.[7] Transurethral ultrasonography has revealed that the rhabdosphincter is a vertical structure extending from the membranous urethra to the bladder neck. It does not form a complete collar around the membranous urethra but is shaped like the letter C.[8]

The external sphincter complex is innervated through branches of the pudendal nerves. There is some evidence[9] that part of the somatic innervation to the sphincter is located close to the apex of the prostate.



Lianne Friesen

Fig. 1: Anatomy of the pelvic diaphragm. Muscle groups are indicated by the following colour scheme: green = periurethral striated muscle, red = rhabdosphincter, yellow = smooth muscle.

The bladder and its outlet are involved in the storage and evacuation (voiding) of urine. During the storage phase, the bladder should display good compliance, lack of uninhibited detrusor contractions and a competent outlet that sustains a pressure of at least 40 cm H_2O. The voiding phase involves the relaxation of the pelvic floor, funnelling of the bladder outlet and sustained contraction of the detrusor muscle.

Prevalence of post-prostatectomy urinary incontinence

Urinary incontinence after radical prostatectomy for localized cancer has been the subject of scrutiny in recent years. Questionnaires specific for continence history have revealed that 30% of patients experience some form of urinary incontinence after radical prostatectomy.[6] Other studies have shown that incontinence depends on time since surgery: only 23% of patients are continent after 1 month, but by 12 months 84% to 95% have regained continence.[10–12]

Types of incontinence

Most authors agree that incontinence after radical prostatic surgery is caused by direct damage to the sphincter. Outlet resistance is significantly decreased after radical surgery, as indicated by values for Valsalva leak pressure point (the pressure at which urinary leakage occurs when the person increases abdominal pressure), maximum urethral pressure and functional urethral length. However, outlet resistance increases with time and coincides with regaining of continence.[13,14]

Detrusor instability — the development of unwanted detrusor contraction exceeding 15 cm H_2O during the filling of the bladder — is responsible for incontinence in 41% of patients after surgery.[12,15] A combination of detrusor instability and sphincteric incontinence was found in 52% of patients in another study.[16] Detrusor instability is an important factor in treatment, because in patients with this problem incontinence responds less favourably to techniques to increase outlet resistance than in patients with other causes of incontinence.

Diagnosis

History

The physician should identify the degree and type of incontinence, as well as the time of onset. The number of

protective pads used per day by a patient gives an accurate assessment of degree of incontinence. Most patients experience some incontinence after removal of the catheter. Continence gradually improves with time, as evidenced by a continuous decline in the number of protective pads needed. This type of incontinence is usually easy for the patient to describe.

Most patients experience urinary leakage during stressful events such as coughing, stooping and lifting heavy objects. In this situation it is important to assess the patient's normal level of physical activity before starting treatment and tailor the treatment to the level of activity. For example, patients who have been sedentary may experience more incontinence than they otherwise would if they try to become more physically active after their surgery. Some patients experience urinary leakage associated with a sense of urgency. This should point to the possibility of detrusor instability as a cause of the incontinence.

Urodynamic study

Fluoroscopy remains the standard for diagnosing incontinence. A test is conducted with the patient sitting in front of a fluoroscope. While the bladder is filled with a radiocontrasting substance, intravesicle and intra-abdominal pressures are recorded. The operator is able to visualize the contours of the bladder, paying special attention to the bladder outlet (Fig. 2). Persistent funnelling of the latter denotes incompetence of the sphincteric mechanism. When the bladder is filled to capacity, the patient is asked to perform a Valsalva manoeuvre. Most urodynamic devices allow simultaneous recording of intra-abdominal pressure and fluoroscopic visualization of the bladder outlet. The Valsalva leak pressure point is the pressure at which contrast material seeps through the bladder outlet. A value below 40 cm H_2O denotes a severely incompetent sphincter. During the filling phase, the operator should look for detrusor instability, as evidenced by uninhibited detrusor contraction. Occasionally funnelling of the bladder outlet may be seen during this uninhibited contraction.

Treatment

The treatment of urinary incontinence after radical prostatectomy depends on the nature of the mechanism of incontinence.

Pharmacotherapy

The treatment of bladder instability depends greatly on the use of the anticholinergic group of drugs. Oxybutynin remains the standard with which other anticholinergics are compared. The normal dose is 5 mg, taken orally, 3 or 4 times a day, depending on the patient's tolerance of the side effects. The major side effects are dryness of the mucous membranes (which appears in the form of dry throat and conjunctiva as well as constipation) and could precipitate angle-closure glaucoma. Some patients can take oxybutynin on an as-needed basis, which reduces the risk of side effects.

Other anticholinergics — imipramine, flavoxate, propantheline and tolteridine — are less effective, but they have fewer side effects than oxybutynin. Tolteridine is soon to be marketed in Canada; this agent can be titrated in increasing doses as it is associated with less dryness of the mouth.

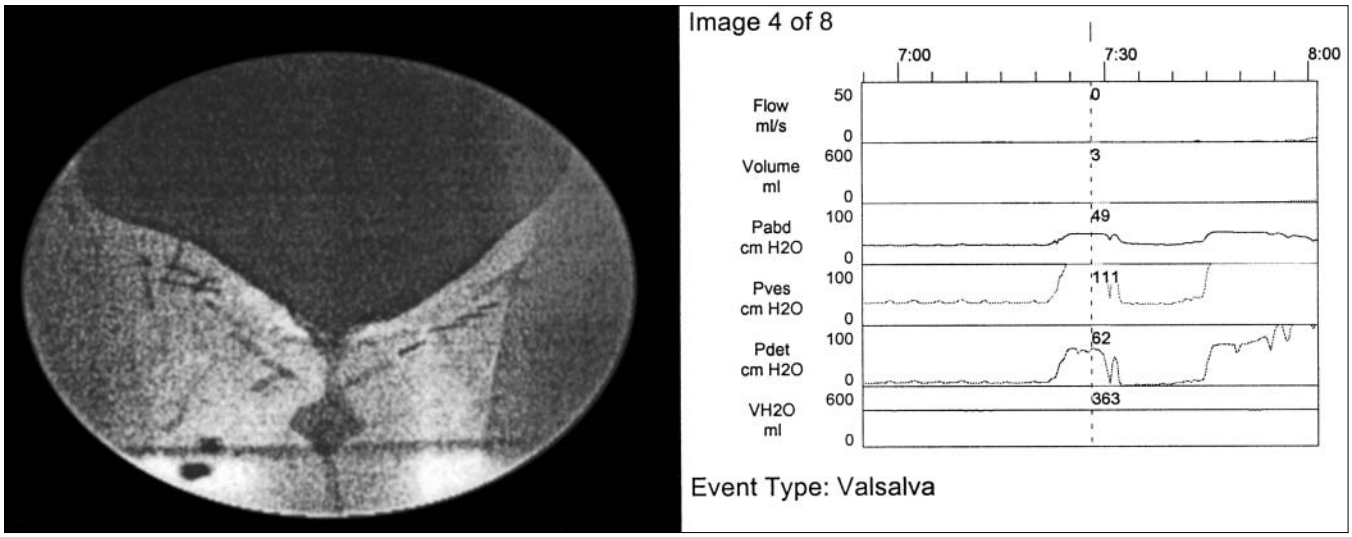


Fig. 2: Fluoroscopy of the bladder and outlet during a valsalva manoeuvre, with readings for flow and volume of urine; abdominal, vesicular and detrusor pressure; and volume of water in the bladder. Peak actual values of the variables are presented. The horizontal scale is time, in minutes.

Pelvic floor rehabilitation

Pelvic floor stimulation and biofeedback have been used in rehabilitating the pelvic floor and helping patients regain continence.[17] Treatment consists of several visits (once or twice a week) in which the patient is taught to carry out a series of rapid and sustained pelvic contractions. The intensity of the contractions is monitored by means of an instrument display visible to the patient.

The setup requires experienced personnel and motivated patients, but this behavioural therapy was successful in restoring continence in 40% to 70% of men in one study.[17] A good response can be expected in patients whose incontinence is due to mild or moderate sphincteric weakness. The results are less favourable for patients who have undergone radiotherapy after radical surgery, because in these patients the musculature of the pelvic floor becomes more fibrotic and less amenable to voluntary contraction.

Teaching points

- Improvements in surgical techniques have resulted in a rate of continence after radical prostatectomy of 70% (at 1 year after surgery).
- Incontinence after radical prostatectomy may be caused by direct damage to the sphincter, or it may result from instability of the detrusor muscle.
- Treatment options:
  - anticholinergic drugs
  - pelvic floor rehabilitation through stimulation and biofeedback
  - injection of bulking material around the bladder neck to increase resistance
  - artificial urinary sphincter
  - gracilis myoplasty

Endoscopic injection of bulking material

Several bulking agents — among them polytetrafluoroethylene (Teflon), autologous fat and silicone — have been used to augment outlet resistance and thus improve continence. Teflon and silicone were associated with a high rate of migration and granuloma formation, and autologous fat often resulted in poor graft survival and rapid absorption. These bulking agents are not currently in use.

Favourable results have been achieved with bovine collagen cross-linked with glutaraldehyde in patients who are not allergic to the collagen. This substance is injected in either an antegrade or a retrograde manner around the bladder neck and the anastomotic line by means of a cystoscope. The retrograde technique (which involves transurethral injection) has been less successful, mainly because of the poorly developed submucosal spaces that accommodate the injected collagen. These spaces are usually obliterated by the fibrosis that occurs at the anastomotic line. Moreover, the amount of collagen that must be injected has made this approach uneconomical. With the antegrade technique, which uses a flexible cystoscope inserted suprapubically, the collagen is introduced around the bladder neck, where the submucosal space has greater capacity. Although this procedure is more invasive, a short-term study found that the success rate in terms of cure of incontinence or significant improvement was 70%.[18]

Artificial urinary sphincter

The artificial urinary sphincter is another method of treating urinary incontinence after radical prostatectomy. This device has been updated since its original inception in the mid-1970s. The AMS 800 (American Medical System, Guelph, Ont.), the artificial sphincter in current use,[19] consists of a cuff that ranges from 4 to 6 cm in length, a pressure-regulating reservoir and a pump. The cuff is implanted around the bulbar urethra, which is easily accessible through the perineum. Implantation of the cuff around the bladder neck is not usually recommended, since the task of dissecting the planes after such extensive pelvic surgery is formidable.

The reservoir comes in 3 pressure ranges: 50–61, 60–71 and 70–81 cm H_2O. The appropriate pressure depends on the level of physical activity of the patient. However, an unnecessarily elevated pressure can result in pressure necrosis in the urethra and eventual erosion of the cuff. The pressure-regulated reservoir is usually implanted in the prevesical space. However, this placement may be difficult if extensive fibrosis develops after surgery. The pump, which regulates the opening and closing of the cuff, is implanted in the scrotum in a place that is easily accessible to the patient. The side chosen depends on the patient's manual dexterity.

The artificial urinary sphincter is usually deactivated after implantation for a period of 4 to 6 weeks to reduce local pressure on the urethra and to allow proper healing. The patient is warned that he will experience urinary incontinence during that time. Activation before healing is complete can result in pressure atrophy and cuff erosion through the urethra and hence failure of the procedure.

After activation, continence rate improves with time, and 90% of patients with this device have full continence by 1 year after implantation.[20] The most important complications associated with the device are infection and erosion. In one study the incidence of erosion reached 9%;[21] the risk of erosion increased with improper urethral manipulation (catheters) and previous exposure to pelvic radiation.

Gracilis myoplasty

Manipulation of the gracilis muscle, with its intact neurovascular bundle, has been used to improve urinary incontinence. The muscle is wrapped around the bulbar urethra in a fashion similar to that for the cuff of the artificial urinary sphincter. In a preliminary study Chancellor and colleagues[22] obtained encouraging results in a limited number of patients. This approach is an appropriate alternative to the artificial sphincter in patients with a high risk of complications, particularly after radiotherapy and cryotherapy.

This procedure is available only in special circumstances, for example, if the pelvic area has been irradiated or after failure of the artificial sphincter because of cuff erosion.

Conclusion

The patient described at the beginning of the article should expect some degree of urinary incontinence after the radical prostatectomy. The incontinence should gradually improve with time and pelvic-floor exercises. If the incontinence persists after 6 months, the patient should consult a urologist for a complete evaluation of the problem.

Erectile dysfunction*

In discussions of the consequences of radical prostatic surgery, and indeed most treatments for prostate cancer, the issue of "impotence" is always relevant.[23] However, the term "impotence" is often considered inappropriate, because it suggests global incompetence and may be perceived as unfair and inaccurate. Since the National Institutes of Health Conference on Impotence in 1992,[24] the term "erectile dysfunction" has been preferred. The advantages of this medical term are that it encompasses different degrees of dysfunction and places the issue in a medical context, somewhat removed from common speech.

Defining erectile dysfunction

Erectile dysfunction is the persistent inability to attain and maintain penile erection sufficient for intercourse. It should be distinguished from sexual dysfunction, a broader term that would include a partner's physical problems, problems with intimacy or desire, and other less anatomically focused problems. Erectile dysfunction is confined to problems with rigidity of the penis and the assumption that these will interfere with normal sexual intercourse or activity.

*This section by Dr. Jeremy P.W. Heaton.

It should be remembered that men can have orgasms independent of erection. Although the sensations of orgasm may arise from motor activity in sexual structures around the prostate, much of the impact of orgasm occurs in the brain. The word "climax" may capture the concept better than "orgasm," and recognizing these 2 components — the physical and the mental — may help in understanding why neither an erection nor a prostate gland is needed for orgasm. Thus, many men relate sensations of climax, even physical ones, after radical prostatectomy.[25]

It is also important to remember that erectile dysfunction is not a single condition; rather it occurs as a consequence of a variety of diseases and conditions affecting penile function. Normal erectile function depends on the near-perfect functioning of a highly vulnerable collection of blood vessels, nerves and fibrous tissue. Most men with erectile dysfunction have several problems that together cause a fault in the mechanics of erection.[26] From the time a man reaches maturity, the coordination of these mainly vascular phenomena begins to diminish, along with the ability to have an erection. For many years, the loss of potential may go unnoticed, but every man eventually realizes that his sexual response is not as robust, immediate or persistent as it used to be. Many men never lose entirely the ability to have an erection, but even so, they adapt their expectations to changing capabilities.

Each year, millions of North American men experience loss of erectile function. Their ability to have an erection reaches a point of delicate balance, where the slightest problem costs them an opportunity for intercourse, if not intimacy. Each year in Canada, more than 100 000 men enter a stage of their lives in which erection is unpredictable (estimated from the Massachusetts Male Aging Study[26]). This figure vastly exceeds the number of men undergoing surgery of the prostate area.

The physiology of erections

To understand the issues related to erectile dysfunction, it is necessary to appreciate how a sexual erection occurs. The brain receives a complex set of stimuli (some primitive, like smell, others sophisticated, like erotic images) and passes them through a specialized area in the midbrain that determines whether the erectile mechanism should be activated.[27] If so, a message is transmitted from the midbrain through the spinal cord. There, further signal processing occurs, and the message is dispersed into a multitude of nerve branches to cause tightening of the pelvic muscles and dilatation of the pelvic arteries. This dilatation allows blood to fill the spaces in the spongy tissue of the penis. If the blood pressure is high enough and the arteries allow enough blood into the penis, the core tissue (corpora cavernosa) swells and becomes tight

against the tough fibrous outer casing (tunica albuginea). The filled corpora cavernosa become rigid and the penis becomes erect. The whole system, from brain to penile blood vessels, is held in a state of nonerection until the proper moment.

Causes of erectile dysfunction

The prostate is positioned astride the nerves and blood vessels that govern and effect erection. There are a multitude of nerves of various sizes, many grouped in bundles, each carrying some component of the erection message. The muscles of the pelvis, which help in subtle ways to enhance erections, also support the prostate. Spontaneous erection cannot occur if too many of these structures are physically damaged. Thus, diseases that affect the nerves may have serious consequences for erectile function, as may conditions affecting the blood vessels. For example, diabetes, through damage to both nerves and arteries, is associated with early development of erectile dysfunction.[26] In addition, as men age, arterial elasticity is lost, and erectile capacity diminishes. Smoking is clearly associated with premature occurrence of erectile dysfunction.[26]

Beyond these potential causes of erectile dysfunction, the treatment of prostate cancer may interfere with erectile function. In fact, given the other factors just outlined, prostatic surgery may be the final step in reducing penile response below the threshold required for normal function. Even so-called "nerve-sparing" surgery can result in nerve and artery damage in this area.[28] All of the structures involved in erection — nerves, blood vessels and muscles — are susceptible to damage during prostate surgery or, indeed, any treatment of the prostate involving heat, cold or radiation.

Medical methods of treating prostate cancer can also interfere with the mechanisms of erection. For example, anti-androgen treatment required in the later stages of the disease blocks the male sexual response at the same time as it blocks growth and reproduction of the cancer cells.

Stress, anxiety and worry — often experienced by men with prostate cancer — have an impact on erectile function, because they block excitation in the brain and relaxation of the blood vessels. Depression, another problem frequently experienced by people with cancer, as well as some other diseases of the brain (and even some character traits), may interfere with the brain chemistry necessary for initiating erection.

Preventive measures

In erectile dysfunction as in many other situations, the best treatment is prevention. Walsh and Donker[29] provided urologists with an understanding of the relevant anatomic structures that has allowed a sophisticated approach to surgical treatment of the disease: nerve-sparing radical prostatectomy. The intention in the nerve-sparing procedure is to avoid damaging the nerves behind the prostate by dissecting as close to the surface of the prostate as possible. Although in theory this might mean that cancer tissue at the surface of the prostate could be left behind, that risk is lower now that there is a much better understanding of who should undergo prostate surgery.[1]

Despite the introduction of a surgical procedure that conserves the nerves, a majority of men who undergo radical prostatectomy can still expect some degree of erectile dysfunction.[30] The early studies of nerve-sparing prostatectomy suggested that 84% of patients might remain potent,[31] 98% would retain some function and 52% would retain the ability to achieve vaginal penetration.[32] Subsequent series modified these expectations (suggesting that 75% might remain potent)[33] and stratified them for the effects of single or double nerve section — the results were better when only one nerve was cut.[34] The published rates of erectile dysfunction after nerve-sparing surgery have continued to rise, but the methods of examining patients before and after surgery, as reported in the erectile dysfunction literature, have not met the usual standards. A recent study[35] pointed out that of 11 patients who reported potency only 2 were satisfied with their sex life, yet 8 of 11 had nocturnal erections. These data demonstrated that it is difficult to ask precise questions and that there is much more to clinically relevant postoperative sexual function than mere penile response. Further studies have reported the rates of potency as 13.3%[30] and 41%[28] among patients with unilateral nerve preservation, and 31.9%[30] and 63%[28] among those with bilateral preservation; full erection has been reported for 9% of patients and partial erection for 38%.[36] There will be more studies with better data as the sophistication of measuring erectile dysfunction increases and the surgical techniques improve, such as with the use of nerve-finding devices and protocols.[37]

The other issues contributing to the successful preservation of potency have become better recognized. Age is a major factor in the societal prevalence of erectile dysfunction,[26] and it is not surprising that age has a significant impact on the incidence of erectile dysfunction after radical prostatectomy.[37] Nerve-sparing radical prostatectomy may influence arterial inflow, although the search for accessory vessels, an unexpected arterial supply within the surgical field, does not seem justified.[38] Surgery may have an effect that appears as veno-occlusive dysfunction on pharmacological testing, but this may also be seen if there is inadequate nerve supply and smooth-muscle deterioration; there is no reasonable causal relation that can be proposed for acute veno-occlusive dysfunction.

There are other consequences of surgery that affect

sexual rehabilitation. For example, the penis becomes smaller,[39] and orgasm is altered.[25] Both the cancer and its treatment have a profound effect on the patient's psychological outlook, which will affect sexual function.[40] It should be noted that there are alternatives to surgery, which should be considered in terms of both sexual consequences and treatment efficacy.[23,41]

Treatment options

Patients with erectile dysfunction after prostatectomy have an advantage over men with spontaneous erectile dysfunction, because they know the reason for the problem. It is often easier to accept a side effect of needed treatment than to admit that the body is simply failing. Of the men who volunteer to discuss their erectile dysfunction with other patients or even for the media, more have a background of surgery than any other cause.

A man or a couple may consider treatment for surgically caused erectile dysfunction at any time after the diagnosis of prostate cancer. When surgery is presented as a treatment option, the patient must be told of the associated risks, but he can also be informed of the solutions for erectile dysfunction. Whether, how and when to treat the condition is a personal choice, but the patient needs information and advice to make such choices. Some urologists prefer to treat erectile dysfunction early — before or immediately after the urinary catheter is removed after surgery. The logic is that the earlier the arteries are "exercised," the better the prospects.[42] In addition, solving at least some of the problems associated with prostate cancer allows the physician and the patient to more effectively manage the intense disruption that cancer causes in a man's life and his relationships. Although there is as yet no perfect solution, research is continuing in this area.

Physicians should remind their patients that it will be months after surgery before healing restores optimal function. Nerve regrowth or repair may be slow and usually continues for 6 to 12 months after surgery.

A few years ago the only solution for erectile dysfunction after radical prostate surgery was the implantation of a penile prosthesis; some surgeons even started the process at the time of the initial procedure. Prosthetic devices are still an option for men unable to find another satisfactory solution. Vacuum erection devices, although effective and helpful for some, can be intrusive to the love-making cycle, may be uncomfortable, and may produce a cold penis (which may be uncomfortable for the partner).[43]

A major advance has been the advent of intracavernous injection of prostaglandin E_1 (alprostadil) (Caverject; Pharmacia & Upjohn, Mississauga, Ont.) (Table 1). Bypassing the mechanisms that may be damaged by aging, disease or surgery, prostaglandin — an agent that causes smooth-muscle relaxation by the cAMP pathway — can be delivered directly to the cavernosa (by injection), which results in penile erection in most men.[44] The drug is safe and has been well tested, the method of injection is much easier to learn than it first appears, and the rewards are clear — the opportunity to return to spontaneous intercourse and to reclaim that part of the patient's relationship and his self-esteem. The resulting erections are normal, and intercourse is not dangerous for either partner.

Prostaglandin can also be given in pellet form, delivered as a suppository to the urethra (MUSE; Vivus, Menlo Park, Calif.). This formulation is already in use in the United States and has recently become available in Canada (MUSE,

Table 1: Options for treating erectile dysfunction after radical prostatectomy

Option	Benefit	Problems
Do nothing	Little "fuss"	May go against patient's, partner's and society's expectations
Intracavernous injection of prostaglandin	Prompt, reliable erection Probably most effective	Intrusive
Transurethral suppository (prostaglandin)	Prompt and safe 40% efficacy	Mildly intrusive
Older oral agents (e.g., yohimbine or trazodone)	Non-intrusive	Seldom effective
New oral agent (sildenafil)	Non-intrusive Efficacy probably similar to injection	Contraindicated if patient is receiving nitrates* 1-h onset time
Other new agents (e.g., phentolamine or apomorphine)	Non-intrusive Variable efficacy	Depends on drug class
Vacuum erection device	Effective	Intrusive, results in cold penis
Penile prosthesis	Effective	Invasive, irreversible

*It is unusual for patients who have undergone prostatectomy to use nitrates.

Janssen Ortho, Toronto). Recent data indicate that it works after radical prostatectomy in about 40% of patients.[45]

There has been enormous interest in sildenafil (Viagra; Pfizer, New York), which received US approval for treatment of erectile dysfunction at the end of March 1998 and is expected to be given approval in Canada late in 1998 or early in 1999. This phosphodiesterase inhibitor, which comes in pill form and acts on smooth muscle by enhancing cGMP to facilitate erection, is effective in 47% of patients who have undergone treatment for prostate cancer. Sildenafil increases cGMP only in systems that are activated, so the instructions for the patient are important. Sildenafil must be taken in prosexual circumstances, that is, sexual activity is needed for optimal effect. The theoretical problem with sildenafil after prostate surgery is that the nerve supply, the putative site of surgical damage causing erectile dysfunction, may be essential for the proper priming of penile smooth-muscle second-messenger (cGMP) systems. A recent study described 28 healthy patients who were given sildenafil roughly 1 year after undergoing some form of prostate surgery.[46] Of these, 12 (43%) regained their ability to have intercourse; this group represented 80% of those who had undergone bilateral nerve-sparing surgery. Those who underwent unilateral or non-nerve-sparing prostatectomy did not experience an improvement. The reasons for selecting certain patients for the bilateral procedure were not reported, but the patients were of equivalent age. Side effects included headache (39% of patients), abnormal vision (11%) and facial flushing (7%). This small, preliminary, retrospective study provides some basis for advising patients and certainly suggests that if there is some degree of nerve continuity, sildenafil may provide a satisfactory response.

As in other patients with erectile dysfunction, sildenafil should be prescribed, according to the manufacturer's dosing recommendations, by knowledgeable physicians. The drug is safe, but the side-effect profile must be understood in the context of the individual patient. The clear contraindication of any nitrate-containing medications has been well publicized. The advent of sildenafil as an effective and safe oral therapy for erectile dysfunction is certainly an important event for patients with this condition.

Other medical alternatives include sublingual apomorphine (TAP Holdings, Deerfield, Ill.) and phentolamine taken by mouth (Vasomax; Zonagen/Schering Plough, Madison, NJ), either of which may be appropriate for erectile dysfunction related to prostate cancer. These compounds are still undergoing clinical trials and are not expected to receive approval until sometime in 1999 or 2000.

Other sources of prostaglandin E_1 are being developed, mainly for topical application. A combination injectable drug, consisting of a vasoactive intestinal polypeptide and phentolamine (Invicorp; Senetek, London, UK), is undergoing international trials, and new phosphodiesterase inhibitors that will work in a manner similar to sildenafil are being developed.

There may be benefit from early intracavernosal injection of prostaglandin after nerve-sparing radical prostatectomy. Montorsi and associates[42] found that 67% of patients given prostaglandin E_1 by this method early after their surgery had a satisfactory resumption of sexual function, compared with only 20% of those treated late. This is thought to be due to the antifibrotic properties of prostaglandin E_1. Other effective agents for erectile dysfunction may also have beneficial effects if started early after potentially "erectolytic" surgical injury.

For patients in whom oral and local prostaglandin therapy has failed, we use "triple therapy" by intracavernosal injection. This combination of prostaglandin E_1, phentolamine and papaverine was used before commercial preparations of prostaglandin E_1 became available and may be tried before the physician resorts to mechanical or surgical means of restoring rigidity.

Will conventional therapies for erectile dysfunction work after nerve-sparing radical prostatectomy? Given that there is no proven basis for selecting a particular therapy, treatment should be governed by the principles of goal-directed therapy[47] — whatever is safe, effective and suits the patient and his needs is reasonable.

The range of possible therapies is growing rapidly, which is fortunate given that most are satisfactory in fewer than 50% of patients after radical prostatectomy. In treating erectile dysfunction caused by prostatectomy, physicians will need good knowledge of the alternatives and an interest in trying different options. "Salvage therapy" includes a combination of drug therapy and penile prostheses.

Men who underwent prostatectomy many years ago may also want to consider treatment of any erectile problems that have resulted. However, the more severe the problem, the less likely that full erectile function will be recovered. In more difficult cases, more invasive solutions

Teaching points

- Erectile dysfunction can result from normal loss of coordination of internal functions with age, but smoking speeds up the process, and diseases like diabetes can also be a factor.
- Stress, anxiety and worry also have an impact.
- Current treatments include intracavernous injection of prostaglandin, transurethral suppositories, drugs and various mechanical devices.

may be needed, although these may not be acceptable to all patients. In short, every man should have the choice of pursuing a remedy to his liking, but no one is guaranteed a satisfactory solution.

Conclusion

Erectile dysfunction occurring after treatment for prostate cancer brings with it yet another decision for the patient: the choice of whether to do anything about it. Even patients who do not have exceptional expectations of their family life should feel at liberty to ask questions about the problem. Physicians are now better informed about the issue than they were even 5 years ago, because of new interest in erectile dysfunction and vast improvements in managing the condition. The 68-year-old patient described at the beginning of this article has a better choice of treatment options and can expect more improvements in the future. In the whole complex of cancer care, erectile dysfunction is one area where the wishes and opinions of the patient must be considered first, and, finally, it is a problem that can be managed effectively in most men.

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Reprint requests to: *Dr. Magdy Hassouna, 399 Bathurst St., MP8-306, Toronto ON M5T 2S8; fax 416 603-1961; mhassouna@yahoo.com. Dr. Jeremy P.W. Heaton, Department of Urology, Kingston General Hospital, 76 Stuart St., Kingston ON K7L 2V7; fax 613 545-1970; Heatonj@post.queensu.ca*