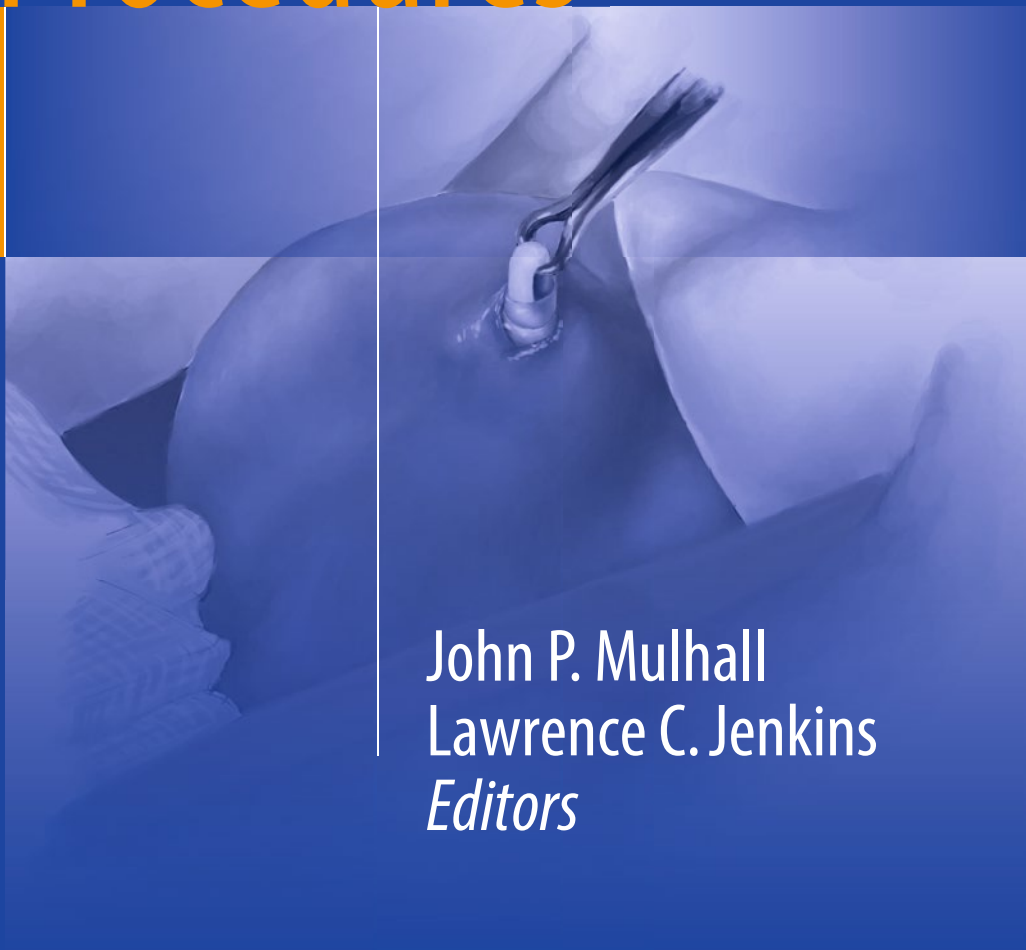
Atlas of Office Based Andrology Procedures



John P. Mulhall
Lawrence C. Jenkins
Editors

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Preface

Andrology is the medical specialty that deals with male health, especially as it pertains to problems of the male sexual and reproductive system. Andrological issues in urologic practice and indeed in general medical practice are commonly encountered, yet perplexing for many clinicians. Sexual dysfunction is gaining increased attention in the media as it becomes more acceptable to discuss previously taboo topics. These are often topics that men suffered from but either did not know to ask or were too uncomfortable to ask with their physician. Sexual dysfunction is a common problem that can have a major impact on a patient's quality of life, including their relationship and treatment satisfaction.

There is an increasing trend towards more medical care being delivered in the office setting rather than in an operating room. Office-based andrology procedures are more common than other areas of urology but yet not as well trained during urology residency training. The increasing pressure of duty hours on urology residency training leaves residents often lacking comfort with these procedures.

The purpose of this text is to act as a resource to aid andrology practitioners, including physicians, nurse practitioners/physician assistants, clinical trainees, nurses, medical assistants, and others, who perform or assist in-office andrology procedures. We tried to cover the most common procedures within a typical andrology office practice. However, some procedures were excluded because they are not very common in an office setting. We hope this book will be found useful to those who have had no specific andrology training and to those who are simply out of practice.

New York, NY — John P. Mulhall
New York, NY — Lawrence C. Jenkins

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Chapter 1
Focused Genital Exam

John P. Mulhall and Lawrence C. Jenkins

Introduction

The patient's medical history can often lead to a diagnosis before an examination or adjuvant testing has been performed. A thorough medical, sexual, and fertility history will help identify (1) the nature of the problem(s), (2) the chronology of the complaints, (3) the interaction between multiple sexual complaints, (4) potential etiological (risk) factors, and (5) the impact of the problem on the patient, his partner (where one exist), and their relationship, sexual and otherwise (Table 1.1).

Focused Genital Examination

The physical examination complements the history and, while sometimes noncontributory, is an essential component to confirm a suspected diagnosis or pick up an otherwise unsuspected etiology to the patients problem (Table 1.2). Useful anatomical images can be found in figures 1.1, 1.2, and 1.3.

The Penis

For the man with sexual problems, penile examination is essential and, while often unremarkable, for example, in a young man with premature ejaculation, may shed light on the patient's complaint(s) (micropenis, Peyronie's disease plaque,

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Table 1.1 Key history points

History of medical comorbidities (especially vascular risk factors)
Congenital or childhood diseases
Psychological disorders (anxiety, depression)
Prior surgeries (especially pelvic or genital)
Medications
Social (smoking, alcohol, recreational drugs, occupational exposures)
Exercise capacity
Duration of sexual dysfunction or infertility
Onset (sudden, gradual) and chronology of complaint(s)
Situational factors
History with partner(s)
Aggravating/alleviating factors
Current and prior sexual function
Penile pain (characterize)
Discuss ejaculation (presence/absence, normal/premature)
Discuss orgasm (presence/absence, normal/delayed)
Assess for sexual incontinence
Reproductive history (prior pregnancies/children, duration trying to conceive)
Prior evaluation(s)
Prior treatments

Table 1.2 Key exam points

General appearance
Gynecomastia
Hair distribution
Pre-pubic fat pad
Scars from prior surgery
Penile skin assessment
Penile meatus assessment
Penile stretch and length
Penile plaques (tenderness)
Testicular volumes
Epididymal presence and consistency
Vasa deferentia
Varicocele

diminished penile stretch) and/or may lead to the discovery of an unsuspected problem (hypospadias, phimosis, skin abrasions, sexually transmitted infection-related lesions). Assessing general penile stretch is a good start. As resting penile smooth muscle tone is under adrenaline control, anxious patients will often have a contracted penis, which on stretch will elongate significantly. In some highly

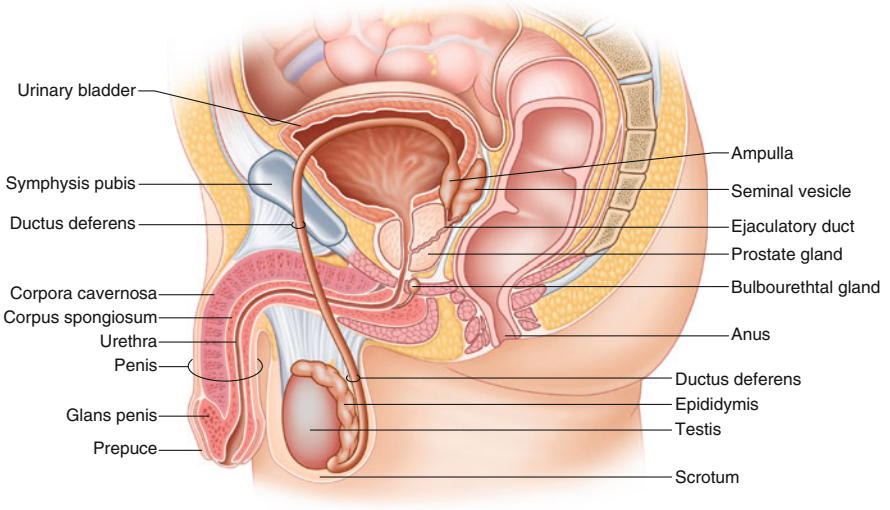


Fig. 1.1 Anatomy of the male pelvis

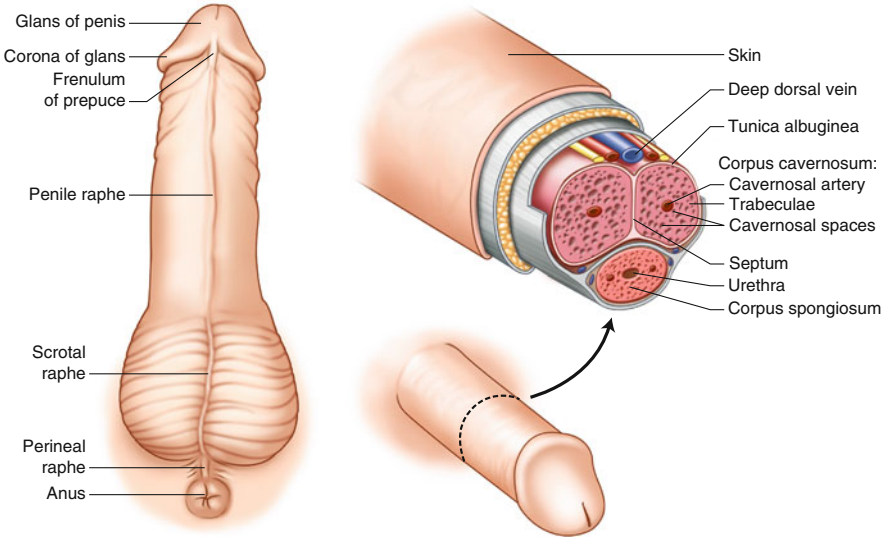


Fig. 1.2 Penile anatomy

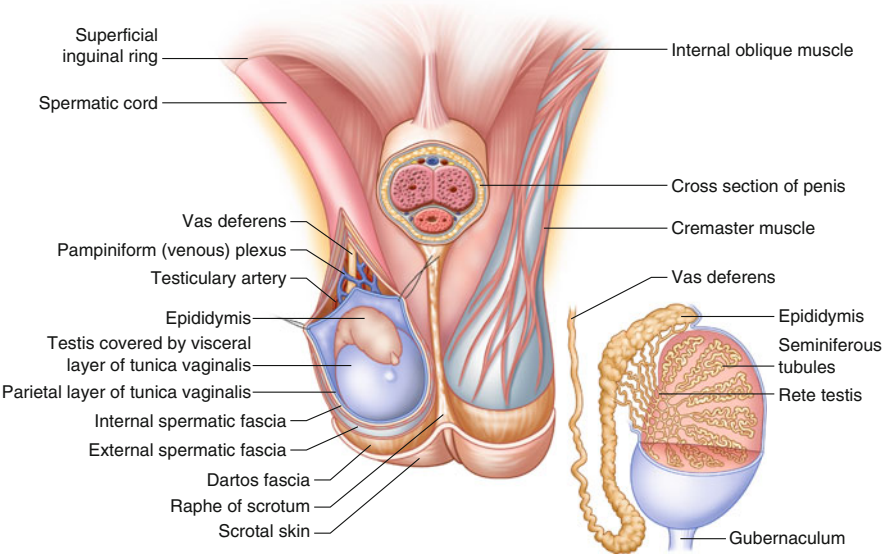
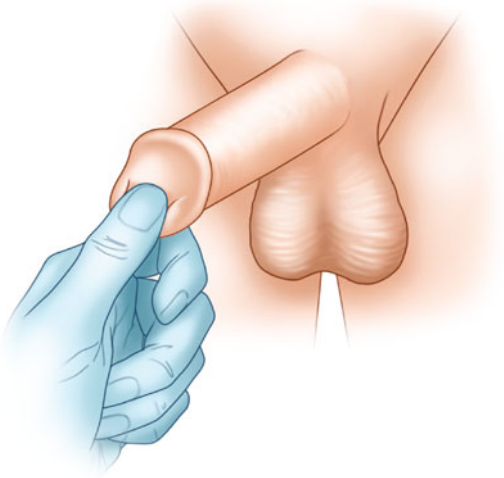


Fig. 1.3 Scrotal anatomy

anxious patients, the resting smooth muscle tone may be high enough that the penis will feel woody throughout, but on gentle stretch (with distraction of the patient), this generally disappears.

Careful palpation of the penile shaft should be performed, from pubic bone to coronal sulcus, to elucidate any plaque (Fig. 1.4). The patient may have more than one plaque present and may have plaques on both the dorsum and ventrum. The latter group of patients will often have no significant deformity, as such plaques counteract each other, but may complain of significant penile length loss. Palpation, applying side-to-side, *and* dorsoventral pressure are the optimal means of outlining plaque and septal anatomy. Side-to-side compression beginning at the 3 and 9 o'clock positions on the shaft and rolling firmly upward (for dorsal plaque) and downward (for ventral plaque) should be conducted meticulously along the entire shaft. The plaque location, morphology, and approximate size (where possible) should be documented, and measurement of the stretched flaccid length is recommended (Fig. 1.5). We suggest that such measurement be conducted between two fixed points, the pubic bone and the coronal sulcus. Measuring plaque size is surprisingly challenging and difficult to replicate because all methods are subject to intra- and inter-observer variability (Fig. 1.6). Further confounding the problem is the lack of universal agreement regarding the optimal method of measurement. Despite this, the frequency of plaque size being reported in the literature mandates an understanding of the methodology in addition to the limitations. Options include using calipers and rulers during physical exam or utilizing imaging modalities. Plaque size can be documented as either area or less appealingly as the longest plaque dimension.

Fig. 1.4 Penile stretch



Scrotal Contents

Examination of the scrotal contents, while important for all men presenting to the andrologist, is critical for the infertility patient. It is surprising to me how often a urology resident/fellow has a poor appreciation for the normal content anatomy, and this is especially true for the vasa deferentia. All urologists are encouraged to feel for the vasa every time a scrotal exam is being conducted.

Each testis should be examined individually. The testis should be palpated along its entire surface. Its regularity as well as consistency should be recorded. Assessment of testicular volume is ideally performed using ultrasound; however, this is not practical in everyday andrology practice for every single patient. In the early stage of the andrologist's career, an orchidometer should be used to assist in the clinician becoming familiar with testicular volumes. Following testis examination, attention should next be focused on the epididymis. This structure lies posterolateral to the testis, and examination on the epididymis should include its caput, corpus, and cauda. Its presence and consistency as well as the presence of any induration should be recorded. The vas deferens should be examined next. This is best examined by rolling this fibrous cord between two fingers, placed anterior and posterior to the structure. In heavy-set men, in men with varicoceles, or a spermatic core lipoma, palpation of the vas deferens can be challenging. Of course, the absence of the vas deferens on either side should lead one to suspect one of the congenital absence of the vas deferens syndromes. Following this, an assessment for the presence of the varicocele should be performed. Grade III varicoceles are routinely visible, grade II varicoceles are using palpable within the spermatic cord, and Grade I varicoceles require the conduct of a Valsalva maneuver. It is important when conducting the Valsalva maneuver to be aware as to whether what is being felt as a venous thrill may actually be contraction on this spermatic cord musculature. Thus, caution should be exercised when diagnosing a Grade I varicocele.

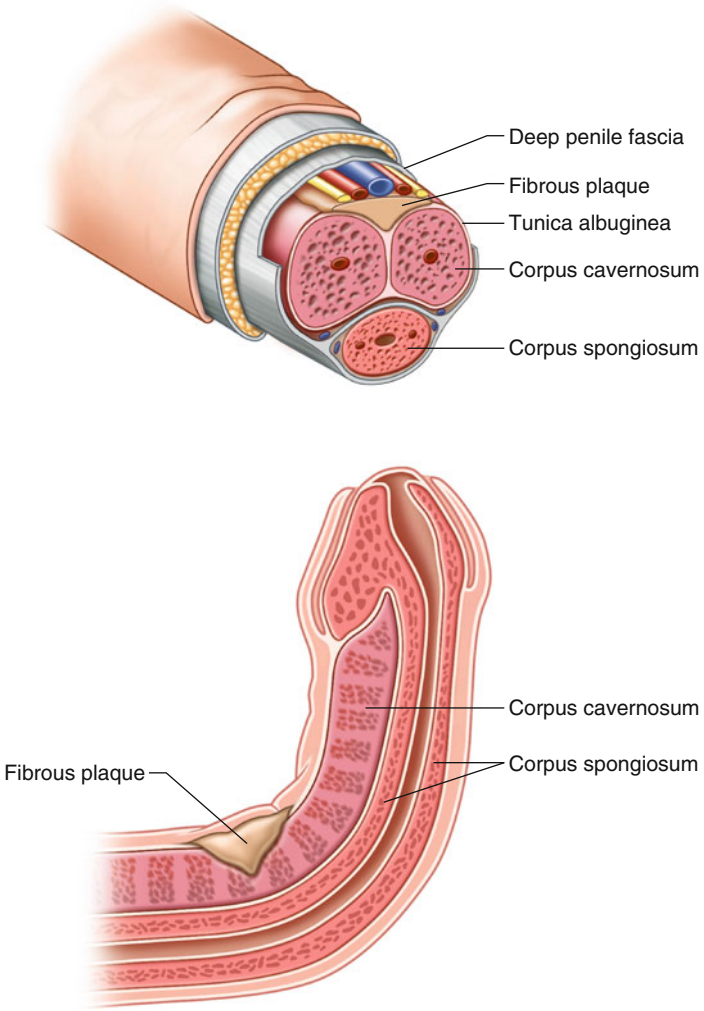


Fig. 1.5 Peyronie's plaques

Rectal Examination

Urologists are very familiar with digital rectal examination for the purposes of prostate evaluation. While assessment of the prostatic anatomy, its size, shape, consistency, and level of induration is important in routine clinical practice, the andrologist should also be aware of any other generally subtle structural changes on digital rectal examination. This is particularly important in patients with a history of hematospermia and ejaculatory duct obstruction. Even before assessing

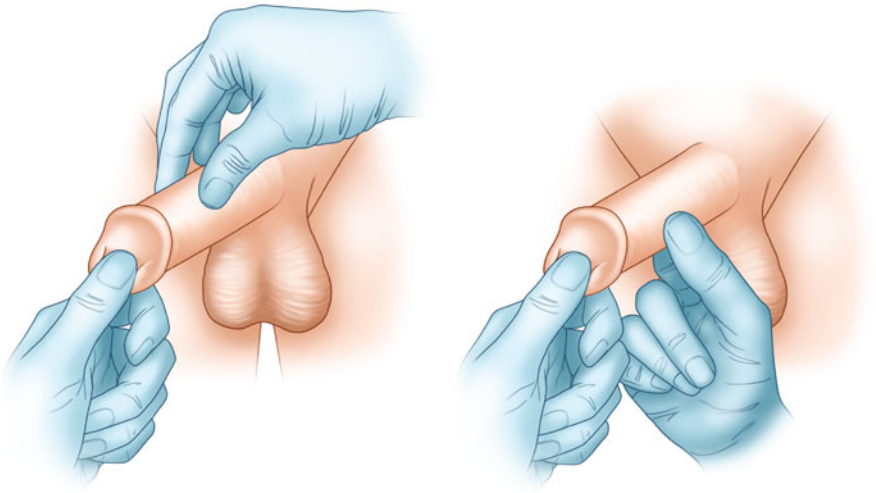


Fig. 1.6 Peyronie's plaque exam

prostatic anatomy, an external examination of the perianal area is a valuable step in the evaluation of patients. While not uniformly accurate, it is worthwhile recording the presence of a bulbocavernosus reflex and anal tone as part of the routine andrology examination.

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Chapter 2
Biothesiometry

John P. Mulhall and Lawrence C. Jenkins

Background

The biothesiometry device is used to measure the threshold of appreciation of vibration in patients. A decreased sensitivity to these vibrations may indicate the presence of a penile sensory neuropathy. This is a quantitative measure of the vibratory sense of the penis. The biothesiometer vibrates at a known frequency, and it is compared to other parts of the body with known vibration thresholds. The effectiveness of this test in documenting sensory neuropathy of the penis has not been established but is considered as a useful screening test. It is worth noting two important points: (1) this is only assessing sensory nerve function (and not motor or autonomic nerve integrity) and (2) this test may not be covered by the patient's insurance plan.

When patients complain of penile sensation loss, the andrology practitioner can utilize biothesiometry to screen for a sensory neuropathy. As the symptom of sensation loss may be organically based (penile sensory neuropathy) or perceptual in nature (psychogenic), biothesiometry is a useful diagnostic tool. Biothesiometry cannot locate the focus of the lesion nor its severity. For this we refer the patient for dorsal penile nerve somatosensory evoked potential (SSEP) analysis. Generally, any etiology of neuropathy can lead to penile sensation loss, but the most commonly encountered in routine andrology practice is diabetes mellitus.

While not well appreciated, reduced penile sensation may be a secondary psychosexual dysfunction. Typically anxiety-prone men, especially young men, develop multiple sexual dysfunctions, become increasingly focused on the penis, and may complain of reduced penile sensation. This increased focus on the penis, or penocentricity, may lead to a form of genital dysmorphophobia.

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Table 2.1 Nomogram

Nomogram for penile biothesiometry			
Age	Fingertip	Shaft	Glans
18–29	3	3	3
30–39	4	4	4
40–49	4	5	5
50–59	5	6	7
60–69	5	7	7

Biothesiometry is a useful way to detect neurologic disease in at-risk men (i.e., spinal cord injury or diabetes). It is also used to establish a baseline level of function prior to any surgical procedure that may compromise sensation to the head of the penis. Normalcy is determined by referring to the nomogram as shown in Table 2.1.

Indications

1. Patient complaining of penile numbness
2. Delayed orgasm
3. Prior to penile reconstructive surgery

Pre-procedural Considerations

Familiarize yourself with the device prior to starting the procedure (Figs. 2.1, 2.2, and 2.3). The patient should be supine on the examination table in a calm and relaxed state. The patient should be undressed from the waist down with a sheet covering their lower body prior to starting. The examiner should check finger and penile positions to be examined (Fig. 2.4). A standardized report should be ready to document findings (a sample report is shown in Fig. 2.5).

Procedure

With the patient undressed and ready, place the device on a stand or table near the patient (examination table). You should start by placing the probe on the tip of the patient's index finger (examine both the right and left fingers) and slowly increase the intensity of the vibration until the patient declares they are feeling the vibration. This is then used as a baseline so the patient can compare to the vibration sense of the penis.

The device is placed on the left and right mid-shaft of the penis, the left and right mid-glans, and finally the frenulum. The probe should be held perpendicular to the

Fig. 2.1 Main unit

Fig. 2.2 Dial

Fig. 2.3 Handheld probe

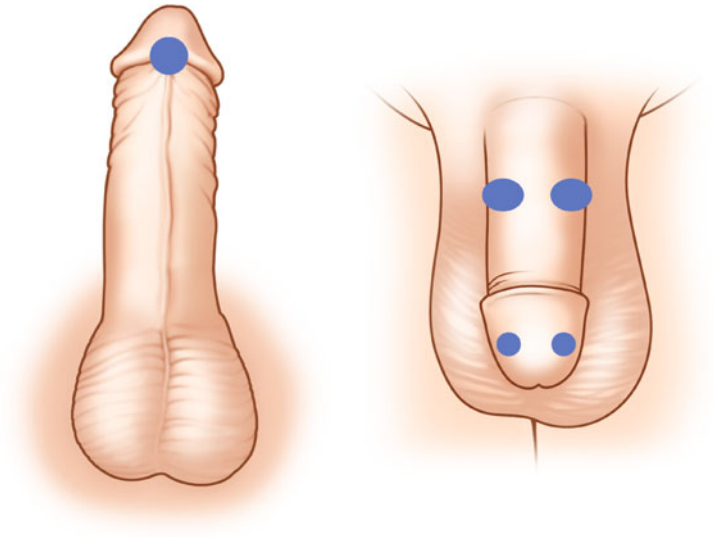


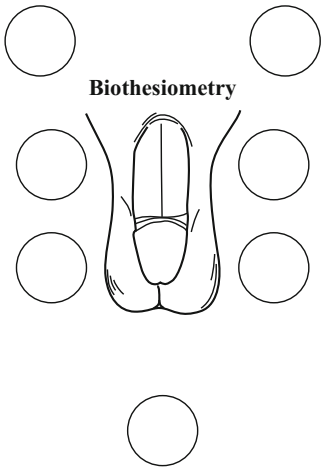
Fig. 2.4 Locations for assessment

skin surface to assure the probe tip has full and even contact with the skin. At all locations, intensity of vibration is slowly increased until the vibration is felt. This location is repeated twice and the average result should be documented on the report sheet.

BIOTHESIOMETRY

Patient: _____ Date: _____

MRN: _____



NOMOGRAM FOR BIOTHESIOMETRY

AGE	Pulp	Shaft	Glans
18-29	3	3	3
30-39	4	4	4
40-49	4	5	5
50-59	5	6	7
60-69	5	7	7

DIAGNOSIS:
- □ Consistent with neuropathy
- □ Normal

TREATMENT:
- □ Neurology consult
- □ SSEP
- □ Monitor

Comments:

_____

_____
Provider's Signature

Fig. 2.5 Report sheet

Complications

None.

Post-procedural Instructions and Management

If abnormal we suggest to all of our patients to consider referral for pudendal nerve SSEP testing for confirmation as well to define the severity of the sensory neuropathy as well as the location of the lesion within the neural arc. If the SSEP is abnormal, we would recommend a full consultation with a neurologist to investigate further.

Suggested Reading

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Chapter 3
Nocturnal Penile Tumescence

John P. Mulhall and Lawrence C. Jenkins

Introduction

The test was developed to study a man's erectile function while sleeping. The normal male has 3–5 erections while sleeping and a lack of these erections may be a sign of a larger problem. There have been several methods to assess rigidity in the past including the postage stamp test, the snap gauge, and the strain gauge. The snap gauge method uses bands of varying strengths wrapped around the penis. When an erection occurred, bands would break based on the degree of rigidity. The postage stamp test is a rudimentary form of the snap gauge. A roll of postage stamps was placed around the flaccid penis, and if a rigid erection occurred, the postage stamp roll would break. The strain gauge works by placing bands around the penis, and if an erection occurred, they would become stretched and retain their distension based on the change in penile circumference.

Indications

Psychogenic erectile dysfunction
Patients complaining of painful (and potentially prolonged) nocturnal erections
Medical-legal cases involving erectile function

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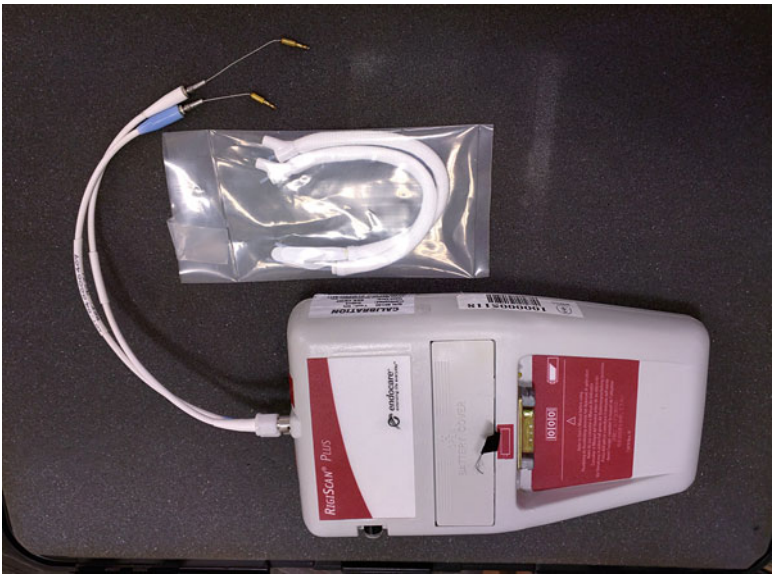

Fig. 3.1 Rigiscan® Plus device (GOTOP Medical, Inc., St. Paul, MN, USA)

Pre-procedural Considerations

The Rigiscan system (Rigiscan® Plus device—GOTOP Medical, Inc., St. Paul, MN, USA) is composed of two parts: (1) a portable nocturnal penile tumescence and rigidity data-logging unit and (2) a computer with printer for processing and printing the data (Fig. 3.1). It is important for the clinician to take note of conditions that may interfere with the Rigiscan analysis (sleep apnea syndrome, use of psychotropic medications, insomnia). Penile rigidity is measured as a percent displacement by the tension loops; thus, 100 % rigidity reflects zero tissue compression. Normal has been defined as rigidity ≥60–70 % (represents penile rigidity adequate for vaginal penetration), and rigidity <40 % equates to a flaccid penis. Some authorities have suggested using 55 % rigidity as a normal cutoff to yield the best sensitivity-specificity relationship.

Procedure

Prior to sleeping, the unit is secured to the patient's thigh in a pouch worn on the leg, and the penile loops are fitted to the penis, one toward the base and the other toward the tip (Fig. 3.2). We typically place these at the junction of the mid-proximal one third of the penis (base loop) and at the junction of the mid and distal one thirds of

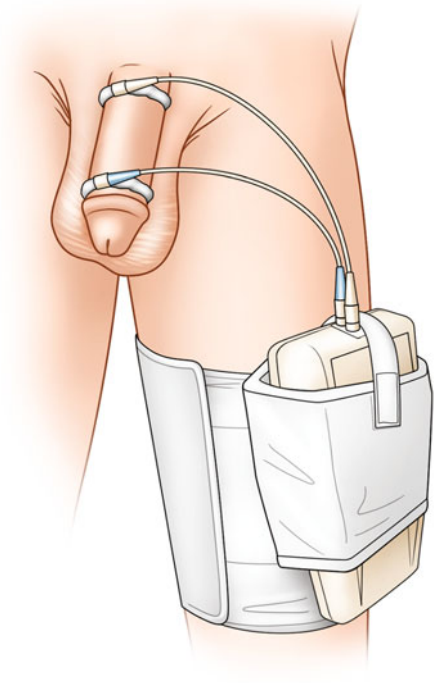

Fig. 3.2 Illustration of device placement. Rigiscan® device

the penis (tip loop). The penile circumference is measured by the machine at baseline every 15 s and saved into memory. The penile rigidity is checked every 3 min; if there is a greater than 3 mm increase, the sampling rate increases to every 30 s until the rigidity returns to baseline, and all is saved into memory. The device is worn for at least two nights at home. Once the unit is returned to the office, it may be connected to a computer where the data can be downloaded to show rigidity and circumference readings.

The limitation of this device is that the majority of patients even with normal erectile function will have an equivocal result; that is, they will fail to get 3–5 erections of 60–70 % rigidity lasting at least 10–15 min in duration. The most recent iteration of this device uses rigidity activity units (RAU) to quantify more accurately the duration of the achieved rigidity. The number of minutes recorded at any given rigidity level is printed on the data sheet. Despite the advent of this innovation, there is little evidence to suggest that this approach is anymore accurate than the use of number or erections, degree of rigidity, and duration on any given night.

This test is most helpful when it is completely normal as defined by the above criteria or when it is completely flat (failure to record any penile tumescence or rigidity). A complete absence of nocturnal erectile activity may lead to a diagnosis of profound neurogenic ED, severe venogenic ED, testosterone deficiency, or technical problems with use of the device.

Complications

None.

Post-procedural Management and Instructions

Patients with values below the normal level might benefit from further testing to determine the etiology of their ED.

Suggested Reading

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Chapter 4
Penile Block

John P. Mulhall and Lawrence C. Jenkins

Introduction

The penile nerve block is a useful technique when performing procedures on the penis to minimize pain. The penis is innervated by the left and right dorsal nerves, which are branches of the pudendal nerve. There are a variety of penile blocks and we describe our favorite approach.

Indications

1. Treatment of penile pain
2. To rule out extra penile pathology in patients with possibly functional penile pain
3. Penile procedures

Pre-procedural Considerations

Do not perform if there are signs of skin infection near the area of injection. A topical agent (EMLA) can be utilized, but this requires significantly more prep time as it may take up to 45 min for the topical agent to be effective. Use anesthetic agent (lidocaine, bupivacaine) *without epinephrine* to prevent ischemia to the penis. Both 1 and 2 % lidocaine (Xylocaine) without epinephrine will work satisfactorily.

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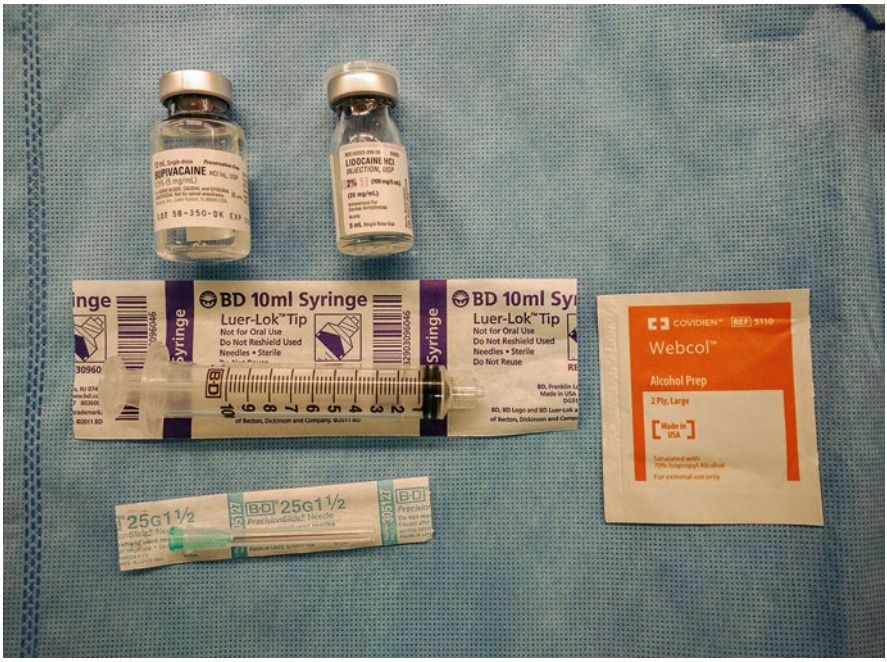


Fig. 4.1 Necessary equipment

For a longer effect, one may use equal parts of 0.5 % bupivacaine and 1 or 2 % lidocaine without epinephrine. The patient should be placed supine (lest a vasovagal reaction occurs) with the genitalia exposed. If right-hand dominant, stand on the patient's right side. If an assistant is available, they can hold the penis on stretch to facilitate the procedure. They can also hold compression once completed. Bending the needle slightly may aid in following the curve around the penis.

The list of necessary equipment includes (Fig. 4.1):

1. Skin prep—alcohol/chlorhexidine prep swab
2. Anesthetic agent—lidocaine or bupivacaine
3. 10 mL syringe
4. 16-gauge needle to withdraw medication
5. 27-gauge needle to inject
6. Dry gauze—to absorb any bleeding post procedure
7. Sterile gloves

Procedure

We do not inject under the pubic bone as we believe this is truly blind procedure and difficult to compress vessels should excessive bleeding occur and the likelihood of hematoma formation is greater. In addition, do not go too proximal on the penis to

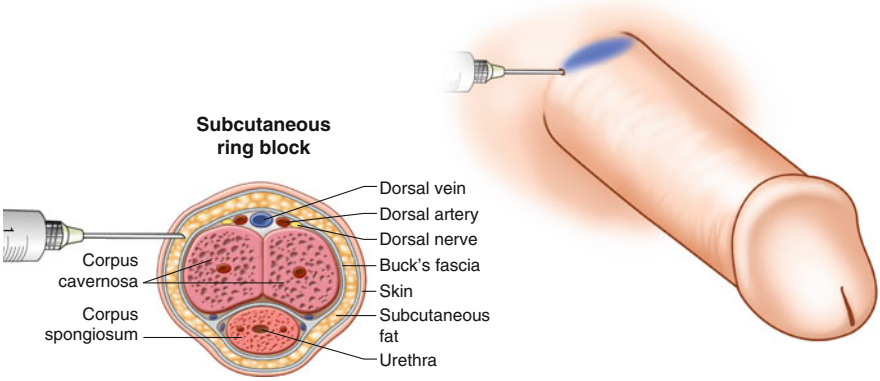
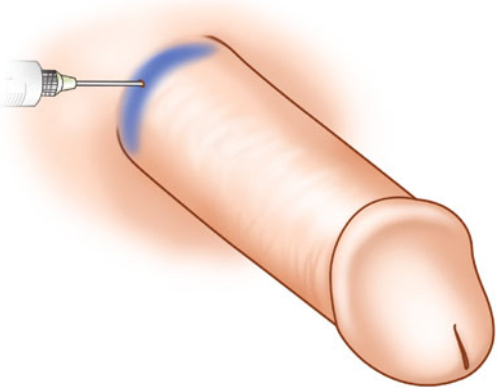


Fig. 4.2 Illustrations of injection location technique—dorsal modified from Kraft NL. A pictorial guide to circumcision without pain. Adv Neonatal Care. 2003;3(2):50–64

Fig. 4.3 Illustrations of injection location technique—270°



avoid injection into the prepubic fat pad. Using the larger needle, draw up the anesthetic agent into the syringe and then switch to the smaller caliber needle. One can place two fingers at the base of the penis and press against the pubic bone. This allows any prepubic fat or redundant skin to move away from the base of the penis and aids in exposing the basal penile shaft. This results in more accurate targeting of the space just above Buck's fascia.

Prepare the skin with an alcohol/chlorhexidine swab. Using a 27-gauge needle, insert the needle transversely at the 9 o'clock position and advance across the shaft of the penis while remaining above Buck's fascia until you reach the opposite side (Figs. 4.2, 4.3, 4.4, 4.5, 4.6, 4.7, 4.8, and 4.9). Try to avoid damaging any visible vessels (Fig. 4.2). Aspirate to make sure you are not within a blood vessel. If blood is easily drawn into syringe, readjust needle location; otherwise continue. Begin injecting anesthetic agent as the needle is slowly withdrawn. Hold pressure on the treated area after the needle is removed and also help distribute any medication bulges (Fig. 4.11).

For circumferential (270°) block, one can inject and avoid trauma to the urethra by going only 270° with the needle and sparing the urethra. To perform the 270°

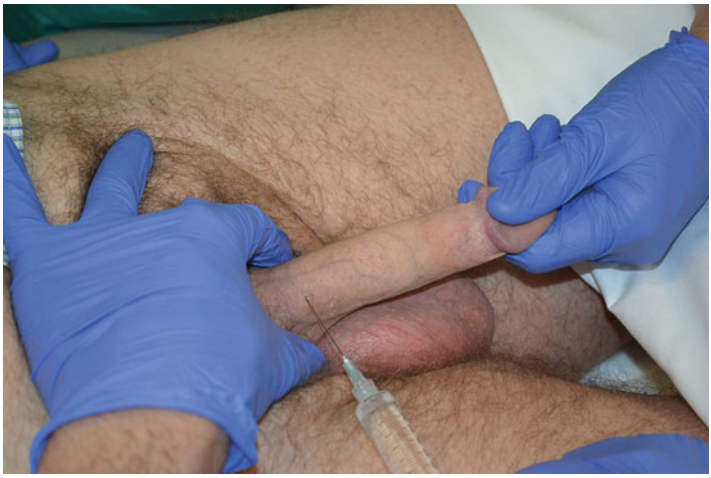


Fig. 4.4 Pictures of technique stepwise

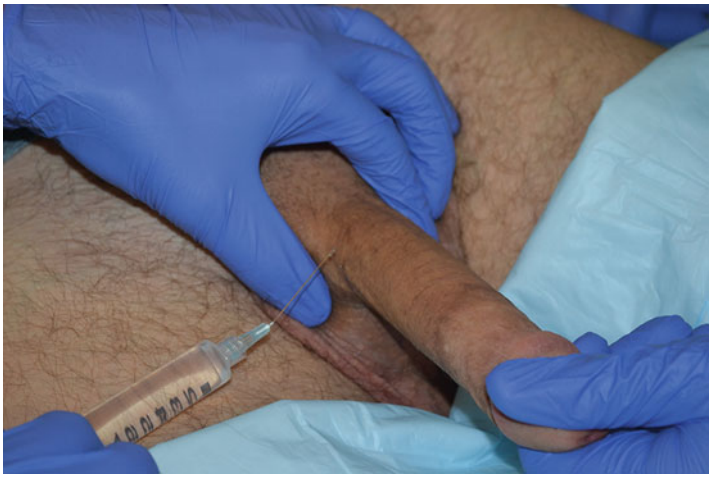


Fig. 4.5 Pictures of technique stepwise

block, the needle should be inserted at the 11 o'clock position and advanced to the 5 o'clock position. Anesthetic is injected as the needle is slowly withdrawn (Fig. 4.3). A second injection is then performed from the 11 o'clock position back to the 7 o'clock position and again the anesthetic is injected while the needle is withdrawn (Fig. 4.10).

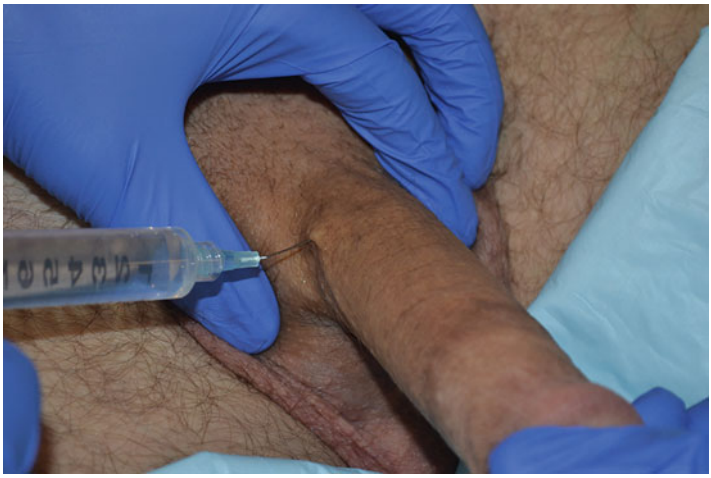


Fig. 4.6 Pictures of technique stepwise

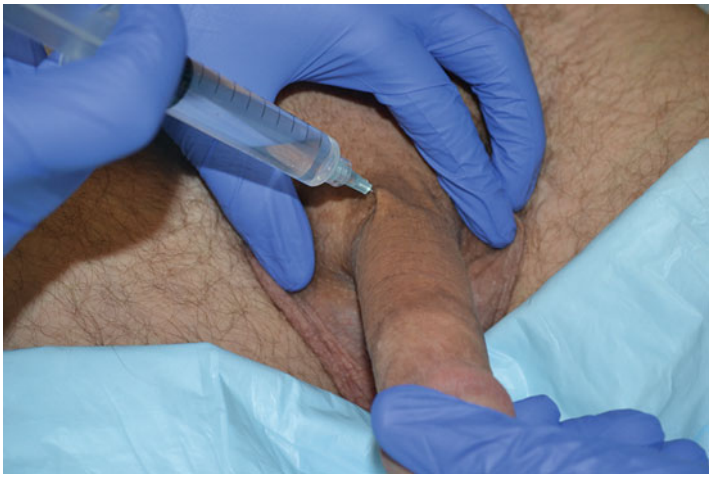


Fig. 4.7 Pictures of technique stepwise

Complications

1. Ecchymosis and hematoma—maintain pressure on the injected region to minimize.
2. Incomplete anesthesia—repeat block. Be careful not to cause lidocaine toxicity by exceeding the recommended dose of 4.5 mg/kg.
3. Vasovagal response.
4. Prolonged neuropraxia.

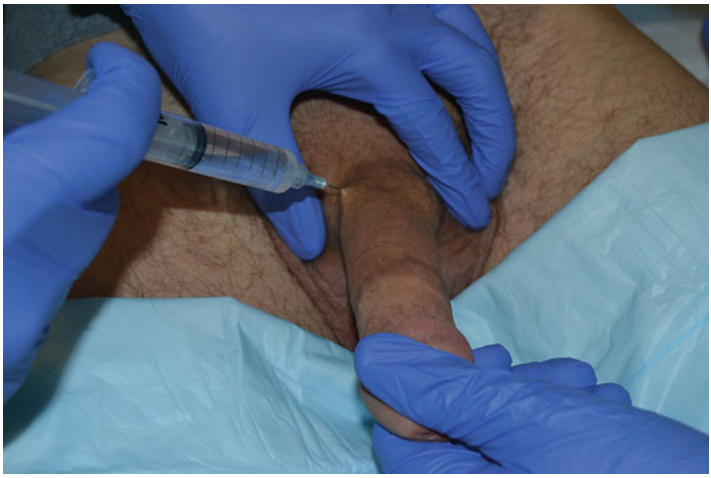


Fig. 4.8 Pictures of technique stepwise

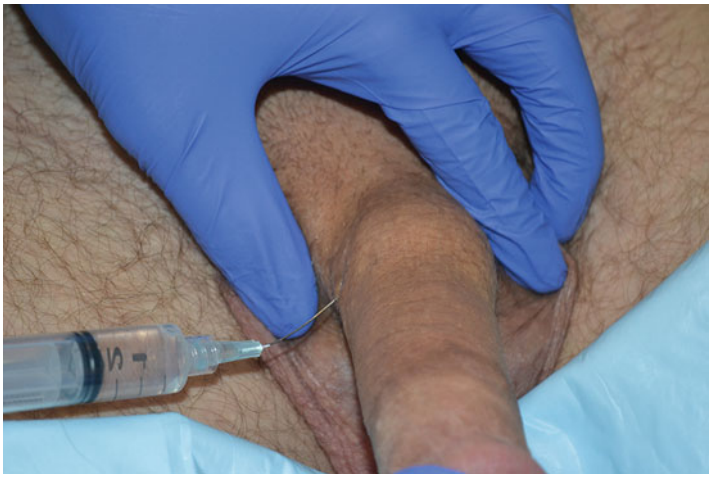


Fig. 4.9 Pictures of technique stepwise

Post-procedural Management

Hold compression for 2 min afterward to prevent hematoma formation (Fig. 4.11). Apply a lightly wrapped compression bandage as you see fit. Leave on for not more than 1 h.

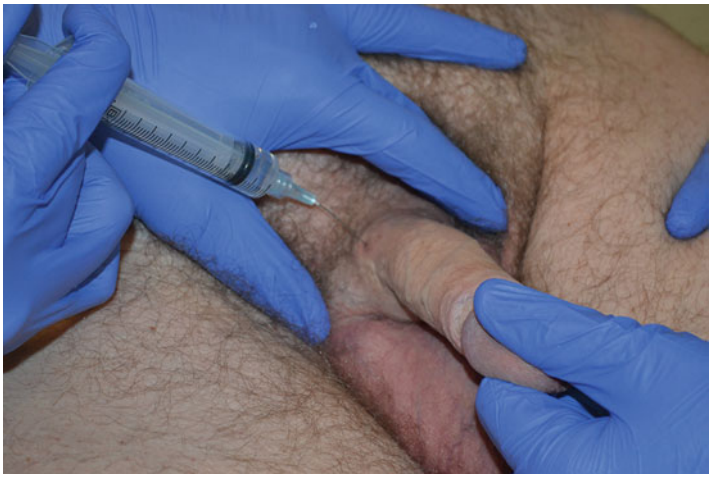


Fig. 4.10 Pictures of technique stepwise

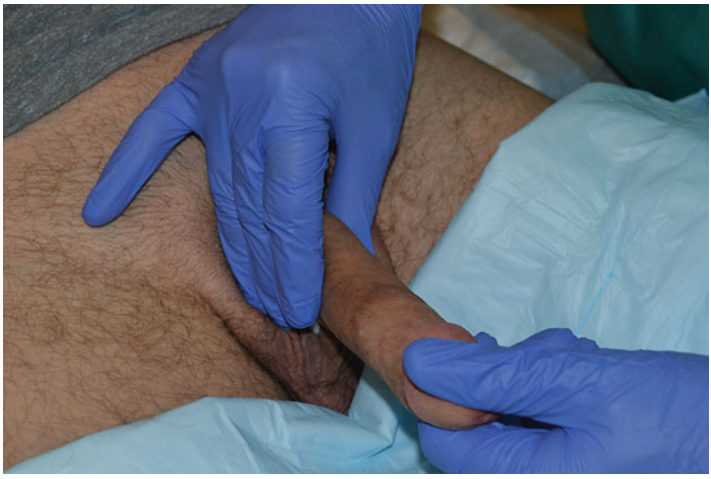


Fig. 4.11 Pictures of technique stepwise

Suggested Reading

Brady-Fryer B, Wiebe N, Lander JA. Pain relief for neonatal circumcision. Cochrane Database Syst Rev. 2004;4, CD004217.

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Chapter 5
Spermatic Cord Block

John P. Mulhall and Lawrence C. Jenkins

Introduction

The spermatic cord block is a useful strategy when performing procedures on the testicle/epididymis to optimize pain control. It is also useful for patients complaining of testicular/epididymal pain prior to any more invasive procedures. A trial of anesthesia can also help select patients who would most benefit from a spermatic cord denervation surgery.

Indications

1. As a treatment for chronic testicular pain
2. To differentiate between intra-scrotal and extra-scrotal pathology prior to spermatic cord denervation surgery
3. To optimize pain control after testicular/epididymal surgery

Pre-procedural Considerations

Do not perform if there are signs or concerns of skin infection near the area of injection. The spermatic cord block only provides anesthesia to the testicle/epididymis and not to the overlying scrotal skin. This should be anesthetized separately if necessary

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for the procedure. A topical agent (EMLA) can be considered but this requires significantly more prep time as it may take at least 45 min for the topical agent to be effective. Use anesthetic agent (lidocaine, bupivacaine) without epinephrine to prevent ischemia to the testicle/epididymis. Both 1 and 2% lidocaine (Xylocaine) without epinephrine will work satisfactorily. For a longer effect, one may use equal parts of 0.5% bupivacaine (Marcaine) and 1 or 2% lidocaine without epinephrine. Patient should be supine with the genitalia exposed.

List of Necessary Equipment

1. Skin prep—alcohol/chlorhexidine prep swab
2. Anesthetic agent—lidocaine or bupivacaine
3. 10 mL syringe
4. 16-gauge needle to withdraw medication
5. 27-gauge needle to inject
6. Dry gauze—to absorb any bleeding post procedure
7. Gloves

Procedure

Using the larger needle, draw up the anesthetic agent into the syringe and then switch to the smaller caliber needle. Prep the skin with an alcohol/chlorhexidine swab. At a position high in the cord within the scrotum, place thumb and index fingers of the nondominant hand around the cord securing it into position. Using a 27-gauge needle, insert needle with the dominant hand until you reach the opposite side of the cord (Fig. 5.1). Aspirate to make sure you are not within a blood vessel. If blood is easily drawn into the syringe, readjust needle location and apply some compression, then reattempt. Begin injecting anesthetic agent as the needle is slowly withdrawn. Hold pressure on the treated area after the needle is removed and also help distribute any medication bulges. We typically inject no more than 5–10 mL/cord.

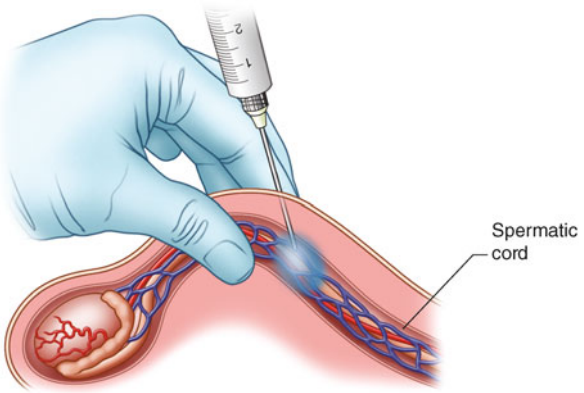

Fig. 5.1 Illustrations of hand position and injection location

Complications

1. Ecchymosis and hematoma—maintain pressure on the injected region to minimize.
2. Incomplete anesthesia—repeat block. Careful not to cause lidocaine toxicity by going over the recommended dose of 4.5 mg/kg.
3. Vasovagal response.
4. Puncture of the surrounding tissue—including the vas deferens.
5. Prolonged neuropraxia.

Post-procedural Management

Compression to prevent hematoma formation.

Suggested Reading

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Chapter 6
Penile Duplex Doppler Ultrasonography

John P. Mulhall and Lawrence C. Jenkins

Introduction

The duplex Doppler ultrasound is a simple, non-invasive procedure to evaluate erectile hemodynamics in men with ED (erectile dysfunction); however, there is a learning curve for obtaining the most accurate results. Doppler ultrasound is combined with an intracavernosal injection of vasoactive agents to evaluate penile blood flow: inflow (arterial) and outflow (venous). In a normal erection, the smooth muscle within the corpora cavernosa relaxes allowing blood to fill the sinusoidal spaces. As the penis gets engorged with blood, the veins along the periphery of each chamber are compressed against the enveloping tunica albuginea preventing blood from escaping, thus adding to the rigidity. The erection dissipates as the smooth muscle contracts, under adrenaline control, forcing the arterial inflow to decline and allowing the peripheral veins to drain the remaining blood back into the general circulation. If there is a problem with the arterial inflow (arterial insufficiency) or the venous outflow (corporal veno-occlusive dysfunction or venous leak), the erection will not reach optimal rigidity.

Some practitioners examine both flaccid and erect blood flow; however, many authorities recognize there is no additional clinical value learned from the flaccid blood flow given the variability in basal intracavernosal adrenaline levels and therefore smooth muscle tone. Likewise, the measurement of the cavernosal artery diameters while part of the classic protocol adds little to our understanding of the patient's erectile hemodynamics. In addition, many andrologists repeat the scanning of the blood flow at preset time points (5, 10, 15 min, etc.). In fact, the optimal timing of hemodynamic evaluation is at the time of complete cavernosal smooth muscle relaxation, which under ideal conditions is at the point of maximal rigidity. In patients

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Table 6.1 Normative criteria

Diagnosis	Peak systolic velocity (cm/s)	End diastolic velocity (cm/s)
Normal (Fig. 6.10)	>35	<3
Cavernosal artery insufficiency (Fig. 6.11)	<30	<3
Venous leak (Fig. 6.12)	>35	>5
Mixed vasculogenic disease (Fig. 6.13)	<30	>5

with less than fully rigid erections defining this time point can be a challenge. There are two means of trying to define complete smooth muscle relaxation. Firstly, and the only truly accurate means of defining this phenomenon, is the achievement of negative end diastolic velocity (EDV) values. Under these circumstances the operator can state the data achieved are most probably accurate. The other method, a surrogate technique, is to define a priori what the patient's best quality erection (BQE) is at home. The ideal assessment of the BQE is his best nocturnal erection, followed by his best sex erection without the use of erectogenic medications. The former is preferable as there is less adrenaline at play for nocturnal erections (less pressure, expectation, and anxiety).

Normative criteria (Table 6.1) are based on pooled data of the population to identify what "normal" should be. The ROC curve is able to identify values that will adjust the sensitivity and specificity of the test. We define definitely normal peak systolic velocity (PSV) as values >35 cm/s. Numbers such as 30 cm/s or 25 cm/s may also be used, but based on the ROC, they will have a lower true positive rate (specificity), while the sensitivity will increase. For venous leak, we utilize an EDV cutoff of >5 cm/s to optimize the ROC.

Indications

1. Erectile dysfunction
2. Evaluate for AV fistula
3. As part of penile deformity assessment (Peyronie's disease)

Pre-procedural Considerations

1. Assess the patient's blood pressure and heart rate prior to administering any vasoactive agent. While hypertension is not a contraindication to receiving vasoactive medication intracavernosally, should the patient experience a prolonged erection, intracavernosal phenylephrine (or other alpha-adrenergic agonists) should not be given to a patient with baseline hypertension, for fear of inducing a malignant hypertensive episode.

2. Check that the patient is not taking MAOIs as this is a true contraindication to using intracavernosal phenylephrine (or other alpha-adrenergic agonists).
3. Encourage the patient to avoid use of PDE5i the morning of the procedure. However, a patient who is using stable daily dose of tadalafil for ED or BPH/LUTS may continue his medication regimen.
4. Some patients might benefit from the use of audiovisual sexual stimulation (AVSS) by means of adult reading material or videos to help them increase arousal and relax.
5. For intracavernosal injection, we use trimix (papaverine 30 mg, phentolamine 1 mg, alprostadil 10 μg) if the patient is injection naïve. Other injection agents may be used such as papaverine monotherapy, bimix (papaverine + phentolamine), and PGE monotherapy (Caverject®, Pfizer Inc., New York, NY; Edex®, Auxilium Pharmaceuticals, Inc., Chesterbrook, PA) as long as the goal of achieving complete cavernosal smooth muscle relaxation is appreciated.
6. It is necessary to have an ultrasound machine with color duplex Doppler capabilities and a high frequency, preferably a 7.5–15 MHz linear transducer. Doppler angle should be set at 60° of insonation (Fig. 6.1).
7. Positioning: for penile imaging the patient should be supine; however, for perineal imaging, the patient should be frog legged. The penis should be oriented upward with the glans grasped by the patient himself to stabilize the penis for examination.
8. A dosing sheet and report sheet are useful in keeping track during and after the procedure (Figs. 6.2 and 6.3).

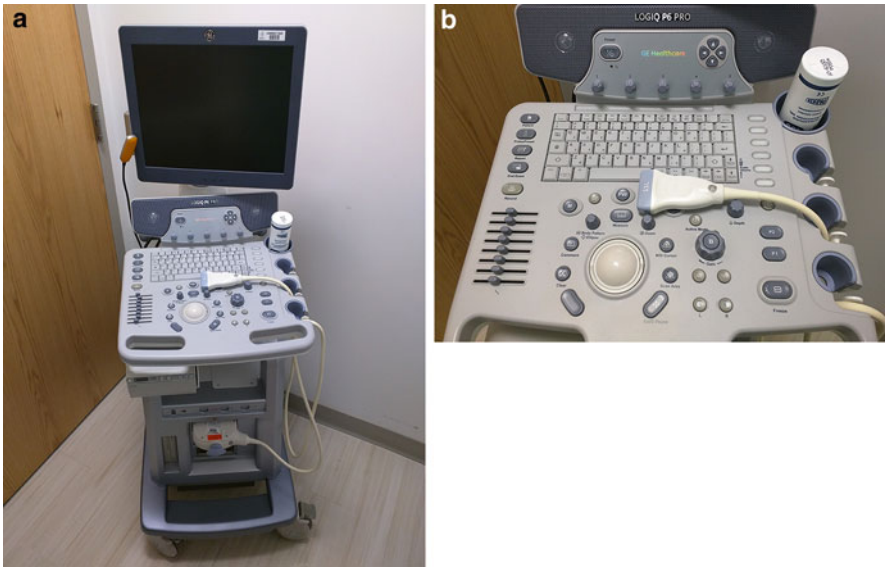

Fig. 6.1 Picture of ultrasound machine and probe

Penile Duplex Sonogram Injection Log							
Name: _____							
MRN: _____			Allergies: _____				
Time	**Date**	**Agent**	**Dose**	**Administered by**	**Response**	**Post DUS Response**	**Comments**
Neo-Synephrine given:		Yes _____	No _____				
Time	**Date**	**Agent**	**Dose**	**Administered by**	**Post Neo-Synephrine Response**	**Comments/Vital Signs**	

Fig. 6.2 Sample dosing sheet

Duplex Doppler Ultrasonography											
Clinician Performing Review: ☐NP/PA ☐ Fellow ☐ Attending											
Indications: ☐ED ☐Penile Deformity ☐Other:											
Procedure: Risk/Benefits Reviewed ☐ Yes ☐ No											
Agent: ☐ Trimix ☐ Bimix ☐Other_____					#Doses ☐ 1_____ ☐ 2_____ ☐ 3_____ total units____						
BQE: /10	Oral Agent Response: /10				ICI Response: CA /10			DUS /10			
Right PSV	Left PSV		Right EDV		Left EDV		Right RI		Left RI		
Curvature	☐Yes	☐No					Location				
Primary Curve	☐Dorsal	☐Ventral	☐Left	☐Right	Degrees:		☐Prox1/3	☐Mid	☐Distal1/3	☐Retro	
Secondary Curve	☐Dorsal	☐Ventral	☐Left	☐Right	Degrees:		☐Prox1/3	☐Mid	☐Distal1/3	☐Retro	
Hourglass Deformity	☐Yes	☐No	Magnitude:	☐Mild	☐Mod	☐Severe	☐Prox1/3	☐Mid	☐Distal1/3	☐Retro	
Indentation	☐Yes	☐No	Magnitude:	☐Mild	☐Mod	☐Severe	☐Prox1/3	☐Mid	☐Distal1/3	☐Retro	
Tapering	☐Yes	☐No	Magnitude:	☐Mild	☐Mod	☐Severe	☐Prox1/3	☐Mid	☐Distal1/3	☐Retro	
Instability	☐Yes	☐No	Magnitude:	☐Mild	☐Mod	☐Severe	☐Prox1/3	☐Mid	☐Distal1/3	☐Retro	
Other Deformity											
Stretched Flaccid Length (cm):			Erect Length (cm):								
Neo-Synephrine Administration:			☐No ☐Yes Dose:				% Erection at Discharge:				

Fig. 6.3 Sample report sheet

List of Necessary Equipment

1. 29-gauge insulin syringe
2. Injectable vasoactive medication
3. Alcohol prep pads

4. Non-sterile gloves
5. Report sheet
6. Ultrasound machine, probe, and ultrasound gel

Procedure

A redosing schedule should be utilized in an effort to overcome intracavernosal adrenaline and achieve complete smooth muscle relaxation. Approximately one half of men seen by us with a diagnosis of venous leak based on an outside DUS have a normal DUS result when repeated at our center. This is the result of underdosing and failure to achieve maximal smooth muscle relaxation and thus a false diagnosis of venous leak is given. The agent and the dose of medication are less important than the outcome. At our center as previously mentioned, we use trimix. We commence with a first dose of trimix five units (unless the patient happens to already be using intracavernosal injections and then we will use his at home agent/dose), and if optimal rigidity has not been achieved in 10 min, a second and possibly a third dose of trimix ten units will be given. The decision to redose is based on two main factors, penile rigidity and EDV values. Failure to achieve a BQE (unless the study is normal) and elevated EDVs dictates administering a second or third dose of vasoactive agent.

Once the patient information is entered into the machine's database, set the machine on the duplex (pulse wave) and color flow mode. Start by applying ultrasound gel to the base of the penis.

Place the probe vertically along the base just lateral to the urethra. Angle the probe so that it is perpendicular to the skin. Avoid excessive pressure of the probe on the penis (Figs. 6.4, 6.5, and 6.6). Beginning paraurethrally just above the peno-

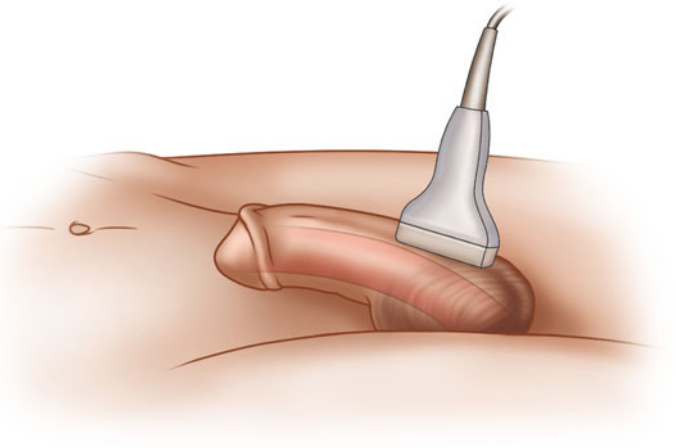

Fig. 6.4 Illustration of location to scan—penis

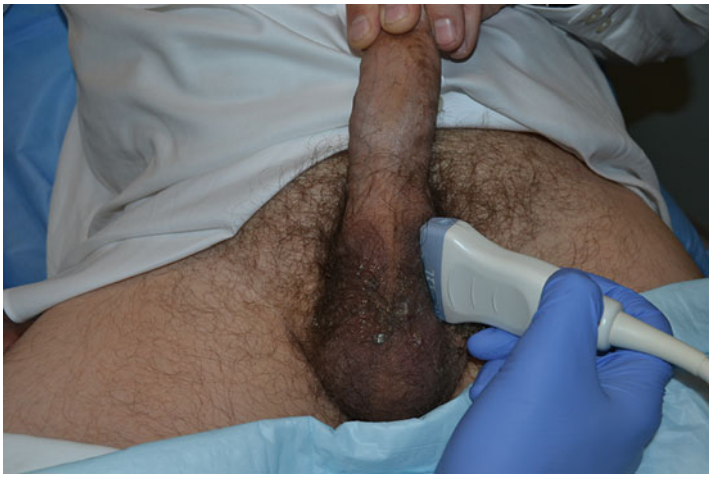

Fig. 6.5 Picture of left cavernosal artery imaging

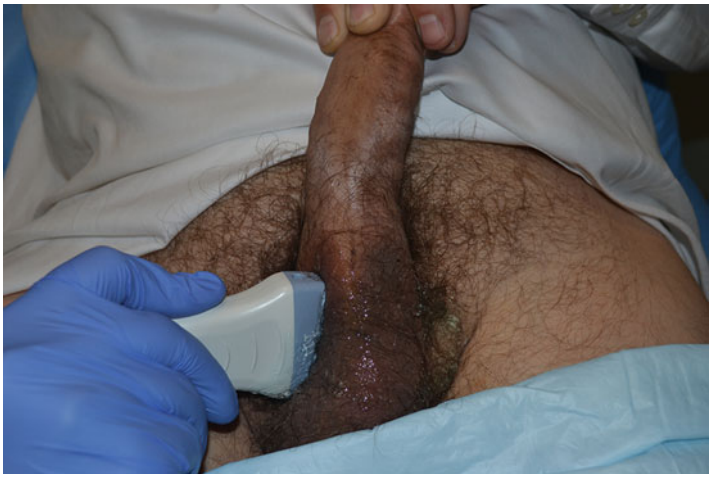

Fig. 6.6 Picture of right cavernosal artery imaging

scrotal junction, slowly move the probe further laterally around the penis to identify the cavernosal artery. The tunica albuginea is visualized as a linear hyperechoic structure covering the hypoechoic corpora cavernosa. The cavernosal arteries are identified by linear hyperechoic structures with a hypoechoic lumen or color flow. Once the artery is located, the probe can be moved proximally and distally to identify the best signal.

For velocity measurement, place the crosshairs on the vessel to visualize the wave pattern. There will be a systolic peak flow followed by the diastolic flow. With full smooth muscle relaxation within the corpora cavernosal, the end diastolic

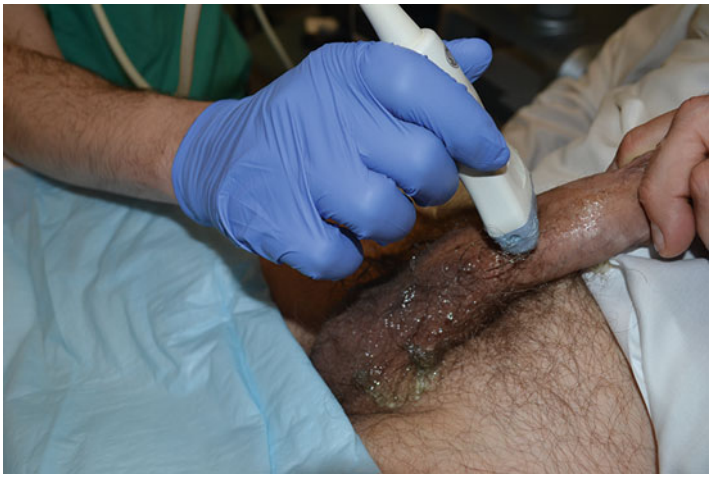

Fig. 6.7 Picture of shaft imaging

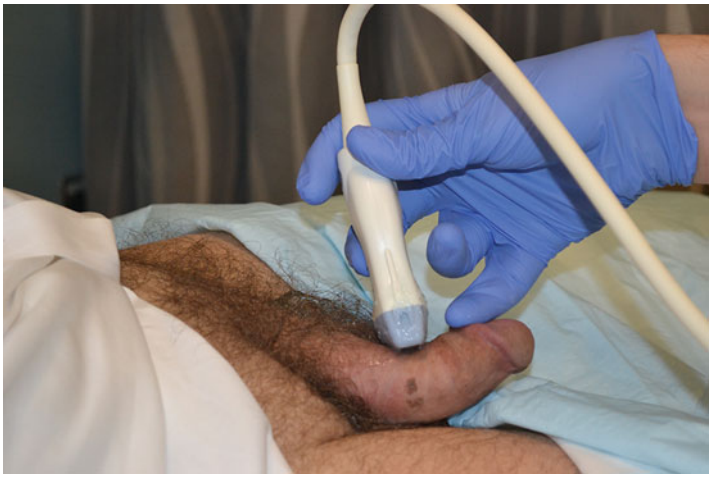

Fig. 6.8 Picture of penile deformity assessment

velocity will often be negative (reversal of flow). Once the pattern is visualized, freeze the image, and measure the PSV and EDV using the digital calipers on the machine, then save/print the image. Repeat the same steps on the opposite side. Once duplex measurements are completed, switch into B mode and scan the penis for any plaques or calcifications. Be sure to adjust the depth of penetration appropriately (Fig. 6.7). Freeze and label any pertinent images. If the patient is being evaluated for penile deformity, turn the probe horizontally. Pay special attention while scanning areas of deformity for signs of plaque or calcification as this might impact treatment decisions especially if located at the point of maximal curvature. Full cross-section images may be easier to interpret. Freeze/save any images after properly notating and/or measuring findings (Fig. 6.8).

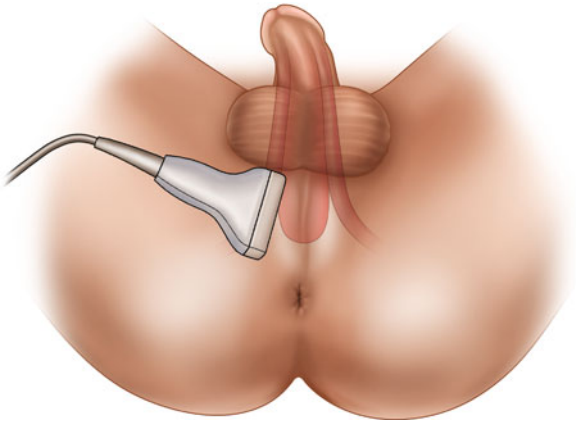

Fig. 6.9 Illustration of location to scan—perineum

For perineal ultrasound, while in color flow mode with patient in the frog-legged position, scan the perineum beginning at the most proximal portion of each corpora cavernosa and slowly move distally. The most common indication for this is the identification of an arteriovenous fistula in nonischemic priapism. In such patients, the entire penis should also be examined (Fig. 6.9). Save and notate any findings.

One particular scenario to be cognizant of is the patient with a significant discrepancy in PSV or EDV values between right and left sides. It is generally accepted that a difference of more than 10 cm/s in PSV values is pathological. When unilateral cavernosal artery insufficiency occurs, it is a relatively unusual circumstance, most often seen in our practice in patients post-radical prostatectomy who have had ligation of an accessory pudendal artery. More likely is the situation where the patient loses his erectile rigidity in the middle of the procedure between examination of the first and the second side. Likewise, we see men with perfectly normal EDV values on one side, who after losing their erection mid-procedure have an elevated EDV value on the opposite side. Given that the veno-occlusive mechanism is a three-dimensional construct, one can appreciate that it is impossible to have venous leak on one side of the penis and not the other (sample images—Figs. 6.10, 6.11, 6.12, 6.13, 6.14, 6.15, 6.16, 6.17, 6.18, 6.19, 6.20, 6.21, and 6.22).

Post-procedural Management and Instructions

A comprehensive discussion of the results, their implications, and a treatment plan occurs after the procedure has ended on the same day.

After the procedure and discussion, the patient is instructed to sit in the waiting room for another 20 min to allow time for detumescence. If upon reexamination, the erection remains at penetration hardness, intracavernosal phenylephrine is

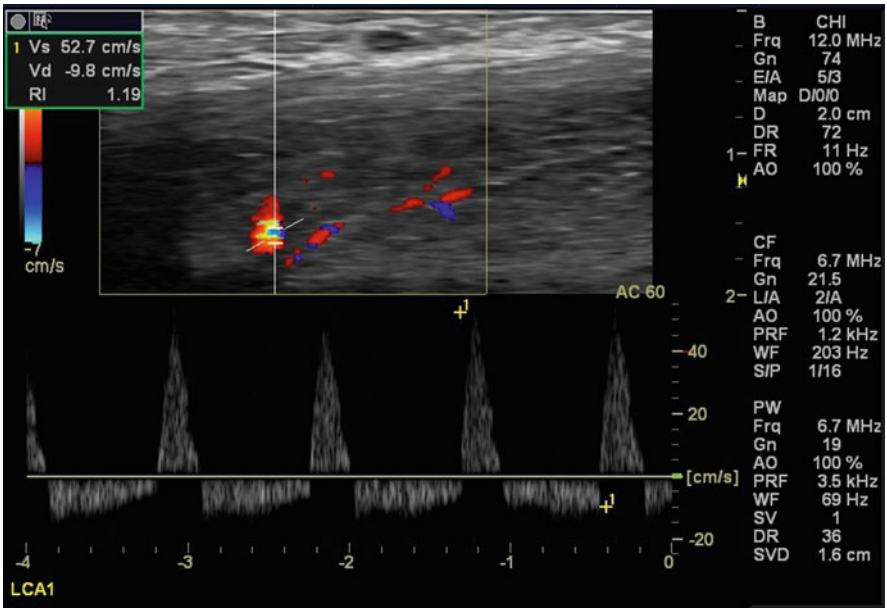

Fig. 6.10 Sample tracing: normal tracing (variety)

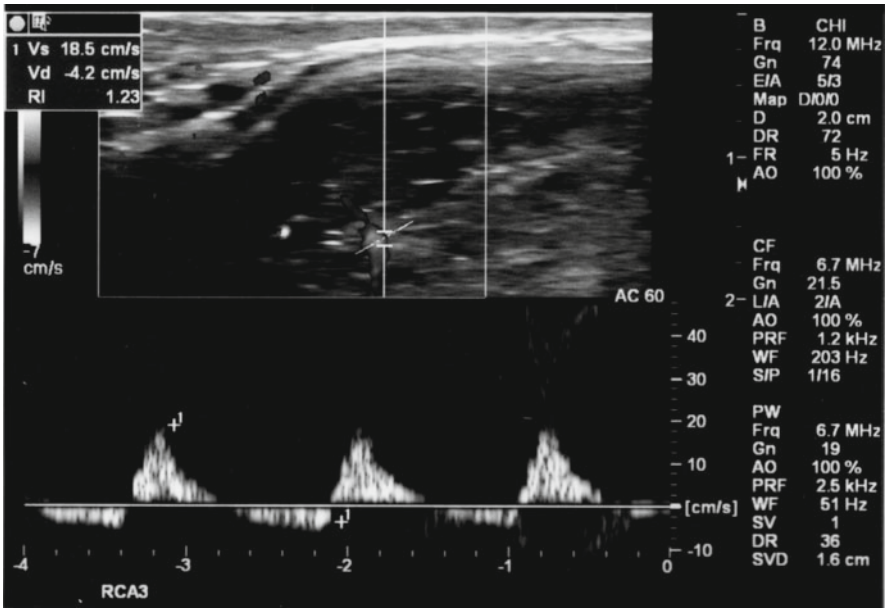

Fig. 6.11 Sample tracing: cavernosal artery insufficiency

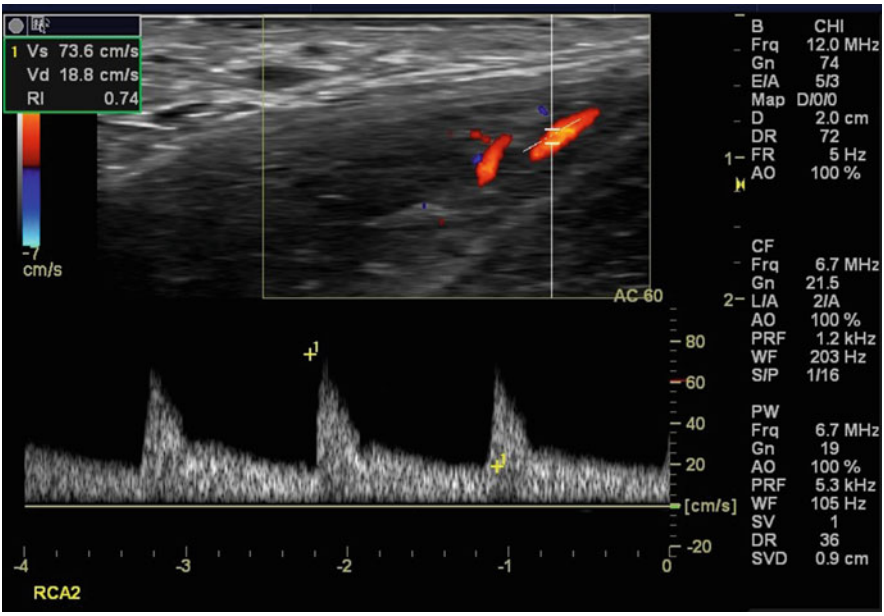

Fig. 6.12 Sample tracing: corporal veno-occlusive dysfunction

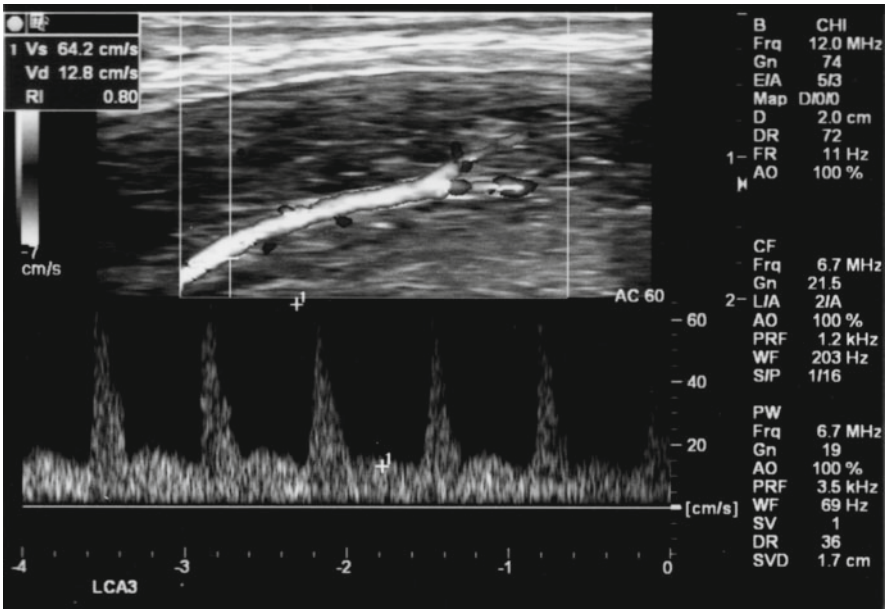

Fig. 6.13 Sample tracing: corporal veno-occlusive dysfunction—2

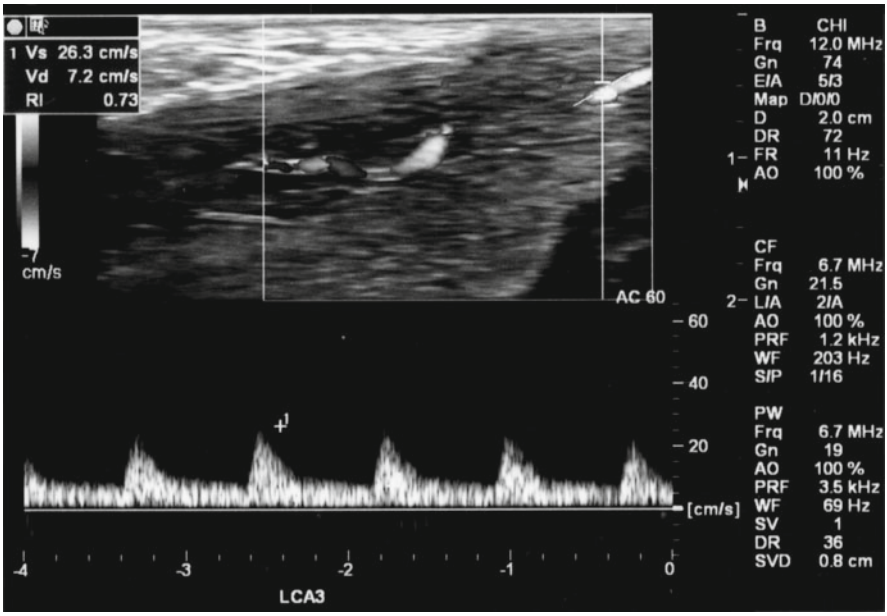

Fig. 6.14 Sample tracing: combined disease

administered (see chapter 18 on priapism treatment). The patient should never leave the office with an erection hard enough for penetration for fear of re-tumescence to the point of rigidity and priapism occurring.

Complications

1. Ecchymosis from the injection
2. Vasovagal response to penile injection
3. Prolonged erection
4. Hypertension and possibly reflex bradycardia with the administration of intracavernosal phenylephrine if reversal is needed

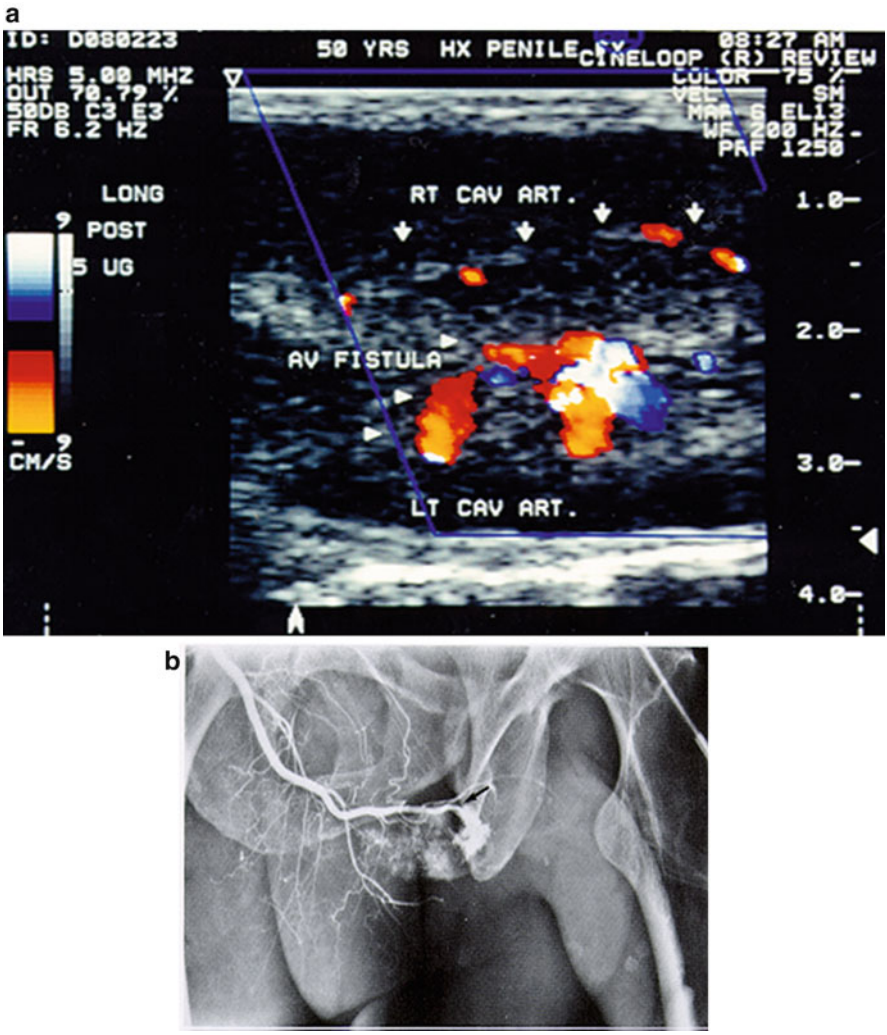

Fig. 6.15 Sample tracing: AV fistula

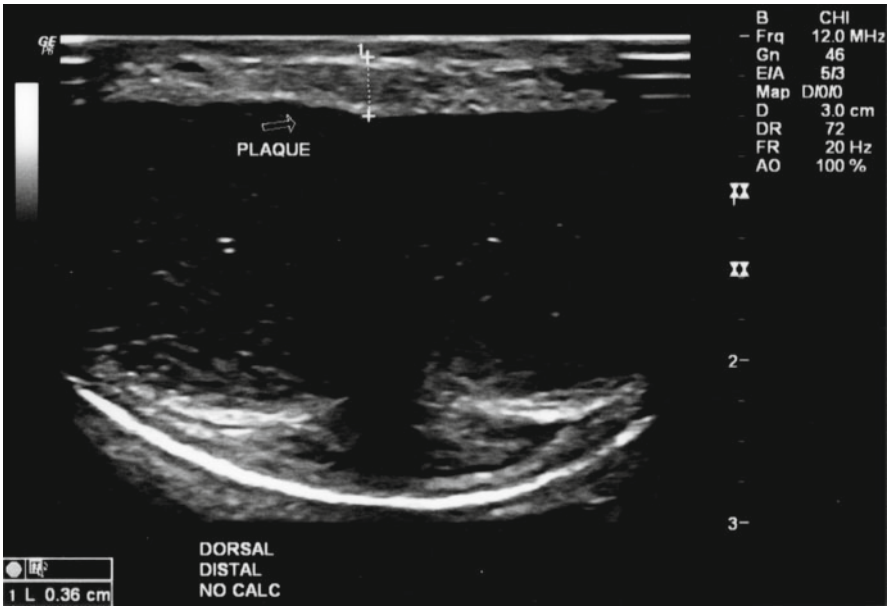

Fig. 6.16 Peyronie's plaque

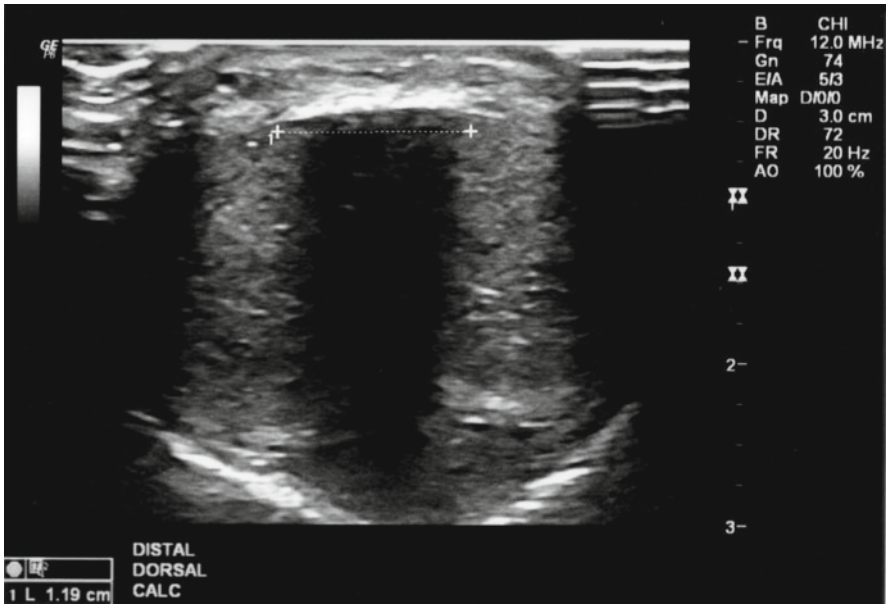

Fig. 6.17 Large dorsal midline calcified plaque

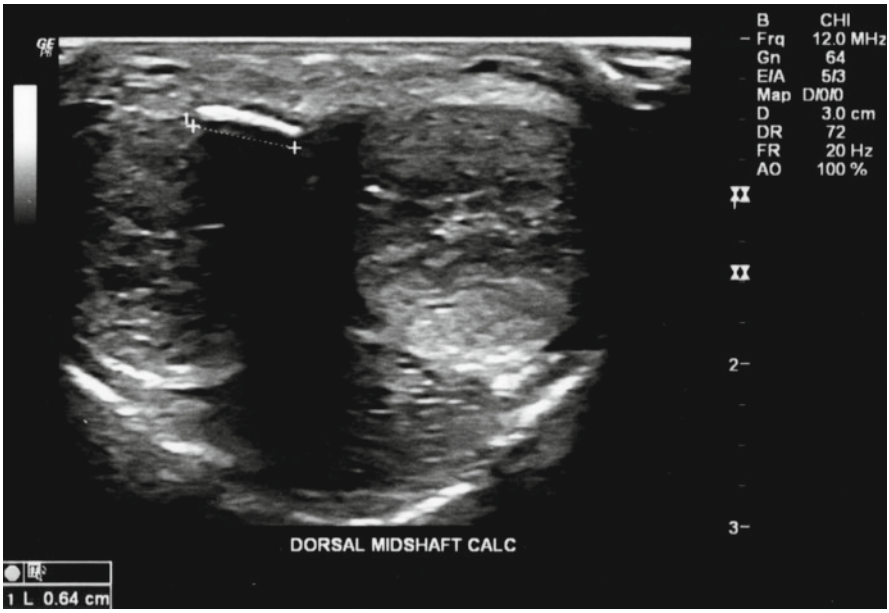

Fig. 6.18 Right dorsal "platelike" calcified plaque

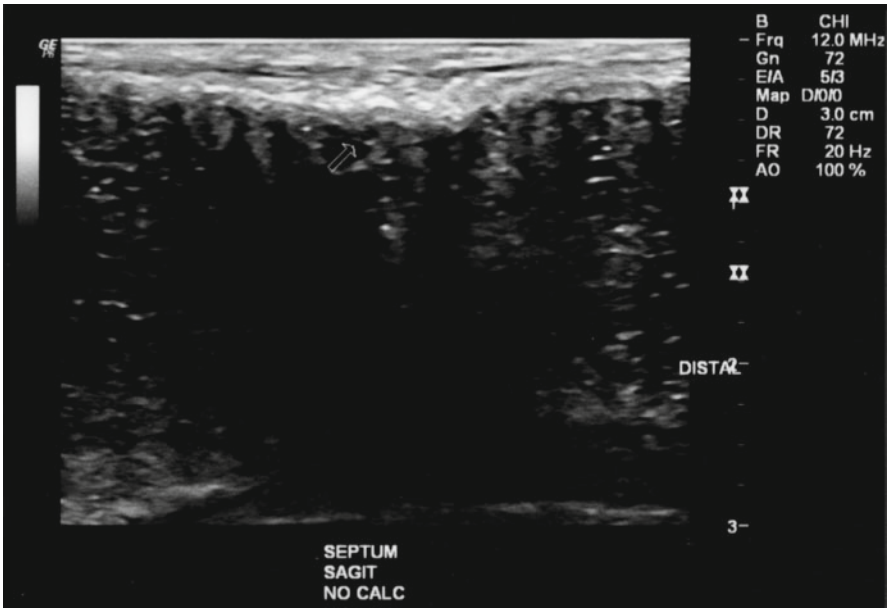

Fig. 6.19 Sagittal view of dorsal indentation plaque

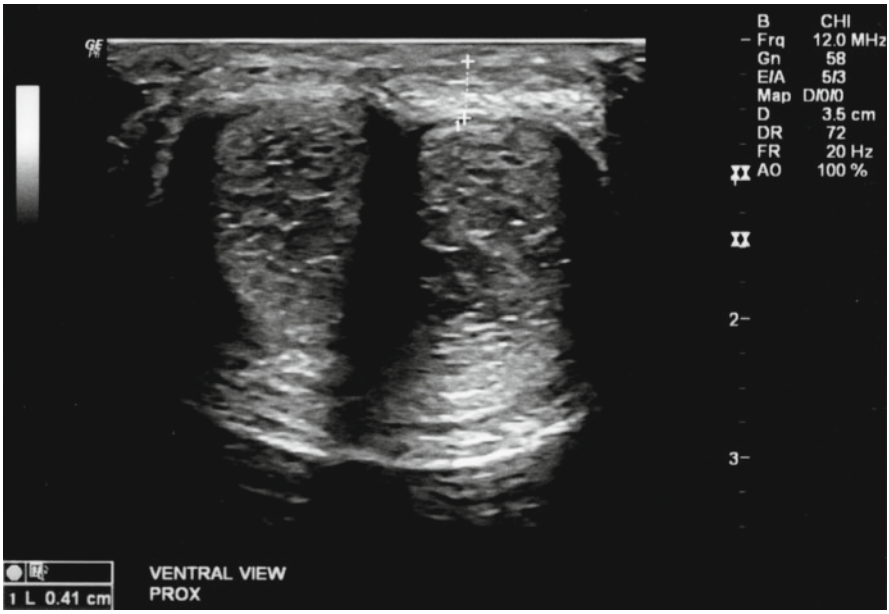

Fig. 6.20 Large ventral plaque

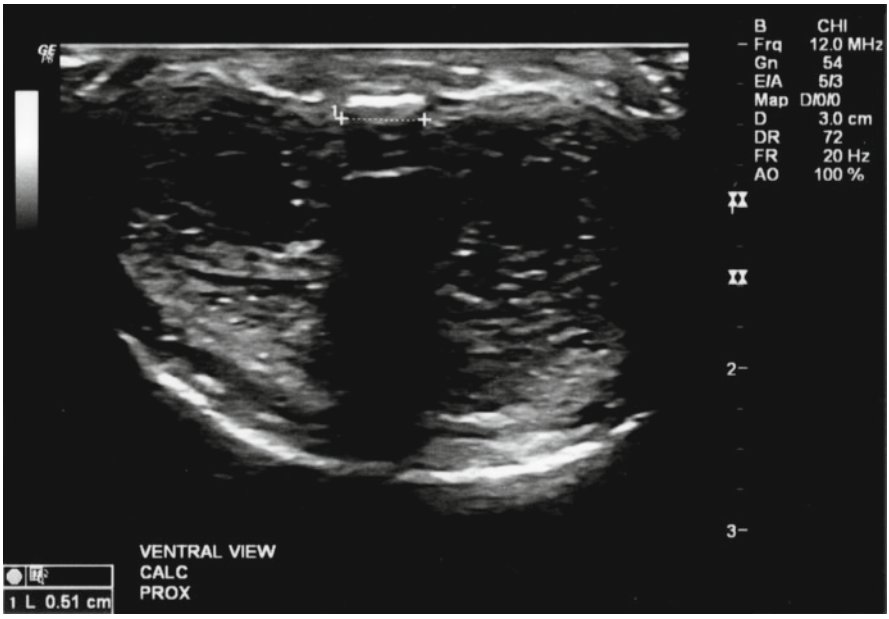

Fig. 6.21 Ventral midline calcified plaque

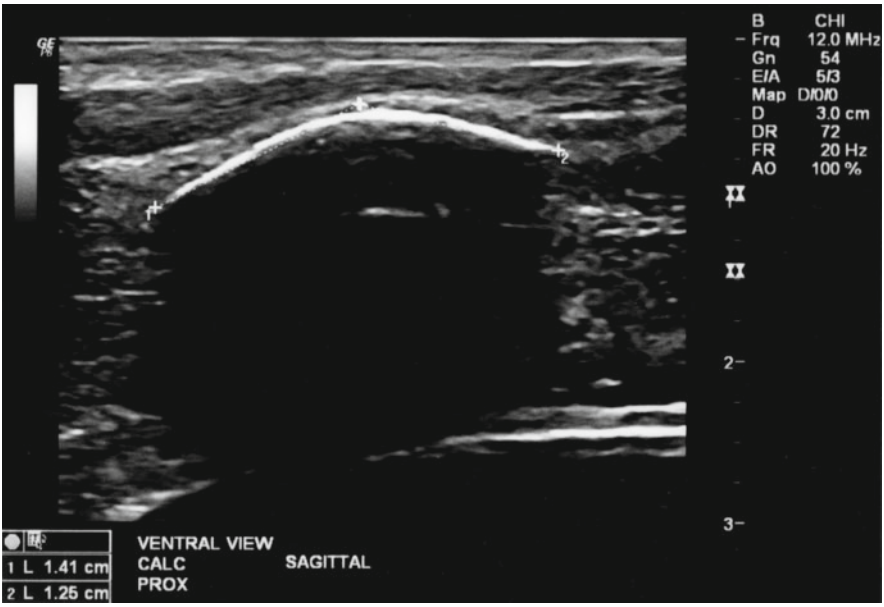

Fig. 6.22 Sagittal view of large ventral midline calcified plaque

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Chapter 7
Penile Deformity Assessment

John P. Mulhall and Lawrence C. Jenkins

Introduction

Peyronie's disease is known to cause penile deformity after the formation of fibrotic plaques within the tunica albuginea. However, the cause of the disease is not well known, but our current understanding is that it is secondary to repetitive trauma in a man with a genetic predisposition for dysregulated wound healing in the tunica albuginea. The subsequent scar formation, known as plaques, can cause not only curvature but also various other deformities like indentation, tapering, and hourglass deformity. The curvature is most commonly dorsal but can be lateral or ventral and can also be in multiple planes (biplanar), and many patients have curvature associated with another non-curvature-type deformity.

Grading the level of curvature is difficult. Penile curvature has been classified as mild (<30°), moderate (30–60°), and severe (>60°) according to the Kelami classification. However, this is not a universally accepted grading method. We prefer to us the following system: minimal ≤10°, mild 11–30°, moderate 31–60°, severe 61–90°, and profound >90°. We consider it important to obtain a properly performed deformity assessment in order to establish an accurate baseline prior to any intervention, whether it be medical or surgical. Furthermore, for the candidate for intralesional collagenase (Xiaflex®, Endo Pharmaceuticals; Malvern, PA), identifying the point of maximal curvature is critical to the success of this treatment.

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Indications

Prior to intervention in men with Peyronie's disease

Pre-procedural Considerations

We encourage patients to remain off any on-demand phosphodiesterase 5 inhibitor for the 24–36 h prior to intracavernosal injection (ICI) to minimize the risk for priapism. Patients using daily tadalafil for ED or BPH/LUTS may remain on the regimen. A good goniometer and ruler are important to properly measure the deformities (Fig. 7.1). Prior to ICI, we recommend measuring the stretched flaccid length of the penis from the pubic bone to the coronal sulcus. In addition, vital signs (blood pressure and heart rate) should be checked to ensure they are within normal limits in case phenylephrine is needed at the end of the procedure to reverse the erection (see Chapter 18 on Office Management of Prolonged Erection/Priapism).

Fig. 7.1 Measuring devices

Procedure

ICI should be given and re-dosed as necessary to achieve an erection rigidity of >80 %. This is very important because the degree of curvature is directly related to rigidity. We use Trimix (papaverine 30 mg, phentolamine 10 mg, prostaglandin E1 10 μg/mL) with a standard dosing regimen of 5, 10, and 10 units to achieve maximal rigidity. If the patient is already using ICI at home, we use their home dose for each of the three doses to achieve rigidity. In patients with concern for venous leak, we will use higher doses to try to achieve rigidity. Basal compression should be utilized to maximize penile rigidity. However, basal compression should not be used instead of an added penile injection when indicated. Beware using basal compression with basal deformity as the compression may distort the penis enough to make accurate assessment of the deformity difficult.

Using a goniometer, one should measure each curve separately (Figs. 7.2, 7.3, 7.4, and 7.5) starting with the most prominent curve. Make sure to document all curves, locations, and degrees. The distance of the point of maximal curvature from the coronal sulcus should also be documented (Figs. 7.6 and 7.7). If there is hourglass, tapering, or indentation, the location of these should be notated in reference to the coronal sulcus (Figs. 7.8, 7.9, 7.10, and 7.11). Quantifying curvature is relatively easy using a goniometer, but other deformities are difficult and we rely on mild, moderate, and severe for indentations and hourglass deformity. The penis should also be checked for stability, which may be done by applying axial loading pressure to the tip of the penis to identify if the penis buckles from the pressure. We rate level of instability: none, mild, moderate, and severe. This is highly arbitrary as instability assessment is a challenge, and if deformity assessment is not being routinely done in a practice, it is quite difficult to quantify.

A penile Doppler duplex ultrasound (Chapter 6) is performed to check penile blood flow followed by assessing the plaque for calcifications. We assess erectile

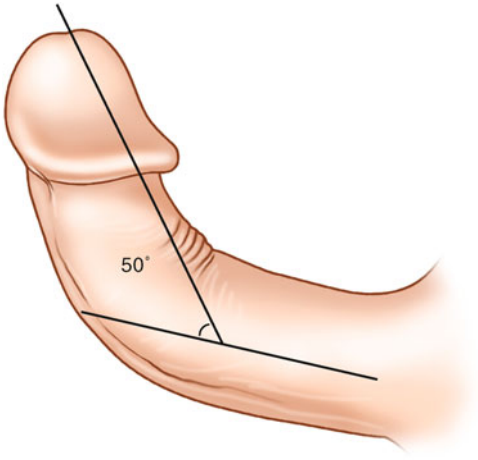


Fig. 7.2 Illustration of measurement of dorsal curvature

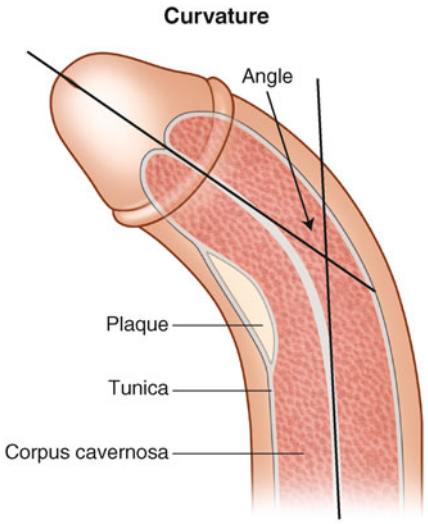


Fig. 7.3 Illustration of measurement of lateral curvature

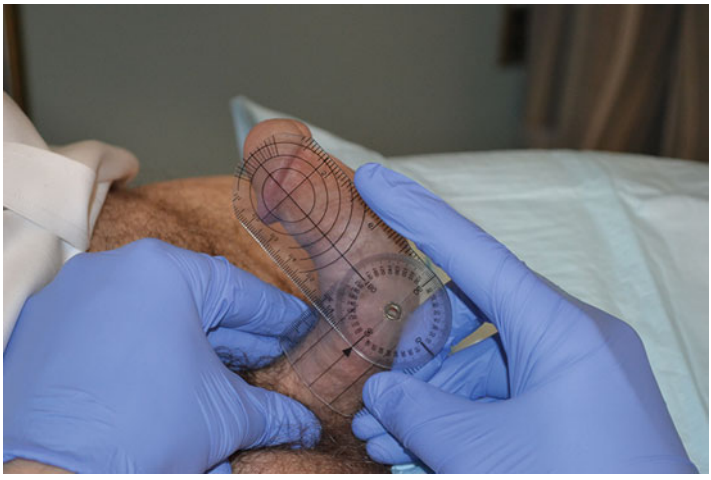


Fig. 7.4 Goniometer measurement—lateral view

hemodynamics especially in patients who are being considered as candidates for penile reconstructive surgery, as the hemodynamic status should play a role in defining the optimal surgical approach for the individual patient. Any calcification should be characterized as being platelike or stippling. Also, the size of the calcification should be measured. All findings should be documented.

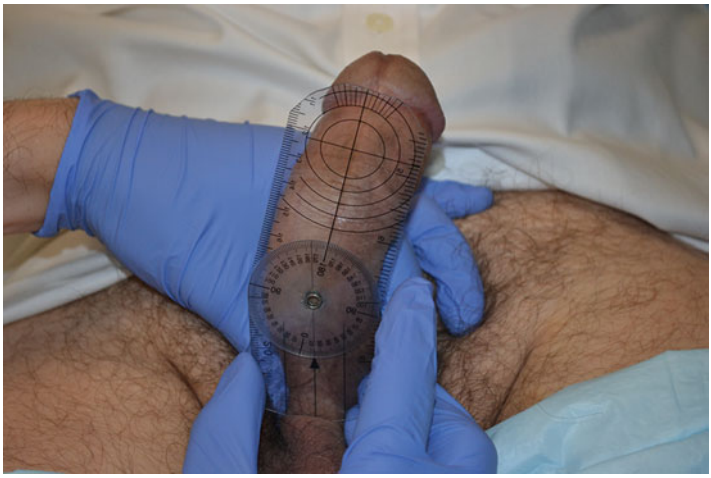


Fig. 7.5 Goniometer measurement—dorsal/ventral view

Fig. 7.6 Measurement of the point of maximal curvature—lateral view

Post-procedural Management

The patient should be examined prior to discharge to assure the erection has dropped below penetration hardness (see Chapter 18 on Office Management of Prolonged Erection/Priapism).

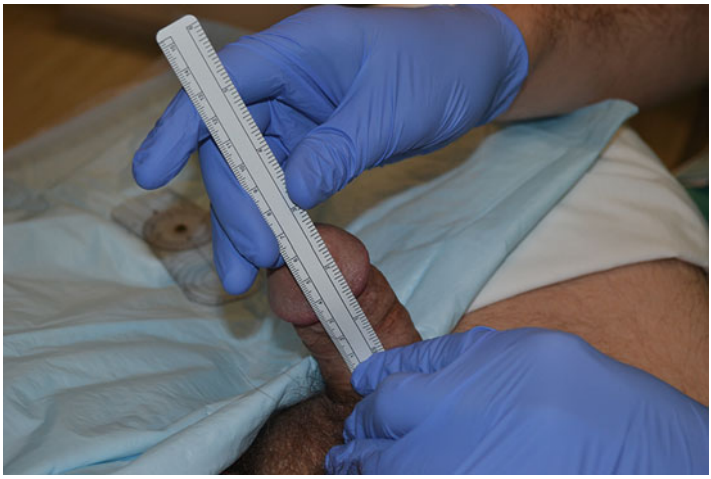


Fig. 7.7 Measurement of the point of maximal curvature—dorsal view

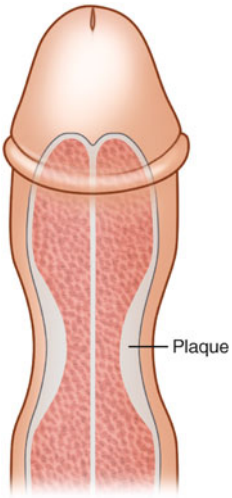


Fig. 7.8 Hourglass deformity

Complications

1. Ecchymosis from the injection
2. Vasovagal response to penile injection
3. Prolonged erection
4. Hypertension and possibly reflex bradycardia with the administration of intracavernosal phenylephrine if reversal is needed

Fig. 7.9 Indentation

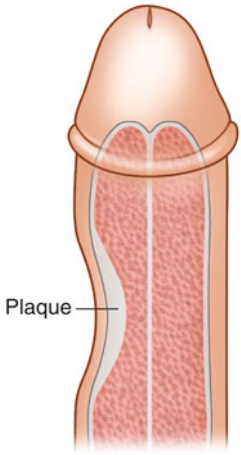


Fig. 7.10 Proximal tapering

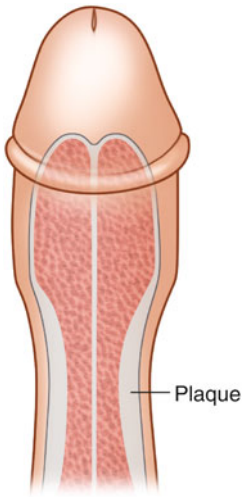
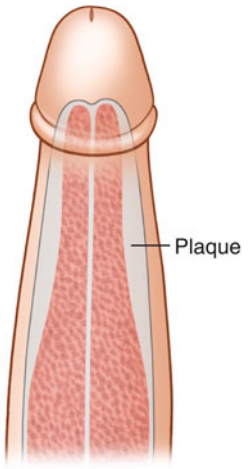


Fig. 7.11 Distal tapering



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Chapter 8
No-Scalpel Vasectomy

Kelly A. Chiles and Marc Goldstein

Introduction

Vasectomy is the procedure most commonly performed by urologists in the United States and is quick, inexpensive, and highly effective.[1,2] While multiple methods for performing a vasectomy exist, the no-scalpel vasectomy (NSV) has emerged as the gold standard for vasectomy approach.[3] A recent review of NSV versus standard incisional vasectomy demonstrated less bleeding, hematoma, infection, intraoperative pain, and a shorter operative time.[4]

Indications

Men who desire permanent surgical sterilization are candidates for the no-scalpel vasectomy.

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Procedural Considerations

The majority of vasectomies are performed in an office or clinic procedure room setting under local anesthesia and is well tolerated. It is important to identify men who have a scarred or tight scrotum with high-riding testes in whom the vasa are difficult to palpate. In these cases, or in men who are very anxious, vasectomy performed in the operating room under sedation (MAC) is recommended.

Both vasa should be easily palpable within the spermatic cords. Congenital unilateral absence of the vas occurs in 1/1000 men and should be diagnosed preoperatively. If there is any uncertainty about the presence of a vas, it is recommended that the vasectomy be performed in the operating room under MAC. If vasectomy is being performed at the same time as a microsurgical varicocele repair, the vasal veins and artery should be preserved since the only venous outflow after varicocelectomy are the vasal veins. Therefore, when performing simultaneous vasectomy or vasal reconstruction and microsurgical varicocelectomy, the operating microscope is utilized to assure preservation of the deferential veins and arteries.[5,6]

Complications

The most disturbing complication of vasectomy is primary failure of the procedure or vasal recanalization, resulting in an unplanned pregnancy. Fortunately, with appropriate follow-up semen analyses, primary failure can easily be identified and managed with a repeat procedure. Recanalization, which can result in the return of sperm to the ejaculate in a previously azoospermic patient, is rare and usually occurs within 12 weeks of the vasectomy. Patients, however, should still be counseled that this is a possibility. Although current American Urological Association guidelines quote a vasectomy failure rate of approximately 1 %[7] as acceptable, using the technique we describe, which employs intraluminal cautery, excision of a 0.5 cm segment of the vas, clipping the testicular end, and fascial interposition, and we have had no failures in 1000 cases.[8]

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[8] Chiles K, Balderrama M, Feliciano M, Li P, Goldstein M. No-scalpel vasectomy: 20 year outcomes utilizing combined cautery, clip and fascial interposition. Baltimore: American Society of Reproductive Medicine Annual Meeting; 2015.

Bleeding and hematoma are the most common complications, and utilization of the NSV approach can decrease the risk to just under 2.5 %[9] or much less (see Footnote 8). Postvasectomy pain syndrome is another bothersome sequela that can appear months to years after a vasectomy. It is thought that epididymal congestion contributes to the etiology, and up to 6 % of men will seek medical advice for bothersome discomfort after vasectomy.[10] However, in our series, by plucking the vas cleanly out of the vasal sheath, thereby preserving the vasal nerves and vessels, we have had no instances of chronic postvasectomy pain (see Footnote 8). Vasectomy reversal has been established as an effective treatment option for men with postvasectomy pain syndrome who fail conservative management.[11]

List of Necessary Equipment

- Skin prep and drape kit, usually Betadine based
- Jet injector filled with 1 % lidocaine
- Vas dissector
- Vas ring clamps × 2
- Battery-driven vasectomy cautery
- Bacitracin ointment
- Fluff gauze
- Scrotal support
- Ice pack

Description of Procedure

The scrotal skin should be prepped with Betadine and draped in a way that allows the scrotum to be easily manipulated without interference from the penis. At our institution, we use a non-occlusive rubber band around the glans to clip the penis to the sterile blue drape up and away from the median raphe.

The vas is identified and, using the three-finger fixation technique, pinned tightly against the scrotal skin surface (Fig. 8.1). Immobilization of the vas is required before introducing local anesthetic to the overlying skin and vasa. At our institution we use a jet injector (MadaJet, MADA Inc. Carlstadt, NJ) with 1 % lidocaine, which studies have shown patients prefer to needles[12] (Fig. 8.2).

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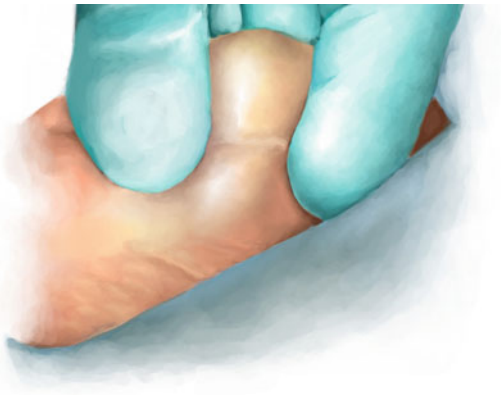

Fig. 8.1 Three-finger vas fixation technique. Courtesy of Marc Goldstein/Weill Cornell Medicine

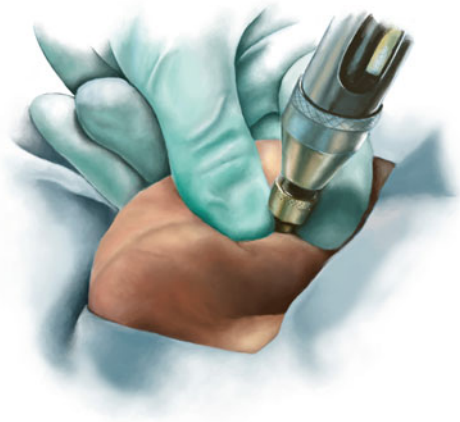

Fig. 8.2 Cord block using jet injector. Courtesy of Marc Goldstein/Weill Cornell Medicine

Once adequate local anesthesia has been achieved, with the original technique described by Shunqiang Li (see Footnote 3), a ring clamp is used to secure the vas, including the thin skin overlying the thin Asian vas. With the thicker Caucasian or African American skin, we now prefer to make a single midline puncture hole directly over the vas using one blade of the vas dissector, which is a sharp, curved hemostat with the serrations filed off (Fig. 8.3). A small hole is developed by placing the closed dissector into the hole made with the single blade and spreading, thereby pushing vessels aside and creating a hole large enough to introduce the ring clamp vertically (Fig. 8.4). The ring clamp is introduced through this hole and the vas grasped within it and then delivered. The vasal sheath is punctured with one blade of the dissecting clamp and the vas cleanly delivered, excluding the vasal vessels and nerves. The vasal vessels are gently swept away from a 2 cm segment of vas by vertically opening the blades of the dissecting clamp (Fig. 8.5). The vas is hemi-transected with electrocautery in two places, approximately 1 cm apart. Intraluminal cautery is performed on both ends, and the wire tip is rotated for

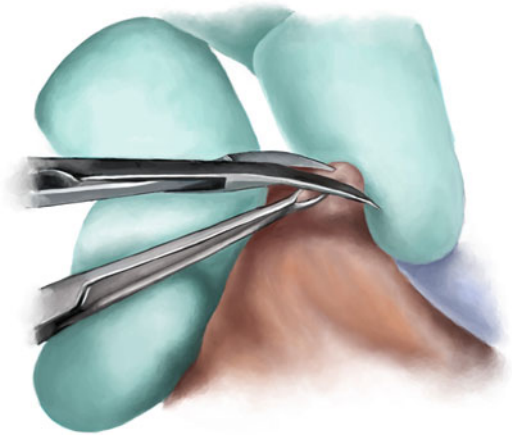

Fig. 8.3 No-scalpel puncture of skin. Courtesy of Marc Goldstein/Weill Cornell Medicine

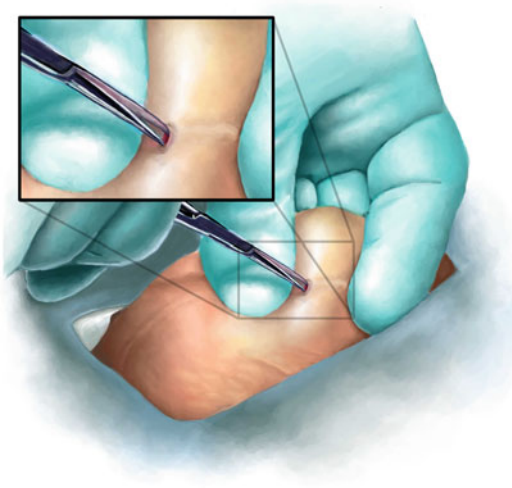

Fig. 8.4 Development of skin puncture. Courtesy of Marc Goldstein/Weill Cornell Medicine

approximately 10 seconds to ensure a 360° mucosal cautery burn (Fig. 8.6). A hemoclip is gently placed on the testicular end of the vas to prevent sperm leakage and granuloma formation until the cautery causes fibrosis of the lumen. The hemitransection of the abdominal end of the vas is taken to completion, and the abdominal end is allowed to retract into the vasal sheath. The sheath is grasped and sealed over the abdominal end with a hemoclip, thereby accomplishing fascial interposition (Fig. 8.7). The intervening vas segment is excised and the vasal ends are pulled into the scrotum by gently pulling on the testicle.

The contralateral side is accessed through the same puncture hole and the steps repeated. Hemostasis of the subcutaneous tissue is ensured. No sutures or skin closure is required for the hole which contracts and is virtually invisible. Betadine is cleaned off the scrotum, Bacitracin ointment is placed on the puncture wound and fluff gauze dressings and an icepack are held in place by a scrotal supporter.

Fig. 8.5 Delivery of vas using ring clamp. Courtesy of Marc Goldstein/Weill Cornell Medicine

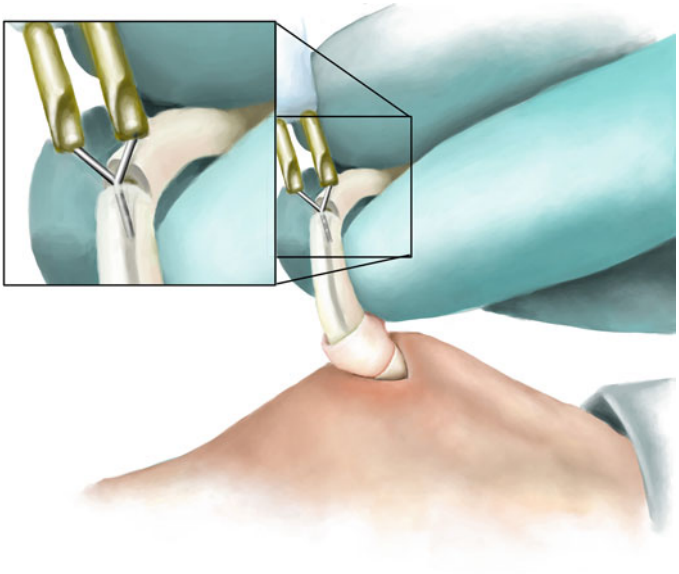

Fig. 8.6 Cauterizing lumen of vas. Courtesy of Marc Goldstein/Weill Cornell Medicine

Post-procedural Management

Nonsteroidal anti-inflammatory medications can safely be used in men after a vasectomy. The use of icepacks to the scrotum for 24 hours after the procedure will decrease medication requirement. No ejaculation or strenuous activity for 1 week.

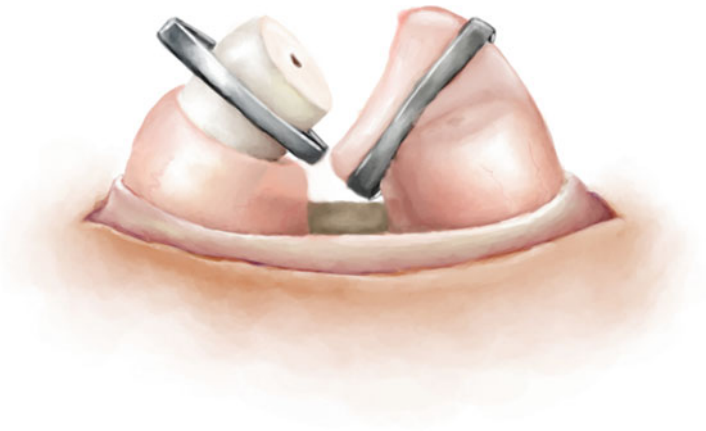

Fig. 8.7 Vas clipping and fascial interposition. Courtesy of Marc Goldstein/Weill Cornell Medicine

Patients can be informed that they are sterile and may stop using contraception when they have one fresh, uncentrifuged semen analysis which demonstrates azoospermia or occasional nonmotile sperm/mL (see Footnote 7). We recommend obtaining the first semen analysis 15 ejaculations or 6 weeks after the procedure, whichever comes first.

Chapter 9
Nonsurgical Sperm Retrieval

John P. Mulhall and Lawrence C. Jenkins

Introduction

Nonsurgical sperm retrieval is a less-invasive process compared to surgical sperm retrieval. Nonsurgical procedures include percutaneous testicular sperm aspiration or biopsy and percutaneous epididymal sperm aspiration. These techniques are a less-invasive and usually less-expensive alternative to the open surgical techniques. However, it is important that the right patient is chosen, ideally a male with normal spermatogenesis (obstructive azoospermia). In addition, there is usually significantly lower numbers of sperm recovered using percutaneous methods compared to open.

Indications

These procedures can be used when there is a reasonable spermatogenesis, normal lab values suggesting azoospermia resulting from vasectomy, bilateral vassal obstruction (inguinal hernia surgery associated injury), or congenital absence of bilateral vas deferens.

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Pre-procedural Considerations

Serum FSH level should be obtained to assess testicular function prior to deciding between percutaneous and open approaches. The lab values can be used in conjunction with testicular volume as a predictor of spermatogenesis (obstructive azoospermia likely when FSH less than 7.6 mIU/mL or testicular long axis greater than 4.6 cm). Having an embryologist available for real-time analysis of testicular tissue specimen is considered ideal bit often not possible.

Procedure

In the office setting, a medication like diazepam may be helpful to lower the patient's anxiety level. The entire procedure is performed under local anesthesia so good spermatic cord blocks should be performed. The skin overlying the area of entry should also be anesthetized.

Epididymal Sperm Aspiration (Fig. 9.1)

After anesthesia has been delivered, the testicle and epididymis should be secured between the thumb and index fingers. A 21 gauge butterfly needle attached to a 10 mL syringe is used to aspirate fluid from the caput epididymis until fluid is seen in the tubing and enough is obtained for its intended purpose. The needle can be redirected to aspirate more fluid. Sample should be transferred to sperm transport media for examination by an embryologist. If good quality, adequate number of motile sperm are found there is no need to repeat the procedure on the same side (caput or corpus) or move to the opposite side.

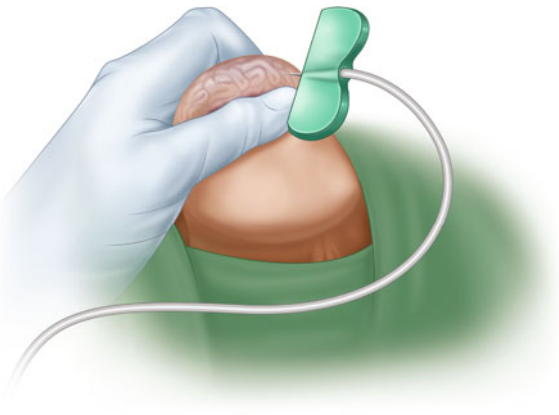

Fig. 9.1 Epididymal sperm aspiration

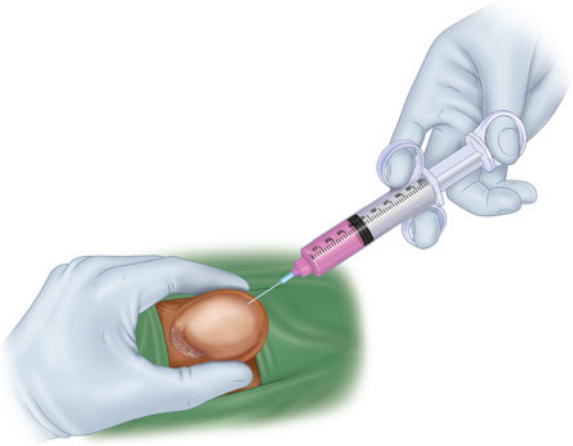

Fig. 9.2 Percutaneous testicular sperm aspiration

Percutaneous Testicular Sperm Aspiration (Fig. 9.2)

The steps for this procedure are similar to epididymal aspiration; however, much less fluid will be obtained and it will likely be bloody. After anesthesia has been delivered, the testicle should be secured between the thumb and index fingers. A 21 gauge butterfly needle attached to a 10 mL syringe can be used to aspirate fluid from the testicle until fluid is seen in the tubing and enough is obtained for its intended purpose. The needle can be redirected to aspirate more fluid. Sample should be transferred to sperm transport media for examination by an embryologist. If good quality, adequate number of sperm is found there is no need to repeat the procedure on the same side or move to the opposite side.

Percutaneous Testicular Biopsy (Fig. 9.3)

After anesthesia has been delivered, the testicle should be secured between the thumb and index fingers. An 11 blade scalpel should be used to make a small skin puncture. A short spring-loaded biopsy needle can then be used to take 3–5 cores from the testis, making sure to examine the quality of each core. Be careful not to biopsy your finger! Sample should be transferred to sperm transport media for examination by an embryologist. If good quality, adequate number of sperm is found there is no need to repeat the procedure on the same side or move to the opposite side.

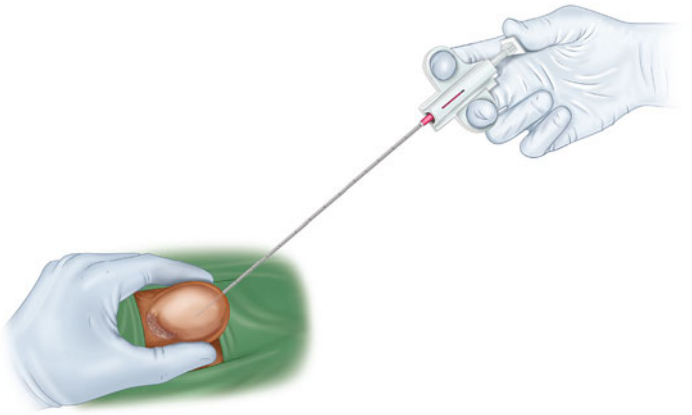

Fig. 9.3 Percutaneous testicular biopsy

Post-procedural Management

1. Scrotal support for 72 h
2. Ice pack for 48 h

Complications

1. Ecchymosis, hematoma formation
2. Failure to obtain sperm
3. Spermatic cord content injury

Suggested Reading

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Chapter 10
Subcutaneous Testosterone Pellet Insertion

David Ray Garcia

Introduction

Testopel® (testosterone pellets, Endo Pharmaceuticals, Malvern, PA) is an FDA-approved form of testosterone replacement therapy for men with testosterone deficiency. It is a long-acting subcutaneous implantable testosterone pellet that requires a dosing frequency of every 3–4 months. It is a well-recognized alternative to transdermal agents or intramuscular injections. Low testosterone levels can produce symptoms such as decreased libido, infrequent spontaneous erections, gynecomastia, alopecia, testicular atrophy, oligospermia, azoospermia, decreased bone density, or hot flashes. Some men also report depressed mood, low energy, sleepiness, decreased concentration, increased body fat, decreased muscle mass, or decreased physical endurance.

Indications

It is indicated for men who have low testosterone levels and is an alternative to daily topical testosterone or intramuscular injections.

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Pre-procedural Considerations

Prior to considering testosterone replacement with Testopel®, the patient should have two low early-morning serum total testosterone levels, the presence of symptoms consistent with low testosterone and screening with bone densitometry.

The clinician should conduct a physical examination of the sites for implantation, noting a suitable amount of subcutaneous fatty tissue on the flanks or buttocks. Extremely lean men, lacking fatty tissue, are not ideal candidates for this procedure as the pellets are supposed to sit in the subcutaneous fat. Additionally, men that have undergone numerous implantations may begin to form subcutaneous scarring that will inhibit insertion of the trocar and advancement of the pellets. Scar tissue may not be noticeable on examination of the exterior site; therefore, site rotation for repeat implantations is advisable for avoiding scar tissue.

Prior to the procedure, informed consent should be obtained. The clinician should provide interventions to decrease patient anxiety, such as explaining pre-procedure activities such as positioning, skin preparation, length of procedure, as well as post-procedure activities such as dressings, pain, alterations in appearance, and activity limitations.

Gather necessary equipment, sterile gloves, and medications (Table 10.1, Fig. 10.1).

Utilizing sterile technique, open Testopak® on a metal tray so that the white paper wrapping becomes a sterile field (Fig. 10.2). Before donning sterile gloves, empty trocar and introducer kit onto field. Proceed to empty optional sutures, sterile scissors, and hemostatic forceps. Don sterile gloves and arrange contents starting at left corner and moving counterclockwise: PVP iodine swabsticks pre-opened, large bore needle connected to 10 mL syringe, marker, #11 scalpel, blue shallow tray with medication cup and Adson forceps, trocar and introducer, drape, stacked 4×4 gauze, 2×2 gauze, alcohol prep pads, transparent occlusive dressing and Steri-Strips with benzoin swabsticks, or optional hemostatic forceps, scissors, and sutures. Use a sterile 4×4 gauze to grasp non-sterile vial of 2% lidocaine with epinephrine and proceed to fill 10 mL syringe with large bore needle. Disconnect large bore needle and connect 27 gauge 1.5" needle. Do not discard large bore needle in case the patient may require an additional dose of local anesthetic. Note that the vial of 2% lidocaine with epinephrine is not placed onto the sterile field. Lastly, open individual Testopel® ampules, one at a time, and drop into medication cup that is in the blue shallow tray (Fig. 10.3). Be cautious that the pellet is vertical and loose while inside the ampule prior to opening, because the ampule is narrow and a horizontal-lying pellet easily adheres to the walls of the ampule.

Procedure

Position the patient in a lateral decubitus position, Fig. 10.4. Cleanse the site with povidone iodine, painting a large area on the upper outer quadrant of the hip. Place the fenestrated drape over the site. Mark two sites on the skin (think of a "V"

Table 10.1 Necessary equipment

Testpak® kit:
Half shallow tray (1)
Non-latex sterile gloves (1)
Fenestrated drape with adhesive (1)
Gauze, 4×4 (5), 2×2 (2)
Alcohol wipes (3)
PVP swabsticks (1)
10 mL BD syringe (1)
Needle 18G×1½ in. (1)
Needle 27G×1½ in. (1)
#11 blade scalpel (1)
30 mL medicine cup (1)
Adson forceps (1)
Steri-Strips ¼×3 (1)
Skin marker (1)
Tegaderm™ bandage (1)
Benzoin swabstick (1)
Trocar kit:
Sharp-ended stylet (1)
Blunt stylet (1)
Trocar (1)
Suturing supplies (optional):
5-0 dissolvable gut suture
Crile hemostatic forceps
Mayo scissors, straight

formation with half of the pellets along each arm of the "V") for ten pellets or three sites for 12 (think of a "W" formation with a third of the pellets along each arm of the "W") (Fig. 10.5). Next, inject 2 % lidocaine with epinephrine to begin hydrodissection along the tracks in the subcutaneous fat, and anesthetize the entire length of the tracts for the trocar. For this, we like to use a spinal needle to ensure coverage of the distal end of the tracks. Leave a weal of lidocaine solution at the insertion site for the skin incision which will follow (Fig. 10.6).

Insert the scalpel straight down to create a 3 mm skin incision (Fig. 10.7). Insert the trocar paired with the sharp-ended stylet, using a 45° angle toward the subcutaneous fat layer. Once the subcutaneous fat layer has been pierced, flatten the angle of the trocar, and do not stop until the entire trochar shaft is embedded subcutaneously. Then pull back until the well of the trocar is exposed outside of the skin (Figs. 10.8 and 10.9). Withdraw the sharp-ended stylet, and begin loading an even distribution of pellets into the well using a forceps (Figs. 10.5, 10.10, 10.11, and 10.12). Do not insert more than six pellets per tract as the proximal-most pellet will lie too close to the skin. Next, begin linear advancement of the pellets into the tract by inserting the blunt stylet while simultaneously withdrawing the trocar (Fig. 10.13). Replace the sharp-ended stylet in the trocar and begin formation of the next tract for the remaining pellets.

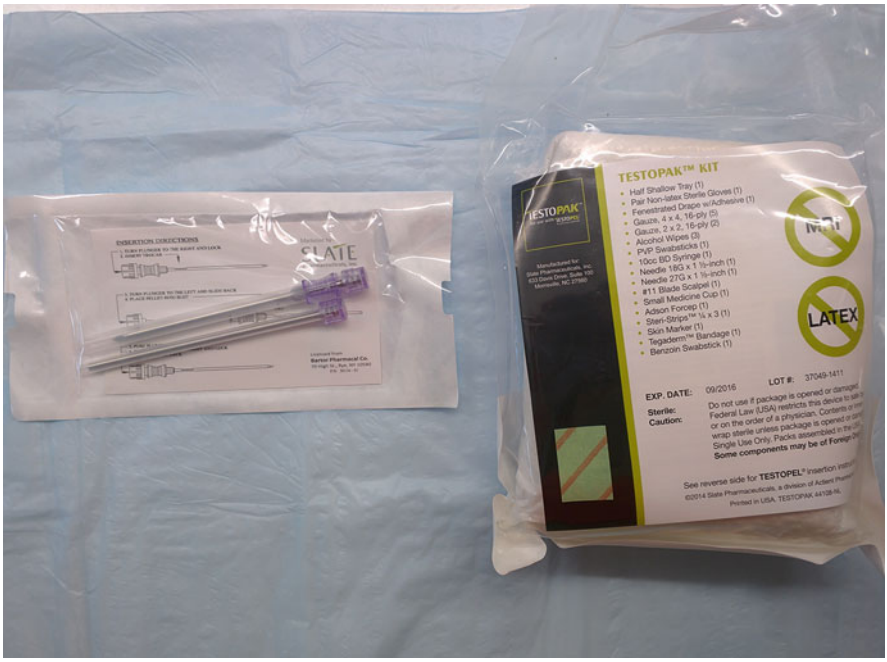

Fig. 10.1 Picture of packs

Fig. 10.2 Picture of necessary equipment arranged on tray

Fig. 10.3 Testopel® testosterone pellets

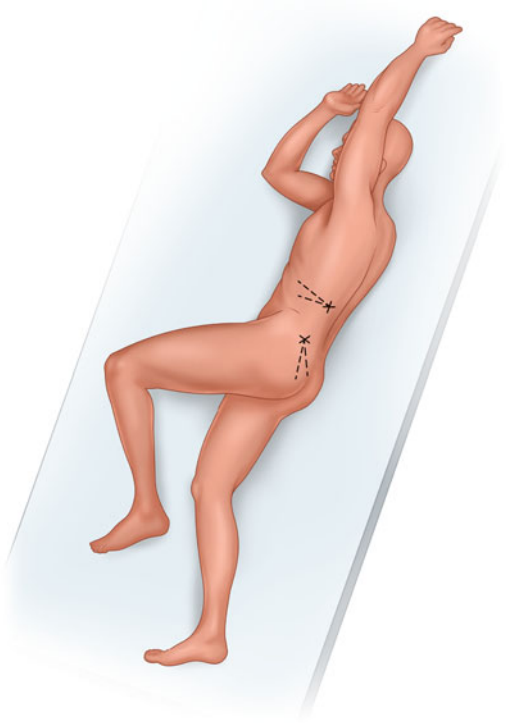

Fig. 10.4 Illustrations of body positioning

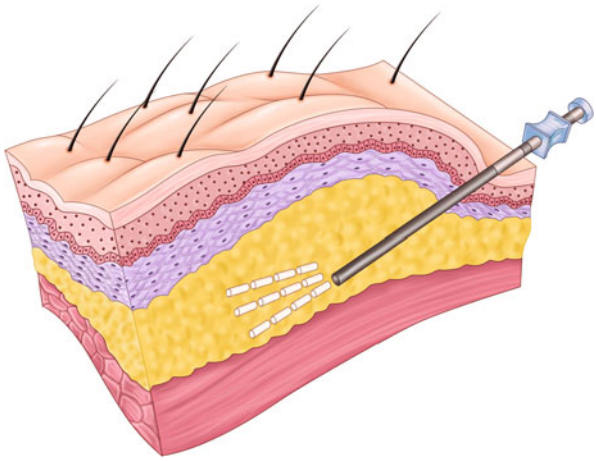

Fig. 10.5 Illustration of pellet insertion diagram for V or W technique

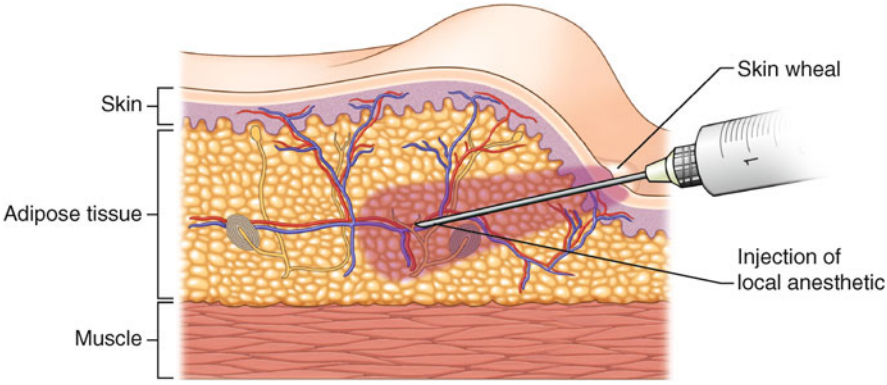

Fig. 10.6 Illustration of local anesthetic injection

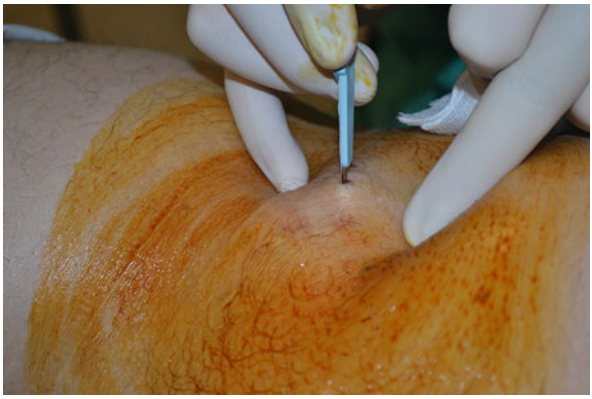

Fig. 10.7 Illustration of skin incision

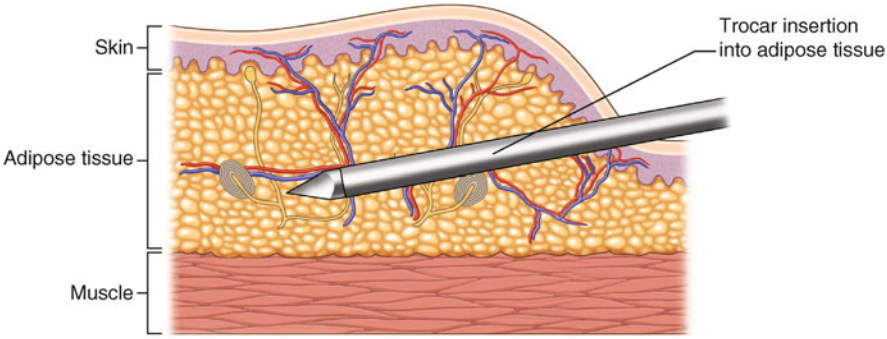

Fig. 10.8 Illustration of trocar advancement

Fig. 10.9 Illustration of trocar advancement

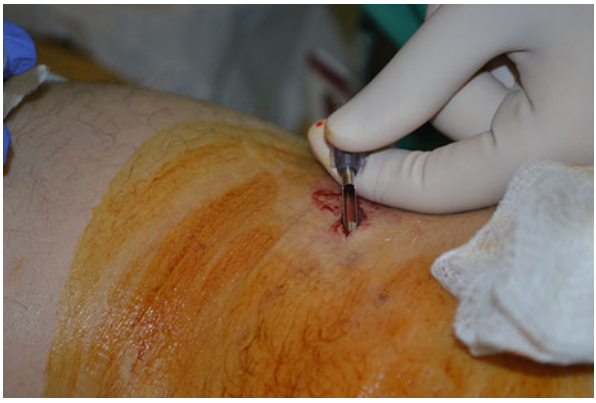

Fig. 10.10 Illustration of pellet insertion into trocar

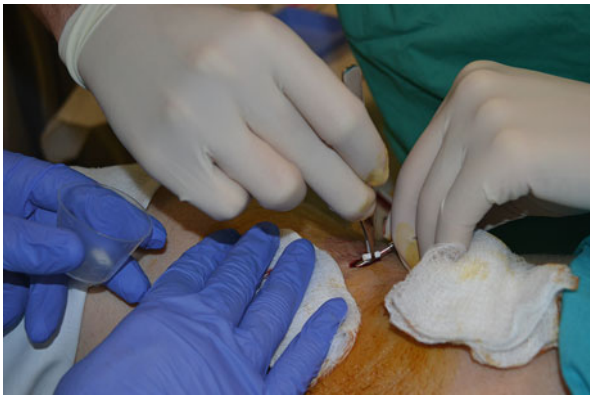

Fig. 10.11 Illustration of pellet insertion into trocar

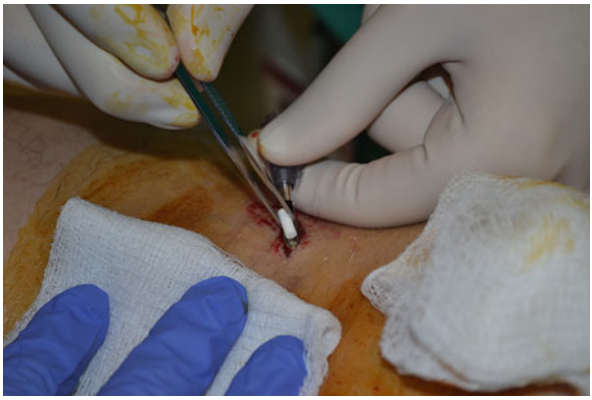

Fig. 10.12 Illustration of pellet insertion into trocar

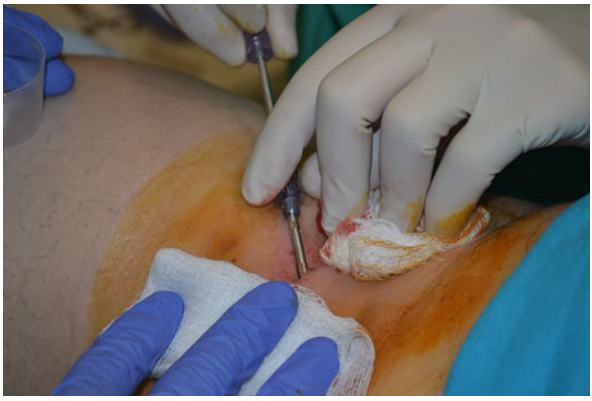

Fig. 10.13 Illustration of blunt stylet use

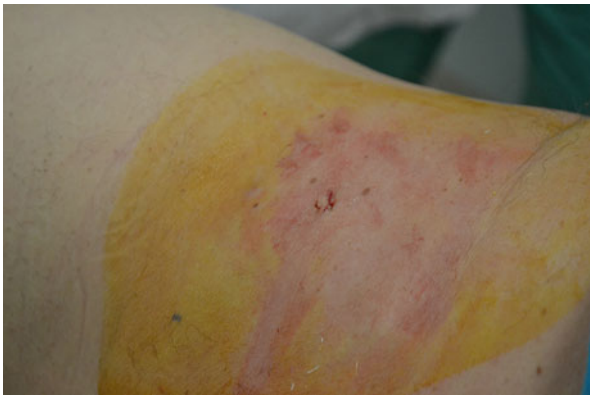

Fig. 10.14 Illustration of skin closure

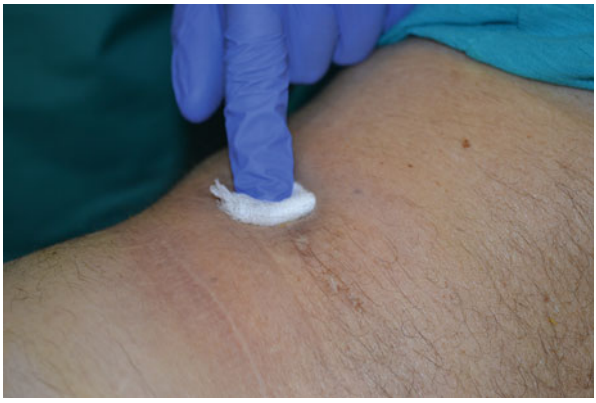

Fig. 10.15 Illustration of gauze pressure

Note: A stacking method can also be used, in which the pellets are dispersed at the distal end of the tract by advancing the blunt stylet while shifting the direction of the trocar upward and downward, although patients often notice the bundle of pellets at the end of the track.

After implantation is complete, blood and residue from the surrounding area should be cleansed with the included alcohol wipes. Wound closure can be completed by painting around the incision with the Benzoin swabsticks and applying the Steri-Strips skin closures. As an alternative, a horizontal mattress suture using absorbable 5-0 plain gut suture can be used or a topical skin adhesive (Fig. 10.14). Dress the wound with a folded 2×2 gauze and cover with a transparent occlusive dressing (Figs. 10.15 and 10.16). Allow the patient to rest on the exam table for approximately 15 min with a sand bag compression over the insertion site, and his arm tucked over the bag while in a side-lying position. This will minimize swelling and risk for hematoma formation.

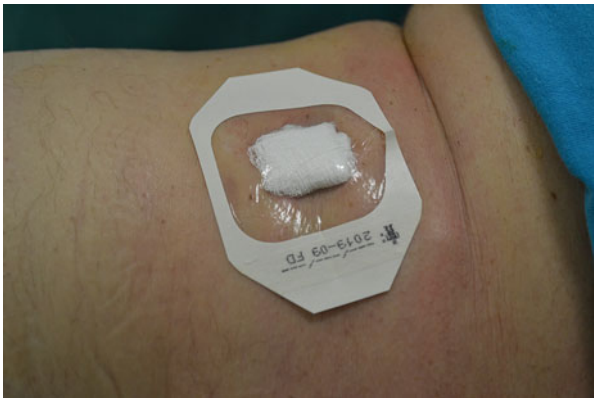

Fig. 10.16 Illustration of dressing

Post-procedural Management and Instructions

Initial implantations should be followed by serial laboratory testing to assess testosterone levels. Monitor free and total testosterone, estradiol, luteinizing hormone, sex hormone-binding globulin, prostate-specific antigen, and a complete blood cell count after 2, 6, and 12 weeks post-procedure. If total testosterone is above the 400–500 ng/dL range after week 12, consider modification of frequency to every 4 months. Levels below 400–500 ng/dL may require an increase in dosage to 12 pellets, from the initial starting dose of ten pellets. Once the dosage, frequency, and therapeutic levels are stable (usually after three cycles), laboratory testing is only necessary 2 weeks prior to subsequent implantations.

The patient may apply a cloth-wrapped ice pack to the area every hour for approximately 20 min while at home. Over-the-counter pain medications may be used, such as acetaminophen or ibuprofen. Soreness and bruising are common occurrences, and strenuous activity should be limited for 48 h. Soaking in a bath, hot tubs, and swimming should be avoided for 72 h. Showering is permissible after 24 h, but a direct stream to the dressing should be avoided. The dressing can be removed in 72 h, but Steri-Strips should remain for 7 days or until would closure has occurred through secondary intention.

The patient should be instructed to report any signs of infection, such as discharge, excessive erythema, fevers over 101.5 °F, chills, nausea, vomiting, dizziness, or tenderness, as well as edema, or pellet extrusion.

Complications

1. Ecchymosis and hematoma formation
2. Puncture of the peritoneum
3. Wound infection
4. Extrusion of pellets

Side effects of testosterone replacement include erythrocytosis and increased estradiol levels; therefore, the continuation of treatment should be based on review of laboratory data. Adjuncts to treatment, such as therapeutic phlebotomy for erythrocytosis, or aromatase inhibitors for elevated estradiol levels, may need to be considered.

Suggested Reading

Auxilium Pharmaceuticals, Inc. An implantation technique for TESTOPEL. Manufacturer's handout (2014a)

Auxilium Pharmaceuticals, Inc. TESTOPEL post-insertion tips and considerations. Manufacturer's handout (2014b)

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Chapter 11
Intralesional Collagenase Injection

John P. Mulhall and Lawrence C. Jenkins

Introduction

Collagenase clostridium histolyticum (CCH—Xiaflex®, Endo Pharmaceuticals, Inc. Malvern, PA) is an enzyme, which acts to breakdown the collagenous Peyronie's plaque. This enzyme is injected directly into the Peyronie's plaque. The injection technique takes less than 2 min in duration. Bleeding complications (ecchymosis, hematoma formation) and penile fracture (corporal rupture) are the main complications.

The label limits its indication to men with dorsal or lateral plaques causing between 30 and 90 degrees of curvature.

Indications

The medication is for patients with Peyronie's disease (PD) and an identifiable plaque causing dorsal or lateral curvature of greater than 30°. Intralesional collagenase is currently indicated for stable PD.

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Pre-procedural Considerations

Anticoagulants (except low-dose aspirin or NSAIDs), ventral plaques (risk of damaging the urethra), and plaques with plate-like calcification are considered contraindications. The injection site should be defined at the time of curvature assessment (Chap. 8).

We strongly recommend waiting until the patient arrives in clinic before warming up and preparing the CCH solution. The CCH solution is reconstituted by drawing up 0.39 mL of diluent and mixing with the powdered CCH. Once combined, the mixture should be swirled, not shaken, in order to mix without creating bubbles. The reconstituted CCH solution should be clear. Inspect the solution visually for particulate matter and discoloration prior to administration. If the solution contains particulates, is cloudy, or is discolored, do not inject the reconstituted solution. *The solution should remain constituted and out of the fridge for at least 15 min and no longer than 1 h at room temperature (68–77 °F) or 4 h refrigerated (36–46 °F).* Using a hubless syringe (needle swaged onto the syringe so that the pressure exerted during the plaque injection does not result in the needle popping off the syringe) containing 0.01 mL graduations with a permanently fixed 27-gauge ½-in. needle (not supplied), withdraw 0.25 mL of the reconstituted solution. Note: many centers (including ours) use the full 0.39 mL of reconstituted solution rather than the recommended dose.

List of necessary equipment (Fig. 11.1):

1. Vial of Xiaflex
2. Vial of supplied diluent for reconstitution

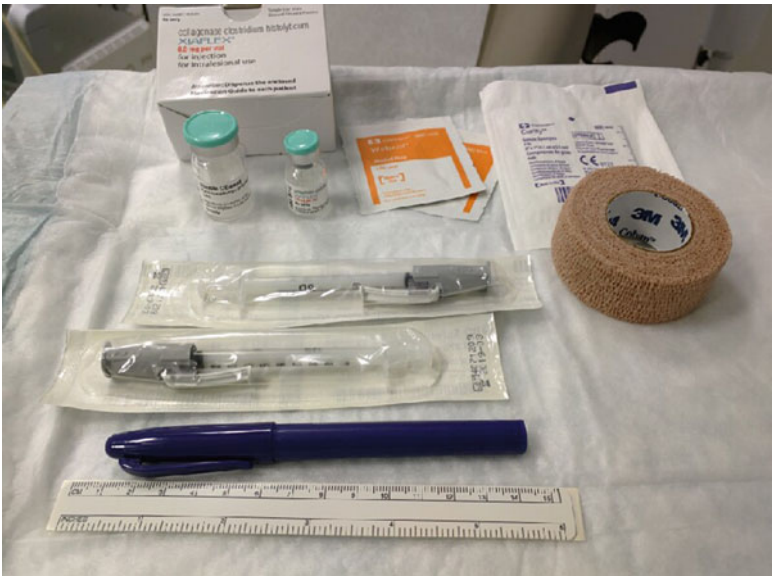

Fig. 11.1 Necessary equipment arranged on tray

3. Hubless syringe
4. Coban dressing
5. 2×2 gauze pads
6. Alcohol prep pads
7. Sharps container
8. If needed—syringe of 2 % lidocaine/0.5 % bupivacaine (10 mL) × 1 and 25 gauge 1½ in. needle

Procedure

Have the patient undress from the waist down and place patient supine on examination table with a sheet covering them. Optional: If using local anesthetic, this should be given as a penile block at the base of the penis as described in Chap. 4. Allow 5–10 min for the block to be effective.

The point of maximal curvature which was determined during a prior curvature assessment should be marked as the location for injection (Fig. 11.2). The injection should only be performed on a flaccid penis. If using an assistant, have them stretch the penis as you get a good grip on the plaque (Fig. 11.3). Use an antiseptic wipe to prepare the skin prior to injection and allow skin to dry. While wearing gloves, insert the needle into the marked location going transversely into the side of the plaque but not completely through the other side (Figs. 11.4 and 11.5). You should feel resistance while inserting the needle due to the dense plaque tissue. Slowly depress the plunger to dispense the medication and slowly withdraw the needle back through the plaque (Fig. 11.6). You should note there is also resistance to the dispersion of medication. Once the medication is fully delivered, the needle can be removed and secured. The goal is to dispense all of the medication within the plaque. Apply gentle pressure at the injection site for 60 s and longer if the injection site continues to bleed (Fig. 11.7).

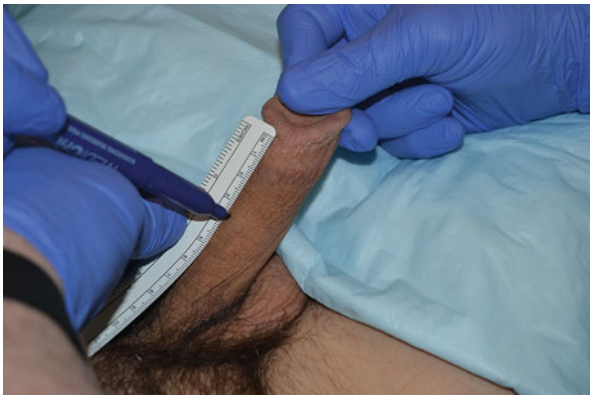

Fig. 11.2 Marking of target—point of maximal curvature

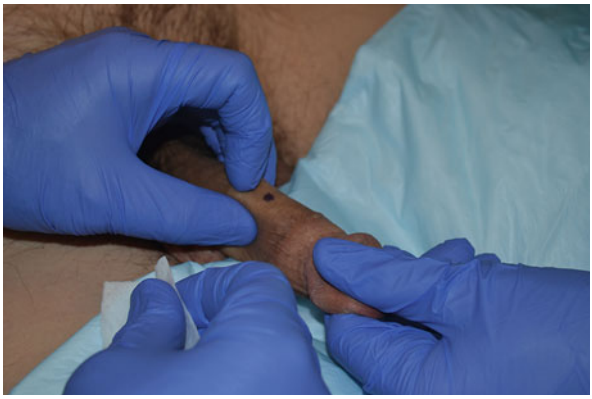

Fig. 11.3 Illustration of hand positioning

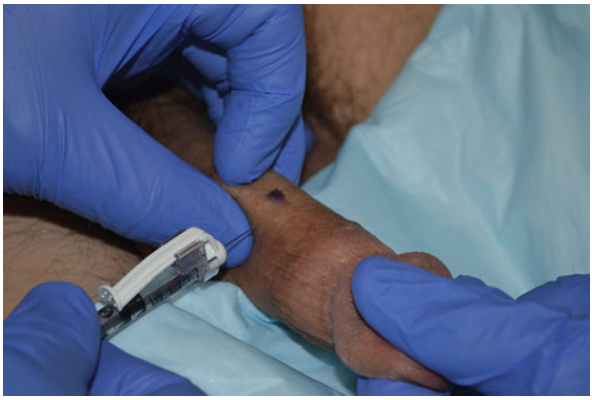

Fig. 11.4 Illustration of needle placement

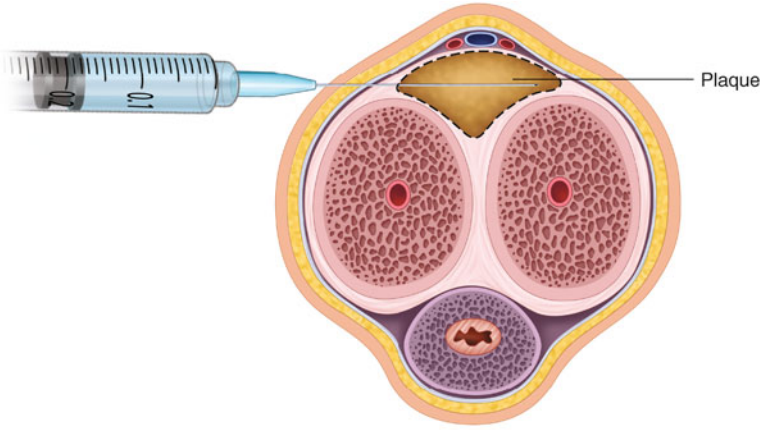

Fig. 11.5 Illustration of needle placement

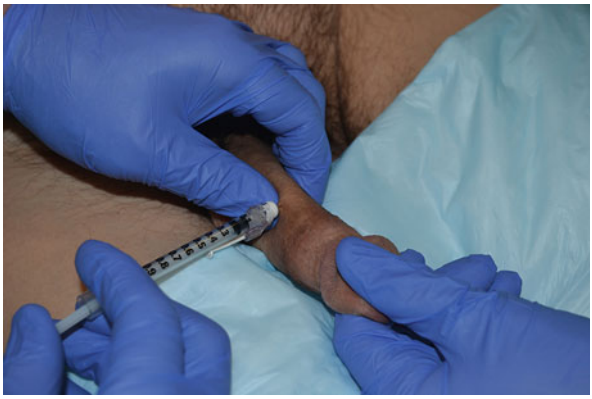

Fig. 11.6 Dispensing medication while withdrawing needle

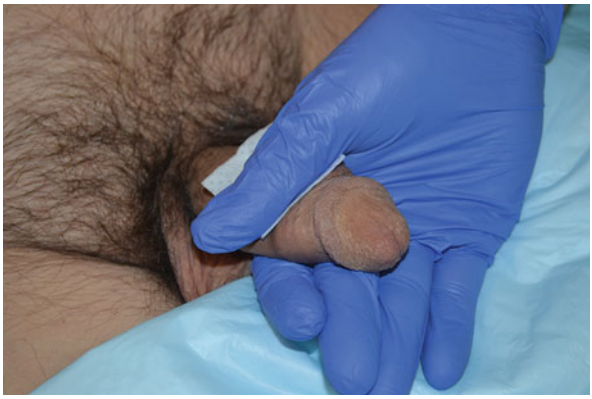

Fig. 11.7 Application of pressure after injection

Bandage the penis using a 2×2 gauze over the injection/plaque region followed by a gently applied Coban dressing from the mid-glans to base of the penis (Figs. 11.8, 11.9, and 11.10). We avoid wrapping the penis solely over the site of injection as edema may occur distally or proximally to the wrap. Thus, we utilize a full penile wrap. This dressing is significantly more difficult to maintain on uncircumcised men. One should be cautious not to place the dressing on too tightly because it may restrict blood flow or urine flow. Also, try to avoid including scrotal or pubic hair. We leave the dressing bandage on for 24 h although the patient can remove it themselves if it is uncomfortable. It is clear from our extensive CCH experience that this bandage for this duration limits bruising, hematoma and edema formation.

Standard dosing is 0.25 mL of reconstituted solution (0.58 mg) of Xiaflex® per manufacturer directions; however, some practitioners are injecting the full 0.39 mL (0.9 mg) dose. Discard any unused portion of the reconstituted solution and diluent after each injection. The remaining solution should not be saved for future use.

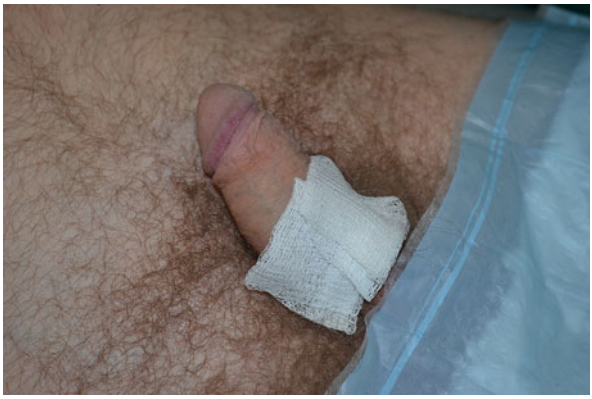

Fig. 11.8 Application of bandage wrap

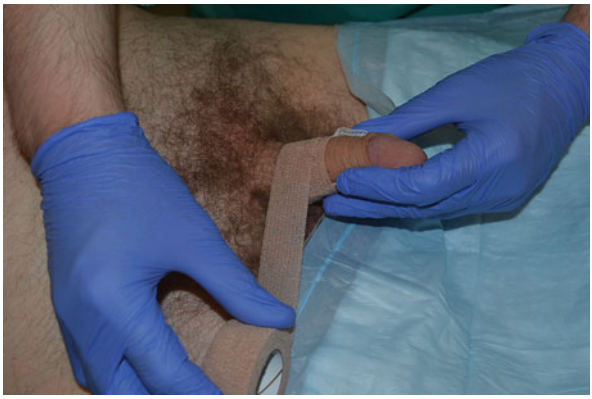

Fig. 11.9 Application of bandage wrap

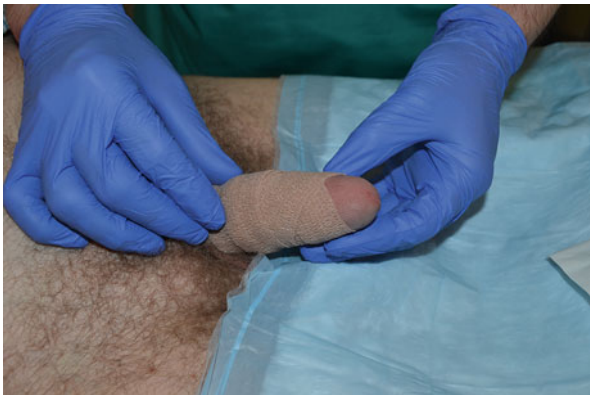

Fig. 11.10 Application of bandage wrap

While the manufacturer recommends (based on the clinical trials) that the second injection of each treatment cycle be made approximately 1–3 days after the first injection, many clinical trialists noted that the plaque was difficult to palpate due to the edema on the day of the second injection. Thus, we leave this injection for 1 week. Each cycle consists of a 6-week "break" period after the second injection. A total of four cycles are recommended, although anecdotal reports exist of patients receiving more than this.

Post-procedural Management

Penile stretching should be performed after the CCH injection, based on the data from clinical trials. This can be done by either modeling (as described by the manufacturer) or by using a penile traction device. The traction allows a more standardized and more recordable means of penile stretching and is what we recommend our patients do. We tell our patients to use traction four times a day for 15–30 min minimum. This commences 7 days after the second injection.

As an alternative approach and the one suggested by the manufacturer, modeling can begin at a follow-up visit 1–3 days after the second injection of each treatment cycle. The modeling procedure is performed on the flaccid penis to stretch and elongate the treated plaque. Isolate the plaque above and below the injection site and use steady pressure to stretch and elongate the plaque while not applying direct pressure to the injection site. You should aim to bending the penis in the opposite direction of the curvature, thus putting increased tension on the plaque. The stretch maneuver should be performed in 30 s cycles off and on for a total of 3 attempts. The patient should continue to perform these stretch maneuvers at home for the remainder of the 6-week period until the next cycle. Patients should be instructed to stretch the flaccid penis three times daily. In addition, in the trials patients were instructed to straighten their penis during spontaneous erections but not to a point resulting in pain. This stretched position is to be held for 30 s.

Sexual relations (masturbation, intercourse) are allowed to commence 2 weeks after the second injection in an effort to limit penile fracture occurrence.

Complications

1. Bleeding (ecchymosis 15 %, hematoma 65 % in the trials)
2. Edema (55 % in the trials)
3. CCH hypersensitivity (none reported in the trials)
4. Penile fracture (corporal rupture): 0.5 % in the trials

Suggested Reading

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Chapter 12
Intralesional Verapamil

John P. Mulhall and Lawrence C. Jenkins

Introduction

Intralesional verapamil is used in the treatment of Peyronie's disease. The rational for verapamil focuses on its ability to alter fibroblast metabolism by decreasing collagen exocytosis and increasing collagenase activity. Some authorities believe that the needle used during this process may in fact be the major factor in causing plaque reconfiguration. Verapamil therapy has been shown to improve pain and decrease progression in the acute phase of Peyronie's disease. Verapamil injection is safe, well tolerated, and commonly used as part of the nonsurgical Peyronie's management.

Indications

Intralesional verapamil is used for treatment of Peyronie's disease. In our practice, we recommend treatment to patients who have not stabilized or who have a ventral plaque/curvature who are not candidates for intralesional collagenase or who want to avoid surgery.

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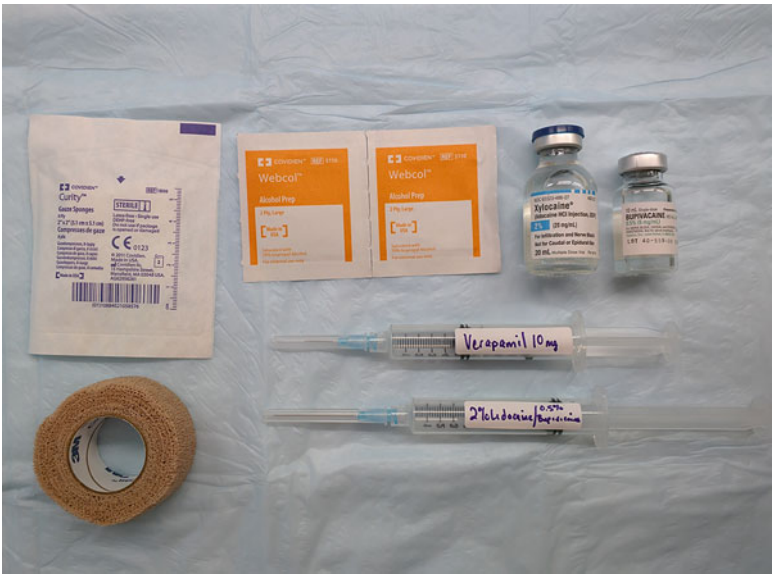

Fig. 12.1 Illustrations of necessary equipment arranged on tray

Pre-procedural Considerations

Measurement of penile deformity is conducted during the curvature assessment. The treatment area should be on record and accessed prior to starting the procedure.

List of necessary equipment (Fig. 12.1):

1. Syringe of verapamil (10 mg verapamil/5 mL normal saline within a 10 mL syringe)
2. Syringe of 2 % lidocaine/0.5 % bupivacaine (10 mL)
3. 25-gauge 1.5-in. needle
4. 25-gauge 5-/8-in. needle
5. 2 × 2 gauze
6. Coban dressing
7. Alcohol prep pads
8. Sharps container

Procedure

The first step is to palpate and identify the area of plaque formation. The previously identified point of maximal curvature (during curvature assessment) can be used as a point of reference. The penis should be placed on good stretch (with an assistant) and the skin prepped with alcohol swab. Using the nondominant hand grasp the

plaque and the dominant hand can begin injecting into the plaque moving in a fashion to create rows of injection (Figs. 12.2, 12.3, 12.4, 12.5, 12.6, 12.7, and 12.8). The needle does not have to be withdrawn from the skin after each injection, only when needed to fully treat the plaque. For a ventral curvature, the injections are performed lateral to the urethra in a series of rows much like the dorsal technique (Figs. 12.9, 12.10, 12.11, 12.12, 12.13, and 12.14). Hold pressure for 3 min over the injected region to minimize hematoma formation.

Post-procedural Management and Instructions

Bandage the penis mid glans to base; however, the dressing is difficult to maintain on uncircumcised men (Figs. 12.15, 12.16, and 12.17). The patient may remove the compression dressing at home after 4 h. The patient should use traction therapy in combination with the intralesional injection.

Complications

1. Bleeding—ecchymosis, hematoma, urethral bleeding (for ventral injections)
2. Edema

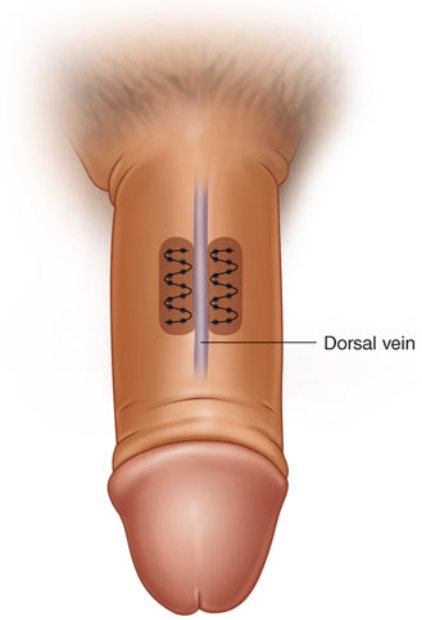

Fig. 12.2 Dorsal—cornrow technique

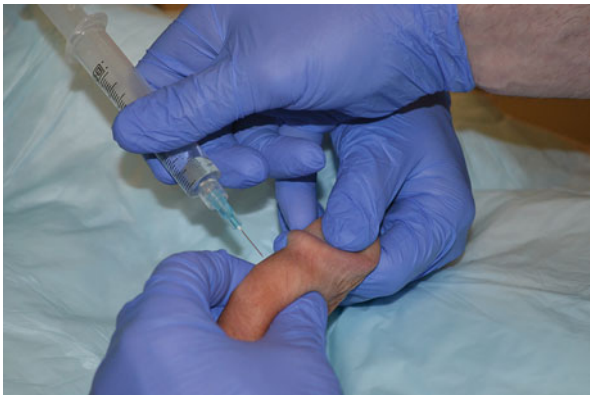

Fig. 12.3 Gripping the plaque

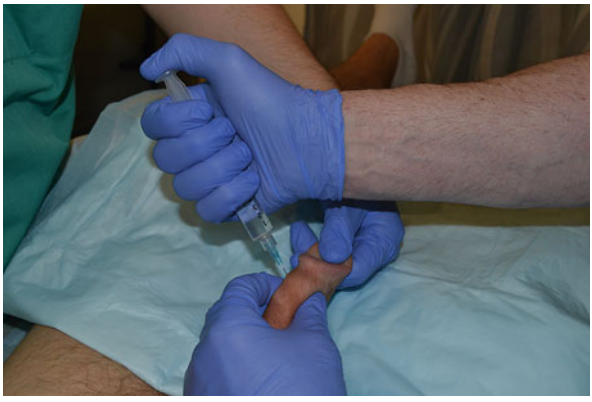

Fig. 12.4 Injection of the dorsal plaque

Fig. 12.5 Injection of the dorsal plaque

Fig. 12.6 Injection of the dorsal plaque

Fig. 12.7 Injection of the dorsal plaque

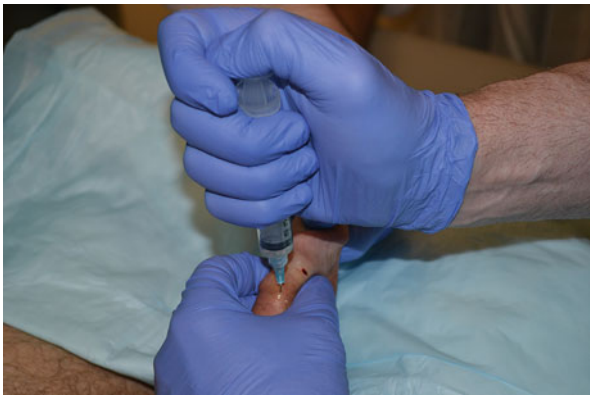

Fig. 12.8 Injection of the dorsal plaque

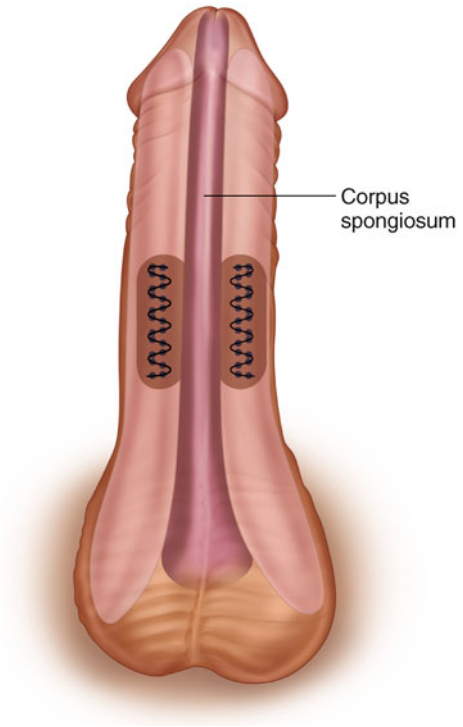

Fig. 12.9 Illustration of ventral technique

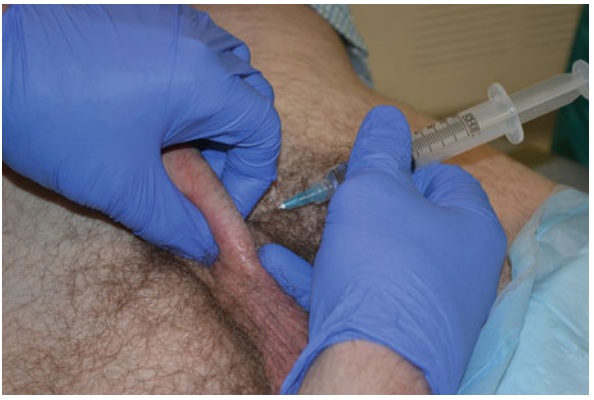

Fig. 12.10 Injection of ventral side one

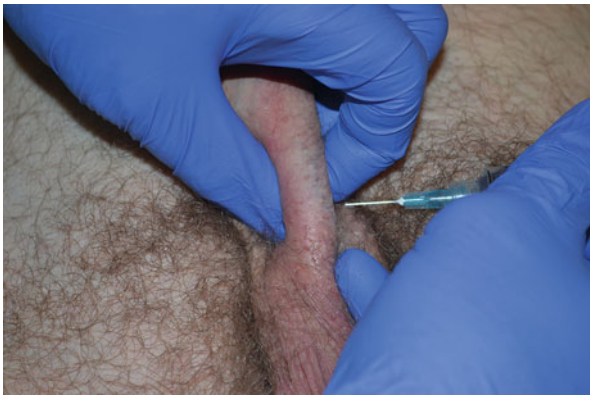

Fig. 12.11 Injection of ventral side one

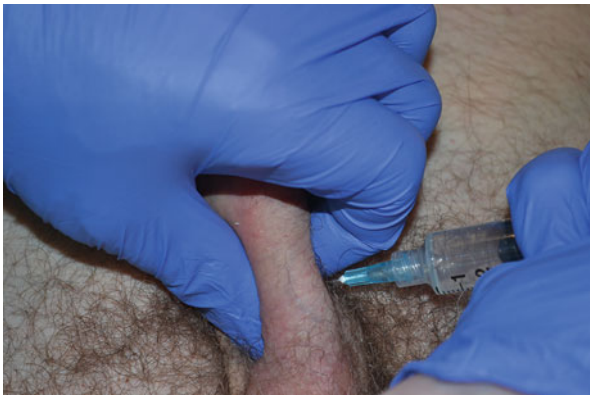

Fig. 12.12 Injection of ventral side one

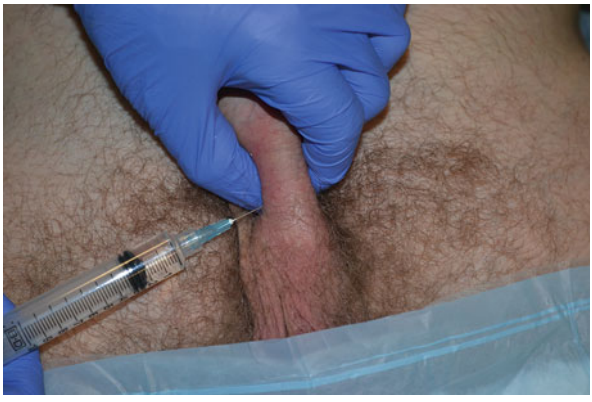

Fig. 12.13 Injection of ventral side two

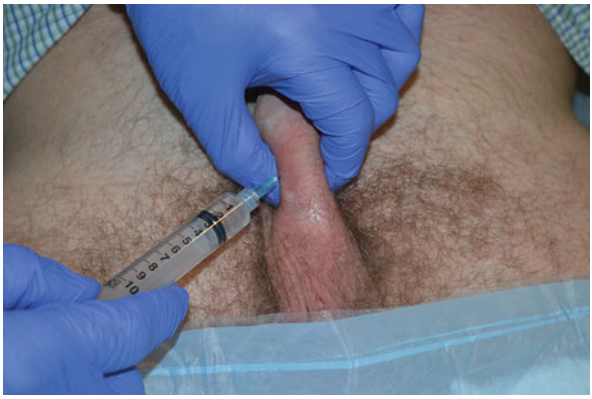

Fig. 12.14 Injection of ventral side two

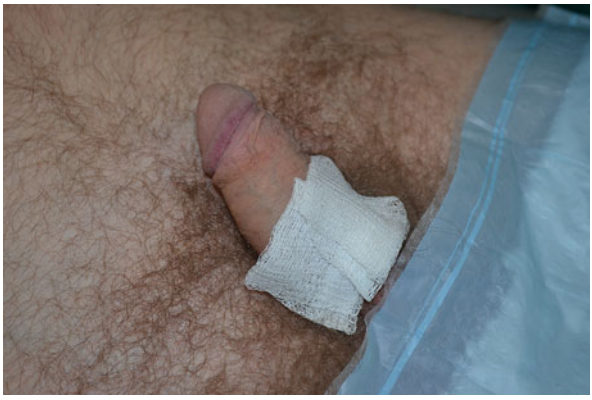

Fig. 12.15 Placement of compression dressing

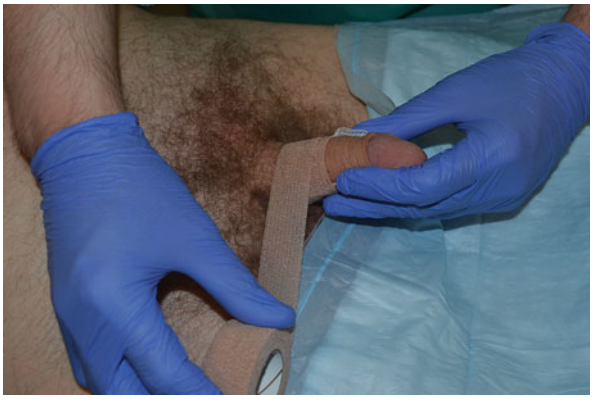

Fig. 12.16 Placement of compression dressing

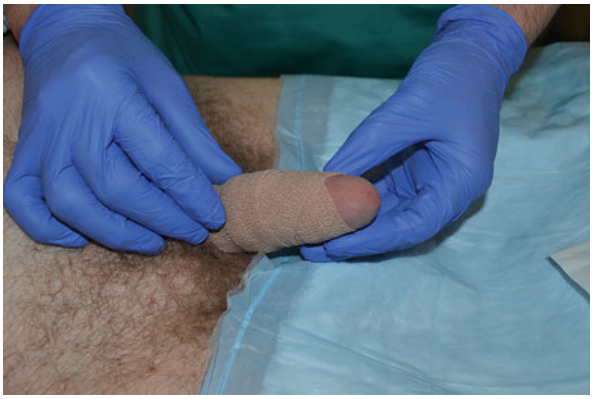

Fig. 12.17 Placement of compression dressing

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Chapter 13
Intramuscular Testosterone Training

Natalie C. Wolchasty

Introduction

Intramuscular testosterone injection is a method used to deliver testosterone directly into the body. It has a long history of use, has minimal side effects, and has the distinct advantage of ensuring excellent testosterone levels. Its only significant concern is that depending upon the interval of injection, the patient may experience variable testosterone levels over the course of each cycle.

Indications

Intramuscular testosterone should be considered in patients who have testosterone deficiency, as evidenced by at least two subnormal morning serum testosterone levels and by the presence of clinical symptoms. Symptoms may include: low libido, decreased morning erections, loss of body hair, low bone mineral density, gynecomastia, and small testes. Fatigue, depression, anemia, reduced muscle strength, and increased fat mass may also be present but are less specific symptoms of hypogonadism. Other candidates include patients who have had poor response to topical testosterone replacement, who have concerns about transference of topical testosterone agents to women and children, who have previously reported skin irritation with topical testosterone replacement gels and patches, who have difficulty complying with daily application of topical testosterone replacement gels and patches, or where topical testosterone replacement is cost prohibitive.

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DOI 10.1007/978-3-319-42178-0_13

Precautions

1. Metastatic prostate cancer or breast cancer
2. A history of poorly controlled or late-stage heart failure
3. Abnormal prostate exam or elevated PSA levels until fully evaluated
4. Baseline erythrocytosis (hemoglobin greater than 16.5 g/dL or hematocrit greater than 50 %)
5. Untreated obstructive sleep apnea
6. An interest in fertility or of childbearing age without a full discussion on the risk of infertility

Pre-procedural Considerations

Prior to prescribing intramuscular testosterone injection therapy, a teaching session should be completed by a licensed provider with the patient demonstrating proficiency in the injection technique. Patients should be scheduled for follow-up with their licensed provider 2–4 months after initiation of intramuscular testosterone injections to assess response to the medication and to reevaluate symptoms. Intramuscular testosterone injections should not be administered to sites that are inflamed, edematous, or irritated or to sites containing moles, birthmarks, scar tissue, or other lesions.

For oil-based solutions such as testosterone, providers should consider using a 22–25 gauge needle. Needle size and injection site should be selected on an individual basis. Patients who are overweight or obese may require a longer needle (1½ in. or longer) to ensure delivery into the muscle and not into subcutaneous fat, whereas patients who are thin may require a shorter needle (½–1 in.). We encourage patients to use an 18-gauge needle to draw up the medication into a 1 mL syringe (tuberculin syringe). The patient is then instructed to change the needle a 22 gauge or 25 gauge for the injection itself depending on the syringe size.

Careful monitoring should be considered in patients who are coagulopathic or edematous due to potential for bleeding and impaired absorption of testosterone medication. Patients should be instructed to contact their local health department regarding policies for safe needle disposal. Improper disposal of syringes and other sharp objects can pose a health risk and can ruin the environment.

Necessary equipment arranged on tray (Fig. 13.1):

1. Two alcohol swabs
2. One multidose vial of testosterone cypionate (200 mg/1 mL)
3. 1 ml Tuberculin syringe with 25 G 1 1/2 in needle attachment or 3 ml syringe with 22 G 1 1/2 in needle attachment
4. 18 gauge needle and 25-gauge needles

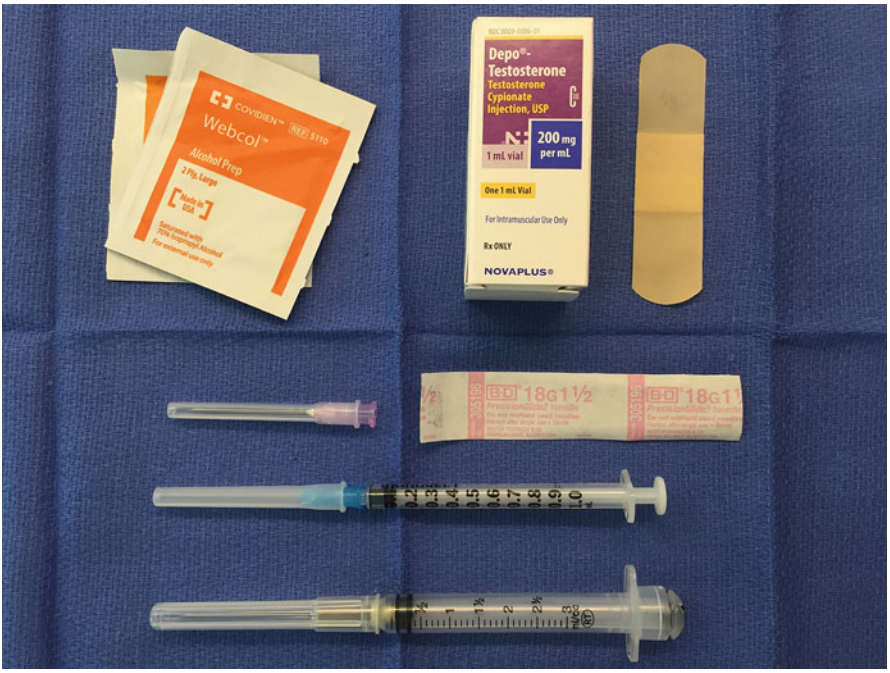

Fig. 13.1 Picture of necessary equipment arranged on tray

Procedure

Patients should be instructed to always use proper hand hygiene and a clean surface when preparing their intramuscular testosterone injection. The patient should also clean the top of the medication vial with an alcohol swab prior to every injection. After making sure the needle is firmly attached to the syringe, the patient should remove the cap from the needle and draw up a small volume air, which should then be injected into the medication vial. With the needle still in the vial, turn the syringe and vial upside down for medication withdrawal. Once the desired amount of medication has been removed for the injection, the patient may remove the needle from the medication vial, remove the 18 gauge needle and replacement with either a 22 gauge needle or 25 gauge needle for the injection itself. The needle should remain capped during preparation of the injection site. If the two-needle technique is being used, a small amount of (0.03 mL) medication should be aspirated into the syringe to flush out the air in the second needle.

Prior to performing the injection, the site should be identified and cleaned with a second alcohol swab, in an outward motion, 2 in. surrounding the injection site. The patient should then relax the muscle, uncap the needle, and insert the needle at a 90° angle into the muscle (Figs. 13.2 and 13.3). Once the needle is in the muscle, the patient should pull back the plunger and check the syringe for any blood. If there is no blood present in the syringe, the patient should inject the medication into the

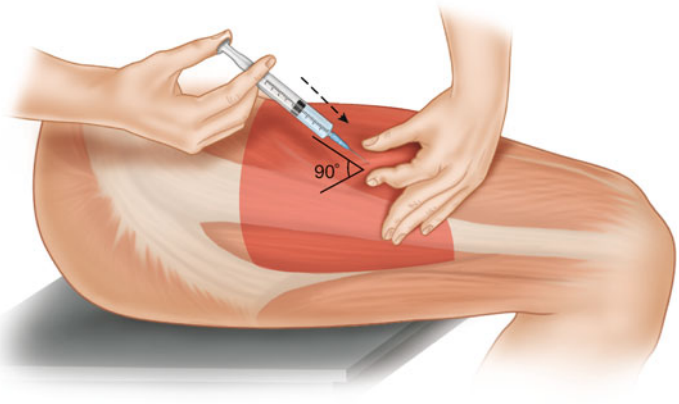

Fig. 13.2 Illustration of where thigh injections may be performed (with anatomical landmarks)

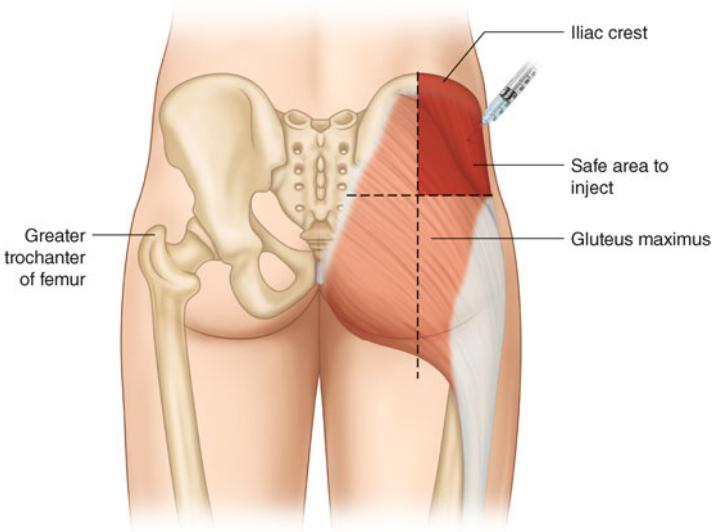

Fig. 13.3 Illustration of where gluteal injections may be performed (with anatomical landmarks)

muscle. If blood is aspirated during needle insertion, the needle has likely entered a blood vessel. If this occurs, the needle should be withdrawn and the injection aborted. The patient will need to repeat the procedure by preparing a new injection. Once all of the medication has been injected, the patient should carefully remove the needle and hold pressure at the injection site.

The injection may be performed in several areas: the deltoid, gluteus, or quadriceps. Due to ease of self-administration, we prefer teaching patients to inject their quadriceps. However, the other areas may be useful if the patient will not be giving themselves the injection.

Complications

1. Testosterone crash
2. Erythrocytosis
3. Elevated estradiol level
4. Ecchymosis and hematoma
5. Injection site infection

Intramuscular testosterone injections do not provide normal circadian patterns of serum testosterone, which can result in wide variations in testosterone levels. Patients may experience supratherapeutic effects from medications in the first 2–3 days post injection and then report "testosterone crash," which results in a sudden recurrence or worsening of hypogonadal symptoms during the days prior to the next injection. Erythrocytosis may occur as testosterone can increase red blood cell mass. Older men may be more susceptible to the rise in hemoglobin than younger men. Therapeutic phlebotomy should be considered if the hemoglobin level is greater than 17.5 g/dL. Therapy should be held if hemoglobin is 17.7 g/dL or greater, and we recommend that the patient be referred to a hematologist for evaluation and to rule out any other causes of the erythrocytosis. There is also a risk of nerve injury related to the injection damaging peripheral nerves at the site. Nerve injury is most common in elderly and underweight patients who have decreased subcutaneous fat and muscle mass. Presentation of nerve injury may range from minor pain to severe sensory disturbance and even motor loss.

Post-procedural Management

Apply pressure to the injection site to decrease bleeding and bruising following the injection. Patients may use ice and NSAIDs for the first 48 h following the intramuscular injection to reduce mild inflammation at the injection site. Patients who experience swelling and pain lasting greater than 48 h should be evaluated by their provider. Patients should be instructed to monitor for signs and symptoms of infection, which may include erythema and edema at the injection site, fever, and/or chills.

We perform peak and trough testosterone levels on all patients using IM testosterone therapy. Patients should be made aware that two blood draws will be necessary to assess response to one intramuscular testosterone injection. The first blood draw should occur the morning after the injection (approximately 18 h after). In this test, we include a total testosterone level (to measure the peak level), free testosterone level, complete blood count, estradiol, luteinizing hormone, and sex hormone-binding globulin. In order to achieve this, the patient should be instructed to inject between 4 and 6 p.m. the evening before the blood draw, and labs should be scheduled before 10 a.m. the day of the blood draw. The second blood draw should occur before 10 a.m. the morning of the next injection, before the next injection and should include a total testosterone only (trough level). A PSA level should be

evaluated annually in non-prostate cancer patients and at least every 6 months in patients with a history of prostate cancer. Blood draws for each injection should be performed with one single laboratory to ensure that methodology is the same for both peak and trough testosterone levels. Frequency of blood work may be determined by the provider but should be completed following initiation of intramuscular testosterone and following any changes to testosterone dosing and or frequency.

Dosing as well as frequency of intramuscular injections should be adjusted accordingly following review of all labs, but unless warranted, providers should try to avoid making changes to both dosing and frequency at the same time. Blood work should be repeated if levels and symptoms are not reflective of dosing (extremely supratherapeutic peak or subtherapeutic trough levels or equivalent peak and trough levels). Patients with an elevated estradiol level should be evaluated for breast changes including tenderness and enlargement. Once testosterone levels are stable in dose/frequency, blood work should be completed every 6 months with follow-up in clinic annually to reevaluate patient and symptoms. In patients who exhibit noncompliance with blood work, consideration should be given to switching them to transdermal agents or subcutaneous pellets.

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Chapter 14
Vacuum Erection Device Training

John P. Mulhall and Lawrence C. Jenkins

Introduction

The vacuum erection device (VED), also known as vacuum constriction device (VCD), is a long-standing treatment for erectile dysfunction (ED) which is attractive to patients because it is a drug-free and surgery-free alternative for their ED. However, for some patients, the device may be too cumbersome to use or difficult to integrate into their sexual activity. The device works by using a vacuum to draw blood into the penis. A constriction band is then placed on the base of the penis to hold the blood in place.

Indications

The VED can be used for the treatment of erectile dysfunction as an alternative to oral phosphodiesterase type-5 inhibitors. Some studies have utilized it for penile rehabilitation after radical pelvic surgery. It has also been used as a form of traction for patients with Peyronie's disease.

Precautions for use include:

1. Impaired penile sensation (diabetes mellitus)
2. Anticoagulant medications use
3. High risk for priapism (sickle cell disease, multiple myeloma)
4. Bleeding diathesis
5. Severe Peyronie's disease

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Fig. 14.1 Picture of device and parts

Pre-procedural Considerations

Trimming the hair at the base of the penis will help facilitate a good seal when the gel is applied to the base of the penis. There are both automated and manual vacuum devices which differ mainly in cost and ease of use (Fig. 14.1). The patient should spend the first session without the constriction band to familiarize himself with the device. Several VED manufacturers have personnel willing to work with a patient in the clinician's office to train the patient. We recommend once at home that the patient use it at least twice a week for the first month to develop expertise in its use. These practice sessions will also help condition the blood vessels and penile tissue to respond to the stress of the vacuum. Initially, patients are instructed to avoid maximum inflation and to use the double pump technique. That is, they will pump up to 50 % rigidity, reduce it by approximately 20 % and then pump up to 70 % rigidity and drop down by 20 % again and continue to do this. This is used to condition the erectile tissue and the tunica albuginea to the degree of stretch and engorgement that the vacuum device induces. Once the patient is comfortable with this technique and how the penis feels they may reach maximum rigidity.

Procedure

Once the device is assembled (Fig. 14.2), the constriction ring should be placed on the base of the pump, using lubrication to help apply the band. Some bands have a unique design to allow less tension over the urethra by creating a notch on the

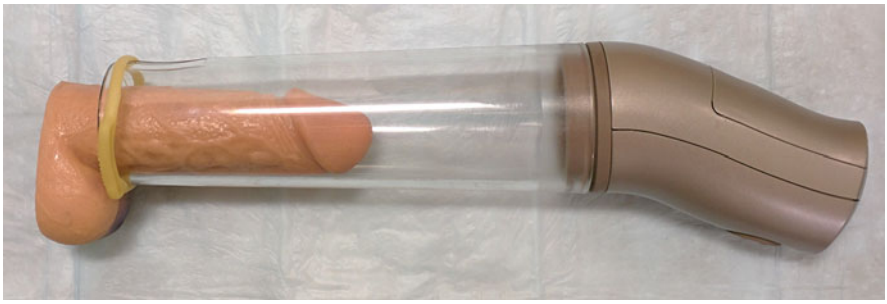

Fig. 14.2 Picture of device in position

inferior portion of the ring. If this is the type of ring being used, one should make sure it is lined up appropriately when placed on the vacuum device. Plenty of water-soluble lubricant should be placed on the tip and base penis to assist in the insertion of the device and to help create a good seal against the body. Lubricant should also be placed inside the base of the device to further assist in creating a good seal. The lubricated penis should be placed in the device. This may be easier to perform while standing. The cylinder should be secured against the body to make sure an airtight seal is obtained, but be cautious that the scrotum is not caught within the device. Once the device is in place, the patient should pump up slowly to create the vacuum. Pumping too fast may cause discomfort within the penis, if this happens air should be released (via the pop-off valve) and then continue pumping again. It may take several cycles of pumping and releasing to reach a fully rigid erection.

Once a full erection is achieved, the erection is maintained by placing the constriction ring around the base of the penis. It is important to keep the cylinder snug against the body to maintain the airtight seal until ready to place the ring into position (Fig. 14.3). Some men find it easier to tilt the cylinder while placing the ring on that side of the penis. If there is difficulty removing the cylinder to place the ring, the vacuum can be released on the device to facilitate removal. The constriction ring around the base of the penis should be removed after sexual activity and remain n place no longer than 30 min at a time. Ensuring placement on the constriction band at the very base of the penis will circumvent the "fulcrum effect" that may occur. The penis will be rigid beyond the constriction band but entirely flaccid behind, and to maximize penile stability, the band should be placed as far proximal as possible.

To remove the constriction ring, reapply lubricant to the shaft of the penis, and then pull the loops around the ring outwards and away from the body and hold for approximately 10 s to allow detumescence to occur. Lying down might help the blood return to the body faster. Once the penis is less rigid, the ring can more easily be removed by continuing to pull the loops of the ring away from the body.

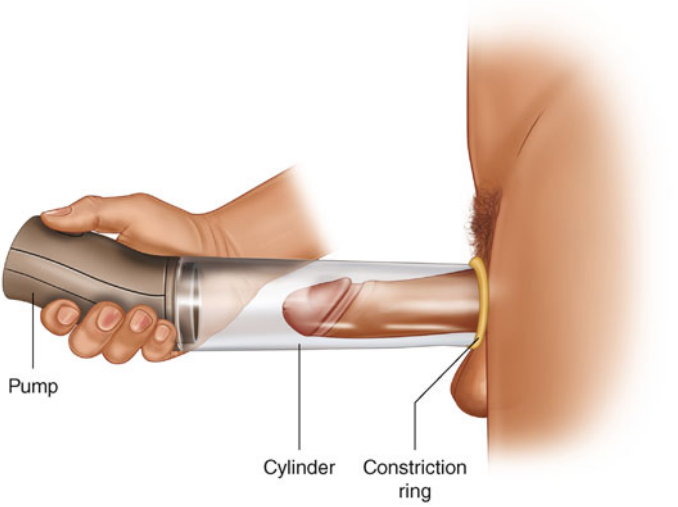

Fig. 14.3 Illustration of device placement, flaccid and erect

Post-procedural Management and Instructions

Advise the patient not to leave the constriction band on for longer than 30 min and to allow at least 60 min between uses. Alert the patient that delayed ring removal may damage the tissue within the penis. Patients with decreased hand strength may have difficulty removing the constriction rings.

Common Complaints

1. A hinge effect at the base of the penis due to a lack of rigidity below the constriction band. It may be necessary to direct the penis for penetration.
2. Coolness in the penile skin is normal and is due to the limited blood flow while the constriction band is in place.
3. Sensation impairment/tingling is not unexpected due to the pressure of the constriction band decreasing nerve signaling.
4. Discomfort while pumping is common but may be a sign that the vacuum is increasing too fast.
5. Intense venocongestion with blue/gray discoloration of the skin is expected due to the increased venous blood within the penis after the vacuum.

Complications

1. Petechiae—if these form, the manufacturers typically recommend discontinuing use of the device for 5–7 days.
2. Bruising.
3. Skin trauma—due to an excessively tight constriction ring.

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Chapter 15
Penile Traction Device Training

John P. Mulhall and Lawrence C. Jenkins

Introduction

Penile traction has been adapted from use in other specialties like orthopedics and plastic surgery as a tool to increase or regain length. Several studies have looked at the effects of penile traction in patients with Peyronie's disease and in patients with complaints of a "short penis." Studies on the use of traction in Peyronie's patients have shown modest improvements in curvature and stretched flaccid length. However, it appears that the traction must be used for about 3–4 h each day in order to derive a benefit. Changes in stretched flaccid penile length have been reported to range from 0.5 to 2 cm. Penile traction has also been utilized in conjunction with intralesional injections to attempt to obtain the maximal responses using this combination therapy. In patients with body dysmorphophobia, traction has been used to aid in penile lengthening with again modest results. One study showed an average improvement of 1.3 cm in stretched flaccid penile length, no change in penile girth, and modest changes in patient satisfaction.

Indications

There have been modest improvements in patients with Peyronie's disease whether as solo therapy or in combination with intralesional therapies. Traction has also been utilized after plaque incision/excision and grafting surgery to prevent penile length loss. It is also being explored after radical prostatectomy surgery to limit the amount of penile shortening.

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Pre-procedural Considerations

There are several devices on the market, the most commonly used being the USPhysioMed (http://www.usphysiomed.com/home.html), the AndroPenis® devices (https://www.andromedical.com/), and the PeniMaster®/Pro (http://www.penimaster.com). There is typically a minimum erect length to be able to use the device; AndroPenis reports their minimum length as 3.2 in. (8 cm); however, they carry a second device for shorter penises. It is recommended that the patient use the device at least 2 h daily, but longer times might produce greater effects. They should however take breaks after 2 h to reduce any risk for prolonged compression on the tip of the penis (glans ischemia) or prolonged nerve distraction. The device consists of a ring base that goes against the skin; there are two spring-loaded struts with adjustable lengths, which connect to a tension band at the tip of the penis. The struts allow adjustments for varying size penises and to increase the amount of traction over time.

Description of Procedure

The traction device is spring loaded and once assembled should be placed on the penis and secured using the special sling around the coronal sulcus of the penis (Figs. 15.1 and 15.2). Some patients have difficulties with the plastic buttress placed around tip of the penis slipping off or causing skin irritation. These may be remedied by using a combination of Vaseline to protect the skin and a cloth/gauze to wrap around the skin to prevent friction injury. The attachment to the tip of the penis should be snug but still comfortable. Patients should feel the penis taut once the device is applied.

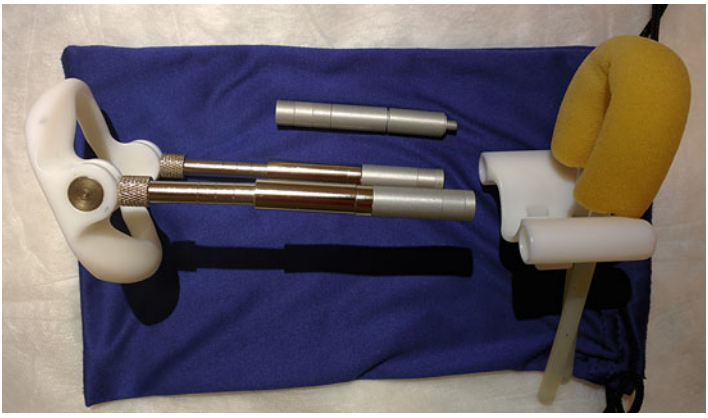

Fig. 15.1 Picture of device and parts

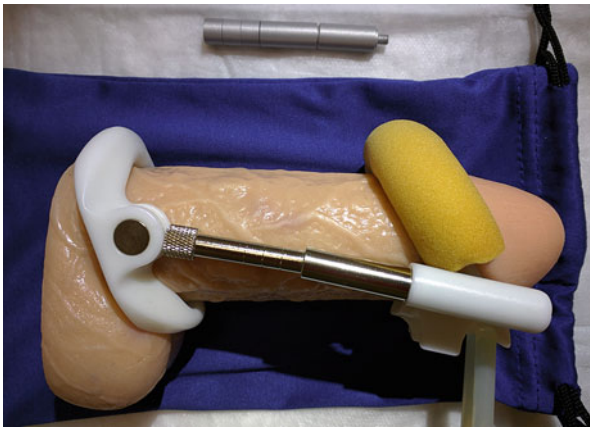

Fig. 15.2 Picture of device placement on penis

Post-procedural Management and Instructions

Patients should add 0.5–1 cm extenders to the device every 2–4 weeks, as tolerated. Overall compliance is poor, so patients should be advised about the importance of using the traction as much as possible. In our patient population, only 20 % of patients continue use exactly as prescribed after the first month of use. Some patients complain of skin changes, coolness, or bluish discoloration on the glans, and this is all related to the distal loop causing skin irritation or compression to the vasculature of the glans. These skin changes resolve once the device is no longer being used. For severe discomfort, the device should be removed and reapplied after a 5–15 min break.

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Chapter 16
Intraurethral Alprostadil Training

John P. Mulhall and Lawrence C. Jenkins

Introduction

Intraurethral alprostadil suppository is available on the market under the trade name MUSE® (Medicated Urethral System for Erection, Meda Pharmaceuticals Inc. Somerset, NJ). The medication is placed within the urethra and is absorbed via retrograde venous channels between the corpus spongiosum and corpora cavernosa. The medication is consistently effective in a minority of patients, and a significant proportion of patients discontinue use due to a lack of efficacy, difficulty integrating it into sexual activity, or side effects of burning. Trial doses and teaching are initially performed in the office prior to patient use at home.

Indications

MUSE is generally used as a second-line therapy for erectile dysfunction in patients who have already failed oral phosphodiesterase type five inhibitors.

Precautions include:

1. Known hypersensitivity to alprostadil.
2. Urethral abnormalities.
3. Predisposition to priapism (sickle cell anemia, multiple myeloma).
4. It also should not be used for sexual intercourse with a pregnant partner unless a condom is used.

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Pre-procedural Considerations

The most common complaint is aching/burning/stinging pain. Approximately, 2 % of patients will get hypotension with the 1000 μg dose. Best results are typically seen from the two higher doses, 500 and 1000 μg, although 125 and 250 μg do exist. The medication should remain refrigerated prior to use.

Procedure

During in-office training, the patient should have his blood pressure measured pre- and post-application of the pellet. The patient should urinate prior to administration; this serves to help lubricate the urethra and dissolve the pellet. The patient should be standing or sitting at the edge of a chair. The medication applicator comes in a foil pouch, and this should be opened and saved for disposal of the applicator after use. The applicator is then removed from its protective sheath using a twisting motion, and this sheath should be saved for disposal after use (Fig. 16.1). Be careful not to push the applicator button, which will dispense the pellet. Examine the applicator to confirm the white pellet is present within the device.

While gently stretching the penis, the applicator can be placed within the urethra (Fig. 16.2); at this point, it is safe to press the release button at the top of the applicator to deposit the medication within the urethra (Fig. 16.3). Hold in this position for 5 s and then gently rock the device side to side to help release the pellet from the applicator. Avoid excessive motion as it may cause damage to the urethra. The applicator can now be removed but make sure the penis remains pointing upward.

The applicator should be examined to make sure the medication is no longer attached. If there is still some medication present, the applicator may be reinserted and the previous steps repeated. The patient should then be instructed to stretch the penis and massage between the hands in a rolling motion for at least 10 s but a few minutes may help further. If there is discomfort or burning, it may help to continue massaging for at least 30–60 s.

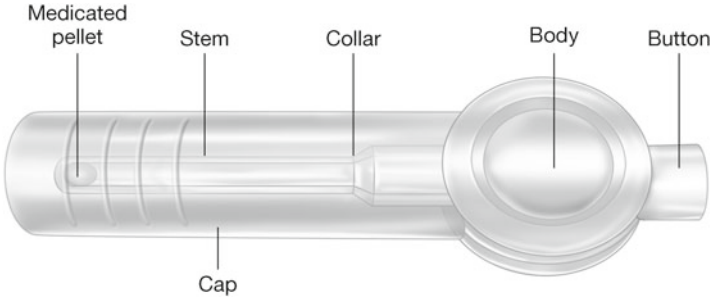

Fig. 16.1 Illustration of the device

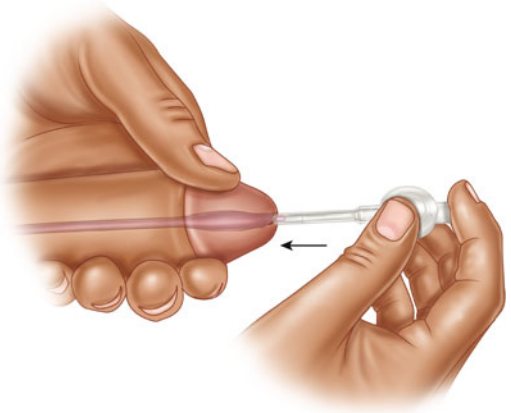

Fig. 16.2 Illustration of hand and applicator location prior to insertion

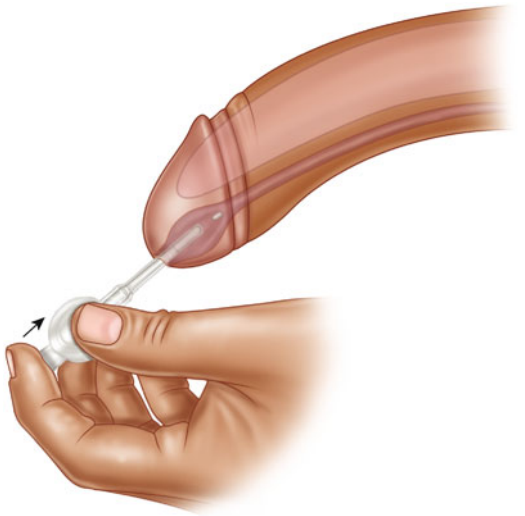

Fig. 16.3 Illustration of hand and applicator location during insertion, showing plunger depression

The applicator can be placed back in its protective covering and foil wrapper and disposed of in the trash. The patient should remain standing, walking, or seated for at least 10 min after insertion to facilitate opening of the spongiosal-cavernosal venous channels required for medication transfer. Erection, if this occurs, should be happened within 20 min.

Complications

1. Priapism
2. Urethral bleeding or spotting (5 %)
3. Aching penile pain
4. Warmth or burning sensation within the urethra
5. Light-headedness/dizziness

Post-procedural Management and Instructions

After in-office training, the patient should be monitored for priapism. If the erection fails to decrease after 60 min, it should be reversed using intracavernosal phenylephrine prior to discharge home. The dose may be adjusted to a lower level if there is concern for priapism. There have been reports of vaginal irritation associated with use; however, this is very uncommon.

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Chapter 17
Intracavernosal Injection Training

Joseph B. Narus

Introduction

Intracavernosal injection therapy has been utilized for erectile dysfunction since the 1980s when Giles Brindley and Ronald Virag almost contemporaneously discovered that intracavernosal phenoxybenzamine and papaverine, respectively, resulted in erection. Penile injections are typically a second-line therapy utilized when oral PDE5 inhibitors are found to be ineffective. There may be some hesitancy by patients to start self-injections due to a fear or anxiety of needles; studies showing this range from 5 to 23 %. In addition, there is also a real concern for priapism, a prolonged erection, which must be treated urgently if encountered.

Indications

Intracavernosal injection therapy involves the direct injection of alprostadil (prostaglandin E1), phentolamine, and papaverine (or other vasoactive agents) separately or in combination into the corpus cavernosum of the penis. Prostaglandin E1 (PGE1) relaxes the trabecular smooth muscle as well as cavernosal artery dilation allowing arterial blood inflow and entrapment with the lacunar spaces of the penis. Phentolamine is a nonselective α-adrenoceptor blocker that produces brief antagonism of circulating adrenaline and noradrenaline on α-adrenergic receptors and papaverine, a non-specific PDE inhibitor, results in cavernosal smooth muscle relaxation.

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Intracavernosal injections (ICI) are indicated when oral erectile agents are ineffective or their side effects are intolerable, when a penile vacuum device is considered too burdensome by the patient and/or his partner/spouse, or when intraurethral suppositories are ineffective or contraindicated.

Pre-procedural Considerations

ICI therapy is *contraindicated* if the man is on a MAO inhibitor, has uncontrolled hypertension, has a penile prosthesis, or when sexual activity is inadvisable. Management of priapism with intracavernosal phenylephrine or oral pseudoephedrine tablets could result in hypertensive crisis or cerebral vascular accidents with concurrent MAO inhibitor use or poorly controlled hypertension.

While not contraindicated, certain precautions exist. These include:

1. Obese abdomen resulting in the inability to self-visualize the penis
2. History of vasovagal episode secondary to needle anxiety
3. Dexterity problems (arthritis, tremors, Dupuytren's contractures)
4. Anticoagulation
5. Predisposition to priapism due to underlying hematologic disorders (e.g., sickle cell anemia)

Remind the patient to bring corrective lenses to the visit if required for reading as he will need to visualize units of measurement on the syringe. The patient's spouse/partner is encouraged to attend for emotional support, to understand the process, or to assist if the man is unable to self-inject due to physical or psychological (needle anxiety) constraints.

Procedure

Medication selection: Trimix (papaverine 30 mg/mL, phentolamine 1 mg/mL, PGE1 10 μg/mL) is the medication of choice in our practice (and most high-volume practices) for injection naïve men. A substitution with Bimix (papaverine 30 mg/mL, phentolamine 1 mg/mL) is indicated if there is concern about priapism or the patient has experienced post prostaglandin discomfort (penile autonomic neuropathy). FDA-approved PGE1 monotherapy (Caverject®, Pfizer, New York, NY; Edex®, Auxilium Pharmaceuticals, Chesterbrook, PA) can be used for training; however, they may cause significant penile discomfort in men after a radical pelvic surgery or men with diabetes. The injection dose ordered and administered is typically 5 units (0.05 mL) but is somewhat dependent on the man's age and comorbidity status.

In our practice, men are scheduled for two training sessions with each session lasting approximately 1 h depending on the man's learning needs and response to the intracavernosal medication. We consider two training visits to be optimal. Over

the course of two training visits, we can ensure the technical aspects of injection therapy are mastered. However, and more importantly, in this fashion, we have a reasonable sense for what is an effective and safe starting dose when the patient commences injection therapy at home. The priapism rate in our practice is 0.2 %, and we believe that having two training sessions contributes greatly to such a low rate.

First injection visit: The supplies include:

1. Syringe of ordered medication
2. Alcohol prep pads
3. Sharps container

The first visit consists of the clinician injecting the man's penis with the selected vasoactive agent. The goal of this visit is to assess the man's response to a low dose of medication (rigidity and duration) while allowing him to experience a penile injection to alleviate potential needle anxiety. The man's response to the medication will determine the medication and dose to be ordered for the second visit. If the man experiences penile discomfort (burning or aching) throughout his shaft, especially in men who have undergone radical pelvic surgery in the past 12 months, Bimix should be considered for the second injection session.

The patient is instructed to disrobe below the waist and provided an examination gown or a sheet to be draped across his lap. Inquire if the patient has taken an oral PDE5 inhibitor medication recently as there is a potential risk of prolonged when combined with an intracavernosal agent.

The side effects of ICI reviewed with the patient include:

1. Priapism
2. Penile discomfort (secondary to the PGE1 if used)
3. Bleeding or ecchymosis at injection site
4. Trauma to subcutaneous and erectile tissue if injection site is not rotated to alternate injection sites on penile shaft

The clinician grasps the glans and gently stretches the penis away from the patient's body so it is taut. The area to be injected is then cleansed with an alcohol pad. The prescribed dose is injected into the penile shaft at 2 o'clock or 10 o'clock with the needle injected up to the hub (Fig. 17.2). The plunger is depressed fully and then the needle is swiftly removed. Instruct the patient to hold direct pressure with the alcohol swab at the injection site with his thumb and index finger for 2–3 min (5–6 min if on blood thinner) to minimize the risk of bleeding, ecchymosis or hematoma formation. Explain it is normal to feel a warm sensation throughout his shaft within the first few minutes after the injection. Men are encouraged to gently massage and stimulate their penis after removing the alcohol pad to improve tumescence; however, instruct him to abstain from achieving an orgasm as this will prevent the clinician's ability to grade the erection hardness. Inform the patient you will return to the room in 10–15 min to assess his response.

The clinician should knock on the door prior to entering the room to allow the man to prepare for your entry. Ask the patient to rate his erectile response on a scale

of 0–10, where 0 = no response, 6 = just firm enough for vaginal penetration, 7 = firm enough for anal penetration, 10 = fully rigid response. After he rates his response, the clinician should palpate the penis to confirm his assessment and confirm comprehension of the erection scale. It is important the patient understands how to correctly rate his erection using the scale, because the patient will be instructed to contact the office to report his response after each of the first few home injections.

If his response is <60 % upon reentering the room, have the patient wait an additional 10–15 min as anxiety may have delayed his response. When returning to the room for reevaluation, the patient can be discharged if the response remains <60 %. Explain that although his erection is not completely detumesced, there is limited risk of priapism. Reassure the patient he may have a partial erection until the medication has been completely eliminated; however, should tumescence occur with an erection ≥60 % lasting 60 min, he should contact the office.

The patient will remain on site if his response is ≥60 % until detumescence begins and his response is <50 %. Neo-Synephrine® (phenylephrine HCl) is administered intracavernosally if the erection is ≥60 % after 1 h (Chap. 18). Men commonly achieve an erection response <60 % at the first visit. Reassure the patient this is not unusual and remind him a low dose was selected to avoid aprolonged erectile response while allowing him to experience a penile injection. Explain the dose will be increased for his second visit. Men may stand and walk around the room for a few minutes to determine if the response improves while in standing position (suggestive of venous leak).

Second injection visit: The supplies for this session include (Fig. 17.1):

Sample Injection Kit

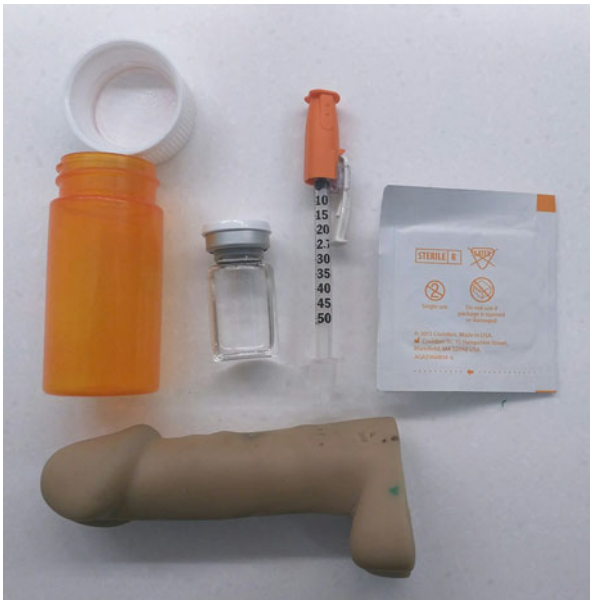
1. Rubber penis model
2. Normal saline vial (10 cc)
3. 29 gauge, ½" needle on a 50-unit syringe
4. Syringe of ordered medication
5. Alcohol prep pads
6. Sharps container

The second visit consists of the patient and/or spouse/partner receiving instructions on how to inject at home. The man or his spouse/partner is taught how to draw fluid from a multidose vial using the vial of normal saline and a 29-gauge syringe. The amount he practices drawing into the syringe is the dose he has been prescribed for the second visit. Once the correct dose is drawn into the syringe the man or his spouse/partner is taught how and where to inject using a rubber penis model.

Review penile anatomical landmarks with the man to prevent nerve, artery, or vein injury with self-injection. Instruct the man or his spouse/partner where to inject on the penile shaft. The penis should be divided into two parts: the first is proximal to mid-shaft; the second is mid-shaft to glans. The needle will be injected mid-shaft at the 10 o'clock (left side) or 2 o'clock (right side) position (Fig. 17.2). The injection should occur at 45° mid-shaft.

After the patient has practiced injecting the rubber model and the clinician and patient are comfortable with the technique, the patient will self-inject the prescribed

Fig. 17.1 Equipment



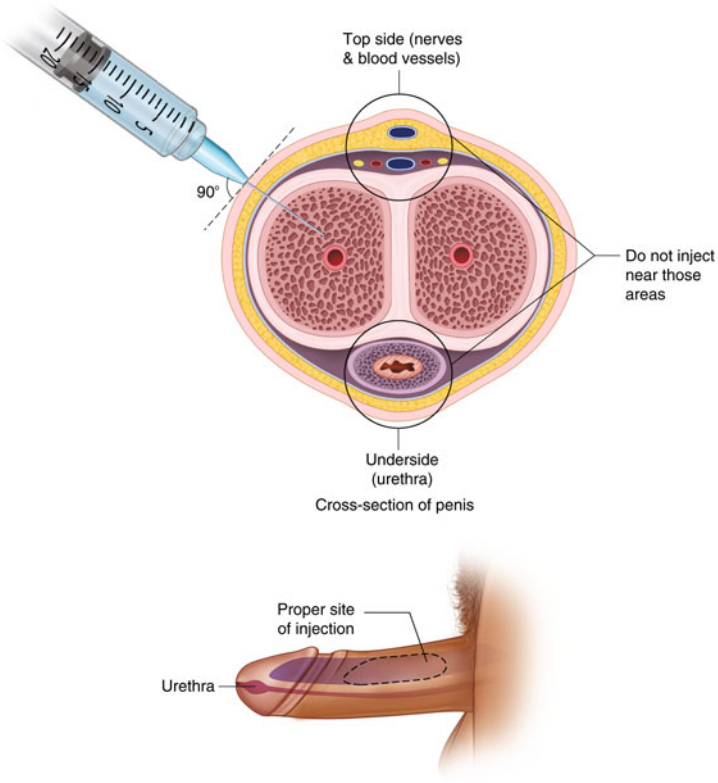


Fig. 17.2 Illustration showing where to inject needle—cross section of penis

dose (or the spouse/partner will inject the patient if the patient is unable to self-inject due to needle anxiety, dexterity issues, or an obese abdomen where he cannot visualize his penis). The man's response (rigidity and duration) at the second visit will determine the dose he will be ordered to inject at his first home self-injection.

When ready to inject, instruct the man or his spouse/partner to grasp the glans of his penis in their non-dominant hand and stretch the penis away from the body. The foreskin should be retracted if uncircumcised to permit a firm grip. Identify the area to be injected as defined above avoiding any visible superficial veins. Hand the man a prefilled syringe with the medication and dose to be injected. Instruct the man or his spouse/partner to touch the needle to the shaft and swiftly slide the needle into the shaft up to the hub (Figs. 17.3, 17.4, and 17.5). The plunger is then depressed to

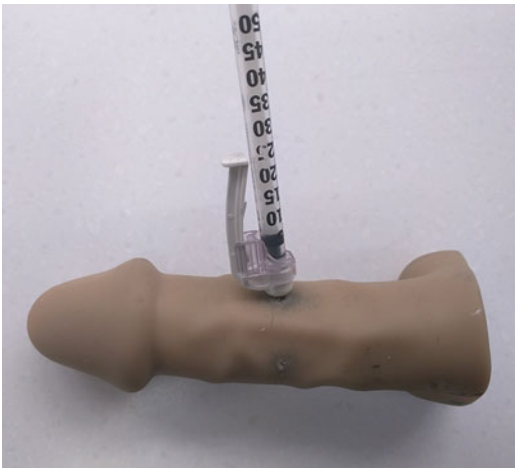


Fig. 17.3 Photograph showing where to inject needle—penis model, lateral view

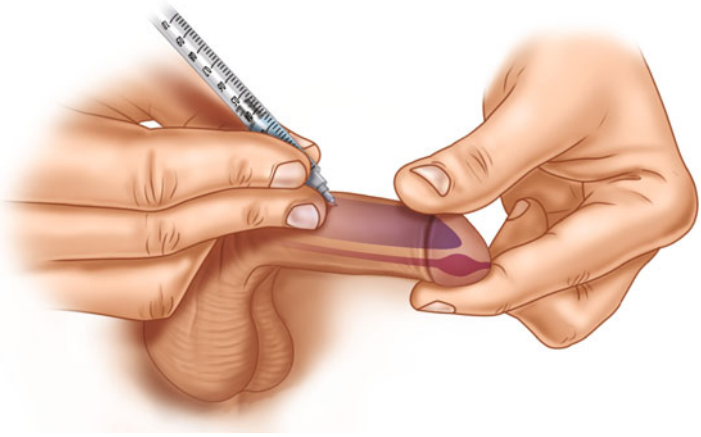


Fig. 17.4 Illustration showing where to inject needle—stretching

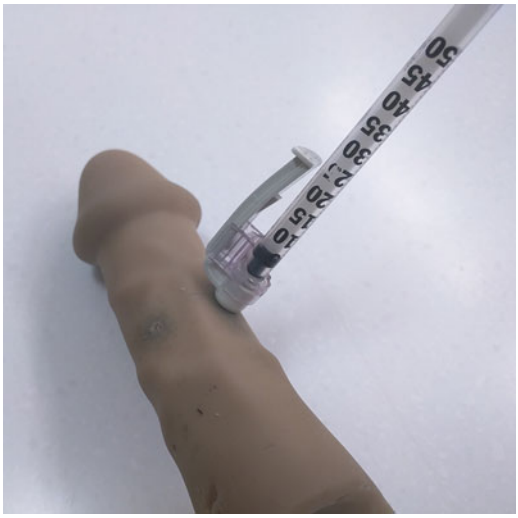


Fig. 17.5 Photograph showing where to inject needle—penis model, dorsal view

instill the prescribed dose. Remind the man and his spouse/partner to observe that the needle is not being withdrawn as the medication is injected. Direct pressure is applied at the injection site as outlined earlier. The clinician should return within 10–15 min to assess the man's response.

The man will rate his response using the erection scale. The same instructions noted under "*First Injection Visit*" apply for management of an erection ≥60 % lasting more than 60 min.

Post-procedural Management and Instructions

Men are instructed to contact the office to report their home response after each injection until they achieve a satisfactory response with detumescence within 90 min. The patient provides the following information when reporting his response, and the dose is then adjusted accordingly: name of medication, dose (in units) of medication injected, erection response using erection scale of 0–10, and duration (in minutes) of erection until ≤50 % response.

Discharge instructions include:

1. Call the office for instructions within 24 h after your first home injection.
2. Never self-adjust your dose.
3. Never self-inject a second dose on the same day if there is a poor or no response to the first injection.
4. Do not take oral erectile agents (sildenafil, vardenafil, avanafil) within 18 h of an injection, and do not inject within 18 h of one of these agents.

5. You may use daily tadalafil 5 mg if you were using this strategy at the time of your injection training.
6. You may inject up to three times a week as long as there is 24 h (approximately) between injections.
7. Concurrent use while undergoing chemotherapy may be inadvisable when there is a risk of neutropenia (usually 7–14 days after chemotherapy dose).

It is also important to review how medication will be sent from the compounding pharmacy and the need to store all products containing PGE1 under controlled temperatures (35–46 °F or 2–8 °C). Also, men should be advised how to store and dispose of medical sharps by checking with their local department of health for disposal instructions.

Management of a prolonged erection (defined in our practice as a penetration hardness erection lasting ≥2 h):

1. Take four 30-mg pseudoephedrine HCL tablets if the erection response is ≥60 % at the end of 2 h (should clear use with cardiologist if indicated).
2. If the erection remains ≥60 % at the third hour (1 h after taking the recommended pseudoephedrine HCL dose), he must call the office during office hours or the on-call clinician after hours and on weekends.
3. If the erection remains ≥60 % at the fourth hour, he is advised to access a local emergency room for immediate evaluation. Men are supplied a wallet card of written instructions for the emergency room clinician on the use of phenylephrine HCL (Neo-Synephrine®) as shown below (Box 17.1).

Box 17.1: Priapism Wallet Card
Please show *this* card to your doctor or the emergency room staff.

The person carrying this card is under the care of **XX, MD**, at **XX Hospital/ Clinic.** This patient is taking oral medication or using intracavernosal (penile) injections for erectile dysfunction. He has been instructed to go to the nearest emergency room if an erection stays at penetration hardness for 4 h. Upon arrival, the patient should be assessed immediately by the emergency room physician and the on-call urologist should be contacted.

Urgency: Priapism, erections lasting longer than 4 h, can cause permanent damage to erectile tissue. This condition is a medical emergency, and you should treat it with the same urgency as you would a testicular torsion or a myocardial infarction. Failure to deliver appropriate, timely care may result in permanent, untreatable erectile dysfunction for the patient.

(continued)

Treatment: Most men with priapism lasting less than 6 h require only the intracavernosal (intrapenile) administration of phenylephrine hydrochloride (Neo-Synephrine®) to achieve detumescence. This agent is not available outside of the United States so another alpha-adrenergic agonist should be used. Intracavernosal phenylephrine may be administered by the emergency physician if he or she is familiar with the technique of intracavernosal injection. If the emergency physician is not familiar with the technique and the on-call urologist is not immediately available, the patient is capable of self-administering the injection, provided the medical or nursing staff supply him with the syringe (27- to 29-gauge needle) and medication.

We advise that the patient be placed on a cardiac monitor and a continuous blood pressure monitor during phenylephrine administration.

Dosing: Phenylephrine usually comes as 10 mg/mL (10,000 μg/mL) solution. This solution should be mixed with 9 mL of injectable saline to make a 1 mg/mL (1000 μg/mL) solution. An initial dose of 1000 μg (100 units/1 mL) should be administered intracavernosally. If detumescence has not occurred after 10 min, another 1000 μg (100 units/1 mL) of phenylephrine should be given. The most concerning side effect of this medication is hypertension with reflex bradycardia. This agent is contraindicated in men with a history of profound (malignant) hypertension or who are using (or have used in the recent past) monoamine oxidase inhibitors (MAOIs).

If the patient cannot take phenylephrine or if the medication fails to achieve detumescence, the patient will require corporal aspiration of blood. This should be performed by a urologist. Rarely, a patient may need to be taken to the operating room for a shunt to achieve detumescence. Timely treatment generally prevents the *need* for this.

As a courtesy, please notify the **XX Doctor on-call** by calling **555-555-5555** when the patient has been seen by the emergency physician.

Complications

The following complications may occur from use of intracavernosal injections:

1. Priapism
2. Penile discomfort (secondary to PGE1)
3. Bleeding, ecchymosis, or hematoma at the injection site if pressure is not applied correctly, especially when on anticoagulation
4. Hematuria from an intraurethral injection
5. Trauma to tissue when injection site is not rotated to alternate injection sites on the shaft

Clinicians should advise patients that papaverine turns urine toxicity tests positive for opiates.

ICI Pearls

Poor Response

1. The penis was not stretched taut when injecting, so the needle failed to penetrate the corporal body.
2. A subcutaneous injection and not intracavernosal injection was administered by injecting too horizontally or laterally on the shaft missing the corporal body.
3. The plunger was depressed before the needle was completely inserted into corporal body.
4. The needle was inadvertently pulled out while depressing the plunger to instill the medication.
5. The correct dose of medication is not in the syringe because the plunger was accidentally depressed when replacing the needle cap on needle after prefilling with the prescribed dose.
6. The foreskin was not properly retracted, preventing a firm grasp of the glans.
7. The needle was injected into a Peyronie's plaque.
8. The injection was too proximal on the shaft and entered the pre-pubic fat pad.
9. The inability to self-visualize the penis due to an obese abdomen (a second set of hands to assist is recommended).
10. The medication has expired and a new vial is needed.
11. The medication was not being properly stored (PGE1 deactivates with time; this is accelerated without refrigeration).

Hematoma/Ecchymosis

1. The injection site was massaged too firmly when holding direct pressure with alcohol pad while on anticoagulants.
2. Direct pressure was not held at the injection site, because there was no blood present when he removed the needle after injecting.
3. A superficial vessel was inadvertently entered.

Pain

1. The needle became dull by inserting it too many times into the rubber stopper while trying to withdraw medication into the syringe.
2. Secondary to the PGE1 due to nerve injury after recent radical pelvic surgery, or from diabetic neuropathy.
3. The needle broke and became dislodged into the shaft from using too fine a gauge (30 or 31 gauge).

Answers to Common Questions

1. Needles finer than 29-gauge are not recommended due to risk of needle breakage. We have evaluated men referred to our practice after the needle broke with an injection. They were prescribed a 30- or 31-gauge needle by their local clinician.

2. Travel with the compounded agent is permitted; however, speak with the clinician or compounding pharmacy regarding storage.
3. Most insurance plans will not cover medications produced at a compounding pharmacy.
4. The compounded agent should not interfere with oral medications taken for other underlying medical issues.
5. A numbing agent applied to area to be injected is not recommended to avoid delayed orgasm.
6. Latex barriers are recommended for safer sex practices with new or multiple partners.
7. The medication should not be prepared by your local pharmacy. Quality and sterility are important factors when selecting a compounding pharmacy.
8. Injecting more than three times a week is not recommended as there are no longer-term studies.

Suggested Reading

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Chapter 18
Office Management of Prolonged Erection/Priapism

John P. Mulhall and Lawrence C. Jenkins

Introduction

We define a prolonged erection as one of penetration hardness greater than 2 h in duration, and priapism is such an erection lasting longer than 4 h. Ischemic (low-flow, veno-occlusive) priapism is a medical emergency, which may lead to erectile tissue fibrosis and permanent erectile dysfunction. The management of prolonged erection/priapism is performed in a stepwise algorithm involving increasing invasiveness. This treatment algorithm begins with the injection of a vasoconstricting sympathomimetic medication (phenylephrine), followed by aspiration/irrigation of the corpora cavernosa if necessary, and finally creating a surgical shunt to facilitate cavernosal drainage and detumescence.

The two main types of priapism include ischemic and nonischemic (arterial or high-flow). Ischemic priapism is a low-flow, veno-occlusive, hypoxic state characterized by little to no cavernosal arterial inflow with a rigid and painful erection. This is a medical emergency requiring immediate steps to induce detumescence, lest erectile tissue infarction and collagenization occur. Nonischemic priapism is an arterial, high-flow state characterized by unopposed cavernous artery inflow and a not fully rigid or painful penis. This form is not a medical emergency given the oxygenated state of the blood within the corpora.

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Indications

Prolonged erection.

Pre-procedural Considerations

A penile local anesthetic block (Chap. 4) will make the procedure more comfortable for the patient. In an office that performs many intracavernosal injections, it may be prudent to keep a ready-made kit of all necessary equipment to treat a patient with prolonged erection/priapism. When administering intracavernosal phenylephrine, the patient should be on a blood pressure and heart rate monitor because phenylephrine can result in hypertension sometimes followed by reflex bradycardia. In a patient with sickle cell disease or a hematologic malignancy, treating the prolonged erection/priapism should be done concurrently with treatment for the underlying condition (oxygen, hydration, systemic alkalinization plus acute management of sickle crisis/hematological malignancy).

List of necessary equipment (Fig. 18.1):

1. Prep tray and basin
2. Three way port

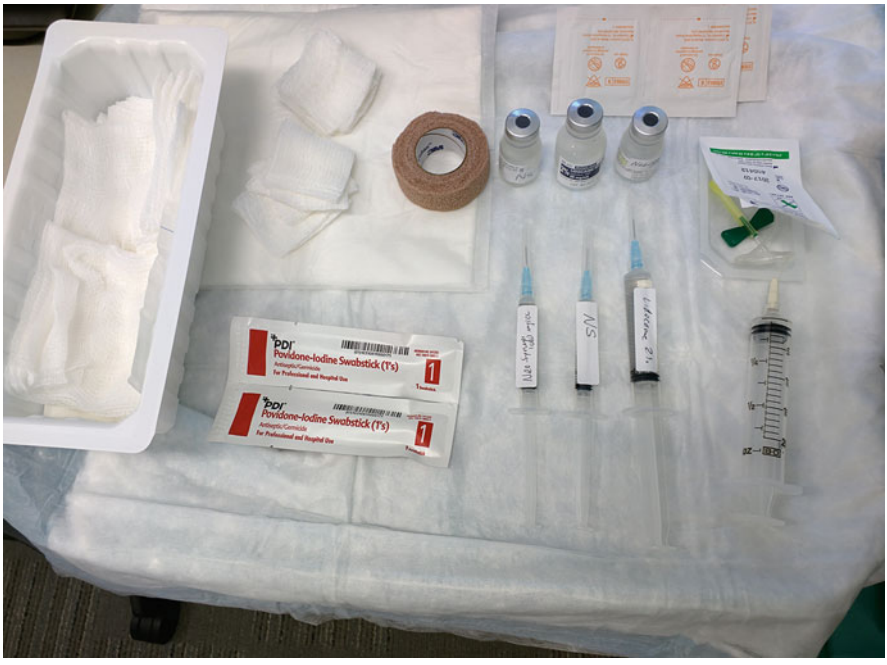


Fig. 18.1 Picture of recommended equipment arranged on tray

3. 19 g × ¾" Butterfly needle
4. Cohesive tape
5. Alcohol preps
6. 4" × 4" Gauze
7. Sterile fenestrated drape (18" × 26")
8. Saline flush
9. Needles (16 g × 1" and 27 g × 1 1/4")
10. Syringes (3, 5, 20 mL)
11. Syringe with needle 1 mL (27 g × ½")

Procedure

The patient should be supine on an examination table undressed from the waist down. If the patient has presented within 4–6 h of the commencement of the erection, a simple intracavernosal injection (one or two) is likely all that will be needed. If longer than this, the chance of needing aspiration increases significantly. When aspiration is expected, a penile block should be administered. While the definitive means of differentiating between ischemic and nonischemic states is a STAT cavernosal blood gas, for the patient in your office, the clinical history will usually suffice in defining the cause. Most of the patients will have undergone intracavernosal injection of a vasoactive agent for ED or for the purpose of a penile duplex Doppler ultrasound.

Phase 1: Injection of Sympathomimetic (Fig. 18.2)

We recommend administering 1000 μg per injection for a patient with a fully rigid erection and using lower doses (250–500 μg) for men with an erection that is just about penetration hardness. There is no limit on how intracavernosal phenylephrine can be administered as long as the patient's hemodynamics are within normal limits. Inject the phenylephrine slowly. We inject repeated injections at 5–10 min intervals. As long as some detumescence is occurring, we will continue with this approach. If no softening of the erection is occurring, we move to Phase 2. Also, if after 60 min of injecting a sub-penetration hardness erection is not achieved, we proceed to corporal aspiration.

Phase 2: Aspiration (Fig. 18.3)

While it is routine to place the butterfly needle into the corporal body from the side of the shaft, we prefer to place it through the glans. This dramatically reduces the chance of significant ecchymosis and hematoma formation on the shaft once

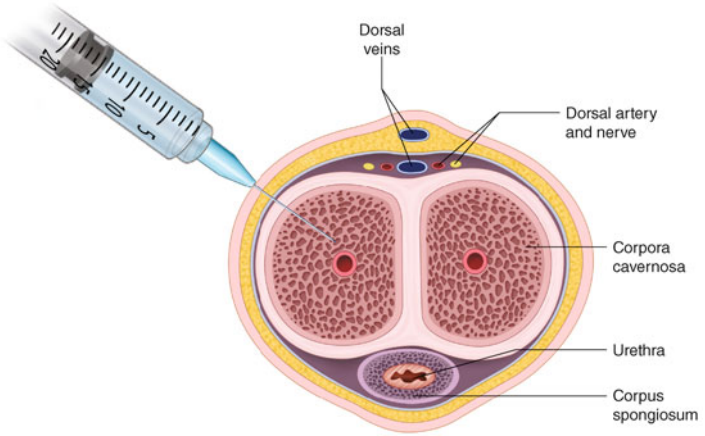
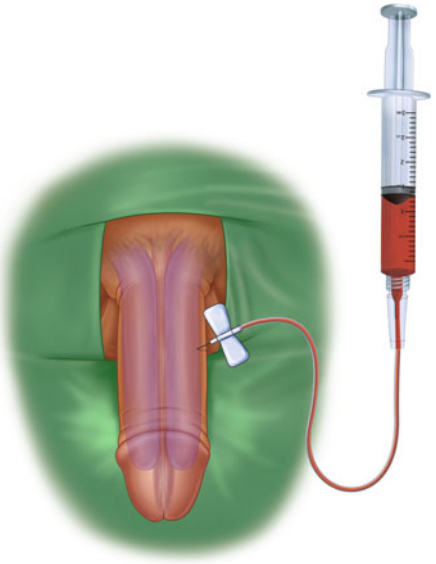


Fig. 18.2 Illustrations of needle location/placement

Fig. 18.3 Illustration of needle placement for aspir ation/irrigation



the aspiration procedure has been completed. Once the needle is in place, aspirate until the penis is flaccid and then inject more phenylephrine and cap the needle/syringe for a few minutes. This allows the medication time to work before aspirating more blood and demonstrates if re-tumescing is occurring. Perform a few cycles of aspiration and injection of phenylephrine, and if no sustained detumescence is achieved, move to irrigation.

Phase 3: Irrigation (Fig. 18.3)

We typically use irrigation with dilute phenylephrine (10 mg/L vial/250 mL = 40 μg/mL) when aspiration fails to withdraw liquid blood. Placing a second needle may be useful for this maneuver. After aspirating, irrigate with the dilute phenylephrine solution and repeat the steps until the penis is flaccid. If this fails, the next step will be fashioning a surgical shunt.

Post-procedural Management and Instructions

The penis should be wrapped with a gentle compressive dressing (gauze and Coban) to reduce the risk of hematoma formation. The patient should be monitored for 30–60 min after completion of the procedure(s) to make sure the erection does not return.

Complications

1. Hematoma—conservative management with ice and compression dressing
2. Failure to detumesce—if after about 1 h of treatment without signs of resolution cavernosal shunting will be necessary

Suggested Reading

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