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Peyronie's disease: an update
The role of diagnostics

LS Hakim[1]*

[1]*Section of Sexual Medicine, Male Infertility and Prosthetics, Cleveland Clinic, Florida, USA*

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While erectile dysfunction (ED) effects more than 50% of men over the age of 40, Peyronie's disease, often associated with ED, is also an important medical problem occurring in at least 1% of all men. Through numerous advances made in understanding the mechanisms involving Peyronie's disease, improved clinical diagnostic techniques have been developed, allowing for the successful treatment of both ED and Peyronie's disease. This work reviews the contemporary state of knowledge of Peyronie's Disease, focusing on the role of diagnostics and offering an algorithmic approach to the management of this disorder.

Peyronie's disease is a common potency-threatening condition of male sexual dysfunction. The symptoms may be immediately obvious: a curved or bent penis, penile plaque, decreased penile length, diminished penile stretch, less rigidity, penile numbness and erectile dysfunction. This is different from 'congenital' curvature of the penis as seen in children and young adults. While the causes of Peyronie's disease can vary and are not always known in every situation, it is often thought to be caused by solitary or repeated injury during sexual activity. MRI studies obtained during coitus, illustrating the forces on the erect penis in or against the vagina during intercourse, tend to support this theory.

Peyronie's disease can often cause poor erectile function. The penis may become firm up to the point of the plaque and remain soft beyond that point. In some instances, the patient may see a narrowed 'bottleneck' or an 'hourglass' shape of the penis as well. The plaque can also prevent the penis from storing blood during erection. As a result of this, the patient may be unable to have intercourse because of a soft and curved penis.

To achieve the ultimate goal of therapy, the restoration of a straight, rigid erection, a number of effective procedures can be used, including intralesional injection therapy, surgical plication, or plaque incision and grafting. For patients who have poor erectile function, insertion of a penile implant with subsequent repair of any residual curvature is an excellent treatment option for restoring both normal sexual function and a straight erection.

Because no single treatment is appropriate for everyone, it is critical to make an accurate diagnosis prior to treatment, and factors such as plaque size, stability and location, penile curvature, stretch and baseline erectile function, should be determined prior to instituting any form of intervention. This is most effectively done using a directed approach, which provides for comprehensive evaluation of both the patient and his partner. Sexual dysfunction is a *couple's disease*. Penile curvature and poor erectile function can directly effect both patient and partner (ie dyspareunia). Both patient and partner sexual issues need to be addressed as part of any couple's sexual function evaluation to assure the greatest chance of success. In addition, setting realistic goals is essential prior to any form of therapy to assure maximal patient and partner satisfaction. Numbness and loss of length do not always improve or resolve despite any type of therapeutic intervention. In addition, since many patients with Peyronie's disease do not require *any* form of intervention, evaluation of the plaque's impact on the couple's sexual function should also be considered when discussing the role of therapy, if needed.

As in any form of sexual dysfunction, the initial evaluation of the male with Peyronie's disease begins with a sexual, psychosocial and medical history. The presence of associated risk-factors, such as penile injury or trauma, as well as systemic vascular disease should be assessed. An important part of the history involves the length of time that

*Correspondence: LS Hakim, Department of Urology, Cleveland Clinic Florida, 2950 Cleveland Clinic Blvd., Weston, FL 33331, USA.
E-mail: hakiml@ccf.org
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the plaque has been present. Is it stable? Greater than 1 year? Is it getting larger? Smaller? Changing location or orientation? These factors are important parts of the diagnostic evaluation and history as they have a direct impact as to the role and form of intervention that will be offered. Other associated forms of sexual dysfunction, including poor libido and ejaculatory dysfunction, should be evaluated and treated appropriately. Patient and partner education with regard to various intercourse positions and non-coital sexual activities is often an important part of the management of this disease.

Once a complete history has been obtained, a thorough physical examination and routine laboratory tests are in order. Specifically, assessment of the penile plaque, if present, is of foremost importance. In most cases, a clearly palpable penile plaque will be identified on physical examination, and in fact may be the reason for the patient's concern (ie cancer scare). Factors including the plaque location, size and consistency, as well as the presence of any pain or tenderness, are useful during the decision-making process.

Another penile lesion, which may be confused with Peyronie's Disease or plaque, during the diagnostic evaluation is 'sclerosing lymphangitis' (SL). SL is typically a superficial ropelike lesion, usually located at the coronal sulcus. It is most commonly seen in men who engage in extremely vigorous sex and is thought to be due to repeated penile trauma during intercourse. A 'thrombosed' vein (not actually lymphatic) is felt on physical examination, which usually resolves spontaneously after a period of abstinence.

In some situations, Peyronie's disease may present with decreased penile stretch or deformity with no specific, palpable plaque. Evaluation of penile length, stretch and sensation are an important part of the directed genital examination to make the diagnosis of Peyronie's disease.

Depending on the results of this evaluation, a variety of further diagnostic examinations such as vascular, neurologic, hormonal and psychologic testing may be used to further corroborate the findings.

The next step involves evaluation of the penile curvature or deformity in the *erect* state. This is usually assessed following intracorporal injection of vaso-active agents, such as prostaglandin, phentolamine, papaverine, or some mixture of these drugs (ie Trimix). Redosing of vasoactive drugs may be necessary to achieve the best-quality erection and maximal smooth muscle relaxation. Addition of high-resolution duplex Doppler ultrasonography is useful in helping to assess penile hemodynamics, anatomy and erectile function with a simple, non-invasive office-based test. This modality allows for objective understanding of the disease, both for the patient and his partner, as well as the physician.

Specifically, when assessing the plaque in the erect state, factors including the size, degree of penile curvature, direction of curvature (dorsal, ventral, lateral or some combination), and location are critical when deciding on intervention. For example, in cases of an extensive dorsal plaque, often with involvement of the neurovascular bundle, use of a ventral Nesbit-type plication may be appropriate in order to minimize the risk of penile numbness. Other non-invasive erectile function tests may include penile biothesiometry to evaluate sensation pre-operatively. Anatomic changes other than curvature seen with Peyronie's disease, such as an 'hourglass-deformity' should be documented in the erect state, as well. The severity of the deformity, as well as the associated erectile function and storage ability are critical factors when determining the appropriate therapeutic intervention.

One mechanism of Peyronie's disease associated erectile dysfunction is secondary to hemodynamic changes in the corpora cavernosa. Decreased compliance of the penile fibroelastic frame induced by Peyronie's plaques may result in an inability to expand the trabeculae against the tunica albuginea and compress the subtunical venules. The clinical consequence of such hemodynamic alterations in the 'trapping' mechanism is excessive outflow of lacunar blood through the subtunical venules, leading to decreased penile rigidity and a diminished ability to sustain an erection. More invasive diagnostic tests, such as dynamic infusion pharmaco-cavernosometry and cavernosography can be utilized to better understand these changes in the individual patient. Pharmacocavernosography in the erect state in men with Peyronie's disease typically demonstrates penile deformity and a focal, site-specific pattern of abnormal venous drainage. In addition, objective evaluation of penile hemodynamics and storage ability is critical during the pre-operative evaluation, as any therapeutic intervention for Peyronie's disease may have some adverse impact upon erectile function. Hence, documentation of the baseline erectile function is imperative, both from a medical and medico-legal perspective.

Summary

While the overall incidence of Peyronie's Disease in the general population is approximately 1%, it is often a devastating process that effects both the unfortunate man and his partner. Numerous advances have been made in understanding the underlying physiologic mechanisms causing Peyronie's disease. Improved clinical techniques for the diagnosis and treatment of Peyronie's disease, have allowed us to enter a new and exciting era in the field of sexual medicine. While the evaluation process should be individualized for each patient,

a simple, diagnostic algorithm for the evaluation of all patients with Peyronie's disease is described below.

Peyronie's Disease: diagnostic algorithm

Patient and partner history
- Medical, sexual and psychosocial history
- History of penile trauma and pain
- Length of time of plaque/deformity/curvature
- Stability of plaque/deformity/curvature
- Prior therapies (including herbals/vitamins)
- Rule out: ejaculatory or orgasmic dysfunction
- Endocrinological and laboratory evaluation

Physical examination
- Complete genitourinary examination
- Palpable penile plaque (location, size, severity)
- Penile stretch, length, sensation, pain

Vascular evaluation in the erect state
- Abnormal penile curvature (location, size, severity)
- Hourglass deformity (location, size, severity)
- Office intracavernosal injection test
- Penile duplex Doppler ultrasonography
- Dynamic infusion pharmacocavernosography and cavernosography

Neurologic evaluation (performed in selected patients)
- Biothesiometry
- Vibration perception sensitivity testing