

5-1-2012

# Management of sexual disorders in spinal cord injured patients.

Vafa Rahimi-Movaghar

*Sina Trauma and Surgery Research Center, Tehran University of Medical Sciences*

Alexander R Vaccaro

*Thomas Jefferson University, Rothman Institute, Alexander.Vaccaro@mail.tju.edu*

## Let us know how access to this document benefits you

Follow this and additional works at: <https://jdc.jefferson.edu/neurosurgeryfp> Part of the [Medical Neurobiology Commons](#), [Neurology Commons](#), and the [Surgery Commons](#)

### Recommended Citation

Rahimi-Movaghar, Vafa and Vaccaro, Alexander R, "Management of sexual disorders in spinal cord injured patients." (2012). *Department of Neurosurgery Faculty Papers*. Paper 19.<https://jdc.jefferson.edu/neurosurgeryfp/19>

This Article is brought to you for free and open access by the Jefferson Digital Commons. The Jefferson Digital Commons is a service of Thomas Jefferson University's [Center for Teaching and Learning \(CTL\)](#). The Commons is a showcase for Jefferson books and journals, peer-reviewed scholarly publications, unique historical collections from the University archives, and teaching tools. The Jefferson Digital Commons allows researchers and interested readers anywhere in the world to learn about and keep up to date with Jefferson scholarship. This article has been accepted for inclusion in Department of Neurosurgery Faculty Papers by an authorized administrator of the Jefferson Digital Commons. For more information, please contact: [JeffersonDigitalCommons@jefferson.edu](mailto:JeffersonDigitalCommons@jefferson.edu).

# Management of Sexual Disorders in Spinal Cord Injured Patients

Vafa Rahimi-Movaghar<sup>1</sup> and Alexander R Vaccaro<sup>2</sup>

<sup>1</sup> Department of Neurosurgery, Research Deputy, Sina Trauma and Surgery Research Center, Tehran University of Medical Sciences, Tehran, Iran

<sup>2</sup> Department of Orthopaedics and Neurosurgery, Thomas Jefferson University and the Rothman Institute, Philadelphia, Pa 19107, USA

Received: 20 Jul. 2011; Received in revised form: 27 Oct. 2011 ; Accepted: 22 Feb. 2012

**Abstract-** Spinal cord injured (SCI) patients have sexual disorders including erectile dysfunction (ED), impotence, priapism, ejaculatory dysfunction and infertility. Treatments for erectile dysfunction include four steps. Step 1 involves smoking cessation, weight loss, and increasing physical activity. Step 2 is phosphodiesterase type 5 inhibitors (PDE5I) such as Sildenafil (Viagra), intracavernous injections of Papaverine or prostaglandins, and vacuum constriction devices. Step 3 is a penile prosthesis, and Step 4 is sacral neuromodulation (SNM). Priapism can be resolved spontaneously if there is no ischemia found on blood gas measurement or by Phenylephrine. For anejaculatory dysfunction, massage, vibrator, electrical stimulation and direct surgical biopsy can be used to obtain sperm which can then be used for intra-uterine or in-vitro fertilization. Infertility treatment in male SCI patients involves a combination of the above treatments for erectile and anejaculatory dysfunctions. The basic approach to and management of sexual dysfunction in female SCI patients are similar as for men but do not require treatment for erectile or ejaculatory problems.

© 2012 Tehran University of Medical Sciences. All rights reserved.

*Acta Medica Iranica*, 2012; 50(5): 295-299.

**Keywords:** Spinal cord injury; Management; Sexual disorders; Erectile dysfunction

## Introduction

Spinal trauma complicated by spinal cord injury (SCI) is a devastating event on a personal and family level, as well as a great financial burden to society because of its attendant morbidity, expense, and prolonged treatment requirements (1, 2).

The prevalence of SCI has been evaluated in two papers reporting ranges from 110 to 1120 and 223 to 755 per million people (3,4). In a population based study, the point prevalence of SCI in Tehran was 440/million (95% CI: 120-1140) (5). In Tehran, the incidence was 98/million in males and 47/million in females (6). SCI complications were evaluated in 5995 complete motor SCI (ASIA A and B) patients supported by the Welfare Organization in Iran (7). The prevalence of sexual dysfunction in males was 32.4% and in females was 13.9%. Prevalence of infertility was 12.1% and 7.0% in males and females, respectively.

## Materials and Methods

A literature review was performed using the terms “spinal cord”, “injury”, “patient”, “treatment”, “management”, “sex”, “sexual”, and “erectile

dysfunction” in PubMed from 1966 to 20<sup>th</sup> July 2011. The reference lists of the identified articles were also reviewed.

## Results

There is less known about SCI-related sexual dysfunction in females than in males. However, these studies have shown that when vaginal stimulation is done in SCI females and a normal control group, orgasm will happen in 100% of normal controls but in less than 50% of T12-L1 SCI patients. In females with S2-S5 lesions, only 17% achieved orgasm (8).

In female SCI patients, fertility is possible. However, pregnancy needs careful observation for autonomic dysreflexia. For delivery, Oxytocin induction is contra-indicated but epidural anesthesia is recommended to decrease the risk of autonomic dysreflexia. Careful observation for bed sores, urinary tract infections (UTI), leg edema, thrombophlebitis, transient ischemic attack (TIA) and anemia is important. Meanwhile, sequential breast examination is necessary. In patients with cervical lesions, lactation typically continues for 3 months and then stops because of lack of stimulation.

**Corresponding Author:** Vafa Rahimi-Movaghar

Department of Neurosurgery, Research Deputy, Sina Trauma and Surgery Research Center, Tehran University of Medical Sciences, Tehran, Iran  
Tel: +98 216 6757010, 915 3422682, Fax: +98 216 6757009, E-mail: v\_rahimi@sina.tums.ac.ir

Most men with SCI are infertile. Erectile dysfunction (ED), ejaculatory dysfunction and semen abnormalities contribute to the problem. Although sperm count is normal in SCI men, sperm motility is low. There is abnormal sperm viability and morphology, too. Genitourinary infection and endocrine abnormalities can also be present (9-11).

### **Erectile dysfunction (ED)**

ED is defined by the National Institutes of Health (NIH) as the inability to achieve or maintain an erection sufficient for satisfactory sexual performance. ED is the most common sexual problem in men (10). The incidence increases with age and affects up to one third of men throughout their lives. It causes a considerable negative impact on close relationships, quality of life, and confidence (12).

### **ED pathophysiology**

ED may result from variety of psychological and/or organic causes including vascular, neurogenic, hormonal, anatomic and drug-induced conditions. A normal sexual erectile response results from the interaction between neurotransmitters and vascular smooth muscle initiated by parasympathetic and sympathetic neuronal triggers that combine physical stimulation of the penis with sexual perception and desire. Nitric oxide produced from endothelial cells after parasympathetic stimuli triggers a molecular cascade that results in smooth muscle relaxation and arterial influx of blood into the corpus cavernosum. Then, compression of venous return occurs, and an erection arises (13).

### **History taking and physical examination**

In a patient with SCI, history and physical examination are adequate in making an accurate diagnosis of ED in most cases. Sexual history should focus on erection adequacy, altered libido, quality and timing of orgasm, volume and form of ejaculate, presence of sexually-induced genital pain or penile curve and partner sexual function.

The physical examination should evaluate blood pressure and heart rate; body habitus, for central obesity; and cardiovascular, neurologic, and genitourinary systems, including penile, testicular, and digital rectal examinations.

### **Laboratory tests**

Laboratory workup is not initially necessary in SCI patients. However, if the first line of treatment for ED is

not successful, laboratory assessment is recommended to include a fasting blood glucose level and lipid panel, thyroid-stimulating hormone, and testosterone level (14).

### **Conservative management**

First-line therapy for ED consists of lifestyle changes, modifying drug therapy that may cause ED, and pharmacotherapy with phosphodiesterase type 5 inhibitors (PDE5I). Obesity, inactive lifestyle, and smoking greatly increase the risk of ED. Grade A treatment recommendations, based on high-quality patient-oriented studies, suggest that PDE5I are the most effective oral drugs for the treatment of ED in SCI patients (15,16). Retail sales of the three most popular PDE5Is Sildenafil (Viagra), Tadalafil (Cialis), and Vardenafil (Levitra) approached \$1.48 billion in 2007 (17).

Compared with placebo, Sildenafil has been shown to improve erections (74% versus 21%) (18) and results in more frequent intercourse attempts (57% versus 21%) (19).

Approximately one third of men with ED do not respond to therapy with PDE5 inhibitors. In addition, these agents are not effective for improving libido (20).

The three PDE5I are considered to be somewhat similar in effectiveness, but there are differences in dosing, onset of action, and duration of therapeutic effect (21).

The standard dose for Sildenafil is 50 to 100 mg daily. Recommended time between onset of dosing and intercourse is one hour. Drug action starts in 14 to 60 minutes and drug duration extends for up to four hours. Tadalafil and Vardenafil dose is 10 to 20 mg daily. Although the duration of action in Vardenafil and Sildenafil are similar, the duration of action for Tadalafil is up to 36 hours.

There are no conclusive data to suggest that one PDE5I is better than others. An open-label trial established that patients preferred Tadalafil and Vardenafil over Sildenafil (22). However, nearly all evidence supports equal efficacy between Sildenafil and Vardenafil (23).

Headache is the most frequently reported side effect of PDE5Is, occurring in roughly 10% of patients. PDE5Is should not be taken simultaneously with nitrates because this may lead to a synergistic effect, resulting in a potentially severe, even lethal, decrease in blood pressure.

The most frequent predictor of success for PDE5I is upper motor neuron (UMN) lesion. Most patients

tolerate these medications well, and in a meta-analysis, only 1% of patients discontinued their PDE5I. However, PDE5Is had no positive effect on ejaculation except in one study (24).

### **Testosterone**

There is a limited indication for testosterone in SCI patients. Testosterone supplementation in men with hypogonadism improves ED and libido but requires interval monitoring of hemoglobin, serum transaminase, and prostate-specific antigen levels because of an increased risk of prostate adenocarcinoma (25,26).

Intracavernosal pressure and PDE5 activity are androgen-dependent. The prevalence of hypogonadism in men with ED is estimated to be 5 to 10 percent (27).

In men with hypogonadism, testosterone is superior to placebo in improving erections and sexual function. Response rates are higher in primary versus secondary testicular failure. Testosterone is also associated with improved satisfaction with erectile function and sexual desire (28).

### **Second line treatment**

Intracavernous and intraurethral injection of Papaverine, intraurethral prostaglandins (29), and vacuum constriction devices are alternative therapeutic options when PDE5Is fail. Much lower doses of intracavernous injection is prescribed in SCI patients than those who have vasculopathies (29). Intracavernosal Papaverine is more effective, better tolerated, and preferred by men over the intraurethral form. There is a danger for prolonged erection (priapism), which is a medical emergency. Priapism is most frequently treated with aspiration of blood from the corpus cavernosum. If this treatment is inadequate, then intra-cavernosal injections of Phenylephrine should be performed with hemodynamic monitoring. There is similar efficacy for intracavernosal Papaverine and oral PDE5I Sildenafil (30).

### **Vacuum constriction devices**

Some patients refuse vacuum constriction devices treatment due to negative cultural perceptions, minor complications such as ecchymoses or petechiae, and lack of motivation. However, vacuum constriction is a reasonable, safe, and noninvasive alternative, and possibly a better initial treatment for the management of impotence secondary to SCI.

Vacuum constriction is a noninvasive second-line option and has minor side effects. It is contraindicated in men with sickle cell anemia or blood dyscrasias and in

those taking anticoagulants. The worst complication of constriction devices in SCI patients with loss of penile sensation would be ischemic gangrene of penis.

### **Third line: Surgically implanted penile prostheses**

When first and second line therapies have failed, surgical implantation of an inflatable penile prosthesis can be considered in consultation with an urologist (31,32). There is a 16.7% complication rate associated with penile prostheses, which include wound infections, penile pain due to excessive prosthesis length, and displeasure due to the partner's abnormal sensation (33).

### **Fourth line: Sacral neuromodulation (SNM)**

The fourth line of treatment can be SNM, which can be performed in patients with complete SCI in detrusor atonic phase 2-3 months after SCI (34). This minimally invasive surgical operation can be performed under local anesthesia. It involves insertion of an electrode in each S3 root, using anal sphincter contraction following stimulation to determine correct placement. Sievert *et al.*, performed the procedure in 10 patients and 6 controls and showed the procedure prevented detrusor overactivity and urinary incontinence, ensured normal bladder capacity, reduced urinary tract infection rates, and improved bowel and erectile functionality without nerve damage (34).

### **Cognitive behavioral therapy**

Cognitive behavioral therapy aimed at improving relationships may help to improve ED (35). Education about medical and psychosocial etiologies of ED in combination with physician assurance may help patients return to normal male sexual function.

Screening for cardiovascular risk factors should be considered in men with ED because symptoms of ED present on average three years earlier than symptoms of coronary artery disease. Men with ED are at increased risk of vascular diseases (36).

### **Management of anejaculation**

Semen retrieval is necessary in the management of anejaculatory patients hoping to conceive and can be performed by penile vibratory stimulation, electroejaculation, prostate massage, and surgical sperm retrieval, Intravaginal insemination, intrauterine insemination (pregnancy rate 28.6% per couple), and *in vitro* fertilization (pregnancy rate of 68.75% per couple) can all be used (37). Intracytoplasmic sperm injection can be required if there is a low total motile sperm count.

Priapism might be seen in SCI males. Corporal blood gas measurement is recommended to confirm non-ischemic priapism. Intracorporeal phenylephrine is used for priapism treatment. Spontaneous resolution might happen within 5 hours (38).

Detrusor-external sphincter dyssynergia (DSD) is seen in SCI patients. DSD is a debilitating problem and even life expectancy can be affected. This can be managed with urethral stents and botulinum toxin injection. First line treatment is the use of antimuscarinic medication and catheterization. External sphincterotomy is the surgical option in refractory cases. However, it can lead to ED (39).

### References

1. Rahimi-Movaghar V. Efficacy of surgical decompression in the setting of complete thoracic spinal cord injury. *J Spinal Cord Med* 2005;28(5):415-20.
2. Rahimi-Movaghar V, Vaccaro AR, Mohammadi M. Efficacy of surgical decompression in regard to motor recovery in the setting of conus medullaris injury. *J Spinal Cord Med* 2006;29(1):32-8.
3. Blumer CE, Quine S. Prevalence of spinal cord injury: an international comparison. *Neuroepidemiology* 1995;14(5):258-68.
4. Wyndaele M, Wyndaele JJ. Incidence, prevalence and epidemiology of spinal cord injury: what learns a worldwide literature survey? *Spinal Cord* 2006;44(9):523-9.
5. Rahimi-Movaghar V, Saadat S, Rasouli MR, Ganji S, Ghahramani M, Zarei MR, Vaccaro AR. Prevalence of spinal cord injury in Tehran, Iran. *J Spinal Cord Med* 2009;32(4):428-31.
6. Rahimi-Movaghar V, Moradi-Lakeh M, Rasouli MR, Vaccaro AR. Burden of spinal cord injury in Tehran, Iran. *Spinal Cord* 2010;48(6):492-7.
7. Taghipoor KD, Arejan RH, Rasouli MR, Saadat S, Moghadam M, Vaccaro AR, Rahimi-Movaghar V. Factors associated with pressure ulcers in patients with complete or sensory-only preserved spinal cord injury: is there any difference between traumatic and nontraumatic causes? *J Neurosurg Spine* 2009;11(4):438-44.
8. Sipski ML. The impact of spinal cord injury on female sexuality, menstruation and pregnancy: a review of the literature. *J Am Paraplegia Soc* 1991;14(3):122-6.
9. Patki P, Woodhouse J, Hamid R, Craggs M, Shah J. Effects of spinal cord injury on semen parameters. *J Spinal Cord Med* 2008;31(1):27-32.
10. Heidelbaugh JJ. Management of Erectile Dysfunction. *Am Fam Physician* 2010;81(3):305-12.
11. Brackett NL, Ibrahim E, Iremashvili V, Aballa TC, Lynne CM. Treatment for ejaculatory dysfunction in men with spinal cord injury: an 18-year single center experience. *J Urol* 2010;183(6):2304-8.
12. Bacon CG, Mittleman MA, Kawachi I, Giovannucci E, Glasser DB, Rimm EB. Sexual function in men older than 50 years of age: results from the health professionals follow-up study. *Ann Intern Med* 2003;139(3):161-8.
13. McVary KT, Kaufman J, Young JM, Tseng LJ. Sildenafil citrate improves erectile function: a randomised double-blind trial with open-label extension. *Int J Clin Pract* 2007;61(11):1843-9.
14. Montague DK. Penile prosthesis implantation for end-stage erectile dysfunction after radical prostatectomy. *Rev Urol* 2005;7 Suppl 2:S51-7.
15. Esposito K, Giugliano F, Di Palo C, Giugliano G, Marfella R, D'Andrea F, D'Armiento M, Giugliano D. Effect of lifestyle changes on erectile dysfunction in obese men: a randomized controlled trial. *JAMA* 2004;291(24):2978-84.
16. Vardi M, Nini A. Phosphodiesterase inhibitors for erectile dysfunction in patients with diabetes mellitus. *Cochrane Database Syst Rev* 2007;(1):CD002187.
17. Modern Medicine Network. Drug Topics. Top 200 brand drugs by retail dollars in 2007. [Internet] 2008 Mar 10 [cited 2012 Mar 15]; Available from: <http://drugtopics.modernmedicine.com/drugtopics/Top+News/Top-200-brand-drugs-by-retail-dollars-in-2007/ArticleStandard/Article/detail/500215>
18. Burls A, Gold L, Clark W. Systematic review of randomised controlled trials of Sildenafil (Viagra) in the treatment of male erectile dysfunction. *Br J Gen Pract* 2001;51(473):1004-12.
19. Stuckey BG, Jadzinsky MN, Murphy LJ, Montorsi F, Kadioglu A, Fraige F, Manzano P, Deerochanawong C. Sildenafil citrate for treatment of erectile dysfunction in men with type 1 diabetes: results of a randomized controlled trial. *Diabetes Care* 2003;26(2):279-84.
20. Goldstein I, Lue TF, Padma-Nathan H, Rosen RC, Steers WD, Wicker PA. Oral sildenafil in the treatment of erectile dysfunction. Sildenafil Study Group. *N Engl J Med* 1998;338(20):1397-404. Erratum in: *N Engl J Med* 1998;339(1):59.
21. Brant WO, Bella AJ, Lue TF. Treatment options for erectile dysfunction. *Endocrinol Metab Clin North Am* 2007;36(2):465-79.
22. Tolrà JR, Campaña JM, Ciutat LF, Miranda EF. Prospective, randomized, open-label, fixed-dose, crossover study to establish preference of patients with erectile dysfunction after taking the three PDE-5 inhibitors. *J Sex Med* 2006;3(5):901-9.

23. Rubio-Aurioles E, Porst H, Eardley I, Goldstein I; Vardenafil-Sildenafil Comparator Study Group. Comparing vardenafil and sildenafil in the treatment of men with erectile dysfunction and risk factors for cardiovascular disease: a randomized, double-blind, pooled crossover study. *J Sex Med* 2006;3(6):1037-49.
24. Lombardi G, Macchiarella A, Cecconi F, Del Popolo G. Ten years of phosphodiesterase type 5 inhibitors in spinal cord injured patients. *J Sex Med* 2009;6(5):1248-58.
25. Jain P, Rademaker AW, McVary KT. Testosterone supplementation for erectile dysfunction: results of a meta-analysis. *J Urol* 2000;164(2):371-5.
26. Rhoden EL, Morgentaler A. Risks of testosterone-replacement therapy and recommendations for monitoring. *N Engl J Med* 2004;350(5):482-92.
27. Earle CM, Stuckey BG. Biochemical screening in the assessment of erectile dysfunction: what tests decide future therapy? *Urology* 2003;62(4):727-31.
28. Boloña ER, Uruga MV, Haddad RM, Tracz MJ, Sideras K, Kennedy CC, Caples SM, Erwin PJ, Montori VM. Testosterone use in men with sexual dysfunction: a systematic review and meta-analysis of randomized placebo-controlled trials. *Mayo Clin Proc* 2007;82(1):20-8.
29. Linsenmeyer TA. Treatment of erectile dysfunction following spinal cord injury. *Curr Urol Rep* 2009;10(6):478-84.
30. Yildiz N, Gokkaya NK, Koseoglu F, Gokkaya S, Comert D. Efficacies of papaverine and sildenafil in the treatment of erectile dysfunction in early-stage paraplegic men. *Int J Rehabil Res* 2011;34(1):44-52.
31. Iwatsubo E, Tanaka M, Takahashi K, Akatsu T. Non-inflatable penile prosthesis for the management of urinary incontinence and sexual disability of patients with spinal cord injury. *Paraplegia* 1986;24(5):307-10.
32. Kimoto Y, Iwatsubo E. Penile prostheses for the management of the neuropathic bladder and sexual dysfunction in spinal cord injury patients: long term follow up. *Paraplegia* 1994;32(5):336-9.
33. Kim YD, Yang SO, Lee JK, Jung TY, Shim HB. Usefulness of a malleable penile prosthesis in patients with a spinal cord injury. *Int J Urol* 2008;15(10):919-23.
34. Sievert KD, Amend B, Gakis G, Toomey P, Badke A, Kaps HP, Stenzl A. Early sacral neuromodulation prevents urinary incontinence after complete spinal cord injury. *Ann Neurol* 2010;67(1):74-84.
35. Melnik T, Soares BG, Nasselo AG. Psychosocial interventions for erectile dysfunction. *Cochrane Database Syst Rev* 2007;(3):CD004825.
36. Thompson IM, Tangen CM, Goodman PJ, Probstfield JL, Moinpour CM, Coltman CA. Erectile dysfunction and subsequent cardiovascular disease. *JAMA* 2005;294(23):2996-3002.
37. Heruti RJ, Katz H, Menashe Y, Weissenberg R, Raviv G, Madjar I, Ohry A. Treatment of male infertility due to spinal cord injury using rectal probe electroejaculation: the Israeli experience. *Spinal Cord* 2001;39(3):168-75.
38. Gordon SA, Stage KH, Tansey KE, Lotan Y. Conservative management of priapism in acute spinal cord injury. *Urology* 2005;65(6):1195-7.
39. Ahmed HU, Shergill IS, Arya M, Shah PJ. Management of detrusor-external sphincter dyssynergia. *Nat Clin Pract Urol* 2006;3(7):368-80.