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An Important Problem for the Individuals with Spinal Cord Injury: Neurogenic Bladder

Poważne powikłanie u osób z uszkodzonym rdzeniem kręgowym: neurogeniczna dysfunkcja pęcherza moczowego

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Abstract

The complications of neurogenic bladder which follows spinal cord injury include urinary infections, sepsis, hydronephrosis, urinary tract stones, structural deterioration of bladder and bladder cancers. If the care and treatment intended to prevent these complications are not performed, the quality of life and environmental and social compliance of the patient are declined, and it can result with serious mortality and morbidity. Therefore, rehabilitation of neurogenic bladder should begin immediately after the injury in individuals with spinal cord injury, the patient and his family should be informed and educated adequately and the patient should be followed up for a lifetime. With proper management, urinary continence can be safely achieved and renal deterioration can be effectively prevented. (JNNS 2015;4(1):35–39)

Key Words: spinal cord injury, neurogenic bladder, rehabilitation, nursing

Streszczenie

Powikłania neurogenicznej dysfunkcji pęcherza moczowego będącej następstwem urazów rdzenia kręgowego to zakażenia dróg moczowych, sepsa, wodonercze, kamica układu moczowego, pogorszenie strukturalne oraz nowotwory pęcherza moczowego. Brak opieki i leczenia mającego na celu uniknięcie powyższych komplikacji powoduje, że jakość życia oraz warunki środowiskowe i społeczne pogarszają się, co prowadzi do poważnych stanów chorobowych, a nawet śmierci. Rehabilitacja pęcherza z dysfunkcją neurogeniczną u osób z uszkodzonym rdzeniem kręgowym musi zacząć się zaraz po urazie. Pacjent oraz jego rodzina powinni zostać poinformowani i odpowiednio przeszkoleni. Pacjent powinien być monitorowany przez całe jego życie. Dzięki odpowiedniej opiece można nie tylko uniknąć pogorszenia czynności nerek, ale również bezpiecznie osiągnąć kontynencję. (PNN 2015;4(1):35–39)

Słowa kluczowe: uraz rdzenia kręgowego, neurogeniczna dysfunkcja pęcherza moczowego, rehabilitacja, opieka

Introduction

Spinal cord injury (SCI) results from compression, contusion and transection of the spinal cord. After trauma there occurs physiologic disruption in spinal functions. Spinal shock is a physiologic disruption of the spinal cord functioning that accompanies SCI. Spinal shock occurs in the early period after trauma and lasts from one week to 6–8 weeks. It is a temporary suspension of function and reflexes below the level of injury. The symptoms include: flaccid paralysis of all

skeletal muscles, loss of all spinal reflexes, loss of thermoregulation, loss of pain, proprioception, and other sensation, and bowel and bladder dysfunction with paralytic ileus [1].

After the injury, the problems related to bladder drainage come out for the patients in parallel with the injury level. Flaccid paralysis and areflexia bladder are available under the level of lesion, after spinal shock period, being complete and incomplete of trauma and urodynamic examination give information about neurogenic dysfunctions [2]. Anatomic localization of the

injury and bladder symptoms are not parallel. Because of this detailed diagnosis should be made.

Nursing history; urinary elimination habits, anticipatory abdominal or uro-gynecological operations, commonly applied medications (diuretic etc.), smoking and alcohol.

Physical examination; abdominal region is considered in terms of distension. External genital organs and perineal region are examined.

Motor function; using their hands, the condition of sitting, standing and walking are taken into consideration.

Reflex examination; deep tendon, perianal sense, anal tonus and control are considered.

Upper urinary tract; direct urinary tract graphy, ultrasound, intravenous pyelography, computerised tomography, urinary culture, creatinine clearance in 24-hour urine, serum creatinine level are considered.

Lower urinary tract; cystogram, cystoscopy and urodynamics are practised. In the result of diagnosis, 3 different dysfunction are noticed;

1. Detrusor hyperreflexia (DH) and synergistic sphincter; in incomplete injuries.
2. Detrusor hyperreflexia and detrusor-external sphincter dyssynergia (DESD); complete thoracic or sacral injuries.
3. Detrusor areflexia; sacral and lumbar injuries [3].

Management of neurogenic bladder

The management of neurogenic bladder after SCI is a crucial component of the care program because it continues to affect both the morbidity and mortality. Bladder drainage is achieved through indwelling catheterization, intermittent catheterizations, condom catheters, pharmacologic management as well as other methods.

Indwelling Catheterization (transurethral or suprapubic)

At early stages after the injury, the best method consists in continuous bladder draining bladder with a catheter. However, using that for a long time may generate many complications. The patients using indwelling catheter often suffers from repeatable bladder infections, epididymal orchitis, bladder stones, urethral stricture, fistula and erosion. It is possible to decrease the complications by means of appropriate daily care [4,5]. Indwelling catheterization should be applied in the patient who lacks the manual dexterity to perform intermittent catheterization. In the case of women it sometimes preferred because intermittent catheterization is made more difficult due to anatomic considerations. In

men who will require a long term indwelling catheter, converting to a suprapubic catheter should be considered in order to prevent such complications as improper insertion and placement, urethral fistulas and strictures, and urethral erosions [6].

Here are points to consider in applying indwelling catheter:

The care of perineum and catheter; the care of perineum and catheter is maintained with water and soap. Urethral meatus and catheter are cleaned. During the care, pushing the catheter to the bladder causes the bacteria to get into the bladder and infection.

In the studies about applying the antibiotic cream to the meatus and the area combining meatus and catheter, it has been found that the cream does not reduce the amount of bacteria considerably in short-term catheterization, however silver sulfadiazine cream protects against the bacteria in long-term catheterization [7].

Fluid intake; the daily fluid intake should range 1.5–2 liters if there is no fluid restriction. Intaking plenty of fluid increases the urine output and prevents the urine from collecting in the catheter. The fluid can be taken orally or by means of infusion.

Urine drainage bags; they are always kept below the level of bladder. Some bags include a valve which prevents coming back of urine. There is a drain valve under the bag to drain urine. Except for draining urine, the valve is always kept close. Due care should be taken so as not to twist the drain system, and avoid sedimentation in the drain tube.

Preventing the infection; the most frequent complication in urinary catheterization is urinary tract infection. The risk of the bacteria increases by 3–6% a day for the individuals with indwelling catheter. In this situation, the patients catheterized for 7–10 days can have urinary infection at the rate of 50%. The pathogens causing urinary tract infections include Escherichia coli, proteus, citrobacter, pseudomonas aeruginosa, klebsiella, staphylococcus aureus and streptococcus faecalis. Moreover, acute pyelonephritis, the occlusion of catheter, periurethral infections, chronic renal inflammation, urinary tract Stones, renal impairment and in the forthcoming years urethral stricture and bladder cancer can be observed in the individuals with indwelling catheter [8,9].

Urinary catheters are generally made from latex, silicon, teflon or polyurethane and some of them are covered with hydrogel. Special urethral catheters which are composed with covering the surface of catheter and/or lumen with antimicrobial agents (antibiotic or antiseptic) have been developed, too. When the studies were examined, it was noticed that the catheters which are silver plated or absorbed antibiotic can decrease the risk of bacteria [7,10–12].

In order to prevent the infection in indwelling catheter;

- Aseptic method should be adapted and sterilized materials must be used.
- The continuance of the closed drainage system should be provided.
- Catheter and drainage system should not be separated from each other if not required.
- If catheter and drainage system are separated, a new drainage system should be installed by disinfecting the point of contact.
- If the drainage system bends, urinary flow can be blocked. It should be prevented.
- Urinary drainage bag and collecting tubules should be below the level of bladder.
- The bag should be drained when half or 2/3 of it is full in order to enable the urinary to flow easily.
- The drain valve should not contact the collection container.
- The urinary bags should not be changed unless they are damaged or insufficient in their sterility.
- Catheter should not be irrigated unless there is a blockage.
- The daily fluid intake should range 1.5–2 liters at the least if there is no fluid restriction.
- The tube should not be clamped for a long time.
- If there is any contamination in meatus, it should be cleaned with water and soap.
- The urinary bag should be drained before bathing and during the transfer of the patient and it ought to be controlled if the integrity is closed.
- Perineum care should be carried out three times a day or after defecation or incontinence.
- The catheter should be removed as soon as possible [5,12–14].

Intermittent Catheterization

Clean intermittent catheterization (CIC) has become widely used in the last 40 years and revolutionized the care of the patient with neurogenic bladder. This procedure has many beneficial effects, which include reduced morbidity and mortality, improved body image, and guaranteed higher self-esteem for the patient. Management of the lower urinary tract is crucially important in neurogenic bladder patients to prevent damage to the upper tract and, preserve renal function. However, intermittent catheterization is not free of complications. At each catheter insertion there is a risk of bacteraemia, genitourinary infection, urethral trauma, bleeding and false passage. Stone formation, urethral stricture, urethral diverticulitis and bladder neck irritation are also related to intermittent catheterization [15,16].

CIC is not a procedure to be undertaken lightly, and requires education and support, particularly during the initial stages, and during the follow-up. The patient should take 1.5–2 liters of fluid a day. Catheterization should be inserted every 4–6 hours; urinary over 400 ml should be stored so as not to stretch the bladder [3,4]. Catheterization should be taught to the patient who has a good hand function as soon as possible, and it is supposed to be done by the patient himself. The patient should be informed about the chosen treatment method, and educated about practising the method. Each member of the team has a responsibility regarding that. The training is important for both the successful of the treatment and the continuity of the method [3,4, 14,17–19].

The patients who are appropriate for intermittent catheterization have the sufficient bladder capacity, reduced bladder pressure, urethral resistance not obstruction. Their fluid intake, amount of urine and the frequency of catheterization are regulated well. They also have a good hand function and motivation; intermittent catheterization is much more successful for these patients [12].

Condom Catheters

Condom catheters help the men collect the leaking urine into a system. It provides a better hygienic control and improves life quality. It is a proper method for the patients who have a low urine pressure, and does not have penile lesion. Penile lesion and latex allergy are considered to be its contraindications [1,4].

Pharmacologic Management

Pharmacologic management of neurogenic bladder may also be required, and many medications are currently available. For instance, when there is a failure to store due to bladder dysfunction, anticholinergics such as oxybutynin and propantheline have an antispasmodic effect on the smooth muscle. Common side effects of anticholinergic drugs include pupillary dilation, blurred vision, tachycardia, dizziness and constipation [4,6,20].

Tricyclic antidepressants such as imipramine are thought to have a peripheral anticholinergic effect. These medications suppress uninhibited bladder contractions, increase bladder capacity, and increase urethral resistance [15,16].

Intravesical therapy application has gained importance because of the side effects of anticholinergic medicines. Systemic side effects are very few or none. 5–10 mg of oxybutynin can be applied in 30 ml of normal saline every 4–6 hours. It is the disadvantage that it has short

action time and no liquid form. After application, suprapubic pain or discomfort, and otonom disreflexia can be observed [4,20,21].

The other medicine under researched include intratekal baklofen and prostaglandin applications, botulinum toxin A and desmopressin. Botulinum toxin A has been used as transurethral and transperineal injection in DESD in recent years. Its mechanism of action is the inhibition of asetilkolin cycle in neuromuscular inunction [4,6,20].

The number of patients is small in the studies. Bigger groups of patients and the studies with plasebo control are necessary to evaluate its effectiveness. Baklofen, diazepam and dantrolen using for streak sphincter have not been found very much effective [4,20].

Other Methods

Other methods are timed voiding, biofeedback and pelvic-floor exercises. Valsalva manuevers, Crede's method, suprapubic tapping, and anal stretch aid in voiding in a patient with problems of urinary retention.

It has been pointed that the bladder cannot be drained completely; it can be high pressure urination. It is also reported that it should be careful for the men who have much more resistance of urine output in clinic appearances [4,6,15].

Electric stimulation has become a favourite method in recent years. The Neuro Control Bladder System is a popular approach to the management of upper motor neuron bladder dysfunction. First, a posterior rhizotomy of the sacral nerve roots is performed to prevent reflex incontinence. Electrodes are then attached to the anterior nerve roots. Electrical stimulation of these roots generates simultaneous contraction of the detrusor and sphincters. Because the striated-muscle external sphincter fatigues before the smooth-muscle detrusor, voiding occurs in short spurts when the sphincter intermittently relaxes [6].

Conclusion

Neurogenic bladder rehabilitation should be immediately commenced for the individuals with spinal cord injury, and it should be observed for life. The most suitable method should be determined, to provide the urinary drainage, and the individual and his family should be informed. With proper management urinary continence can be safely achieved and renal deterioration can be effectively prevented.

References

- [1] Barker E. *Neuroscience Nursing*. Mosby Year Book Inc Missouri, St. Louis 1994.
- [2] Erol A., Gürdal M. Medulla spinalis yaralanmalarında nörojenik mesane. In Hancı M., Aydıngöz Ö. (Ed.), *Medulla Spinalis Yaralanmaları*. Logos Tıp Yayıncılığı, İstanbul 2000;383–404.
- [3] Gündüz B., Erhan B. Omurilik Yaralanması Sonrası Gelişen Nöropatik Mesanenin Fizyopatolojisi. *Türkiye Fiziksel Tıp ve Rehabilitasyon Dergisi*. 2003;49(3):3–5.
- [4] Gündüz B. Omurilik Yaralanması Sonrasında Nöropatik Mesane Rehabilitasyonu. *Türkiye Fiziksel Tıp ve Rehabilitasyon Dergisi*. 2003;49(3):6–10.
- [5] Craven R.F., Hirnle C.J. *Fundamentals of Nursing*. 6th Edt. Lippincott, Philadelphia 2009.
- [6] Burns A.S., Rivas D.A., Ditunno J.F. The management of neurogenic bladder and sexual dysfunction after spinal cord injury. *Spine*. 2001;26(24S):129–136.
- [7] Schumm K., Lam TBL. Types of urethral catheters for management of short-term voiding problems in hospitalised adults. *Cochrane Database of Systematic Reviews*. Issue 2. Art. CD004013. DOI: 10.1002/14651858.CD004013.pub3. 2008.
- [8] Teke T., Yavuz Z., Atalay H., Maden E., Solak Y., Uzun K. Yoğun bakımda kateter nedenli idrar yolu enfeksiyonlarını önlemede gümüş kaplı idrar sondasının etkinliği. *Yoğun Bakım Dergisi*. 2010;2:45–47.
- [9] Jahn P., Preuss M., Kernig A., Langer G., Seifert-Huehmer A. Types of indwelling urinary catheters for long-term bladder drainage in adults. *Cochrane Database of Systematic Reviews*. Issue 3. DOI: 10.1002/14651858.CD004997.2007.
- [10] Kibar Y., Demir E., Aydur E., Dayanç M. Ürolojide temiz aralıklı kateterizasyon uygulamaları. *Türk Üroloji Dergisi*. 2006;32(4):529–532.
- [11] Pomfret I. Catheter care in community. *Nursing Standard*. 2000;14(27):45–53.
- [12] Robinson J. Urethral catheter selection. *Nursing Standard*. 2001;15(25):39–42.
- [13] Potter P., Perry A.G. *Fundamentals of Nursing Concepts, Process and Practice*. 7th Edt. Mosby Year Book, St Louis 2009.
- [14] Balcı Akpınar R., Yurttaş A., Karahisar F. Üriner Kateterizasyona Bağlı Enfeksiyonun Önlenmesinde Hemşirenin Rolü. *Uluslararası İnsan Bilimleri Dergisi*. 2004; 1(1):1–8.
- [15] Weld K.J., Dmochowski R.R. Effect of bladder management on urological complications in spinal cord injured patients. *J Urol*. 2000;163:768–772.
- [16] Weld K.J., Graney M.J., Dmochowski R.R. Differences in bladder compliance with time and associations of bladder management with compliance in spinal cord injured patients. *J Urol*. 2000;163:1228–1233.
- [17] Whyndaele J.J. Intermittent catheterization: which is the optimal technique? *Spinal Cord*. 2002;40:432–437.
- [18] Çetinel B., Hancı H. Omurilik lezyonlarında nöroürolojik sorunlar. In Zileli M., Özer A.F. (Ed.), *Omurilik ve Omurga Cerrahisi*. Meta Basım Matbaacılık, İzmir 2002; 1835–1844.

- [19] Mhr H. Travmatik Omurilik Yaralılarda Rehabilitasyon. *Trkiye Klinikleri J Int Med Sci.* 2007;3(10):43–53.
- [20] Linsenmeyer T.A. Neurogenic bladder following spinal cord injury. In Kirshblum S., Campagnolo D.L., DeLisa J.A. (Ed.), *Spinal Cord Medicine.* Lippincott Williams and Wilkins, Philadelphia 2002;182–206.
- [21] Gndz B., Erhan B., Lake E., Akyrek B., Elbaşı N. Omurilik Yaralanmalı Hastalarda Antikolinergik Tedavinin Nrojenik Mesane Disfonksiyonu zerine Etkisi. *Trkiye Fiziksel Tıp ve Rehabilitasyon Dergisi.* 2006;52(2):48–50.

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