

NEUROGENIC BLADDER

Introduction

The bladder has two functions:

- 1) to act as a temporary storage organ for the urine constantly being formed in the kidneys.
- 2) to evacuate the urine at the suitable moment after a suitable amount of urine has accumulated in the organ.

In order to perform these two functions smoothly, the two components of the bladder, smooth muscle and nerves, work together. The nervous control of the bladder may be damaged, resulting in a neurogenic bladder. But before considering the various types of neurogenic bladder, a brief review of the physiology of the bladder is necessary.

Physiology

1) The detrusor muscle:

The detrusor muscle of the bladder has the intrinsic quality of the smooth muscle in that it maintains tone even after all motor nerves to the bladder are blocked. During filling, a constant pressure is maintained in the bladder, whether innervated or denervated. This adaptative relaxation of the bladder is lost after overstretching of the bladder or when there are excessive motor impulses to the bladder.

2) Nerve supply of the bladder and sphincter

The parasympathetic supply constitutes the main micturition reflex arc by way of the hypogastric and the pelvic nerves. The sensory fibres carry sensation from the bladder, enter the cord at the second, third and fourth sacral segments, synapse there, and the efferent fibres cause contraction of the detrusor muscle.

The pudendal nerve, a somatic nerve, contains both sensory and motor fibres of the external sphincter. However the external sphincter cannot be voluntarily relaxed but can be voluntarily contracted. Therefore, the function of pudendal nerve is still doubtful.

The sympathetic supply plays a doubtful role in micturition. It contains both sensory and motor fibres of the trigone and urethra.

3) Normal closing mechanism

Leakage of urine into urethra is prevented by an efficient closing mechanism at the urethrovaginal junction. This is achieved by apposition of folds of bladder mucosa at internal meatus. The mucosal folds are supported by underlying detrusor muscle which is continuous with urethral muscle. This is the so called internal sphincter of the bladder. Should normal closing mechanism fail, urine leaks into urethra, continence depends on voluntary contraction of external sphincter. This can be maintained for about a short time only. Thus, external sphincter

does not play a part in normal continence.

4) Normal opening mechanism

When the bladder is being filled, proprioceptive sensation passes over the pelvic nerves to the cord. The reflex arc is under the influence of higher centers. Usually inhibitory impulses from the cortex prevent micturition and allow the bladder to fill until 300 mls of urine. If the patient makes no restraint when he feels the sensation of bladder fullness as more urine is accumulated, the inhibition is removed and facilitatory impulses pass down the cord. Motor impulses through the parasympathetic outflow cause detrusor contraction. This not only empties the bladder but also pulls the urethrovaginal junction upwards as the trigonal muscle is continuous with the detrusor. The upper urethra becomes effectively part of the bladder. The taking up and funnelling of the bladder neck draw apart the mucosal folds, allowing urine to flow into the urethra. The external sphincter relaxes when the detrusor muscle is contracting. However, the exact mechanism of micturition is not known.

Classification of neurogenic bladder.

The reflex arc of micturition can be deficient in any part. According to site of lesion, various functional disorders result. A rough classification of them is made here though actually they merge into one another.

- 1) The uninhibited neurogenic bladder.
- 2) The automatic neurogenic bladder
- 3) The autonomous neurogenic bladder
- 4) The sensory neurogenic bladder
- 5) The motor atonic bladder
- 6) The bladder during spinal shock

The uninhibited neurogenic bladder

This results from decreased cerebral inhibition of bladder reflexes. This occurs in the normal infants when micturition is brought by simple reflex. Only later, bladder training allows cerebral cortex to exercise an inhibitory control over micturition.

Its abnormal occurrence in children or adults may be:

- 1) Congenital in origin due to faulty development.
- 2) Acquired from cortical disease or partial destruction of spinal cord pathways:

 - Hemiplegia
 - Brain tumour
 - Depressed skull fracture
 - Multiple sclerosis
 - Pernicious anaemia

Voiding reflexes to filling are not suppressed. Therefore reflex emptying is not delayed for holding more

urine in the bladder. The bladder capacity is somewhat decreased, resulting in frequency in daytime, enuresis at night. Micturition is precipitate with no residual urine. Incontinence may or may not occur as it can be avoided by powerful voluntary contraction of the external sphincter.

Automatic (reflex) neurogenic bladder

The condition results from extensive impairment of the supraspinal reflex pathways or complete transection of the cord at a level above the conus. The bladder is governed by the reflex arc running from the bladder to the sacral cord, synapsing and running back to the bladder.

This occurs in cerebral and cord lesions:

- Brain tumour
- Spastic paraparesis
- Transverse myelitis and acute myelitis
- Multiple sclerosis
- Pernicious anaemia
- Neoplasm of spinal cord
- Cordotomy
- Extensive extradural abscess

Bladder sensation is absent though some may remain. Urination is involuntary and precipitate as soon as the reflex arc is closed by summation of afferent stimuli. The reflex arc functions well in a few cases but in the majority the bladder takes part in general hyper-tonicity and becomes contracted. The capacity decreases, causing frequency. If not treated, the bladder becomes so contracted that dribbling of overflow incontinence occurs.

The autonomous neurogenic bladder

This results from complete dissociation of the bladder from the central nervous system.

Lesions of the sacral centres may be congenital:

- Spina bifida
- Myelomeningocele
- Lesions may be acquired:
- Traumatic lumbosacral spine
- Neoplasm involving the cauda equina
- Inflammatory abscess
- Chronic arachnoiditis.

There is no bladder sensation and no coordinated reflex stimulus to the detrusor. Therefore the contraction of the detrusor is weak and incompetent of opening up the bladder neck. Urination is irregular, incomplete and voluntary abdominal contraction and manual compression may help. The high residual urine predisposes to infection. If the sphincter resistance is high, urination may fail completely and retention occurs. If the resistance is low, continuous dribbling results.

Sensory neurogenic bladder

This occurs after interruption of sensory pathway, typically in tabes dorsalis. Bladder sensation is lost.

EDITORIAL

WHAT happened at Victoria Park on the evening of August 13, 1971 gives one glimmer of hope that it is possible for democracy and freedom of expression to exist in Hong Kong. The student demonstration over Japan's claim to the sovereignty of the Tiao Yu Tai Islands ended with a friendly handshake between one student leader and a police superintendent, demonstrating eloquently what could be achieved with understanding and mutual respect between the authorities and the students.

It is undeniable that the students of Hong Kong, like their counterparts elsewhere, are emerging as a very strong social force, prepared to attack any social injustices and ever ready to tear down the mask of conceit of the older generation. The authorities must not view this phenomenon with alarm for the rise of the students as a powerful social force is a natural and world-wide one. The Tiao Yu Tai row is but an instrument whereby this new force is made manifest.

The authorities must expect to see more of these student demonstrations — over the Tiao Yu Tai row, or over the Chinese-as-an-Official-language issue, or over anything their uncorrupted morals tell them to be evil or unjust. The authorities must handle these with the same wisdom and understanding as they did the demonstration on August 13. After all, is it not a compliment to the Hong Kong Government that colonial education under the British, too, can breed social consciousness and moral righteousness?

The patient can still micturit normally by will. If he forgets to micturit, gross over distension results. The bladder is overstretched and atony develops. Retention occurs and finally there is continuous dribbling due to overflow incontinence.

Motor atonic bladder

This results when the motor side of reflex arc is involved.

This happens rarely in polio myelitis.

Distension is painful. If not promptly treated, overdistension and the same sequence of events occurs.

Atonic bladder during spinal shock

Spinal shock is the state of suppression or altered state of segmental reflex activity below level of cord injury by spinal injury of any type. The bladder functions as a completely denervated

organ and its intrinsic activity is suppressed. The bladder detrusor tone is less than urethral resistance. The detrusor muscle is paralysed, the internal sphincter is close, the external sphincter relaxes. The bladder distends with urine, no emptying takes place. This will lead to a flaccid atonic bladder and overflow incontinence. The state may last for days, weeks or months. If catheterization is taken to prevent permanent damage, it enters into either the automatic or autonomous neurogenic bladder.

The material is taken from Textbook of Physiology and Biochemistry B.D.S., Christopher's Textbook of Surgery British Journal of Urology 1964 Clinical cystoscopy Lowrance E. McCrea, Textbook of Genito-urinary Surgery.

(Continued from Page 1)

The Grantham Hospital:

financial year. Although the Government has offered to remit all existing debts of the hospital with the Government, the ultimate remedy perhaps lies in the Government's willingness to increase the annual subvention to the hospital. Under the present arrangement there is no guarantee that The Grantham Hospital will not run into red figures again next year. It is a test of the Government's vision and foresight whether or not to save The Grantham Hospital from bankruptcy, and to allow it to continue to do what good work it has done for the people of Hong Kong. (HK)

(Continued from Page 2)

HONG KONG-English Style

and the best of all — a Chinese Lantern. At this rate I will have to send all my clothes home ahead of me and fill my cases with gifts. I will probably present

quite a sight at London Airport with my luggage filled with curios and clutching a lantern in one hand.

Working in Q.M. proved to be quite different from work in the hospital in Newcastle. The hours worked tended to be the greatest shock as my usual timetable only includes working four days per week as Wednesdays and Saturdays are free. Also we have half-hour coffee breaks each morning and afternoon. However, I soon found that work was not so arduous as I had expected and for the first time in over a year I am beginning to get enthusiastic about it. Whether this is due to the kindness of my fellow students or to their good example I don't know but it is something quite new I assure you.

Anyway this may be my first visit to Hong Kong but I have fallen in love with it already and I know it won't be my last. (But next time I'll take a crash course in Cantonese before I come!)

啟文

幼兒期間的各種 防 疫 措 施

自有歷史以來，疾病一直纏擾人類，無時或已。而人類為抵抗此一強敵，曾經盡了千百種或的方法，而累積了千百年來種種的抗病方法，醫學於焉誕生。但不論是古代或是今天，不論是西方還是東方，最佳的抗病方法畢竟還是防範於未然。雖然有很多疾病不可能防禦而只可以治療，但亦有不少疾病（大部份是傳染病）却很容易預防範。免疫醫學在當今醫學中所佔的重要位置，自有統計數字作為明證。預防疫症的措施，當

然以幼兒期間進行的最為有效，因凡預先防範皆貴乎早也。

今日之醫學已製定一類若時間表者，作為嬰兒出生後按之定期施行疫苗之張本。嬰兒長大後將面臨無數疫症之威脅，惟皆將受保護於幼兒期內所接受之防疫措施。關於此一按時施苗之定期表，茲在此作扼要說明。

嬰兒產下之第一年內，須接受一種含有對抗白喉及破傷風的疫苗，而此兩者皆與一種百日咳之菌苗混合而施，故此疫苗名曰三合菌液（TRI-POLY VACCINE）。三合菌液有強烈之產生抗原作用，故其效果於幼兒期內甚為顯著。通常須三劑量之三合菌液方可有效地產生免疫作用。第一劑量約於出生後三至六月內注射，第二劑量之注射須於第一次之六至八星期後實施，而第三劑則再於六月後施行。與之同時，可使嬰兒接受三劑量口服之小兒麻痺症疫苗。故嬰兒於周歲已有白喉，百日咳，破傷風及小兒麻痺之免疫作用。對抗天花之疫苗須於

我的朋友，名字很熟悉，為着方便起見，暫時稱呼為「她」吧。她有張充滿笑容而可愛的臉，咀角時常掛着微笑，眼睛大，包含着慈愛，而於慈愛中又含着嚴肅，使人不敢迫視，這就是她面部的素描。

她為人忠誠而坦白，平易近人，全無虛偽，亦不喜歡造作，你若有不對的地方，她必定以誠懇的態度，勸導你改過。你聽到她的勸說後，就好像不能反駁，因為她的言語，就像有無上的威嚴，使人不能不遵照而行。如此，但亦喜歡與她多接近。她喜歡幫助人，做事負責，回答尤人的請求，必定盡自己盡大的力量去使人達到目的，故使人感覺到她潛着的力量好像是無窮盡的。她做事認真，絕不苟且和馬虎從事，故做起每一樣事情來，均井井有條，絕不會有混亂之感。她脾氣極好，溫柔而忍耐，絕不會發怒。先天和後天的培養極佳，幾是任勞任怨，故很是得人親近。有遠大的志向。將來成後，濟世活人，真乃女中丈夫。

她有美滿的家庭，受着高深的教育，有良好的宗教背景，由於種種，亦更增加她的美德，更趨向完善，雖然人總有缺點，但她的好處太多，故雖有缺點，亦為她的美點，不能發現。

孔子曰：「益者三友，友直、友諒、友多聞，益矣！」她的性情，已包括有上述三點，且有過之而無不及，如此完美的人，誰不願與她為友。

（編者按：所謂良禽擇木而棲，君子擇善而交，得如斯良朋益友，一年級同學能失諸交臂耶？）

第 三 卷

香 港 大 學 學 生 會
醫 學 會 月 刊

一九七一年八月十五日

LETTERS to the Editor

Sir,

I refer to your July, 1971 issue (Vol. 3 No. 7) page one in which there are two points of misinterpretation regarding the General Assembly:

(1) Hong Kong University Medical Society is a full member of the International Medical Students Association (IFMSA) and enjoys all the rights and privileges accorded to IFMSA members INSTEAD of your reporting as that 'HKU Medical Society is not a member of IFMSA'.

(2) Hong Kong University Medical Society is sending a delegation of two students to attend the ARMSA 5th General Assembly, in which the Official Delegate is Tsang Chiu Wah and the Official Observer is Wan Ho Yue, INSTEAD of as reported that 'two delegates of

the Medical Society Mr. Tsang Chiu Wah and Mr. Wan Ho Yue will attend the 5th G.A. of ARMSA in Sydney . . . ,

This is because each member country of ARMSA can only have one vote in the General Assembly and is thus represented by one Official Delegate only, while others are only Official Observers.

Thank you for attention.

Yours sincerely,

Sd. Tsang Chiu Wah
External Affairs Secretary
Medical Society
University of Hong Kong.

Ed: It seems that the misinterpretation was that of the General Secretary of the Hong Kong University Medical Society since the information was provided by her and printed verbatim.

child care project
小兒護理指導

