

Clean Intermittent Catheterization in the Management of Children with Neurogenic Vesical Dysfunction

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ABSTRACT

Clean intermittent catheterization (CIC) has been shown to be an effective, safe and an easy method of managing patients with neurogenic vesical dysfunction.

A total of seventy four children with neurogenic vesical dysfunction were treated with CIC at two institutes. There were children from the Children's Hospital of Eastern Ontario (CHEO) in Ottawa, Canada, and eleven patients from King Abdulaziz University Hospital (KAUH) in Jeddah, Saudi Arabia. The complication rate encountered was low. Most patients demonstrated stable upper urinary tracts. One of our patients was only four months old. In some patients vesico ureteral reflux improved without surgical intervention. Chronic indwelling catheterization or supravescical diversion are alternatives that are associated with morbidity and mortality.

The primary objectives in the care and management of children with neurogenic vesical dysfunction are:

1. Preservation of renal function.
2. Prevention of clinically significant urinary tract infection.

3. Maintenance of social urinary continence.

Supravescical urinary diversion and long term indwelling catheterization have been found to be associated with a high incidence of morbidity and mortality.

Intermittent catheterization as a method of managing neurogenic bladder dysfunction was first advocated by Guttman and Frankel.¹ It was popularized by Lapides² in the early seventies and has gained great popularity since then.

The purpose of this paper is to report on our experience with the CIC.

METHODS:

There were seventy four patients (63 patients from Children Hospital of Eastern Ontario, Ottawa, and 11 patients from King Abdulaziz University Hospital in Jeddah), 35 males and 39 females, ranging in age from 4 months to 16 years with an average of 6.8 years.

The main cause of neurogenic vesical dysfunction in this group was myelomeningocele (**Table 1**). The indications for CIC were incontinence and/or urinary tract changes. The average period of follow up was 32 months (range 2 months – 8 years).

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TABLE 1

Diagnosis

Spinabifida with myelomeningocele	59 patients
Tumor	4 patients
Trauma	3 patients
Cerebral Palsy	1 patient
Sacral agenisis	1 patient
Undetermined	6 patients
Total	74 patients

For the Canadian patients the parents were taught the technique of CIC either while the patient was in the hospital or during outpatient visits. A trained nurse visits th patient at home pays regular visits to his school. For the Saudi patients, all of them were admitted as day cases, and after performing the procedure once or twice the mother is asked to demonstrate it in front of the treating physician. The patients are followed up regularly and seen at short intervals in the outpatient clinic. They are also asked to keep a record of the urine obtained by the catheter. Patients above 6 years old were encouraged to begin self catheterization. Some patients required anticholinergic therapy of Probanthine or Ditropan, while others were put on alph adrenergic agents.

RESULTS

1. I V P: Fifty four patients had normal I V P before CIC and remained normal. Twenty patients had abnormal I V P, and twelve of them improved after CIC while eight remained unchanged. No renal deterioration was seen in any I V P. (Table 2).

TABLE 2

Intravenous Pyelogram

Before CIC	After CIC
Normal 54 patients	Normal 54 patients
Abnormal 20 ,,	Improved 12 ,,
	Unchanged 8 ,,
	Deteriorated 0 ,,
Total	74 patients

2. Vesico -ureteric reflux: Reflux was diagnosed in twelve patients. It has improved in four, three underwent surgical repair, three remained stable and two did not have follow up cystogram (Table 3)

TABLE 3

Vesico-ureteral reflux

After CIC	Improved	4 patients
	Operation	3 patients
	Stable	3 patients
	No follow up	2 patients
Total	12 patients	

3. Incontinence: Fifty patients were dry, thirteen were intermittently wet and eleven remained incontinent (Table 4).

TABLE 4

Incontinence

Dry	50 patients
Fair	13 patients
Wet	11 patients
Total	74 patients

4. Complications: Urethritis was seen in two patients, one had bleeding, one had false passage and one developed vesical stone (Table 5).

TABLE 5

Complications

Urethritis	2 patients
Bleeding	1 patient
False passage	1 patient
Stone bladder	1 patient
Total	5 patients

DISCUSSION

The primary difficulties encountered in children with neurogenic bladder are:

1. Loss of bowel and bladder control.
2. Varying degrees of diminished sensations and motor activity in the legs.

Left to their own devices these children will usually wet their clothings or diapers continuously, leading to severe psychological disturbances in many of them and their families.

The type of urinary incontinence associated with myelodysplasia, which is the commonest cause of neurogenic bladder in children, can vary from continuous dribbling from an almost empty bladder to overflow from a tense distended bladder. Most children with myelodysplasia fall some where in between these two extremes.

The long term complications of ileal conduit diversion or indwelling chronic catheterization are now evident. Chronic pyelonephritis, stone formation, loss of renal function, epididymitis, urethral stricture, and peno-scrotal complications (abscess, fistula, diverticulum) occur frequently.^{3,4,5,6,7}

In paraplegics with indwelling catheters, 58% of deaths related to paraplegia were caused by renal failure or complications of urinary tract infections.⁸

When ileal conduit urinary diversion was compared with CIC in a series of children with myelomeningocele, renal deterioration did not occur in any patient who began CIC with normal upper tract. On the contrary, the patients undergoing ileal conduit diversion had tremendously high complication rates (80% late ureteral dilatation, hydronephrosis, or both; 40% pyelonephritis; and 17% stone disease).⁹

The use of external collecting devices is frequently impossible in the young boy. There is no satisfactory collecting device that can be used in the female.

The inability to empty the bladder completely will lead to recurrent infection and obstruction. Both have deleterious effects on the renal function.

CIC has been advocated based on the theory that host resistance factors are more important than the introduction of bacteria in preventing UTI. Frequent emptying of the bladder will prevent over

distention which produces ischemia and lowers the resistance.¹⁰

Although significant bacteriuria is found frequently in urine culture from patients on CIC, occasionally there is associated renal damage or pyelonephritis.¹¹ Later cultures often become sterile even in the absence of antibiotic treatment. Antibiotics are probably only needed in those children with known reflux and those with repeated clinical symptoms of infection. Antibiotic prophylaxis significantly reduced the probability of lab infection but not the probability of clinical infection.¹²

We use a No. 5 or 8F feeding tube which is kept in savlon solution and is changed every week. Perineal urethrostomy has been used by Rabinovitch¹³ in boys to facilitate catheterization.

If the bladder is very small CIC becomes impractical. Pharmacological manipulation, mainly anticholinergics, have been successful in increasing bladder capacity to allow longer intervals between catheterization.¹⁴ Age is not a contra-indication to CIC. One of our patients was only four months old when joined the CIC programme.

The presence of vesico-ureteric reflux is not a contra-indication for CIC, in fact patients with reflux may benefit from such management. Four out of twelve of our patients had improved reflux while on CIC. In a study done by Kass,¹⁵ he showed that 48% of 27 kidneys with grade 1-11 reflux and 35% of 34 kidneys with grade 111 reflux the reflux stopped after CIC.

CIC is beneficial in preserving renal function and improving the pre-existing hydronephrosis. Twelve out of twenty of our patients with hydronephrosis showed improvement after CIC. Similar observation was made by Crooks¹⁶ and Scott¹⁷ The potential complications of CIC include urethritis, epididymitis, stricture, or bleeding. But the incidence of these complications is low.¹⁸

Continence rate, measured by the ability to stay dry for 3 to 4 hours, was achieved in 67.5% of our patients. In large programmes this may be as high as 85%.¹⁹

The success rate of CIC depends heavily on the compliance of the patients, their parents and other personnel involved in their care.²⁰

Before starting this programme in Jeddah, we were sceptical about its success due to the lack of special nurses or community personnel who can visit the patients at home, and assure the performance of the procedure properly and the continuity of the programme. We were also concerned about the reluctance of the parents to manually participate in the management of their children, because of their fear of inadvertently harming them.

However, the first problem was easily overcome by arranging frequent visit to the clinic. Regarding the second problem, we found that our fears were baseless and the parents, regardless of their social background, accepted the idea of CIC quite enthusiastically once the technique and the anatomy of the lower urinary tract was explained to them in simple words.

CONCLUSION

Retrospective data on seventy four children with neurogenic vesical dysfunction who were using CIC suggested that this procedure is safe and satisfactory.

Tremendous improvement was observed in all abnormal parameters. It is an effective and remarkably physiological method of dealing with an inadequately functioning bladder. It is a technique that can be easily learned by parents or the child himself and can contribute greatly to the patient's sense of body image and social acceptance. In Saudia Arabia the frequent clinic visits by the patient and his parents can greatly help in the success and continuity of this programme.

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