

Total endoscopic and anal irrigation management approach to noncompliant neuropathic bladder and bowel in children: A long-term follow-up

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Abstract

Purpose: To evaluate the long-term efficacy and durability of combined intradetrusor botulinum-A toxin (BTX-A), endoscopic treatment of vesicoureteral reflux and anal irrigation for stool incontinence (SI) via a total endoscopic and anal irrigation management (TEAM[®]) approach in patients with myelomeningocele and neuropathic bladder and bowel who did not respond to conservative measures.

Materials and Methods: Fourteen myelomeningocele patients with at least 3 years follow-up were included in the study. All patients have urinary and SI not responded to conservative management. All patients received a cystoscopic intradetrusor injection of 12 U/kg (maximum 300 U) BTX-A. There was vesicoureteral reflux in 22 ureters, and a Deflux[®] injection was completed during the same procedure. SI was managed using trans-anal irrigation, either with a fleet enema or Peristeen[®] system regularly.

Results: After at least 3 years of follow-up, mean maximum bladder capacity increased significantly from 78 ± 36 ml to 200 ± 76 ml ($P < 0.0001$) and the maximum detrusor pressure decreased from 56 ± 12 cm H₂O to 29 ± 7 cm H₂O ($P < 0.001$). Twenty-one refluxing ureters (95%) showed complete resolution and one persisted. Ten patients (72%) achieved complete dryness between catheterizations. Four patients (28%) went for augmentation cystoplasty, due to progressive hydronephrosis and/or persistent urinary incontinence. Thirteen patients achieved complete stool continence.

Conclusions: Over long-term follow-up, major reconstruction surgery can be avoidable or delayable; the TEAM[®] approach is a minimally invasive, safe, simple, and effective way to achieve upper urinary tract protection and provide urinary and stool continence.

Keywords: Myelomeningocele, neuropathic bladder, stool incontinence, total endoscopic and anal irrigation management[®], urinary incontinence

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INTRODUCTION

Myelomeningocele in children have a negative impact on both lower urinary tract and bowel functioning; causing

upper urinary tract dilatation, vesicoureteric reflux, recurrent UTIs, as well as urinary and stool incontinence (SI).^[1,2]

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The majority of patients improve with conservative management of anticholinergics medications, antibiotic prophylaxis, and clean intermittent catheterization (CIC).^[3] For patients who fail to respond to such management, major reconstruction surgery seems to be unavoidable.^[4]

At the same time, SI unfortunately more difficult to manage conservatively using diet modification and bulking agents; a significant percentage of patients will end up requiring diapers, despite urinary continence.^[5]

Late in 20th century, major reconstructive surgery-bladder enterocystoplasties and Malone Antegrade Continence Enema (MACE)-have been widely used and accepted as a gold-standard management of noncompliant neuropathic bladder and bowel.

Over the following years, complications of these surgeries have been a major issue, including electrolytes disturbance, stone formation, recurrent pyelonephritis, malignancy, continent stoma malfunctioning and so on.^[6-8]

Our preliminary results of managing those patients in a minimally invasive way are promising. We combined an intravesical botulinum-A toxin (BTX-A) injection and Defflux[®] sub-ureteral injection to manage lower urinary tract dysfunction and vesicoureteral reflux (VUR), as well as trans anal irrigation to manage SI as a total endoscopic and anal irrigation (TEAM[®]) approach.^[9] Here, we present the long-term outcome of this approach with the goal of determining if such a minimally invasive approach can stand the test of time.

MATERIAL AND METHODS

Fourteen mayelomeningocele patients with noncompliant neuropathic bladder and bowel, VUR, and urine/SI were prospectively enrolled in our trial of the TEAM[®] approach. The median age of the patients 6.5 years; all individuals failed to respond to conservative management including anticholinergic, CIC, diet modification and bulking agent and were still incontinent of urine and stool. Thirteen patients furthermore had a high intravesical pressure (detrusor leak point pressure > 40 cm H₂O).

The parents/guardians of all patients signed an informed consent for the treatment and follow-up.

Patients underwent cystoscopic intradetrusor injection of BTX-A, 12 U/kg, with a maximum dose of 300 IU.

Of the 22 refluxing ureters, 6 patients exhibited unilateral and 8 patients showed bilateral. Nine patients showed

high-grade VUR (bilateral grade 3 or more, or the presence of grades 4 or 5), and 5 patients with low-grade underwent an endoscopic correction using Deflux[®] at the same time.

Four patients maintained regular usage of fleet enemas and 10 patients started on a Trans anal irrigation system, Peristeen[®] (Coloplast, Denmark).

After close follow-up in the 1st year, 1st month with history, physical examination and Ultrasound, 2nd month with voiding cystourthro gram (VCUG) and 6th month with urodynamic study, there after patients were followed-up routinely every 6 months with a history, physical examination and ultrasound. On finding of continue to have urinary incontinence (UI) or worsening of hydronephrosis in the ultrasound, we conducted an urodynamic study; otherwise, it's conducted yearly. Depending on the result of the urodynamic and the history of UI, the BTX-A injections were repeated.

All patients underwent repeated BTX-A injections with an average interval of 1-year and 6 patients underwent repeated Deflux[®] injection upon VCUG finding.

Response criteria included a stable, compliant bladder with acceptable capacity given the patient age, VUR resolution, dryness between catheterization, and stool continence.

All patients completed at least 3 years of follow-up; the median duration was 4.3 years.

RESULTS

After a median 4.3 years of follow-up, mean maximum bladder capacity increased from 78 ± 35 ml to 200 ± 76 ml ($P < 0.0001$) and the maximum detrusor pressure decreased from 59 ± 11 cm H₂O to 29 ± 7 cm H₂O ($P < 0.001$).

Twenty-one refluxing ureters (95%) showed complete resolution; 55% after one attempt of Deflux[®] injection, 40% after 2 attempts and one ureter persisted.

Ten patients (72%) achieved complete dryness between catheterization and 4 still remained incontinent.

Thirteen patients achieved complete stool continence. One patient did not respond and underwent a MACE procedure.

No side-effects were noted in our approach, except for mild abdominal cramps with initial use of Peristeen[®] in 5 patients out of 10; these cramps disappear spontaneously after a short period of use.

At long-term follow-up, 4 patients (28%) did not exhibit the same initial response and they underwent augmentation cystoplasty due to progressive hydronephrosis and/or persistent UI in 3 patients; these individuals had not responded to repeated Botox injections and they still had high detrusor pressure and low bladder capacity (patients 6, 8, and 13 in Table 1). The fourth patient (patient 10, Table 1) had a wide bladder neck so bladder neck reconstruction was performed in addition.

DISCUSSION

Early in this century, Schurch *et al.* reported a first attempt of using BTX-A in adults for neuropathic bladder.^[10] In 2002, Schulte-Baukloh *et al.* extended the use of BTX-A in children with encouraging results.^[11] Since that time, many studies have been published proving the efficacy and safety of BTX-A.^[12,13]

Spontaneous resolution of VUR was reported in 43–58% of cases with standard conservative treatment.^[14]

Long-term data showed a low success rate of endoscopic correction of VUR in this group of patients,^[15] particularly if not combined with treating the underlying-bladder-cause.

In our institute, we used to treat patients who failed to respond to conservative measures with combined endoscopic management using intravesical BTX-A and Deflux[®] sub ureteral injections. This total endoscopic management approach preceded major reconstructive surgery^[16] and we have seen encouraging results with this technique.

Trans anal irrigation to manage SI was used and tested previously in our institute and others^[17-19] with

good results, in an effort to avoid major surgical reconstruction.

As a result, we extended our approach to the TEAM[®] approach using a Peristeen[®] anal irrigation system once with BTX-A and endoscopic treatment for VUR.

Basically the Peristeen[®] system consists of 3 components: A water bag, pump and rectal tube. The operation of the pump was explained to the family. To enhance their understanding, a video tape was also showed.

We start irrigation with 500 ml of tap water-adjusted accordingly to the patient's response-; 3 times a week. After the patient becomes complete dry, the frequency is reduced to twice a week. In case of abdominal cramps (s), our recommendation is to ensure the water temperature is neutralized and/or decrease the amount of irrigation.

Since we have found that the TEAM[®] approach provides a complete minimally invasive and effective management technique to meet the treatment goals, we recommend considering it as a second-line management for noncompliant bladders or bowels when conservative approaches fail.

Each BTX-A procedure costs approximately \$1000–1500 (around \$2000–3000 per year). Peristeen[®] consists of a disposable rectal catheter, which cost approximately \$1000/year and Deflux would cost another \$1000. Accordingly, the TEAM[®] approach would cost an average of \$4000 in the 1st year and around \$3000 yearly thereafter. These costs differ among different countries.

A main limitation is the need for frequent hospitalization for Botox injections, every 6–12 months, and frequent urodynamic studies, which invasive diagnostic tool.

Table 1: Result

Age*	Base line				At first year				VUR resolution	At median 4.3 years			
	Bladder capacity (ml)	DLLP (cmH ₂ O)	U.I.	S.I.	Bladder capacity (ml)	DLLP (cmH ₂ O)	U.I.	S.I.		Bladder capacity	DLLP	U.I.	S.I.
12	80	76	Yes	Yes	110	40	No	No	Yes	280	26	No	No
6	100	70	Yes	Yes	150	38	No	No	Yes	230	27	No	No
6	70	54	Yes	Yes	130	39	No	No	Yes	150	17	No	No
5	138	45	Yes	Yes	160	40	No	No	Yes	280	39	No	No
4	125	43	Yes	Yes	160	37	No	No	Yes	300	36	No	No
11	80	60	Yes	Yes	100	40	Yes	No	Yes	100	56	A.C.	No
9	50	36	Yes	Yes	177	22	No	No	Yes	280	35	No	No
10	110	59	Yes	Yes	135	72	Yes	Yes	No	130	65	A.C.	MACE
4	50	81	Yes	Yes	80	77	No	No	Yes	140	48	No	No
6	120	56	Yes	Yes	150	40	Yes	No	Yes	200	34	A.C.	No
6	50	40	Yes	Yes	150	46	No	No	Yes	276	31	No	No
4	30	65	Yes	Yes	174	42	No	No	Yes	220	43	No	No
6	60	75	Yes	Yes	110	30	Yes	No	Yes	100	76	A.C.	No
4	33	61	Yes	Yes	65	40	No	No	Yes	129	45	No	No

*Age at base line. DLLP: Detrusor leak point pressure, U.I.: Urinary incontinence, S.I.: Stool incontinence, A.C.: Bladder augmentation cystoplasty, MACE: Malone Antegrade Continence Enema, VUR: Vesicoureteral reflux

All patients younger than 10 years of age need assistance to use the Peristeen® system.

Moving families not located in the same city would be a challenge to continuing the protocol.

The small number of patients included in this study is one of its weak points. However, our work represents a good start to avoid or delay major reconstructive surgeries. Additional large, multicenter, prospective studies are warranted.

CONCLUSIONS

Over long-term follow-up, major reconstruction surgery can be avoidable or delayable. The TEAM® approach is a minimally invasive, safe, simple, and effective way to achieve upper urinary tract protection and improve a person's social life by providing urinary and stool continence.

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Conflicts of interest

There are no conflicts of interest.

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