

Original Article

Paediatric Malone Antegrade Continence Enema (MACE): The Hong Kong Experience

PMY TANG, KLY CHUNG, YCL LEUNG, JWS HUNG, FSD YAM,
CSW LIU, NSY CHAO, MWY LEUNG, KKW LIU, YCF KWOK, CWH NG

Abstract

Introduction: Faecal incontinence in children is a common and socially embarrassing condition. Surgical intervention maybe required when medical treatment fails. Malone antegrade continence enema (MACE) is a well established way to achieve social continence via regular evacuation of the colon through the appendiceal conduit. **Methods:** We retrospectively reviewed the clinical records of patients who have undergone the MACE procedure in our center from 2009 to 2016. **Results:** Eight patients were recruited in the review and all of them were able to achieve a Rintala score of ≥ 15 after the MACE procedure. **Conclusions:** The MACE procedure is safe and effective in the management of children with faecal incontinence and refractory constipation. Careful patient selection and a team of dedicated specialty nurses are essential for optimal outcome.

Key words

Faecal incontinence; MACE; Rintala

Department of Surgery, Queen Elizabeth Hospital & United Christian Hospital, Hong Kong, China

PMY TANG (鄧敏儀) *FRCS(Paed Surg), FHKAM*
KLY CHUNG (鍾立人) *FRCS(Paed Surg), FHKAM*
YCL LEUNG (梁芷綸) *MRCS*
JWS HUNG (孔詠雪) *FRCS(Paed Surg), FHKAM*
FSD YAM (任石達) *MRCS*
CSW LIU (廖思維) *FRCS(Paed Surg), FHKAM*
NSY CHAO (趙式言) *FRCS(Paed Surg), FHKAM*
MWY LEUNG (梁偉業) *FRCS(Paed Surg), FHKAM*
KKW LIU (廖鑑榮) *FHKAM*
YCF KWOK (郭彩鳳) *BN(Post Registration), MPH, MBA(Health Services Management)*
CWH NG (伍慧卿) *BScN(Hons), MScHC, MSc (Gastroenterology)*

Correspondence to: Dr. PMY TANG

Email: tangpaula@gmail.com

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Introduction

Faecal incontinence is usually broadly divided into overflow incontinence and non-retentive incontinence. It is socially embarrassing and when it occurs in children, it is usually associated with spinal cord anomalies, anorectal malformation or Hirschsprung's disease. Irregardless to the aetiology of the faecal incontinence, the Rome III criteria have been established to distinguish between functional constipation and functional non-retentive faecal incontinence in children with a developmental age of at least 4 years.¹ Conservative management of faecal incontinence includes stool softeners, bulking agents, suppositories, rectal enema and biofeedback. Social continence can often be achieved when the colon is kept evacuated by means of regular rectal enema. In 1990s, Malone first described the used of appendix as a conduit for the delivery of antegrade continence enema.² Many modifications have been developed over the years, including the minimally invasive

approach. The theory is that the antegrade enema is to be administered with faecal elimination – thus preventing constipation and faecal continence.³ The improvement in the quality of life in paediatric patients pre and post Malone antegrade continence enema (MACE) procedure has been established.⁴ However, the data on the MACE procedure in Chinese children is lacking.

Methods

We retrospectively reviewed the clinical records of patients who have undergone the MACE procedure in our hospital from 2009 to 2016. Their demographic data, original diagnosis and related complications were reviewed. The operative details of the MACE procedure is shown in Figure 1.

Results

Eight patients were recruited in the review. Their age at the MACE operation, gender, original diagnosis and the

details of the MACE procedure performed are shown in Table 1. All of the patients recruited has a Rintala score⁵ of below 6 prior to the operation. Rintala score is a clinical score for the evaluation of faecal continence. The score is derived from standardised questionnaires and physical examination is not required (Table 2). The score consists of seven factors, which are scored from 0 to 3, except the factor of frequency of defaecation, which is scored 1-2. The maximum bowel function score is 20. Patients with "poor" results scored 6-9 points and usually had to use daily enema because of severe constipation or had constant soiling.

The mean age of the patients was 13.5 years old (range: 10-18 years old). The mean follow up duration was 42 months (range: 6-78 months). There were two laparoscopic assisted MACE procedures and six open MACE procedures, one of which had simultaneous bladder augmentation surgery and Mitrofanoff procedure. There was no peri-operative blood transfusion or mortality. Three minor complications were recorded including one exit site leakage, one exit site stricture and one persistent peri-anal soiling after the MACE procedure. The patient with exit site leakage was successfully treated with ultrasound guided deflux injection at the exit site under local anaesthesia.



Figure 1 Intra-operative photos of the MACE procedure.

Table 1 Patients' demographic data

Age	Gender	Initial diagnosis	MACE procedure	Complications
18	M	Anorectal malformation	VQZ flap	Post MACE peri-anal soiling
12	F	Myelomeningocele	VQZ flap, CIC post op via urethra	
10	F	Visceral myopathy	VQZ flap	
10	M	Spinal bifida	VQZ flap, post op CIC via urethra	
18	M	Anorectal malformation	VQZ flap	Stoma site leakage, treated with deflux injection
10	M	Anorectal malformation	VQZ flap	
12	M	Spinal bifida	VQZ flap, simultaneous bladder augmentation and Mitrofanoff	
18	F	Myelomeningocele	Laparoscopic assisted, VQZ flap	Stoma site stricture

All the patients were followed up at the paediatric surgical gastrointestinal nurse clinic. The technique of the antegrade administration of normal saline was regularly monitored (Figure 2). The volume of fleet enema and normal saline required in the antegrade washout were adjusted periodically according to patient's body weight and the effectiveness of the washout. All patients were able to achieve a Rintala score of ≥ 15 after the MACE procedure.

Table 2 Rintala score for evaluation of fecal continence

Ability to hold back defaecation	Always	3
	Problems < x 1/week	2
	Weekly problems	1
	No voluntary control	0
Feels urge to defecate	Always	3
	Most of the time	2
	Uncertain	1
	Absent	0
Frequency of defaecation	Every other day to twice a day	2
	More often/less often	1
Soiling	Never	3
	Staining less than x 1/week. No change of underwear	2
	Frequent staining, change of underwear required	1
	Daily soiling. Requires protective aids	0
Accidents	Never	3
	Fewer than x 1/week	2
	Weekly accidents	1
	Daily accidents	0
Constipation	No constipation	3
	Manageable with diet	2
	Manageable with laxatives	1
	Manageable with enemas	0
Social problems	No social problems	3
	Sometimes (foul odors)	2
	Restrictions to social life	1
	Psychic problems	0

Conclusions

MACE procedure is safe and effective in the management of children with faecal incontinence, although minor complications can occur. In our review, 7 patients (88%) achieved complete faecal continence after the MACE procedure. All the patients were able to administer the antegrade continence enema via the MACE exit site by themselves independently. And most patients can reduce the use of the phosphate enema and be able to maintain complete faecal continence with the use of antegrade NS irrigation. Moreover, as the normal saline solution could be formulated at home using the standard recipe of 1000 ml of tap water with 1½ teaspoon table salt (or 500 ml of tap water with ¾ teaspoon table salt), cost and time would be saved tremendously as well.



Figure 2 Administration of the antegrade washout using normal saline and fleet enema.

Discussions

For children with faecal incontinence, they often are faced with only three options: daily soiling, diverting colostomy and undergoing the bowel management programme.

A successful bowel management programme should include daily enema, diet manipulation and medications. The goal of such programme is to keep the child clean 24 hours a day, and to allow normal daily activities without the use of protective wear. However, as the child grows older, daily rectal enema may not be sufficient to adequately evacuate the colon for the child to keep dry and clean for 24 hours. Moreover, they may also seek more autonomy and independence as they enter adolescence, and may become reluctant to let the caretaker to assist in the administration of rectal enema.

Careful patient selection for the MACE procedure and a team of dedicated specialty nursing care are essential. We believe with increased awareness, more patients with faecal incontinent and refractory constipation would be able to benefit from the MACE procedure.

Declaration of Interest

None.

References

1. Koppen IJ, von Gontard A, Chase J, et al. Management of functional nonretentive fecal incontinence in children: recommendations from the international children's continence society. *J Pediatr Urol* 2016;12:56-64.
2. Malone PS, Ransley PG, Kiely EM. Preliminary report: The antegrade continence enema. *Lancet* 1990;336:1217-8.
3. Kim J, Beasley SW, Maoate K. Appendicostomy stomas and antegrade colonic irrigation after laparoscopic antegrade continence enema. *J lapaaroendosc Adv Surg Tech A* 2006;16:400-3.
4. Har AF, Rescorla FJ, Croffie JM. Quality of life in pediatric patients with unremitting constipation pre and post MACE procedure. *J Pediatr Surg* 2013;(48):1733-7.
5. Leung MWY, Chao NSY, Wong PY, et al. Management of faecal incontinence in children. *HK J Paediatr (new series)* 2008;13:267-74.