The Use of Antegrade Colonic Enema (ACE) Procedure in the Management of Faecal Incontinence in Children Following Unsuccessful Anorectal Malformation Surgical Correction

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Abstract

Faecal incontinence and intractable constipation can be devastating to the emotional and social development of children. Anorectal malformations affect 1 in 5000 newborns and at least 30% of these children will be faecally incontinent after corrective surgery. Options available for this condition were either continuing incontinence or colostomy formation, if a redo surgery is not planned. Antegrade continence enemas (ACE) delivered through a cecostomy button or catheterizable stoma can be an efficacious surgical option. The Malone ACE procedure can be a solution in these conditions, it gives a better quality of life and most patients and parents are satisfied after the procedure.[3]

Material and Methods: During the period from 2005 to 2007, 14 patients underwent the continent appendicostomy procedure. The age of the children ranged from 6 to 12 years (mean age was 9 years), all of them had two staged surgery for high anorectal malformation. All had Posterior Sagittal Ano-Reco Plasty (PSARP) procedure done at the age from 6 to 18 months after initial defunctioning sigmoid colostomy. After closure of colostomy, none of the patients developed continence.

Results: 13 out of the 14 patients were satisfied after getting used to the antegrade colonic enema and their quality of life improved and psychologically satisfied (93%). Stomal stenosis accrued in 2 patients, leakage from the stomal site after the antegrade enema was troublesome in 5 patients and soiling occurred and lasted for more than one hour in 3 patients.

Conclusion: Malone Antegrade Colonic Enema is a method to keep the child with incontinence clean, more socially active and with a better quality of life. ACE procedure provides what is called as Social Continence in children with unsuccessful correction of anorectal malformations. To convert an introverted, faecally incontinent child in a nappy into a nearly normal child in pants, without the need to a colostomy bag, is immensely satisfactory.

Key Words: Faecal incontinence – Malone antegrade colonic enema (ACE) – Appendicostomy.

Introduction

Faecal incontinence and intractable constipation can be devastating to the emotional and social development of children. They are socially embarrassing and impairing problems commonly associated with spinal cord abnormalities, anorectal malformations, Hirschsprung’s disease and sacral agenesis. Anorectal malformations affect 1 in 5000 newborns and at least 30% of these children will be faecally incontinent after corrective surgery [1].

Conservative management of faecal incontinence and intractable constipation includes stool softeners, bulking agents, digital rectal stimulation, suppositories and enemas. Options available for this condition were either continuing incontinence or colostomy formation, if a redo surgery is not planned. Antegrade continence enemas (ACE) delivered through a cecostomy button or catheterizable stoma can be an efficacious surgical option [2]. The Malone ACE procedure, can be a solution in these conditions, it gives a better quality of life and most patients and parents are satisfied after the procedure [3]. This procedure is actually an appendicostomy which creates a one way valve mechanism that allows for catheterization of the abdominal wall for colonic irrigation and at the same time prevents stool leakage.

The Malone ACE procedure simply combines three well-established surgical principles:

1- The Mitrofanoff principle of a continent catheterizable abdominal stoma and conduit.

2- The knowledge that complete colonic emptying can produce fecal continence.

3- Complete colonic emptying can be achieved by antegrade colonic irrigation.
In general terms, after the Malone ACE procedure patients had continent intermittent catheter access to their proximal colon (usually the cecum) through which they administered antegrade washouts, achieved colonic emptying and thus faecal continence [4].

In this study we report our experience in Malone ACE procedure in children following unsuccessful anorectal malformation surgical correction. This procedure is not a cure for faecal incontinence; rather it is a more pleasant way for children to engage in a bowel management protocol without the need for rectal enemas.

**Material and Methods**

During the period from 2005 to 2007, 14 patients underwent the continent appendicostomy procedure 10 boys and 4 girls. The age of the children ranged from 6 to 12 years (mean age was 9 years), all of them had two staged surgery for high anorectal malformation. All had Posterior Sagittal Ano-Reco Plasty (PSARP) procedure done at the age from 6 to 18 months after initial defunctioning sigmoid colostomy. After closure of colostomy, none of the patients developed continence and that was contributed to different factors and mainly to congenital poor innervations of the pelvic floor muscles.

The selection criteria for our patients to go through the Malone ACE procedure were:

1- Uncorrectable cause of rectal incontinence.
2- Weak or soft anal tone.
3- Dedicated and motivated parents and children above the age of 6 years.
4- Pre-operative effective bowel management programme using frequent rectal enemas.

**Surgical technique: (Fig. 1)**

After bowel preparation, the abdomen is entered through an incision similar to the appendicectomy muscle splitting incision. The tip of the appendix was brought through another opening to the anterior abdominal wall in the right iliac fossa. A V-flap is fashioned with sides of 3cm in length and with optional extension of 1 to 2cm. The dorsal wall of the appendix was fashioned and the tip of the skin flap was inset and sutured with interrupted absorbable sutures so that initially the flap resembled a gutter. Suturing of the flap to the appendix was continued around the appendiceal lumen to form a tube and the continued so that a short (<1 cm) skin tunnel could be created to bury the appendiceal mucosa, thus avoiding the problems of exposed mucosa. The resulting skin defect was closed in two layers. The cecum was fixed to the anterior abdominal wall to avoid traction on the stoma and to ensure long-term ease of catheterization. An indwelling 10F Foley’s catheter was used and kept in place postoperatively for at least two weeks [8]. Post operative antibiotics were given to all patients for at least three days.

**Antegrade colonic enema (ACE):**

After the fourth day, when the bowel peristalsis has recovered fully, the catheter was used for the insertion of a phosphate enema into the cecum with a normal saline flush of about 200mL. A period is required to determine each patient’s precise requirements in terms of the volume of phosphate enema and subsequent saline flushings. Most children empty their colon within 15 to 45 minutes, but any degree of distal obstruction will have caused a secondary megacolon, which may require greater volumes initially. After two weeks the indwelling catheter is removed and the children (or parents) are asked to catheterize themselves at least daily even if they require less frequent antegrade enema to avoid stenosis of the stoma. A close follow-up is required during the first 3 months postoperatively to detect any complications. The phosphate enema initiates defecation and the normal saline flush ensures that the colon is completely clean. Some children require no flush, others require no phosphate enema and others need large volumes of both [8]. The recommended dose is to give one half of phosphate enema (60mL) diluted in equal volume of saline. This is then washed through with 100 to 200mL of saline. The volume of the saline flush can be increased up to 1L in older children. The mean time taken from to complete the procedure until evacuation of the enema is 30 minutes (range from 10 to 60 minutes).

**Results**

Thirteen out of the 14 patients were satisfied after getting used to the antegrade colonic enema and their quality of live improved and psychologically satisfied (93%). Stomal stenosis accrued in 2 patients, both responded to frequent dilatation with metal dilators for few weeks. Leakage from the stomal site after the antegrade enema was troublesome in 5 patients. In three (3 of 5) patients, this complication arose only when the child developed very loose stools for reasons such as gastroenteritis. In the remaining two (2 of 5) patients the
condition subsided completely after 2 months without any intervention. Soiling after the antegrade enema occurred and lasted for more than one hour in 3 patients, they responded to decreasing the amount of the saline flush and/or phosphate enema, the exact amount needed was left to be decided by the patient himself or his parents. There was no complaining of soiling after getting used to the procedure (three months time).

The patient who did not get any benefit from the procedure was the youngest patient in the series (6 years old boy), he had developmental delay and neither the patient nor his parents were cooperative and they did not use the stoma regularly. The stoma got narrowed and obliterated. They were not following up regularly in the clinic. The patient condition remains static and was not deteriorated by the procedure than before surgery.

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**Discussion**

To convert an introverted, faecally incontinent child in a nappy into a nearly normal child in pants, without the need to a colostomy bag, is immensely satisfactory.

The ACE technique performed through a Malone stoma is an effective method of achieving cleanliness in children and young adults with faecal incontinence where non-surgical treatment of soiling is unsuccessful and in particular where formation of a permanent colostomy is being considered.

It is believed that successful application of the Malone ACE procedure hinged on the level of commitment by the child and his/her family. There-
fore, it is advised to carry out a careful assessment with the child and his/her parents before recommending the operation. It has been observed that if the child does not perceive the soiling as a major problem adequate commitment may be lacking. Therefore, this technique should be used with caution in younger children [6].

Phosphate overdose is a theoretical risk of ACE administration. Repeated rectal administration of phosphate enemas has a reported toxicity [7]. Therefore it is advised that if an enema is not evacuated, no further phosphate should be administered until the problem has been resolved. In case of faecal impaction, an ACE using arachis oil has proved to be a safe and effective remedy.

Aksnes et al., [8] assessed the results of 20 patients 6 months after a Malone ACE procedure. They used several validated questionnaires including the Youth Self Report, Child Behavior Check List and Self Perception Profile for Adolescents. They concluded that following a Malone ACE procedure there were important improvements in self confidence and psychosocial functioning. Similarly Mitrofanoff’s unit also published results of their survey to assess the level of satisfaction in patients who underwent a Malone ACE procedure [9]. Twenty four of 28 patients returned the questionnaire and all considered themselves to have benefited from the operation, mainly in respect of personal, family and social well-being. All except 3 patients had acquired faecal continence (83%) on follow-up at 3.7 years.

Sheldon et al., [10] described a technique for constructing a Malone ACE in cases where there is insufficient appendiceal length or when a concomitant appendiceal Mitrofanoff stoma is required. This technique involves tubularization of the cecum in continuity with the orthotopic appendix at its base using a stapling device. Initial results of this technique are encouraging. Webb et al., [11] reported the use of laparoscope in fashioning Malone ACE procedure. Curry et al., [12] reported positioning the stoma in the umbilical region which gives better aesthetic results, because the aperture of the stoma is invisible, which is very significant in adolescent period.

In this study 13 out of 14 patients have benefited from the Malone ACE procedure, all the 13 patients and parents reported better quality of life and they were able to be without soiling during school time and they were able to get rid of there nappies. Parents reported that there children became more socially active and were able to keep there friendships for a longer time. The only patient, who did not gain any benefit from the procedure, was developmentally delayed. Such patients should not be selected for the procedure as their commitment for the procedure is very low.

**Conclusion:**

Malone Antegrade Colonic Enema is a method to keep the child with incontinence clean, more socially active and with a better quality of life. ACE procedure provides what is called as Social Continence in children with unsuccessful correction of anorectal malformations.

This technique, as originally described by Malone, provides a safe and effective route for enema administration in those patients who have successfully managed their faecal incontinence through traditional bowel management and it will allow these patients the satisfaction of remaining clean without the need for rectally administered enemas.

Good selection of the patients and knowledge of the parents are the key for successful ACE procedure.

Incidental appendicectomy should be avoided whenever possible and particularly in patients with multiple congenital anomalies.

**References**


