The Macedo–Malone antegrade continence enema procedure: Early experience

Article in The Journal of Urology · May 2005
DOI: 10.1097/01.ju.0000149678.36915.fe · Source: PubMed

9 authors, including:

Antonio Macedo
Universidade Federal de São Paulo
123 PUBLICATIONS  686 CITATIONS

José Murillo Bastos Netto
Federal University of Juiz de Fora
52 PUBLICATIONS  269 CITATIONS

Valdemar Ortiz
Universidade Federal de São Paulo
200 PUBLICATIONS  1,338 CITATIONS

All in-text references underlined in blue are linked to publications on ResearchGate, letting you access and read them immediately.

Available from: José Murillo Bastos Netto
Retrieved on: 24 August 2016
THE MACEDO-MALONE ANTEGRADE CONTINENCE ENEMA PROCEDURE: EARLY EXPERIENCE

ADRIANO ALMEIDA CALADO,* ANTONIO MACEDO, JR., UBIRAJARA BARROSO, JR., JOSÉ MURILLO NETTO, RIBERTO LIGUORI, MAURICIO HACHUL, GILMAR GARRONE, VALDEMAR ORTIZ AND MIGUEL SROUGI

From the Department of Urology, Division of Pediatric Urology, Federal University of São Paulo, São Paulo, Brazil

ABSTRACT

Purpose: The successful treatment of fecal incontinence can dramatically improve the quality of life of affected children. The introduction of the Malone antegrade continence enema provides the opportunity to manage previously resistant cases. However, using the appendix to create this catheterizable channel is not always possible, and the duration of these antegrade enemas is a source of concern for the patients. We describe a new approach to create left continent colonic access to shorten the duration of these enemas, and report the experience gained from the first 9 cases managed at our institution.

Materials and Methods: During a 5-year period 9 patients underwent a Macedo-Malone antegrade continence enema at our institution. Incontinence was associated with myelomeningocele in 7 patients and anorectal malformation in 2. The antegrade continence enema procedure is begun by isolating a 2 cm flap in a tenia on the left colon (spleen flexure). A 12Fr silicone Foley catheter is placed on the mucosal surface of the flap to allow tubularization of the plate with interrupted polyglycolic acid 3-zero transverse sutures, creating an effluent tubular conduit. Antegrade colonic washouts were started 2 weeks after surgery with saline solution or tap water in all patients.

Results: Followup of our 9 cases ranged from 8 to 33 months (average 20.7). Enema volume varied from 250 to 800 ml, with administration taking from 45 to 60 minutes, and colonic evacuation occurred within 30 to 60 minutes of enema administration. Of the 9 patients 8 were completely continent and 1 was partially continual. Four patients experienced difficulty with catheterization initially because of stenosis of the stomal track. The affected stomas were dilated, which was successful in 1 case. Three patients subsequently required stomal revision.

Conclusions: The Macedo-Malone procedure is a relatively straightforward operative approach providing an effective washout technique that is acceptable to parents and children.

Problems with the gastrointestinal and urinary tracts frequently coexist. They may be part of a complex congenital abnormality or may share a common cause such as neuropathy, or an abnormality in one system may affect the other. The pediatric urologist may be aware of these gastrointestinal anomalies and be conversant with their clinical presentation, management and prognosis.

The development of the continent catheterizable appendicocoeccostomy as described by Malone et al in 1990 allowed the administration of an antegrade continence enema (MACE) for patients with fecal incontinence not responsive to more conservative measures. Failure rates of up to 50% have been described but it is not clear why the MACE fails. Washout failure is the most common overall cause of failure, defined as failure to pass any or passage of little of the enema from the rectum within 1 to 2 hours of lavage. Another frequently related complication is pain in the form of colic, which occurs during washout.

The MACE often is long and tedious for handicapped patients, as the volume of washout from the cecum to the rectum is large, especially in neuropathic bowel prone to dolichosigmoid. To resolve this problem, Liloku et al described a technique to create left continent colonic access to shorten the duration of these enemas. In this technique a segment of descending colon 1.5 to 2 cm wide is isolated with its blood supply, and a Monti tube is fashioned and implanted into the left colon according to the Malone technique. Macedo and Srougi in 2000 described a continent catheterizable ileum based reservoir in which a catheterizable conduit could be created in continuity with the augmented segment. The Macedo-Malone procedure incorporates some of the same principles that have proved reliable in urinary diversion. We believe that our procedure in the left colon may significantly decrease the time required for enema administration and washout, thereby increasing patient satisfaction and compliance. We report our experience with the Macedo-Malone antegrade continence enema procedure in 9 patients.

KEY WORDS: fecal incontinence, enema, colorectal surgery

MATERIALS AND METHODS

Nine patients at our institution were eligible for the Macedo-Malone procedure based on fecal incontinence not responsive to previous attempts of conservative medical treatment between 1999 and 2003. We defined the use of the left colon as a concept and no further radiological investigation was considered in the decision to conduct this procedure. The underlying diagnosis in these patients was myelomeningocele in 7 and anorectal abnormalities in 2. In all patients dietary modifications and medical treatment of fecal incontinence had failed, including various combinations of laxatives, rectal stimulation, suppositories and enemas.
As described by Macedo et al, the antegrade continence enema procedure is begun by isolating a 3 cm flap in a tenia on the left colon (spleen flexure, fig. 1, A). A 12Fr silicone Foley catheter is placed on the mucosal surface of the flap to allow tubularization of the plate with interrupted polyglycolic acid 3-zero transverse sutures (fig. 1, B), creating an efferent tubular conduit (fig. 1, C). The continence valve mechanism is produced by embedding the tube over a serous lined extramural tunnel created by interrupted 3-zero polypropylene sutures (figs. 1, D and 2). The distal end of the tube is anastomosed into a V shape to the skin flap to avoid stomal stenosis. A catheter is left indwelling in the conduit for 3 weeks, through which enema administration begins 7 to 10 days postoperatively.

All of the children were followed for a minimum of 6 months after surgery to determine the success of the procedure. Subsequent information regarding the outcome of the procedure and patient satisfaction was obtained by patient/parent interview using a questionnaire developed at our center (see Appendix). This questionnaire evaluates success of the surgical technique (measuring ease of catheterization and speed of completion of colonic washout), rate of continence and overall improvement in quality of life.

RESULTS

Enema volume varied from 250 to 800 ml, with administration taking from 45 to 60 minutes. In the majority of patients colonic evacuation occurred within 30 to 60 minutes of enema administration (fig. 3). Enemas were given once daily in 7 patients, with the 2 remaining patients requiring colonic washout every other day. Of the 9 patients, 8 were completely continent and 1 was partially continent. We define complete continence of stool as the lack of daytime and nighttime incontinence, and the ability to retain stool without the need for a catheter. The 8 complete continent patients were all able to voluntarily control stool, and no nocturnal enuresis was reported. The patient who was partially continent was able to control stool during the daytime, but required the use of a catheter to retain stool at night.


FIG. 2. End aspect of Macedo-Malone procedure.
nighttime fecal soiling. Postoperative irrigation regimens and patient outcome are detailed in table 1.

The majority of complications involved the stoma, most commonly stomal stenosis. Four patients experienced difficulty with catheterization initially because of stenosis of the stomal track. The affected stomas were dilated, which was successful in 1 case. Three patients subsequently required stomal revision.

Followup of our 9 cases ranged from 8 to 33 months (average 20.7). All patients except one indicated that the Macedo-Malone procedure was superior to medical treatment and that it had significantly improved their quality of life. The only patient who reported dissatisfaction with the procedure (patient 7) was a female teenager with gas leakage during and after the enema. She became increasingly depressed and noncompliant. She declined to administer the enemas herself 4 months after surgery.

**DISCUSSION**

Pediatric urologists are often involved in the care of children who not only have urinary incontinence, but also have problems of fecal elimination. In this series we offered the described procedure to treat fecal incontinence in association with urinary tract reconstruction only when maximal medical treatment (diet, medications, enema) had failed. Traditionally the only surgical option available at this point is the antegrade continence enema. There have been numerous operative modifications since the procedure was first described by Malone et al. Regardless of technique, the Malone antegrade continence enema has dramatically improved the quality of life for patients with fecal incontinence.

In the MACE the enema given differs from center to center. The most common regimen uses a phosphate enema. Care must be taken when using phosphate because toxicity may occur if it is retained, and this is a potentially life threatening complication.

Enema volume and frequency must be individualized to each patient. Although in the Malone procedure almost all of the patients administer an enema containing phosphate followed by smaller volumes of saline solution, our patients have had success using tap water or saline solution with no metabolic problems. Saline was chosen as the enema solution for its simplicity and safety. The enema regimen is subject to considerable individual variation. At our unit we have a clinical nurse specialist who has a specific interest in these cases and is available for advice throughout the week.

As clinical experience with the MACE has accumulated, several limitations have become evident. Enema application is time consuming, and pain with enema administration occurs in many cases. Another related problem is the proximity of the Mitrofanoff stoma when concomitant bladder access is created. Curry et al related that 15 of the 31 children (48%) who underwent a MACE procedure experienced pain during washout. Liloku et al in 2002 described a technique to solve this problem. They reported left continent access to the large bowel, assuming that the emptiness of the left colon and rectum was sufficient to provide fecal continence. In this technique they used a Monti tube as a catheterizable stoma. Although a short-term series, the preliminary results show a significant shortening of the duration of the enema with excellent outcomes in terms of continence. Recently Churchill et al reported a series of 18 patients with fecal incontinence treated by left colon antegrade continence enema (Monti-Malone). A total of 15 patients (83%) achieved fecal continence.

Macedo and Srougi described a continence mechanism based on a flap of intestinal tissue. Using the same principle, we proposed a new technique to achieve the same results. The obvious difference between our technique and that used by Liloku et al is the simplicity of our technique. We do not need to make a Monti tube, so an ileo-ileal anastomosis is avoided. As we have gained experience with the Macedo-Malone procedure at our institution, it has been our bias that

---

**TABLE 1. Patient Information**

<table>
<thead>
<tr>
<th>Pt No.—Age—Sex</th>
<th>Diagnosis</th>
<th>Enema/Vol (ml)</th>
<th>Followup (mos)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 —12—F</td>
<td>Myelomeningocele</td>
<td>Tap water 800</td>
<td>26</td>
</tr>
<tr>
<td>2 —17—F</td>
<td>Anorectal malformation</td>
<td>Saline 500</td>
<td>26</td>
</tr>
<tr>
<td>3 —10—F</td>
<td>Myelomeningocele</td>
<td>Tap water 450</td>
<td>13</td>
</tr>
<tr>
<td>4 —12—F</td>
<td>Myelomeningocele</td>
<td>Saline 300</td>
<td>17</td>
</tr>
<tr>
<td>5 — 8—F</td>
<td>Myelomeningocele</td>
<td>Saline 500</td>
<td>31</td>
</tr>
<tr>
<td>6 — 8—M</td>
<td>Anorectal malformation</td>
<td>Saline 250</td>
<td>33</td>
</tr>
<tr>
<td>7 —15—F</td>
<td>Myelomeningocele</td>
<td>Saline 250</td>
<td>30</td>
</tr>
<tr>
<td>8 — 6—F</td>
<td>Myelomeningocele</td>
<td>Tap water 500</td>
<td>21</td>
</tr>
<tr>
<td>9 —10—M</td>
<td>Myelomeningocele</td>
<td>Saline 500</td>
<td>08</td>
</tr>
</tbody>
</table>

**TABLE 2. Antegrade continence enema series**

<table>
<thead>
<tr>
<th>References</th>
<th>No. Pts</th>
<th>% Success</th>
<th>% Stomal Stenosis</th>
<th>Mean Followup (mos)</th>
</tr>
</thead>
<tbody>
<tr>
<td>McAndrew and Malone</td>
<td>47</td>
<td>97</td>
<td>31</td>
<td>34</td>
</tr>
<tr>
<td>Ellsworth et al</td>
<td>18</td>
<td>100</td>
<td>17</td>
<td>6</td>
</tr>
<tr>
<td>Schell et al</td>
<td>23</td>
<td>86</td>
<td>43.4</td>
<td>43.4</td>
</tr>
<tr>
<td>Wilcox and Kiely</td>
<td>36</td>
<td>77.7</td>
<td>33.3</td>
<td>39</td>
</tr>
<tr>
<td>Current study</td>
<td>9</td>
<td>100</td>
<td>33.3</td>
<td>20.7</td>
</tr>
</tbody>
</table>

**FIG. 3. X-ray of enema**

---

Copyright © American Urological Association. Unauthorized reproduction of this article is prohibited.
the procedure has had a significant impact not only on fecal continence, but also on quality of life for these patients.

As in the Malone procedure, careful selection of patients is essential for the success of the procedure. The surgery should be discussed with the parents of the patient and with older children. They should be given a detailed explanation of what is involved in terms of preoperative preparation, the surgical procedure and its complications, and postoperative management. Because of the complexity of the underlying abnormality and subsequent surgery, the role of the urology clinical nurse specialist in patient selection, preparation, education and supervision cannot be overemphasized. To give a doubly incontinent child independence with increased self-esteem and confidence by making him or her clean and dry must be the aim of all pediatric urologists. Ideally antegrade enemas would allow patients to manage the bowel without the assistance of a caregiver, thereby improving their sense of independence and self-esteem.

The success of the procedure and the morbidity seen in our patients are similar to those reported in several other studies, with stomal stenosis remaining the main concern (table 2). However, stomal stenosis has been prevented successfully in several of our children by daily or twice daily catheterization to keep the stoma patent. In the advent that dilation is unsuccessful stomal revision may be necessary, as in 3 of our patients. Using a healthy conduit with a good blood supply, and providing good support from the surrounding tissues and a straight path to the colon lumen to prevent traumatic catheterization are also basic principles of our procedure.

At initial surgery continence was achieved in all patients. Some reports describe incontinence or flatus via antegrade continence enema channels. Only 1 patient had flatus in our series.

In our series all of the patients used only saline solution enema. If during the long term our success rate is maintained using tap water/saline solution, the potential for hyperphosphatemia that has been described with phosphate enemas would be eliminated.

We stress that the majority of our patients have experienced considerable improvement in quality of life and self-esteem because the surgical procedure results in a significant decrease in fecal incontinence. Older children are able to perform the enema alone and they are more independent. Parents are pleased with the decrease in laundry loads, and the independence and satisfaction of their children. The technique of enema administration is easily learned, and children who are wheelchair bound may administer the enema while sitting on the toilet, since the enema usually takes effect within half an hour of administration. The antegrade continence enema (Macedo-Malone) procedure performed in conjunction with a urological procedure adds little to operative time or hospital stay, and obviates the need for additional anesthesia.

Our series is small but early results suggest consistently shorter washout times and favorable continence rates. In addition, the families maintain a high level of satisfaction with the Macedo-Malone procedure, despite subjectively inadequate financial resources and supplies purchased out of pocket. Catheters and saline solution are the only materials required for antegrade irrigations. The Macedo-Malone procedure may actually decrease the financial burden on families by reducing the need for hygiene garments and other bowel regimen supplies.

CONCLUSIONS

To date, the results of this procedure have been satisfactory. Technically the operation is relatively simple, and it may be performed simultaneously with genitourinary procedures. The success of the Macedo-Malone procedure ultimately lies in patient selection. Patient and caregiver motivation is vital. Detailed preoperative counseling and continued postoperative support, ideally provided by a nurse specialist, are essential to ensure adequate and continued motivation, without which the Macedo-Malone procedure is certain to fail.

APPENDIX: QUESTIONNAIRE FOR PATIENTS WITH MACEDO-MALONE PROCEDURE

<table>
<thead>
<tr>
<th>Name: ___________________________</th>
<th>Age: ____________</th>
<th>Gender: ____________</th>
</tr>
</thead>
<tbody>
<tr>
<td>Date of birth: ___________________</td>
<td>Date of surgery:</td>
<td>Reg. ____________</td>
</tr>
</tbody>
</table>

1) Do you perform your enema every day? How many times per day?
2) How much time do you spend performing your enema?
3) Which solution do you use to perform your enema?
4) Since you are performing the enemas, are you:
   - Totally continent
   - Partially continent
   - Incontinent
5) In your opinion, is performing your enemas easy or difficult?
6) Did you experience difficulties catheterizing your stoma?
7) Did you have any leakage per stoma?
8) Did you experience significant pain? If yes, the pain is:
   - At the introduction of the catheter
   - During the administration of the enema solution
   - When passing the stools
9) Are you satisfied with the surgical procedure? Why?
10) Do you still use your stoma? If not, why?
11) Will you recommend this procedure to another patient?

REFERENCES

5. Macedo, A., Jr. and Srougi, M.: A continent catheterizable ileum-