Manometric evaluation of postoperative patients with anorectal anomalies

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Aim: To evaluate the outcome of surgical treatment in patients with anorectal malformations and to correlate the clinical, manometric and electromyographic studies in assessment of postoperative continence in these patients. Methods: Forty-one patients operated on for anorectal malformations were evaluated retrospectively. These included 13 patients with low anomalies, 24 with high anomalies, and 4 with congenital pouch colon. Functional results after surgical correction were assessed on clinical basis using the Kelley's scoring system and by anorectal manometry. In addition, the electrical activity of contraction of the external sphincter muscle was studied using electromyography. Results: There was direct correlation between anal canal pressures and Kelley's score in patients with both high and low anomalies; Kelley's score of 6, 5, 4, 3 and less had pressures ranging between 60-75, 45-59, 30-44, 15-29 and less than 15 cm H2O, respectively. However, the electromyographic activity did not correlate well with Kelley's score. Conclusions: Anorectal manometry correlates well with Kelley's scoring system and may be a more objective method of analyzing the results of surgery. Poor correlation between Kelley's score and electromyography may be a reflection of poor compliance with instructions to voluntarily contract the muscles of continence. [Indian J Gastroenterol 2004;23:206-208]

Key words: Anorectal malformations, anorectal manometry, fecal continence, posterior sagittal anorectoplasty

Anorectal malformations are common congenital anomalies with a slight male preponderance;1 the average incidence is 1 in 5000 live births although it may vary.2 These malformations include a wide spectrum of defects, which have been classified as low, intermediate and high based on the level of the blind rectal pouch in relation to the pubo-coccygeal and ischial lines on an invermortogram. The most frequent defect among male infants is imperforate anus with rectourethral fistula; in female patients, the fistula is rectovestibular. Imperforate anus without fistula is infrequent, accounting for only about 5% of all anorectal malformations. Persistent cloaca and pouch colon are also uncommon malformations.3,4

Prior to 1985, cut-back anoplasty and translocation anoplasty were the treatments of choice for low anomalies, and abdomino-perineal pull-through anoplasty or sacro-perineal anoplasty and their modifications for the intermediate and high defects. Since then, posterior sagittal anorectoplasty (PSARP) has been adopted as the standard operative procedure for correction of all types of anorectal malformations. In PSARP, the existing muscles of continence are split in the posterior midline and the terminal portion of the bowel is placed within these muscles under direct vision, with the aim of providing the best possible potential for fecal continence. However, despite this improvement, only about 40% of patients are totally continent.5

The results of surgical correction of anorectal malformations can be assessed clinically by using various scoring systems, or functionally by using anorectal manometry.6 In addition, the electrical activity of contraction of the external sphincter muscle can be studied by electromyography. We attempted to find a correlation between manometry and clinical evaluation so that the clinical evaluation may become objective.

Methods

Patients operated on at our institution for anorectal malformations between 1985 and 1999 were evaluated during follow up. Their case records were reviewed for pre-operative and operative details.

Anal continence was assessed using the Kelley’s scoring system.6 This system gives points for continence (2 - normal under all circumstances and no soiling, 1 - occasional escape of feces or flatus, 0 - no control), staining of underclothes (2 - always clean, 1 - occasional staining, 0 - always stained), and quality of sphincter squeeze (2 - strong and effective, 1 - weak and partial, 0 - none). A total of these points gives the score.

All patients underwent anorectal manometry and electromyographic assessment of the external anal sphincter (Phoenix and Griffon Computer System; Albyn Medical, UK). The technique of anorectal manometry included fluoroscopy-guided positioning of a balloon catheter probe into the rectum and placing needle probes for electromyography on either side of the anal canal. Pressure sensors in the probe were used to record the baseline rest-
Forty-one patients (28 males) were studied. Of these, 13 (8 females; age 0.7-14 [mean 5.3] years) had been treated for low malformations (LARM), (perineal anoplasty 10, limited PSARP 3) soon after birth. Three patients soiled their underclothes occasionally and two other patients had occasional involuntary escape of feces or flatus. The other 8 patients had normal voluntary bowel control.

Twenty-four patients (20 male; 2-24 [9.2] years) had been treated for high malformations (HARM), (PSARP 21, re-do PSARP 3); they had completed their treatment 1 to 22 (average 6.6) years ago. Only 11 patients (42%) were fully continent (one of these patients had undergone a re-do PSARP); one patient had occasional soiling and 12 had frequent fecal soiling.

Four patients (3 male; age 3.6-7 [4.9] years) had been treated for pouch colon (pouch excision 3, colorrhaphy followed by abdomino-perineal pull-through 1), 6 months to 6 years (average 2.6 years) ago. Three patients had both occasional soiling and incontinence of feces and flatus, and one was totally incontinent.

## Table 1: Distribution of clinical outcome based on Kelley’s scoring system

<table>
<thead>
<tr>
<th>Type of anomalies</th>
<th>Kelley’s score</th>
<th>Good (n</th>
<th>6</th>
<th>5</th>
<th>4</th>
<th>3</th>
<th>2</th>
<th>1</th>
</tr>
</thead>
<tbody>
<tr>
<td>LARM (n=13)</td>
<td></td>
<td></td>
<td>8</td>
<td>3</td>
<td>1</td>
<td>1</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>HARM (n=24)</td>
<td></td>
<td></td>
<td>10</td>
<td>1</td>
<td>4</td>
<td>8</td>
<td>-</td>
<td>1</td>
</tr>
<tr>
<td>Pouch colon (n=4)</td>
<td></td>
<td></td>
<td>-</td>
<td>-</td>
<td>3</td>
<td>-</td>
<td>-</td>
<td>1</td>
</tr>
</tbody>
</table>

Pearson chi square p=0.01
LARM vs HARM p=0.03 (Fisher exact test)

## Results

The best results were observed in patients with low anorectal anomalies followed by those with high anomalies. Patients with pouch colon had poor results.

Table 2 shows the relationship of resting anal canal pressures, squeeze pressures and electromyographic activity of the sphincter with Kelley’s score. In patients with each type of anorectal malformation, higher Kelley scores were associated with higher resting and squeeze pressures. These were statistically significant when the resting pressure with Kelley score 5-6 was compared with that in Kelly score 3-4 in both LARM and HARM. A similar comparison for the squeeze pressure showed a statistical significance only in HARM. Tests of significance were not applied for the pouch colon because of the small number of patients. In contrast, electromyographic activity did not show a consistent relationship with Kelley’s scores (Table 3).

## Discussion

Factors of functional importance for anal continence and defecation include (i) the rectum, pelvic floor muscles (striated muscle complex), internal and external anal sphincter; (ii) sensory and motor innervation of these organs; and (iii) integrity of reflex arcs and the central nervous system. Evaluation of the results of surgery for anorectal malformations is a matter of debate; there is a large inter- and intra-individual variability in all measured parameters.

Internal anal sphincter is responsible for most of the resting tone and the rectoanal resistance barrier in normal subjects. In anal canal manometry the resting pressure is important for predicting the status of continence. The internal anal sphincter may be congenitally absent or hypoplastic in high or intermediate anomalies. In this study, we observed the presence of resting pressures, the amplitude of which corresponds well with the Kelley’s score. This would indicate the existence of and pres...
ervation of the internal sphincter during the surgical repair of anorectal malformations in this study.

Another important factor responsible for continence is the external anal sphincter. Anomalies of the external sphincter, e.g., congenitally rudimentary in development, severe functional impairment, and defective innervation have been reported in association with anorectal malformations,\(^8,10\) The efficacy of the external sphincter activity is assessed by squeeze pressure on anal canal manometry; its brief contraction when the rectum is transiently distended with a balloon containing air is known as the inflation reflex.\(^11\) This reflex correlates well with the development of anal continence. External anal sphincter can further be assessed by electrical activity on electromyography. The amplitude during maximum squeeze correlates well with the maximum squeezing pressure recorded by manometry, provided the patient is fully compliant to the instructions for muscle contraction at the appropriate time. Although we observed similar results, we were unable to correlate electromyographic activity with the Kelley’s score in many of our cases; poor compliance to instructions may be responsible in some of them. Further evaluation with CT or MR scans may be useful for diagnosis of integrity of the muscles.\(^12\)

The ultimate goal of management in anorectal malformations is bowel control. Results vary in different series. Good results with adequate continence have been reported in patients with low-type lesions. In spite of all efforts, 10%-30% of patients still suffer from total fecal incontinence that is intractable to all kinds of medical efforts,\(^10\) The efficacy of the external sphincter function is fully compliant to the instructions for muscle contraction and reporting of results so that there is meaningful interpretation of collective experience.\(^13\)

Various methods such as defecography, rectal manometry, electromyography, transanal ultrasonography, CT and MR scans have been used to evaluate the status of sphincters and bowel control. However, there should be uniformity in terminology, recording of data and reporting of results so that there is meaningful interpretation of collective experience.\(^13\)

Anal manometry is an important method for evaluating postoperative continence. Its major utility, in addition to obtaining absolute values of sphincter pressure, is to understand the synchronization of the sensory and motor components of the anal canal. All studies have confirmed its utility, and low pressures are always associated with incontinence. It enables the adoption of clear-cut criteria in estimating the effect of operation, indications for re-operation, and the determination of early and long-term prognosis. We observed a direct correlation between manometric anal pressure and Kelley’s scoring.

References


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