

# Post-operative anal Sphincteric Study by Anorectal Manometer after Duhamel's Procedure for Hirschsprung's Disease

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**Abstract:** Background: The purpose of this study is to describe the anal sphincteric function after Duhamel's operation by anomanometer, a versatile instrument, portable and easy to use. It has been used for assessment of continence after surgery of Hirschsprung's disease in children. The measurement of the resting anal pressure [ARP], maximum anal pressure [AMP] and Mean pressure provides the criteria upon which it is possible to quantify continence after surgical correction. of Hirschsprung's disease. The anomanometer records the biphasic response of the sphincters to rectal distension in normal children and the lack of the relaxation phase in Hirschsprung's disease, thus providing a convenient and simple method of diagnosis. Material and Methods: Total 27 patients of Hirschsprung's disease were taken for manometric study postoperatively after Duhamel's procedure. These patients were representative of the whole group of patients in terms of age, continence outcome; extent of the disease, this group consisted of 25 male and 2 female children. The mean age at the time of operation was 8 yrs. The disease had been confined to the rectosigmoid colon in 25 patients and extended to the descending colon in 1 patient. One patient had total colonic Hirschsprung's disease. Mean follow-up time after the operation was 3 yrs. Ten healthy children 8 yr [range 5-10] who had normal anorectal function constituted the control group. Results and Conclusion: The post operative anal sphincteric function was assessed by anorectal manometric study which was suboptimal than control group. The lower resting pressures are caused partially by internal anal sphincter myotomy performed during the pull-through procedure, when the septum between the rectum and ganglionic segment is resected, and partly by the anal dilation performed during the procedure

**Keywords:** Anorectal manometry, Hirschsprung's disease

## 1. Introduction

Hirschsprung's disease (HD) is one of the most common diseases in the field of Paediatric Surgery. It is a congenital condition characterised by the absence of ganglion cells in the submucosal (Meissner's) and myenteric plexus of the distal bowel. It is believed to result from the failure of ganglion cells to migrate fully caudad during the embryonic life. The loss of ganglion cells extends for a variable distance above the anorectal junction. In a recent series the classical HD was found restricted to rectosigmoid junction in 75% cases, long segment disease in 15% cases, ultra short segment disease in 5% cases and variable length was found in 5% of cases. The aganglionic (distal) bowel in Hirschsprung's disease lacks the normal motility, thus the upstream bowel becomes dilated secondary to functional obstruction. Due to the stasis and obstruction there is a great risk of enterocolitis in these patients. There is also a lack of normal internal sphincter relaxation in response to rectal stretch and this is the principle of a diagnostic modality called anorectal manometry.

Anorectal manometry aids in the diagnosis of Hirschsprung disease through identification of the recto anal inhibitory reflex after a distention bolus [1] This reflex is present in normal children but absent in the vast majority of children with Hirschsprung's disease [2]. Although anorectal manometry is possible in newborns, it is thought to be unreliable in children of less than 39 weeks of gestation or weights of less than 2700 g. [3] Manometry is generally not widely available for this age group and is often operator

dependent. In older children the test is technically easier, but false positive results may occur due to masking of the relaxation response by contraction of the external sphincter, as well as artifacts created by movement or crying.

Postoperative evaluation of patients operated upon for Hirschsprung's disease (HD) has mostly been based on functional parameters. In some studies anal sphincter function has been assessed by manometry [4,5]. Recently, anal endosonography (AES) has been introduced as a new tool for evaluation of the anal sphincters, but has so far not been used in the follow-up of patients operated upon for HD. The aim of this study was to record long-term functional results in patients operated upon with the Duhamel technique and relates these parameters to anal canal pressures.

## 2. Material and Methods

### Subject

Total 27 patients of Hirschsprung's disease were taken for manometric study postoperatively after Duhamel's procedure [Table-1]. These patients were representative of the whole group of patients in terms of age, continence outcome; extent of the disease, this group consisted of 25 male and 2 female children. The age at the time of operation was less than 1 year in 13 patients, between 1 and 3 years in 8 patients, and over 3 years in 6 patients. The disease had been confined to the rectosigmoid colon in 25 patients and extended to the descending colon in 1 patient. One patient had total colonic Hirschsprung's disease. Mean follow-up

time after the operation was 3 yrs. Ten healthy children 8 yr [range 5-10] who had normal anorectal function constituted the control group.

All patients were operated upon by the original Duhamel technique, pulling the proximal colon through a transverse incision in the posterior wall of the anal canal just above the dentate line. The septum between colon and rectum was divided with GIA stapler. All patients were interviewed. Anorectal manometry was performed in 27 patients with a Sphinctometer.

### Equipment

A portable anomanometer has been devised and has proved useful for the purposes of diagnosis and assessment of continence after surgery of Hirschsprung's disease. It consists of a single air-filled tambour-type balloon mounted on a Perspex probe and connected through a transducer to an analogue readout, so that changes of pressure in the balloon induced by the sphincter muscles of the anal canal are registered on Sphinctometer which was directly transfer to the computer. (Figure-1)

### Technical Details

External dimensions – Hand-held unit: 210mm x 80 / 100mm x 25 / 45mm  
Weight – Hand-held unit: approx. 520g  
Probe Specifications: MSM Special Pressure Sensor  
Measurement Range: 0 - 300 mmHg  
Measurement Accuracy:  $\pm 3, 0$  mmHg  
Manometric technique and measurements

Anorectal manometry was performed with the child in lateral position. Bowel preparation was done 6 hours before the study with glycerin suppository or enema (2 mL/kg). No sedative was given to any child. As soon as the probe is inserted, clear and intelligible instructions will lead through the operating menu, within a few seconds the measured values will be shown. The use of disposable protective covers for the probe ensures a fast access to Sphinctometer measuring system – anytime. Complicated disinfection of the probe after each use is not necessary. Simple connection to a PC will enable to transmit or import data. Important data compiled in the training phase can be easily stored and recalled giving easy access during therapy. The following parameters were measured in the form of anal canal resting pressure [ARP] and the maximum anal squeeze pressure [AMP] in mmHg and mean pressure was observed in ten second by calculating watch [Figure-2].

### Statistical Analysis:

The descriptive analysis has been expressed as mean  $\pm$  standard deviation for continuous variables. The qualitative data were expressed by their percentages and frequency. The comparison of mean in the cases and control groups was done by student -t test. The data was analyzed by SPSS 15.0 version.

### 3. Results

According to the continence scores, 7 patients (25%) had a normal bowel function (score 14), and good fecal continence (score 10-13) was found in 17 patients (62%). The 23 patients who had normal bowel function or good continence reported no limitations as to their social life. Fair continence (score 5-9) was found in 3 patients (11%). These had significant problems in bowel function including severe constipation or limitations in social life caused by fecal soiling. None of the patients were totally incontinent.

The Table-2 gives the descriptive idea among the cases and control group in Anal resting pressure (ARP), Anal maximum pressure (AMP), & mean pressure. The mean and standard deviation in ARP (mm Hg) was observed as  $24.37 \pm 6.28$  and  $27.40 \pm 4.42$  in cases and control groups respectively. In AMP (mm Hg) it was recorded as  $73.92 \pm 24.67$  &  $84.60 \pm 23.68$  in cases and control group respectively. The mean pressure (mm Hg) in cases and control groups was recorded as  $31.07 \pm 6.77$  and  $33.50 \pm 4.22$  respectively. The difference in anal canal resting pressure and anal maximum squeeze pressures between patients and controls were not found significant among the patient and control groups in any parameters.

### 4. Discussion

Anorectal manometry is widely used in the investigation of patients with anorectal dysfunction [5, 14]. Manometry has traditionally been used as a diagnostic procedure for HD; an absent recto anal inhibitory reflex is pathognomic. In only few cases has manometry been used in the follow-up patients operated upon for Hirschsprung's disease. In the present study, we have shown that patient operated upon with the Duhamel procedure had lower resting and maximum anal pressures than controls. **Mishalany and Wooly (1987)** evaluated anorectal function in 62 patients operated upon for Hirschsprung's disease, 14 by the Duhamel technique. One of the patients with the Duhamel procedure considered there stooling pattern normal, and 50% considered themselves completely continent. In agreement with our study the postoperative resting pressure in the Duhamel group in **Mishalany and Wooly (1987)** study were lower than normal. In **Holschneider's (1980)** series the resting pressure was increased or reduced depending on the operative method. **Sillen et al\* (1987) and Moore et al (1994)** found no significant difference in resting pressures between healthy controls and patients. We suggest that lower resting pressures are caused partially by internal anal sphincter mayotomy performed during the pull-through procedure, when the septum between the rectum and ganglionic segment is resected, and partly by the anal dilation performed during the procedure. However, the performance of the voluntary anal sphincters remained less disturbed. Although the maximum sphincter squeeze of the patients was significantly lower than in controls, there was no statistically significant difference in the voluntary sphincter force between the patients and controls. The voluntary sphincter force reflects the working power of the muscles (external sphincter and levator ani, gluteal muscles) that contribute to the patient's ability to close the bowel outlet and may give a better indication of the integrity of this

voluntary muscle apparatus than maximum squeeze pressure, the value of which is influenced by the resting anal pressure. It is difficult to understand how a completely aganglionic internal sphincter in Hirschsprung's disease would regain normal function (internal sphincter relaxation reflex) after an anastomosis with proximal ganglionic colon. Functional reinnervation of the internal sphincter seems unlikely especially after operations without full-thickness end-to-end anastomosis, such as Duhamel and Soave procedures.

**Moore and co-workers (1994)** evaluated the result of 178 patients operated upon for Hirschsprung's disease; 44 of them were examined with manometry. Sixteen of the 178 patients had clinical evidence of obstruction, but the results of manometric assessment were not significantly different from those of 28 patients who had normal stool evacuation. As in our study, no correlation was found between anorectal function and anal canal pressures. It is believed that anorectal function will improved with time[7,8], although this has been disputed.

**References**

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**Table 1: Clinical Data**

Examined (n=27)		
Types of operation	Duhamel procedure	27
Mean age yr		8 yr
Continence outcome	Normal(score 14)	7(25%)
	Good (score 10-13)	17(62%)
	fair(score 5-9)	3(11%)
Extent of disease	Rectosigmoid	25(92.5%)
	Descending colon	1(3.7%)
	Total colon	1(3.7%)

**Table 2: The findings of Anorectal manometry**

Anal canal pressure (mm Hg)	Groups	Mean±St Deviation	P value
ARP(Anal resting pressure)	Patient(27)	24.37±6.28	0.171
	Control(10)	27.40±4.42	
AMP(Anal Maximum squeeze pressure)	Patient(27)	73.92±24.67	0.246
	Control(10)	84.60±23.68	
Mean Pressure	Patient(27)	31.07±6.77	0.299
	Control(10)	33.50±4.22	



