Pouch surgery –
The importance of the transitional zone

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ABSTRACT: Patients with preservation of the transitional zone of the anal canal have less leakage and less need to wear pads than patients who have had mucosectomy. There is a significant difference in mean maximum resting pressure between patients that have had anal transitional zone preservation and mucosectomy. With preservation of the anal transitional zone, a mean maximum resting pressure of 57.6±3.8 mmHg was obtained compared with 47.3±4 mmHg in the mucosectomy group. Preservation of the resting pressure is dependent on preservation of internal anal sphincter integrity. The integrity of the sphincter is injured during mucosectomy due to anal dilation. Other factors affecting continence and stool frequency, such as diet, antidiarrheal medications, stool consistency and compliance, when examined were found to be unrelated factors.

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Key Words: Ileo-anal anastomosis, Pressure studies, Surgery

Les 'ostomies' – Importance de la zone de transition

RESUME: Les patients chez qui la zone de transition du canal anal a été préservée souffrent d'un nombre moindre de fuites et éprouvent moins le besoin de porter des tampons que les patients qui ont subi une mucosectomie. Il existe une différence significative entre les deux groupes quant à la pression maximum moyenne de repos. Dans le groupe chez qui la zone de transition anale a été préservée, la pression maximum moyenne du sphincter au repos était de 57.6±3.8 mm Hg par rapport à 47.3±4 mm Hg dans le groupe ayant subi une mucosectomie. La préservation de la pression de repos dépend de l'intégrité du sphincter anal interne. Or, la mucosectomie inflige un traumatisme direct au sphincter anal lors de sa dilatation. D'autres facteurs influant sur la continence et la fréquence des selles (régime alimentaire, antidiarrhéiques, consistence des selles et compliance) ont été examinés mais ne semblent pas intervenir.

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IN THE CONTINUING EFFORT TO RESTORE normal bowel function to patients after proctocolectomy for ulcerative colitis, the ileal pouch-anal anastomosis is, at present, the procedure of choice. Patients prefer a pelvic pouch rather than an ileostomy, even though the functional results of the pelvic pouch are not perfect (1,2). Patients have an increased frequency of defection (1,3), and often require dietary and pharmacologic manipulation to alter intestinal transit time (4). The greatest concern to patients is loss of continence (5,6). Leakage of stool has been reported in up to one-half of patients during the day or night (2,7,8). Incontinent patients have lower maximum anal resting pressures than those who are continent (3,9). Maximum anal resting pressures are decreased by anal retraction during mucosal proctectomy (8,10) or the transanal insertion of sutures (11). Preservation of the anal transitional zone has been advised to avoid mucosal proctectomy and decrease leakage (12-14).

PATIENTS AND METHODS
Functional results and manometric data are presented on 221 patients who have undergone ileal pouch-anal anas-
TABLE 1
Diagnosis and technique of ileal pouch-anal anastomosis

<table>
<thead>
<tr>
<th></th>
<th>Preservation transitional zone</th>
<th>Mucosectomy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mucosal ulcerative colitis</td>
<td>96</td>
<td>88</td>
</tr>
<tr>
<td>Crohn’s colitis</td>
<td>7</td>
<td>10</td>
</tr>
<tr>
<td>Indeterminate colitis</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Familial polyposis</td>
<td>7</td>
<td>12</td>
</tr>
<tr>
<td>Total</td>
<td>111</td>
<td>110</td>
</tr>
</tbody>
</table>

TABLE 2
Functional results of 221 patients following ileal pouch-anal anastomosis

<table>
<thead>
<tr>
<th></th>
<th>Function preservation transitional zone</th>
<th>Mucosectomy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequency (median)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stools per 24 h</td>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td>Stools at night</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Leakage (%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Minor during the day</td>
<td>6</td>
<td>16</td>
</tr>
<tr>
<td>Minor at night</td>
<td>14</td>
<td>49</td>
</tr>
<tr>
<td>Major during the day</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Major at night</td>
<td>2</td>
<td>15</td>
</tr>
<tr>
<td>Pads during the day</td>
<td>10</td>
<td>12</td>
</tr>
<tr>
<td>Pads at night</td>
<td>10</td>
<td>41</td>
</tr>
</tbody>
</table>

tomosis following proctocolectomy. One hundred and ten had mucosec-
tomy and 111 had preservation of the anal transitional zone, with either a
stapled anastomosis or a hand-sewn
anastomosis. The diagnosis for which
the procedure was performed and the
method are shown in Table 1. The
pouches were either of the J or S
configuration.

Function was assessed by a
telephone or personal interview. Informa-
tion was collected on the frequency
of defection, continence and the use
of pads. Incontinence has been defined
as: minor leakage producing a stain 3
cm in diameter at least three times a
week; major leakage producing a stain
greater than 3 cm, or the involuntary
passage of a bowel movement at least
once a month.

Anal manometry was performed with
a water-perfused Arndorfer catheter
modified with four sensor ports radially
oriented at 90°, 7 cm from the tip. Two
sensor ports at the tip of the catheter
are enclosed in a 500 mL latex balloon.
Hard copies are generated on a Narco
HHS 200 recorder and amplifier. The
station pull-through technique was
used beginning 5 cm proximal to the
anal verge with resting and squeeze
pressures recorded before advancing
the catheter. The pressures from the
four quadrants at each of the stations
were averaged and the highest recorded
as either maximum resting pressure or
maximum squeeze. Anal canal length
was determined as the length of the
anal canal in which resting pressures
equalled or exceeded 20 mmHg. The
maximum tolerated volume was taken
as the volume infused into the pouch
when the patient felt either an intense
urge to defecate or pain that prevented
further distension. Compliance was
recorded as the pressure in the pouch
minus the balloon pressure at the
maximum tolerated volume.

Operative technique: The transitional
zone was preserved by performing the
proctocolectomy in the lithotomy-
Trendelenburg position using Lloyd-
Davies stutters. The proctocolectomy
was performed in a conventional man-
ner with the rectum being mobilized to
the levator ani and transsected at the
top of the anal canal at the anojejunal
ring. A purse-string suture was placed in
the upper end of the anal canal and the
stapled anastomosis performed with a
round stapling instrument introduced
transanally. A proximal loop ileostomy
was fashioned and closed 12 weeks after
the construction of the pouch, in the
absence of complications.

Mucosectomy was performed using a
Pratt bivalved anal speculum after in-
filtrating the submucosa with 1:200,000
adrenaline solution. The mucosa was
stripped from the dentate line cephalad
to the level of muscle transsection.
The anastomosis between the pouch and
the dentate line was performed by inter-
rupted sutures to the cut edge of the
mucosa at the dentate line.

Statistical analysis: When appropriate,
either the paired or unpaired Student’s
t test and χ² test was used for data
analysis.

RESULTS

Functional results are shown in
Table 2.

Stool frequency: The frequency of
defecation was no different in either
group. The median 24 h frequency was
six with one stool occurring at night.

Leakage: Leakage rates were different
between the two groups, both day and
night. Minor leakage occurred in 6% of
patients with preservation of the transi-
tional zone and 16% of patients who
had mucosectomy (P<0.05). At night the
incidence of minor leakage was 14%
in patients with preservation of the
transitional zone and 43% in those with
mucosectomy (P<0.001). Major
leakage occurred in 2% of the patients
with preservation of the transitional
zone during daytime or at night. Three
per cent of the patients who had
mucosectomy had major leakage during
the day and 15% at night. The dif-
fERENCE in the incidence of leakage at
night was significant (P<0.001).

Pad use: Ten per cent of the patients
that had preservation of the transitional
zone and 12% of those with mucosec-
tomy wore pads during the daytime (not
significant). However, there was a sig-
nificant difference in the use of pads at
night: 10% of those with preservation
of the transitional zone compared with
41% with mucosectomy (P<0.001).
The identical day rates of leakage may
be related to the conscious reinforce-
ment of the external anal sphincters.
## TABLE 3
Postoperative manometric data

<table>
<thead>
<tr>
<th></th>
<th>Preservation transitional zone</th>
<th>Mucosectomy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anal canal length (cm)</td>
<td>2.9±0.3</td>
<td>2.8±0.3</td>
</tr>
<tr>
<td>Rectal anal inhibitory reflex (%)</td>
<td>23</td>
<td>16</td>
</tr>
<tr>
<td>Maximum resting pressure (mmHg)</td>
<td>57.6±3.8</td>
<td>47.3±4.7</td>
</tr>
<tr>
<td>Maximum squeeze pressure (mmHg)</td>
<td>208±20</td>
<td>205±22</td>
</tr>
<tr>
<td>Maximum tolerated volume (mL)</td>
<td>261±28</td>
<td>253±24</td>
</tr>
<tr>
<td>Compliance</td>
<td>13.5±2.4</td>
<td>10.9±1.8</td>
</tr>
</tbody>
</table>

Compliance is the pressure in the pouch minus the balloon pressure at the maximum tolerated volume.

## TABLE 4
Complications following ileal pouch-anal anastomosis

<table>
<thead>
<tr>
<th></th>
<th>Preservation transitional zone</th>
<th>Mucosectomy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ileal pouch-anal anastomosis stricture</td>
<td>4</td>
<td>11</td>
</tr>
<tr>
<td>Ileal pouch-anal anastomosis leak</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>Anal vaginal fistula</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Perianal abscess</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Perianal fistula</td>
<td>0</td>
<td>5</td>
</tr>
<tr>
<td>Pelvic abscess</td>
<td>1</td>
<td>5</td>
</tr>
</tbody>
</table>

### DISCUSSION

Fewer patients in the group with preservation of the transitional zone had minor leakage during the day or night than the mucosectomy group. They also used fewer pads at night than the mucosal proctectomy group (Table 2). There was a significant difference in the mean maximum resting pressure between the groups. The group with preservation of the transitional zone had a mean maximum resting pressure of 57.6±3.8 mmHg and the mucosectomy group 47.3±4.7 mmHg. The relationship between incontinence and low mean maximum resting pressures has been identified by other authors (3,9,14). Preservation of resting pressure is dependent upon preservation of internal anal sphincter integrity. The internal anal sphincter is injured during mucosectomy due to anal dilation (3,9). The authors’ observation in this assessment of their patients supports the observations made earlier (12-14). Patients who have stapled ileal pouch-anal anastomoses without endoanal mucosal proctectomy have higher maximum resting pressure values and a lower incidence of incontinence than patients who have had endoanal mucosal proctectomy.

Patients who have preservation of the transitional zone of the anal canal have less leakage and consequently need to use pads than those that have had a mucosectomy.

Other factors affecting continence and stool frequency are the patient's diet, antidiarrheal medication, stool consistency and pouch compliance. There was no difference between groups when these factors are considered. There was no difference in anal canal length, maximum squeeze pressure or maximum tolerated volume. The significant difference noted was in mean maximum resting pressure which is dependent on internal anal sphincter tone. It appears that preservation of the transitional zone without anal manipulation is important in maintaining internal anal sphincter tone and consequently preservation of continence. Sensation in the maintenance of continence does not seem to be important in the study.

A cause for concern in retention of the transitional zone of the anal canal is the risk of development of carcinoma in retained colonic mucosa. Biopsies to date show that only a very small percentage of the patients have colonic mucosa, and no patient has been found to have dysplasia or carcinoma. Kewenter et al. (15) calculated the cumulative incidence of carcinoma in ulcerative colitis when the whole colon was involved in extensive ulcerative colitis to be 34% 25 years after the onset of colitis. Grundfest et al. in an earlier report from the Cleveland Clinic (16) reported four rectal cancers arising in 84 patients with ileorectal anastomoses (4.8%) followed up to 30 years (mean 7.7). The cumulative risk of
cancer development was zero at 10 years, 2.1% at 15 years, 5±3.5% at 20 years and 12.9±8.3% after 25 years of disease. Extrapolating further reduction in the mucosa at risk following proctectomy and pelvic pouch ileoanal anastomosis with preservation of the transitional zone, while the risk of developing cancer has yet to be calculated it must be very small.

CONCLUSION

The authors believe the operation of ileal pouch-anal anastomosis provides better functional results when anal manipulation (as occurs for a variable time when doing a mucosectomy) is minimized. The risk of cancer in the anorectal stump distal to the anastomosis is not entirely negated, but can be minimized and acceptably lowered by monitoring the anal transitional zone with annual biopsies to exclude or diagnose dysplasia early and by performing mucosectomy in those with a high risk of cancer, eg, synchronous colon cancer. The benefit of improved function that occurs with a stapled ileal pouch-anal anastomosis outweighs the theoretical risk of cancer in the retained anal transitional zone.

REFERENCES
