

Anorectal function following low anterior resection

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Abstract

Introduction Rectal function following rectal resection for carcinoma was studied in 43 patients.

Methods Sixteen women and 27 men with a median age of 66 years (range 41–79 years) were included. Twenty-three patients had a diverting ileostomy at the time of resection. Eight patients had a 6-cm colonic J-pouch. Ten patients had anastomotic leakage including two patients without diverting ileostomy. One patient had pre-operative radiation with 25 Gy. The patients were studied at a median 12 months (range 3–30) after rectal resection. Distance from anal verge to the anastomosis was a median 7 cm (range 3–12 cm). Clinical data, anal manometry and rectal compliance were analysed.

Results Stool frequency was 3 per day (range 1–10). Twenty-two (51%) patients were continent, 11 (26%) were incontinent for flatus, and 10 (23%) were incontinent for faeces (three for liquid and seven for solid stool). Fourteen (33%) patients had constipation, two of whom also had incontinence for solid or liquid stool. The level of the anastomosis for patients with postoperative constipation was 5 cm (range 3–12 cm), while it was 7 cm (range 3–10 cm) for nonconstipated patients (NS). Anal

manometry was normal. Rectal compliance was lower in patients with incontinence for liquid or solid faeces than in patients with flatus incontinence only ($P < 0.01$), and rectal volume tolerability was lower in incontinent patients compared with continent patients ($P < 0.05$). The rectoanal reflex was present in 31 (72%) patients. There was a negative correlation between maximal rectal volume and stool frequency and between level of the anastomosis and degree of incontinence. Age did not affect functional outcome.

Conclusion Many patients had a poor functional result following low anterior resection. One in four suffered from incontinence to liquid or solid faeces and one third of the patients experienced constipation. A low level of anastomosis tended to increase stool frequency and carried a higher risk of incontinence. Patients with faecal incontinence tended to have lower rectal compliance and volume tolerability than patients who were continent, while there was no difference in anal pressures.

Keywords Rectal cancer, rectal resection, anorectal function, anorectal physiology

Introduction

Rectal resection with total mesorectal excision is now the accepted treatment for carcinoma of the middle or lower third of the rectum. When the lateral margins are free of tumour, the distal free margin can be as short as 1 cm without increased risk of local recurrence. This change in surgical treatment has led to an increased number of patients having a low rectal or colo-anal anastomosis. The functional results of these very low anastomoses are not well described and the aim of this study was to evaluate

prospectively anorectal function following low anterior resection.

Materials and methods

Sixteen women and 27 men of median age 66 years (range 41–79 years) were included. Twenty-three patients had a diverting ileostomy at the time of resection which was closed three months later. Eight patients had a 6-cm colonic J-pouch. Ten patients had anastomotic leakage including two patients without diverting ileostomy. One patient had pre-operative radiation with 25 Gy.

The patients were studied at a median 12 months (range 3–30 months). the distance from anal verge to the anastomosis was an interval of 7 cm (range 3–12 cm).

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In addition to clinical evaluation, patients had a complete ano-rectal physiological examination including anal manometry, rectal compliance measurements and a viscous fluid retention test performed as previously described [1–3]. Continence status was assessed by a modified Williams score [4]. Wilcoxon rank sum test for nonparametric data was used to test differences between groups. Linear regression was used to test possible correlation between data.

Results

Stool frequency was a median of 3 evacuations per day (range 1–10 per day). Twenty-two (51%) patients were continent, 11 (26%) were incontinent for flatus, 3 (7%) for liquid faeces and 7 (16%) for solid stool. Fourteen (33%) patients had constipation, two of whom were also incontinent for solid or liquid stool. Age did not affect functional outcome.

There was a negative correlation between the level of the anastomosis and degree of faecal incontinence (Fig. 1). The median level of the anastomosis for patients with postoperative constipation was 5 cm (range 3–12

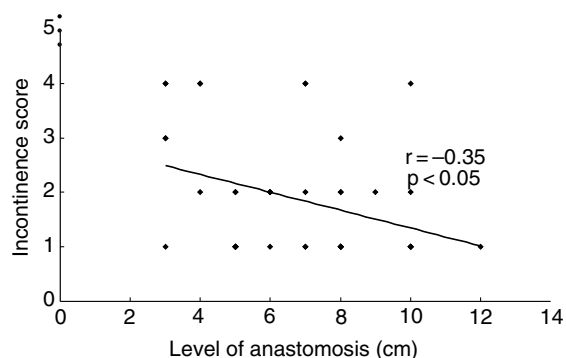


Figure 1 Correlation between level of rectal anastomosis and incontinence score. $r = -0.35$; $P < 0.05$.

Table 2 Neorectal capacitance and compliance following rectal resection in relation to postoperative anal function (43 patients).

	Maximal tolerable volume (ml)	Rectal pressure at maximal volume (cm H ₂ O)	Neorectal compliance (ml/cm H ₂ O)
Incontinence for liquid or solid faeces ($n = 10$)	117 (72–184)‡	77 (48–106)	1.68 (0.68–2.98)†
Incontinence for flatus ($n = 11$)	154 (64–250)	54 (34–76)	2.85 (1.18–4.41)
Continent patients ($n = 22$)	186 (34–380)	74 (24–122)	2.57 (0.43–6.55)

Values are median and range. † $P < 0.01$ compared to patients with flatus incontinence; ‡ $P < 0.05$ compared to continent patients.

cm) from the anal verge, while it was 7 cm (range 3–10 cm) for nonconstipated patients (NS).

All patients had normal anal pressures. For the entire group of patients, median maximal resting pressure was 59 cm H₂O (range 22–101 cm H₂O), while median maximum squeeze pressure was 152 cm H₂O (range 52–300). Anal pressures in relation to anal function are shown in Table 1. The rectoanal reflex was present in 31 (72%) patients. Median volume for initiation of the reflex was 20 ml (range 5–92 ml).

Patients with incontinence to liquid or solid faeces had lower rectal volume tolerability than continent patients (Table 2) ($P < 0.05$) and lower rectal compliance than patients who were incontinent to flatus only ($P < 0.01$). There was a negative correlation between maximal tolerable rectal volume and stool frequency (Fig. 2). Viscous fluid retention test showed that 15 patients (35%) were unable to retain the fluid. Median retention volume was 150 ml (range 50–300 ml).

Patients with a colon J-pouch had similar function to patients with a straight anastomosis. They also had similar anal pressure and rectal compliance. Median maximal anal resting pressure was 54 cm H₂O

Table 1 Anal pressures following rectal resection in relation to postoperative anal function.

	Maximal resting pressure (cm H ₂ O)	Maximum squeeze pressure (cm H ₂ O)
Incontinence for liquid or solid faeces ($n = 10$)	46 (22–72)	152 (72–289)
Incontinence for flatus ($n = 11$)	56 (32–84)	141 (100–216)
Continent patients ($n = 22$)	62 (28–101)	152 (52–300)

Values are median and range.

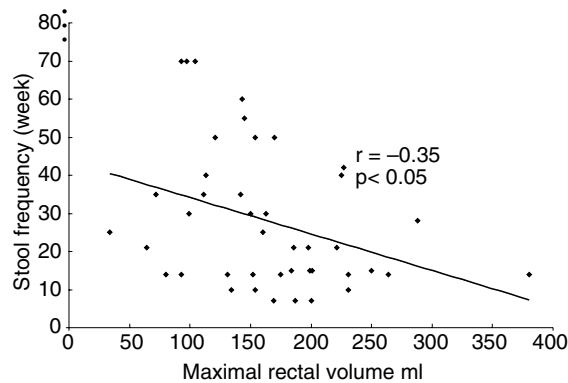


Figure 2 Correlation between stool frequency and rectal volume following rectal resection. $r = -0.35$; $P < 0.05$.

(range 31–83 cm H₂O) and maximum squeeze pressure 135 cm H₂O (range 72–216 cm H₂O). Median maximal tolerable rectal volume was 169 ml (range 121–231 ml), rectal pressure at maximal rectal volume was 74 cm H₂O (range 59–83 cm H₂O) and rectal compliance was 2.41 ml/cm H₂O (range 1.81–3.25 ml/cm H₂O).

Discussion

The results of this study show that only half the patients were completely continent following low anterior resection. In addition, one third of the patients suffered from constipation requiring enemas or laxatives. Patients with a very low anastomosis have an increased risk of faecal incontinence and also tend to have lower rectal capacitance and compliance as well as a higher stool frequency. Anal pressures, however, were not significantly lower than those of continent patients. The frequency of patients with faecal incontinence in this study is in line with other studies reporting that 15–31% of patients suffer from faecal incontinence following rectal resection [5–7].

The study indicates, that changes in rectal capacitance and compliance are the decisive factor for postoperative function and not damage to the anal sphincter. Thus, findings correspond well with results from our previous study of anorectal function after low anterior resection [8]. That study also showed that rectal function improved up to one year after the operation and since median follow-up in the present study is 12 months, the results reported here will undoubtedly represent the final functional outcome in the majority of the patients.

Function and rectal capacitance and compliance in the eight patients in the study who had a colonic J-reservoir did not differ from those with a straight anastomosis. This is in line with randomized studies on colonic J-pouch *vs.* straight anastomosis where an initially superior outcome in the pouch group is markedly reduced after one year [9].

The inverse correlation risk of incontinence with the level of the anastomosis was in accordance with other studies [10,11], and impaired rectal emptying also tended to be more pronounced in patients with a low anastomosis. This may be a result of an altered or absent rectoanal inhibitory reflex. In the present study the reflex disappeared in almost 30% of the patients and in some could only be elicited with very high rectal volumes. Matzel *et al.* [10] reported comparable figures for disappearance of the reflex which occurred significantly more often after low anastomosis. In our previous study only 2 of 13 patients had a normal rectoanal inhibitory reflex postoperatively but no attempt was made to correlate this finding with the functional outcome [8].

It must be concluded that the functional outcome after anterior rectal resection for cancer with a low colorectal or coloanal anastomosis is far from perfect. Both faecal incontinence and impaired rectal emptying occurred in more than 25% of the patients mainly due to alterations in the capacitance of the neorectum and possibly also due to alterations in the rectoanal inhibitory reflex. These disturbances were correlated inversely with the level of the anastomosis and with TME being performed with increasing frequency this problem is likely to increase. Further research should be directed towards possibilities of predicting a poor functional outcome after TME with the aim of improving the basis for counselling the patients on the choice of surgical procedure.

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