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Raising a colostomy – results of a prospective surgical audit

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Abstract. A prospective surgical audit of all colostomies fashioned over a 1-year period in one hospital was conducted. Of one hundred and ten colostomies there were 56 loop and 52 end stomas. Following the formation of the colostomy a proforma was completed and the surgeon interviewed to document the precise surgical technique employed. Whilst in hospital the patients were regularly reviewed and the colostomies assessed by a surgeon and stomatherapist using a scoring system. Follow up was continued until closure of the colostomy or for a minimum period of 1 year. Only 53 (48%) of patients saw a stomatherapist preoperatively. This rate was higher in elective (86%) than in urgent cases (15%). The surgial technique used did not appear to influence the outcome of any given colostomy. However, failure to cruciate the posterior rectus sheath may predispose to stomal stenosis and the use of a subcutaneous polyethylene rod to support a loop colostomy often led to infection. Tension of the colostomy led to complications in 29 cases (26%), this was often the precipitating event to other complications and led to the only colostomy-related death. Registrars with experience of fewer than 5 colostomies received their training largely from other registrars rather than consultants. This prospective surgical audit has disclosed that fashioning a colostomy carries significant stoma related morbidity, most of which is potentially avoidable. Appropriate audit can contribute to the maintenance and improvement of surgical standards.

An operation involving a colostomy has profound physical and psychological sequelae for the patient [1]. This burden is increased if the colostomy is badly constructed or poorly positioned or if preoperative counselling is inadequate [2]. The initial reaction to the stoma or any associated complications may permanently prejudice the patient's attitude towards future management. Any procedure performed at the end of a lengthy operation, undertaken as an emergency or carried out by an inexperienced surgeon is likely to have an increased morbidity. Although the initial construction of the colostomy is so important there has apparently never been a prospective investigation to document the associated morbidity [3–6]. The aim of this study was first to record prospectively the morbidity associated with the fashioning of a colostomy and secondly to assess the importance of a prospective surgical audit in maintaining and improving surgical standards.

Patients and methods

All patients attending hospital during a period of 1 year who required an operation which included the formation of a colostomy were studied prospectively. Follow-up was continued until the closure of the colostomy or for a minimum period of 1 year. A three-part proforma was completed for each patient. The first part contained general information such as the patients' name, age, sex, diagnosis, the type of colostomy and the name and experience of the surgeon fashioning the colostomy. Details of any preoperative liaison with the stomatherapist were also recorded. The second part contained details of the technical aspects of the colostomy. The surgeon fashioning the colostomy was interviewed and details of the technique used for construction of the colostomy were documented. The third part of the proforma contained follow-up information. Whilst the patient was in hospital, the colostomy was critically reviewed jointly by a surgeon and a stomatherapist. Details of the size of the stoma, its position and relationship to wounds, drains and surface markings were recorded. Complications were documented as they occurred and a digital examination was performed on each patient. No specific record was made on the proforma of the precise antibiotics given in each individual patient. However, the hospital had a common antibiotic policy which was uniformally used by all four surgical firms. Patients undergoing elective surgery received an aminoglycoside, usually Tobramycin, and metronidazole intravenously with the induction of anesthesia. Depending on the surgeon's preference, the patient would receive either two further doses or antibiotics for 48 h. Patients undergoing emergency surgery in whom there was already peritoneal contamination were given an aminoglycoside, metronidazole and benzyl penicillin for 5 days. The result was assessed using a simple scoring system (Table 1). The colostomies were evaluated shortly following surgery and the score adjusted as necessary during the postoperative course. A score of 4 or 5 was considered acceptable. The scoring system reflected any technical imperfections and did not consider other aspects such as lack of preoperative counselling or the experience of the surgeon.

Table 1. The relationship between score and type of colostomy

Score	Elective		Emergency		Paul – Mikulicz	Total
	End	Loop	End	Loop		
5	11	10	7	7	0	35 (31.8)
4	5	2	4	11	1	23 (20.9)
3	6	5	3	8	0	22 (20)
2	1	1	1	0	0	3 (2.7)
1	0	0	1	3	0	4 (3.6)
0	2	1	3	1	0	7 (6.3)
Not scored	5	2	3	5	1	16 (14.5)
Total	30	21	22	35	2	110

Percentages in parentheses
Score: 5 perfect; 4 minor unperfection; 3 major imperfection, colostomy care significantly compromised; 2 poor colostomy, patient unable to manage; 1 poor colostomy, stomatherapist only able to manage; 0 refashioning required

Table 2. Indications for colostomy

	End colostomy	Loop colostomy	Total
Abdomino-perineal resection	18	–	18 (16.3)
Hartmann's procedure	5	–	5 (4.5)
Protection of a colorectal or coloanal anastomosis	–	17	17 (15.4)
Obstructing carcinoma	3	12	15 (13.6)
Trauma	5	8	13 (11.8)
Diverticular disease	6	3	9 (8.1)
Gynaecological disease	4	2	6 (5.4)
Radiation colitis	5	1	6 (5.4)
Urological disease	1	4	5 (4.5)
Pancreatitis	2	1	3 (2.7)
Necrotising fasciitis	0	3	3 (2.7)
Miscellaneous	5	5	10 (9.0)
	54	56	110

Percentages in parentheses

Table 3. Number of colostomies performed by surgeons in stages of training

Seniority of surgeon	Type of colostomy				Paul – Mikulicz	Total
	Elective		Emergency			
	End	Loop	End	Loop		
Consultant	8	10	3	8	0	29 (26.3)
Senior registrar	10	6	11	7	1	35 (31.8)
Registrar (> 5 colostomies)	11	4	6	8	0	29 (26.3)
Registrar (2–5 colostomies)	0	1	2	9	1	13 (11.8)
First colostomy by registrar	1	0	0	3	0	4 (3.6)
	30	21	22	35	2	110

Percentages in parentheses

Results

During the year 110 colostomies were raised. The indications are shown in Table 2. The majority were either loop or end colostomies fashioned by general surgeons (Table 3).

Liaison with the stomatherapist

Forty-four (86%) of 51 patients undergoing elective surgery were counselled by the stomatherapist prior to surgery as were nine of 59 (15%) patients undergoing emergency surgery. Eight of the 57 patients not counselled by the stomatherapist preoperatively were not referred to them for at least 24 h following surgery and two were not referred for over 1 week. Joint consultation between the surgeon, the stomatherapist and the patient took place only occasionally. Had it not been for the vigilance of the stomatherapist whilst on the wards fewer elective patients would have been counselled preoperatively. A number of emergency patients likely to receive a colostomy were admitted during working hours and some could have been seen by the stomatherapist preoperatively.

Six (11%) of the 53 patients counselled and sited by the stomatherapist preoperatively had the stoma positioned elsewhere by the surgeon. In three further cases a misunderstanding between the surgeon and the stomatherapist resulted in the stomatherapist positioning the colostomy inappropriately.

Surgical technique

The exact technique employed varied considerably but in all cases save one, the stoma was constructed transperitoneally. No particular technique appeared to confer any advantage but three technical details appeared to be important. In 36 patients (34%) the posterior rectus sheath was divided in a linear manner (as opposed to a cruciate incision) and all seven patients who developed a stomal stenosis occurred in this group. Eighteen patients had a loop colostomy supported by a subcutaneous polyethylene rod [7], five of whom developed an abscess or cellulitis related to the rod. Three colostomies were raised through the laparotomy incision and in each case the wound became infected.

The most important technical failure was retraction due to tension. This occurred in 29 patients (26%) in 21% of whom the surgeon did not appreciate that the colostomy had been completed under tension. Eight of 10 colostomies noted intraoperatively to be under tension retracted.

Colostomies positioned by the stomatherapist preoperatively were on average 7.1 cm from the costal margin and 6.6 cm from the umbilicus. These

Table 4. Colostomy-related complications during admission and following discharge from hospital

During admission	
Retraction	29
Stenosis: at skin	1
at rectus sheath	6
Paracolostomy abscess	6
Paracolostomy cellulitis	2
Infection associated with subcutaneous rod	5
Paracolostomy fistula	4
Colostomy raised through wound	3
Necrotising fasciitis	1
Colostomy unnecessarily close to: bone	5
drain	6
mucous fistula	2
Following discharge from hospital	
Paracolostomy hernia	4
Distal loop prolapse of loop colostomy (56 patients)	2

distances for stomas sited by the surgeon were 5.4 cm and 7.7 cm respectively. Six patients had a drain or mucous fistula positioned unnecessarily close to the colostomy.

Mortality

One patient died as a direct result of a complication arising from a colostomy constructed under tension. Excessive retraction made the colostomy unmanageable and the subsequent early laparotomy was complicated by dense adhesions, iatrogenic bowel perforation, enterocutaneous fistulae, sepsis and death.

Complications

Early complications (within the first hospital admission) and late complications are shown in Table 4. Seven patients required refashioning of the colostomy during the first admission; 4 for excessive tension; 2 for ischaemic necrosis and 1 for necrotising fasciitis secondary to tension, retraction and separation of the colo-cutaneous anastomosis. One patient required refashioning 2 months later because the colostomy retracted. One patient requiring refashioning was deemed unfit for further surgery.

Training

Four registrars performed their first colostomy during the period studied and only one was assisted by a consultant. Seventeen colostomies were performed by registrars who had previously fashioned five or fewer colostomies. Only one of these was an elective case and consultants assisted in four (Table 3).

Fifty-eight colostomies (52%) had a score of four or five and were therefore considered acceptable. The management of the remainder was impaired by various complications (Table 4).

Discussion

The long-term impact of a colostomy and the necessity of adequate community support and nursing have been emphasised by Devlin [1] and Eardley [2]. Preoperative counselling and a well-constructed stoma are essential. An unprepared patient inflicted with a difficult colostomy may be overwhelmed by what he perceives as a disaster. This prospective study has attempted to determine the frequency and types of complication, identify areas of inadequacy and suggest recommendations that will result in improved surgical care.

In this study, liaison between stomatherapists and surgeons was not optimal. Many hospitals now have a fulltime stomatherapist and this undoubtedly has increased the standard of care to ostomates [8]. Much of the traditional role of the surgeon has been transferred to the stomatherapists who are generally more available to devote more time to the patient and offer specialist expertise. It remains, however, the responsibility of the surgeon to ensure that patients are counselled by the stomatherapist. If the stomatherapist is consulted promptly, even some patients admitted as an emergency can be seen. When the stomatherapist is not available the surgeon should mark the position of the stoma preoperatively. This is accomplished by sitting, lying and standing the patient and carefully selecting a site within the rectus muscle that avoids the costal margin, the anterior iliac spine, the pubis, the waistline, any previous incision, the umbilicus and skin creases [9]. In obese patients the site should be on a visible protuberance [10]. The finding that colostomies positioned intraoperatively were almost 2 cm closer to the costal margin than stomas sited preoperatively, underlines the importance of preoperative planning. The lack of communication between surgeon and stomatherapist is well illustrated in 9 patients (17% of the 53 patients marked preoperatively) who had their colostomy constructed other than in the predetermined site. In three patients the stomatherapist misinterpreted the operation to be undertaken and in the remaining six patients the surgeon moved the position for no obvious reason. Even a temporary colostomy requires precise siting and surgeons should remember that approximately one third of temporary colostomies are never closed [11, 12].

Although the use of sphincter saving procedures has generally reduced the necessity for abdominoperineal resection, it is noteworthy that the number performed during the year of audit amounted to approximately one third of all resections for rectal carcinoma. The audit also revealed that obstructing

carcinomas were being managed by a temporary colostomy rather than by immediate resection. Colonic trauma contributed 13 colostomies (11.8%) to this series for repair with exteriorisation is not widely employed at this hospital.

The surgeons operating on the patients in this study were at all levels of experience and seniority and had received their training at various institutions. The techniques employed reflected this diversity but no particular technique appeared to offer any advantage. Three aspects are, however, noteworthy. Although stomal stenosis is normally reported to occur at the colocutaneous margin [8], digital examination suggested that early stenosis was more often at the level of the rectus sheath. Six of the seven patients with a tight stoma did not have a cruciate incision of the posterior rectus sheath [13], and this might be of importance. A cruciate incision does not in the short term appear to increase the risk of a parastomal hernia and may prevent stomal tightness requiring dilatation. The use of a subcutaneous polyethylene rod [7] to support a loop colostomy was uncomfortable for the patient, particularly when employed in the upper abdomen and 5 of 18 such rods were associated with significant infection which in one case progressed to necrotising fascitis of the anterior abdominal wall. The use of this type of rod should be abandoned. A short rod placed over the skin does not compromise the fitting of an appliance and is preferable [14]. Oxfibrin rods (Biethium, Ethicon) [15] were used successfully in slim patients, but in obese patients the support they provided was usually inadequate.

The third and most important technical consideration was the presence of tension in 29 of the colostomies. A colostomy under tension can be a catastrophy for both patient and stomatherapist and may require further surgery. Early post operative retraction may result in separation at the colocutaneous margin, peristomal callulitis, infection and the risk of necrotising fasciitis requiring repositioning of the colostomy with wide debridement of the abdominal wall. When the colostomy does retract the seating of the appliance is not satisfactory and faecal spillage across the wound or drain is almost inevitable. Whilst in hospital the stomatherapist can often compensate for technical inadequacies but following discharge, an elderly or handicapped patient may be unable to cope with a problematic stoma alone. Admission to an institution where help is available or a refashioning operation in an elderly unfit patient are to be avoided.

The scoring system has allowed the standard of colostomies fashioned to be assessed. Although it includes a subjective element, it does permit the perfect or near perfect colostomy (score 4 or 5; 52%) to be contrasted with those so poor (score 1 or 2; 6,3%) as to be unmanageable (Table 1). It is salutory to note that 24 patients (22%) had one or more colostomy-related complications other than stoma retraction prior to discharge.

In conclusion this audit has shown that the fashioning of a colostomy carries a significant technical morbidity. A poorly constructed colostomy may precipitate a cascade of complications that can only be arrested by further surgery. The principal findings are as follows: communication between the surgeon and stomatherapist should be closer, adequate mobilization of the colon to prevent retraction of the colostomy is essential, assistants should receive close supervision in their early training and the use of a subcutaneous rod should be abandoned.

This study is the result of successful execution of a prospective surgical audit and we believe that similar audits should improve and maintain standards of surgical care.

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References

1. Devlin HB, Plant JA, Griffen M (1971) Aftermath of surgery for anorectal cancer. Br Med J 3:413–418
2. Eardley A, George D, Davis F, Schofield PF, Wilson MC, Wakefield J, Sellwood RA (1976) Colostomy: the consequences of surgery. Clin Oncol 2:277–283
3. Smit R, Walt AJ (1978) The morbidity and cost of the temporary colostomy. Dis Colon Rectum 21:558–561
4. Abrams BL, Alsikafi FH, Waterman HG (1979) Colostomy: a new look at morbidity and mortality. Am Surg 462–464
5. Green EW (1966) Colostomies and their complications. Surg Gynecol Obstet 122:1230–1232
6. Burns FJ (1970) Complications of colostomy. Dis Colon Rectum 13:448–450
7. Rickett JWS (1969) A new colostomy rod for subcutaneous implantation. Br Med J. 3:466
8. Goligher JC (1984) Surgery of the anus, rectum and colon. 5th ed. Bailliere Tindall, London
9. Franchini A, Cola B, Steven PJd'E (1983) Atlas of stomal pathology. Cortina International, Verona
10. Foulkes B (1981) The practical management of bowel stoma. In: Beckman B (ed) Stoma care. Beaconsfield Publishers, Beaconsfield, pp 58–68
11. Dent DM, Stevens PJd'E (1976) The temporary colostomy. S Afr Med J. 50:809–811
12. Koruth HM, Hunter DC, Krukowski ZH, Matheson NA (1985) Immediate resection in emergency large bowel surgery; a 7 year audit. Br J Surg 72:703–707
13. Hawley PR (1978) Permanent colostomy In: Todd IP (ed) Intestinal stomas. William Heinemann, London pp 1–16
14. Thompson JPS (1982) Caecostomy and colostomy. Clin gastroenterol 1:285–296
15. Simkin EP (1980) Tissue response to Oxfibrin (Biethium) with special reference to use as absorbable colostomy rods. Br J Surg 67:376

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