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Original Research Article

Outcomes following abdominoperineal resection 6 years retrospective study at a rural district general hospital

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ABSTRACT

Background: A range of surgical techniques are used for perineal wound closure following Abdominoperineal Excision of the Rectum (APER). The aim of this study was to assess the safety and effectiveness of using a biological mesh for perineal wound closure and to compare the outcomes following conventional suture and mesh closure of the perineal wound.
Methods: A single-centre retrospective study of a cohort of patients undergoing surgery for low rectal cancer between January 2013 and December 2018. Patient records were analysed for outcomes including perineal complication rates, length of hospital stay and impact of patient factors on complication rates in mesh vs no mesh group.
Results: Of the total 43 patients included in the study, 13 (30%) had a conventional perineal closure whereas 30 patients (70%) had a biological mesh reconstruction. Early perineal wound complications were seen in 21/43 (49%) patients. Of those, 6 (29%) patients were in the no mesh group compared to 15 (71%) patients in the mesh group ($p = 0.81$). 84% of the patients who received neo adjuvant radiotherapy (NART) developed perineal wound infection. There was no statistically significant difference in the mesh and no mesh groups. None of the patient factors, other than preoperative anaemia, had a statistically significant association with the rate of complications in either of the groups.
Conclusions: There was no statistically significant difference in the complication rate between primary and biological mesh closure. Biological mesh is safe for perineal reconstruction following APER.

Keywords: Abdominoperineal excision of the rectum, Biological mesh, Low rectal cancer, Perineal reconstruction

INTRODUCTION

ELAPE was a technique pioneered by Torbjorn Holm at the Karolinska University Hospital in Stockholm, Sweden. ELAPE is aimed to improve the oncological outcomes for low rectal cancers by excising a more extensive cylindrical specimen (without a waist), which reduces tumour involvement of the circumferential resection margin (CRM) and intraoperative tumour perforation. This however results in a large perineal defect.

Reconstruction of the perineum following APER is carried out either by primary closure or by using a biological mesh or local/regional flaps. These include omentoplasty, myocutaneous gracilis flaps, gluteal flaps and rectus abdominis myocutaneous flaps.

Perineal wound complications following APER are a common and significant problem and include wound infection, abscess, dehiscence, delayed healing, and hematoma. These complications result in significant morbidity that often requires prolonged hospital stay and

readmission. Other long-term complications are persistent perineal sinus, incontinence, and perineal herniation. Factors predisposing to perineal wound complications include NART, wound closure under tension and immunosuppressive conditions like diabetes and use of steroids. Other factors include reduced blood supply secondary to anaemia, smoking etc. and the tendency for secondary bacterial infections in that area.

The use of biological mesh has been shown to cause perineal wound infections such as persistent perineal discharge, perineal sinus, and occasional wound breakdown.[1] With this background, the primary aim of this study was to determine the safety and effectiveness of using a biological mesh for perineal wound closure following APER. The secondary aim was to compare the outcomes following conventional perineal wound closure and biological mesh reconstruction of the pelvic floor.

METHODS

This was a single-centre retrospective observational study of a cohort of patients undergoing conventional APER or ELAPE for low rectal cancer at a rural District General Hospital in the United Kingdom between January 2013 and December 2018. Approval of the study was sought from the local clinical governance team. Data was retrieved for 43 patients from a prospectively kept electronic database and patient notes. Impact of the following patient factors on the complication rate was assessed- age, sex, ASA grade, short or long course neo adjuvant chemo-radiotherapy, diabetes, smoking, BMI anaemia (haemoglobin<11), patients on anticoagulants steroids and use of abdominal or perineal drain. Complications were grouped into local and general and were considered as early if they occurred within 30 days of surgery, or late thereafter. Local perineal complications included perineal discharge, wound breakdown, hematoma, superficial and deep perineal abscess, perineal sinus, fistula, hernia, and chronic perineal pain. General complications analysed were abdominal wound infection, adhesions, ileus, stoma related problems, port site and parastomal hernia, pneumonia, urinary retention and erectile dysfunction. Other outcomes analysed were perioperative mortality, length of hospital stay, readmissions, re-interventions and tumour characteristics like TNM staging, number of nodes retrieved, CRM, mesorectal staging, perivascular and perineural invasion. Univariate associations between perineal wound complications and categorical study variables were assessed using chi square test. A p-value of <0.05 was considered significant.

RESULTS

A total of 43 patients were included in the study. Of these, 67% were male, mean age was 71yrs (range 51-86) and the mean BMI was 27 (range 19-38). 58% were ASA 2 Median duration of follow-up was 34 months (range 2-71).

Table 1: Baseline characteristics.

Characteristic		Total (n=43)	No mesh with complications (n)	Mesh with complications (n)	P value
Age (>65)		33 (76.7%)	10	16	0.12
Sex	Male	29 (67.4%)	2	10	0.17
ASA grade	I	2 (5%)	0	2	0.32
	II	25 (58%)	8	11	0.13
	III	16 (37%)	1	10	0.05
	IV	0			
Comorbidity	Diabetes	6 (14%)	2	3	0.65
	Obesity (BMI>30)	15 (34%)	6	7	0.14
	Anaemia	8 (18.6%)	5	3	0.03
	Smokers	6 (14%)	2	2	0.39
	Collagen vascular disease	0			
	Uraemia	2 (4.6%)	1	1	0.56
	Liver disease	0			
Medications	Steroids	1 (2.3%)	1	0	0.13
	Anticoagulants	4 (9.3%)	2	2	0.39
NART	Long course chemo-radiotherapy	28 (65%)	6	16	0.49
	Short course	2 (4.6%)	0	2	0.32
	Previous pelvic irradiation	1 (2.3%)	0	1	0.49
Abdominal drain (no. of days)		31 (72%)	10	15	0.08
Perineal drain (no. of days)		12 (28%)	1	9	0.08

Table 2: Tumour characteristics.

Characteristic		Total (n=43)
T stage	T0	7 (16%)
	T1	8 (18.6%)
	T2	8 (18.6%)
	T3	16 (37%)
	T4	4 (9.3%)
N stage	N0	33 (76%)
	N1	7 (16%)
	N2	3 (6.9%)
	N3	0
Histology of specimen	Mean no. of nodes retrieved	16.5
	Perivascular invasion	7 (16.2%)
	Perineural invasion	3 (6.9%)
	CRM positivity	5 (11.6%)
Mesorectal staging	I	10 (23.2%)
	2	18 (41.8%)
	3	15 (34.8%)

Table 3: Early perineal complications.

Complication	Total (n=43)	No mesh (n=12)	Mesh (n=31)	P value
Discharge	7 (16 %)	2	5	0.96
Wound breakdown	8 (18.6 %)	3	5	0.2
Hematoma	2 (4.6 %)	1	1	0.47
Superficial perineal infection	3 (6.9%)	1	2	0.82
Deep seated abscess	5 (11.6%)	2	3	0.52

Table 4: Late perineal complications.

Complication	Total (n=43)	No mesh (n=12)	Mesh (n=31)	P value
Perineal sinus	2 (4.6%)	0	2	0.36
Perineal fistula	1 (2.3%)	0	1	0.52
Perineal hernia	1 (2.3%)	1	0	0.1
Chronic perineal pain	0			

The tumour characteristics are shown in Table 2. Median post-operative hospital stay was 6 days (range 3-47) and HDU/level 1 stay was 2 days (range 1-25). Open surgery was performed in 12 cases (28%) as against laparoscopic surgery in 31 cases (72%). 13 of the 43 patients (30%) had a conventional perineal closure (no mesh) whereas 30 patients (70%) had a biological mesh reconstruction.

Table 5: Other early complications.

Complication	Total (n=43)
Adhesions	2 (4.6%)
Ileus	8 (18.6%)
Pneumonia	0
Urinary retention	8 (18.6%)
Stoma complications	4 (9.3%)
Urine infection	1 (2.3%)
Abdominal wound infection	2 (4.6%)

Table 6: Other late complications.

Complication	Total (n=43)
Erectile dysfunction	1 (2.3%)
Parastomal hernia	1 (2.3%)
Port site/ incisional hernia	7 (16%)
Other stoma complications	2 (4.6%)

*BMI body mass index, ASA American Society of Anaesthesiologists

1 patient in the open surgery group had an omentoplasty along with mesh reconstruction of the perineum. Of the total 43 patients, 31 had received pre-operative radiotherapy. Of these, 28 (90%) patients had neo adjuvant long course chemoradiotherapy, 2 (6%) had short course radiotherapy and 1 (3%) had received previous pelvic irradiation. A total of 7 out of 13 (53%) patients in no mesh group received neo adjuvant radiotherapy compared to 23 out of 30 (76%) patients in the mesh group. An abdominal drain was placed in 23 (53%) patients and perineal drain in 12 (28%) patients. Perineal drain was kept for a mean duration of 12 days, and abdominal drain for 5 days.

Early perineal wound complications were seen in 21/43 (49%) patients, as shown in table 3. Of those, 6 (29%) patients were in the no mesh group compared to 15 (71%) patients in the mesh group (p=0.81). Late perineal complications were seen in 4/43 patients (Table 4). Other early and late complications have been discussed in table 5 and 6. 1 patient (2.3%) died within 30 days. This was secondary to an infected vascular graft which was inserted due to a thromboembolic event post operatively.

84% of the patients who received NART developed perineal wound infection. There was no statistically significant difference in the mesh and no mesh groups, as shown in the Table 1. None of the patient factors, other than preoperative anaemia have a statistically significant association with the rate of complications in either of the groups. There was no statistical difference in the 30-day readmission rates (15% in no mesh group and 36% in

mesh group) and reintervention rates (23% in both groups)

DISCUSSION

There was no statistically significant difference in the perineal wound complication rate in the mesh and primary closure group in this study. This was in accordance with the multicentre randomized trial (the BIOPEX study) by Musters et al.[2] A high volume retrospective study conducted by El- Gazzaz et al looking at outcomes following primary closure, showed a perineal morbidity rate of 16% compared to 29% in this study.[3] The incidence of wound dehiscence, perineal abscess, sinus, hernia and reintervention rates in the primary closure group in this study were comparable to the study by El-Gazzaz et al., however, the incidence of wound infection was lower in this study (2.3% vs 13.6%).[3] As per the study by Sumrien et al, the use of negative pressure dressing over the perineal wound closed using a biologic mesh may reduce the rate of perineal complications and eliminate the need for a plastic flap reconstruction.[4] Multicentre Randomised Controlled Trial (RCT) by Collin et al proved that the use of local gentamicin-collagen had no effect on perineal complications.[5]

In this study, there was just one case of perineal hernia in the no mesh group. In contrast, rate of perineal hernia at 1 year follow up was significantly less in the mesh group (13% compared to 27% in the no mesh group) in the RCT by Musters et al.[2]

Preoperative chemoradiotherapy has been reported in the literature to be a risk factor for increased perineal morbidity.[1,6] This is a consequence of radiotherapy damaging the normal tissue in the perineum and causing obstructive vasculitis, delaying wound healing. Perineal morbidity was not affected by the use of neoadjuvant short or long course radiotherapy in the mesh and no mesh groups in this study.

No other patient related risk factors other than anaemia were seen to significantly affect perineal morbidity in this study. However, smoking, diabetes and obesity in the study by Wiatrek et al, and radiotherapy in the study by Nakamura et al. were seen to be detrimental to perineal wound healing.[7] In contrast, the high-volume study by Rencuzogullari et al., showed that older age, baseline dyspnoea, smoking and use of muscle flaps were significant risk factors for perineal wound dehiscence.[8]

There is debate about the risk of causing unnecessary morbidity by performing APER and potentially over-treating the patients with complete or near-complete response following neoadjuvant long course chemoradiotherapy (LCCRT) for locally advanced rectal cancer. TRIGGER trial has been ongoing to analyse the long-term feasibility of MRI- directed management options for such patients.[9] There have been encouraging results from the smaller volume study by Gregory et al, with 74.8% disease- free survival in the patients who underwent surveillance following LCCRT.[10] However, until the time that the results from the TRIGGER trial confirm parity between radical APER and local excision, APER with its associated morbidity remains the gold standard for treatment of low rectal cancers.

We did not identify any statistically significant difference in the complication rate between a primary wound closure and biological mesh closure. There was no association between patient factors and perineal complications apart from anaemia. Therefore, the results of this study demonstrate that mesh closure is a safe and effective technique for perineal floor reconstruction following APER but has no added benefit over primary closure.

CONCLUSION

Biological mesh is safe for perineal reconstruction following APER, however, it does not show a benefit over primary closure, instead increases the duration and cost of the surgery Use of negative pressure systems with biological mesh appear to be promising and feasible options for district general hospitals.

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