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Original Research Article

Clinical and oncological outcomes of pelvic exenteration for rectal and gynaecological malignancies

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ABSTRACT

Background: Pelvic exenteration (PE) is radical surgery which offers prospect of cure for patients with locally advanced pelvic malignancy.
Methods: This is a retrospective cohort study evaluating patient outcomes over six-year period at James Cook University Hospital, a tertiary center in United Kingdom. Primary outcome measures included short-term (90 days) mortality and morbidity. Secondary outcome measures were survival and recurrence. Data was analysed by descriptive statistics and Kaplan-Meier curve used for survival estimation.
Results: Out of 68 patients who underwent PE, 88% (n=61) was for primary locally advanced cancer and 10% (n=7) for recurrent cancer. The 31% (n=21) exenterations were for rectal cancer, 68% (n=46) for gynaecological cancer and 1% (n=1) for bladder cancer. Complete (R0) resection was achieved in 86% rectal exenteration versus 68% in gynaecological exenteration (p=0.1459). The overall 90-day mortality rate was 2.9% (n=2). The 19.1% developed major complications (Clavien-Dindo grades 3a-4). The estimated mean overall survival was 55 months (95% CI, 41-71) for rectal versus 44 months (95% CI, 35-53) for gynaecological (p=0.076). At a median follow-up of 19 months, the local and distal recurrence rate for rectal patients after PE was 4.7% and 14.3% respectively. The 41.3% of gynaecological patients developed recurrence and/ or progression of disease.
Conclusions: PE for rectal and gynaecological cancers has low short-term mortality but is associated with high risks of overall complications, most of which were Clavien-Dindo grades <3. The higher recurrence rate observed in the gynaecological cohort is in keeping with the varying intent of the surgery.

Keywords: PE, Patient outcomes, Rectal cancer, Gynaecological cancer

INTRODUCTION

Pelvic exenteration (PE), is recognized as a radical surgical modality for the treatment of locally advanced and recurrent pelvic malignancy, despite its associated mortality and morbidity. It can be defined as en bloc multi-visceral resection of pelvic organs.[1] Since its introduction in 1948 by Brunschwig as a form of palliative surgery for recurrent cervical cancer, it had evolved into complex surgical techniques with the compartmentalization of pelvic anatomy.[2]

PE can be broadly classified based on the extent of resection as follow: total, anterior and posterior PE. Total PE involves resection of distal sigmoid, rectum, anus, bladder, urethra and the respective reproductive organs in males and females. In females, anterior PE include resection of genito-urinary structures and preservation of rectum and anus; posterior PE refers to resection of gastrointestinal and gynaecological structures with preservation of bladder and urethra.[1,3]

The goal of PE, where surgically possible, is to achieve negative resection margin (R0)-an important predictor of

overall survival.[4] However, radical resection comes at a cost of greater morbidity, which had been reported as high as 80%.[5] Many advocate for the centralization of care for patients requiring PE to specialized dedicated centres with collaborative working via the multi-disciplinary team (MDT).[6,7]

Our study aimed to evaluate surgical and oncological outcomes following PE over a six-year period at our tertiary referral centre, where exenterations are performed for colorectal, gynae-oncological and urological cancers.

METHODS

At our tertiary institution, James Cook university hospital (Middlesbrough, United Kingdom), PE is performed for rectal, gynaecological and urological cancers, by the respective teams based on the primary pathology with cross-specialty operating as indicated. For example, total PE for rectal cancer is performed by colorectal surgeon with joint input from urology and plastics team, and PE for gynae-oncological cancer is performed by dual-specialty surgeons (gynae-oncological and colorectal).

This study is a retrospective cohort study, analyzing consecutive exenterations performed between June 2017-August 2023. Sample size calculation was not performed due to the nature of a retrospective study. Consecutive sampling technique was used, beginning from the time where a prospective database was established for patients undergoing PE (June 2017).

Patient electronic records were reviewed to obtain baseline demographics, perioperative outcomes, and long-term morbidities. All patients aged >18 undergoing exenteration due to primary or recurrent malignancy of rectal, gynaecological or urological cancers were included; solitary benign pathology was excluded.

Patients with locally advanced pelvic malignancies undergo pre-operative imaging (staging CT and MRI) and cystoscopy as indicated, prior to discussion at their respective multidisciplinary team (MDT) meetings where decision regarding elective exenterations are recommended.

The primary outcome measures were 90-days mortality and major morbidity, defined as Clavien-Dindo grades 3a-4.[8] Secondary outcome measures were survival and local and distant recurrence during follow-up. Patients are grouped according to their histology specimens obtained at surgery into the following cohorts: rectal, gynaecological and urological cancers.

All data were collected on secure platform hosted on the institution's intranet. Statistical analyses were performed using IBM SPSS statistics version 29. Descriptive statistics were used to report median (interquartile range) for continuous variables and percentages for categorial variables. Comparative analyses were conducted by Chi square test for categorical variables. Kaplan-Meier model was used to estimate survival times. $P<0.05$ is accepted as statistically significant.

This study was registered locally at our institution as part of a quality improvement project in understanding patient outcomes following PE. No ethical approval was required.

RESULTS

Sixty-nine patients underwent PE for pelvic malignancies during the study period-90% females (n=62) and 10% males (n=7) with a median age of 64 (IQR 17, 35-83). One patient was subsequently excluded due to benign post-operative pathology (diverticular disease), leading to a final sample size of sixty-eight (n=68).

Table 1: Baseline demographics of patients undergoing PE, (n=68).

Demographic data	N
Age (median) (in years)	64 (IQR 17, 35-83).
Females	62
Males	7

The types of PE undertaken were total PE (16%, n=11) and posterior PE (84%, n=57). 24% of exenterations also constitute multi-visceral resections. A small proportion (9%) was performed via minimally invasive assisted approach (laparoscopic, n=4 and robotic, n=2).

88% (n=61) underwent PE for primary locally advanced cancer and 10% (n=7) for recurrent cancer. 31% (n=21) exenterations were for rectal cancer, 68% (n=46) for gynaecological cancer and 1% (n=1) for bladder cancer. Complete (R0) resection was achieved in 86% rectal exenteration versus 68% in gynaecological exenteration (p=0.1459).

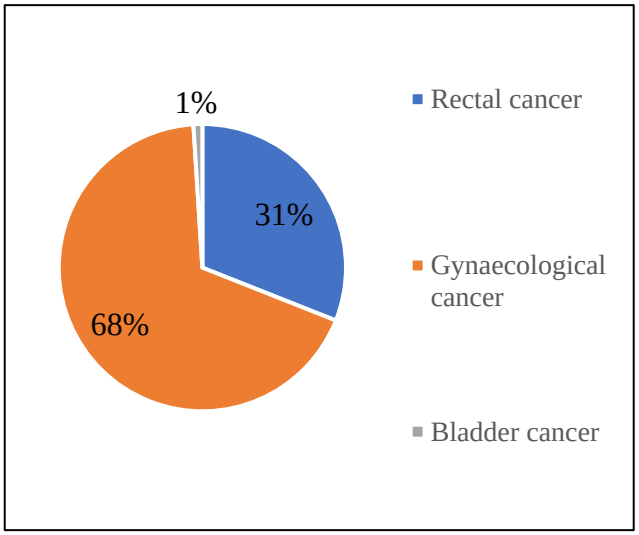

Figure 1: Percentages of PEs performed by cancer type.

Table 2: Histology of PE performed by subspecialty.

Types of cancer by subspecialty	Histopathology	N (%)
Rectal cancer, (n=21)	Rectal adenocarcinoma	21 (30.9)
	Mucinous subtype (n=2), signet ring cell subtype (n=1)	
Gynaecological cancer, (n=46)	Ovarian and fallopian tube carcinoma	27 (39.7)
	High grade serous carcinoma of ovary or tubal origin (n=25), low grade serous carcinoma of ovary (n=1) borderline serous tumour (n=1)	
	Primary peritoneal carcinoma	4 (5.8)
	Endometrial carcinoma	8 (11.8)
	Endometroid adenocarcinoma (n=5), clear cell carcinoma (n=2), leiomyosarcoma (n=1)	
	Cervical adenocarcinoma (n=1)	1 (1.5)
	Vaginal and vulva carcinoma	5 (7.4)
	Vaginal squamous cell carcinoma (n=3), vulva adenosquamous carcinoma (n=1), vulva squamous cell carcinoma (n=1)	
Bladder cancer, (n=1)	Bladder squamous cell carcinoma	1 (1.5)

The median length of stay was 11 days (IQR 12.5, 1-54). Post-operatively, majority of patients required planned admission to higher levels of care consisting of post-anesthetic care unit (14.7%), high dependency (57.4%) and intensive care (14.7%).

Primary outcome measures

The 90-day all-cause mortality rate was 2.9%. One patient died of multiorgan failure secondary to intra-abdominal sepsis, and one patient died of pulmonary sepsis. 58% of patients had at least one post-op complication within 90 days. Majority of events were Clavien-Dindo classification grades 1-2 with 19.1% being major morbidity (Clavien-Dindo grades 3a-4) (Table 4).

Table 3: Clinical outcomes of the patients undergoing PE.

Primary outcome measures	N (%)
90-day mortality	2 (2.9)
90-day morbidity	39 (58)

7.2% (n=5) required a return to theatre for following reasons: abdominal collection, anastomotic leak, ischaemic bowel, colovaginal fistula and flap necrosis. 14.5% (n=10) of patients were re-admitted within 90 days with twelve total episodes of readmissions and median length of re-admission of six days.

Table 4: Overall 90-day morbidity based on Clavien-Dindo classification.[8]

Clavien- Dindo classification	All adverse events within 90-days		
Grade 1 (any deviation from expected) post-operative course	Abdominal collection=5 Atrial fibrillation=2 Acute kidney injury=1 COVID-19=2	Clostridium difficile=2 Fall=1 Hospital acquired pneumonia=6 High-output stoma=1	Ileus=4 Surgical site infection=3 Urinary tract infection=3 VTE=7
Grade 2 (requiring pharmacological therapy)	Ileus requiring TPN=4	Pelvic collection requiring catheter drainage=1	
Grade 3a (Intervention not under general anesthesia)	Abdominal collection-radiological drain=3	Pleural effusion-chest drain=3	Uretero-ileal leak-nephrostomy=1
Grade 3b (Intervention under general anesthesia)	Abdominal collection=1 Anastomotic leak=1	Colovaginal fistula=1 Ischemic bowel=1	Wound dehiscence=1
Grade 4a (single organ support)	Acute kidney injury on continuous veno-venous hemofiltration=1		
Grade 4b (multi-organ support)	N/A		

VTE: venous thromboembolic. TPN: total parenteral nutrition.

Secondary outcome measures

At a median follow-up of 19 months, the overall survival is 60.3%. Estimated overall mean survival is 46 months (95% CI, 38-54) according to Kaplan Meier analysis. Patients with rectal cancer have a longer estimated mean survival of 55 months (95% CI, 41-71), compared to patients with gynaecological cancer whose mean survival was estimated at 44 months (95% CI, 35-53) (Figure 2).

For rectal patients after PE, local and distant recurrence rates was 4.7% (n=1) and 14.3% (n=3) respectively, with a median time of 15 months to distant recurrence. 41.3% of gynecological patients developed recurrence and/ or progression of disease. The sole patient with bladder cancer developed distant recurrence at 7 months post-op.

Table 5: Oncological outcomes of patients undergoing PE, (n=68).

Secondary outcome measures	Variables
Mean survival	
Overall, (n=68)	46 months (95% CI, 38-54)
Rectal cancer, (n=21)	55 months (95% CI, 41-71)
Gynaecological cancer, (n=46)	44 months (95% CI, 35-53)
Recurrence	
Rectal cancer: local recurrence	4.7% (n=1)
Rectal cancer: distant recurrence	14.3% (n=3)
Gynaecological cancer: recurrence	41.3% (n=19)

Mean survival was estimated by Kaplan Meier analysis. N/A: not applicable.

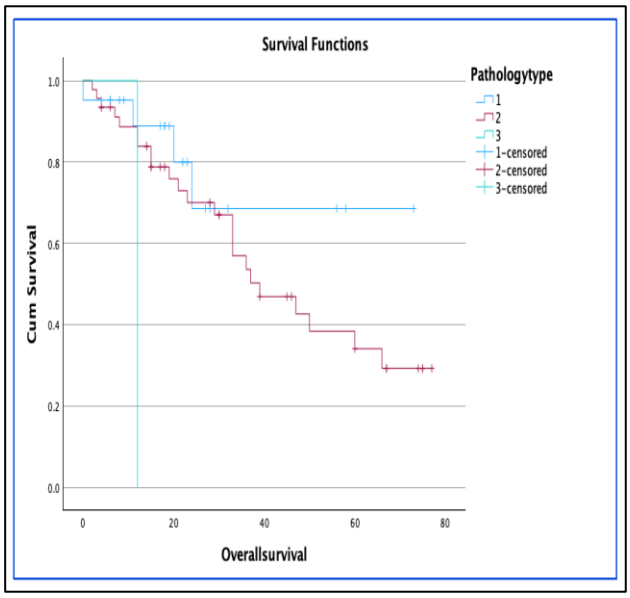

Figure 2: Kaplan Meier survival analysis comparing rectal, gynaecological and urological cohort.
Pathology types: 1=rectal cancer, 2=gynaecological cancer, 3=bladder cancer.

DISCUSSION

Our study examines surgical and oncological outcomes for PE performed during a consecutive period over six years, primarily for colorectal and gynaecological cancers, at our tertiary referral centre. We recognize the importance of multidisciplinary working throughout the patient journey, including but not limited to 1) the pre-operative setting at the cancer MDT meetings, 2) during the surgery with cross-specialties surgeons operating together, and 3) within the post-operative period, with support from intensive care and allied health professionals for rehabilitation.

Our findings demonstrate that while the short-term mortality is low (2.9%) following PE, the post-operative morbidity is high. In our cohort, 58% percent of patients experienced at least one adverse outcome post-operatively, consistent with previously reported literature.[9,10]

However, majority of these adverse outcomes belong in the Clavien-Dindo grades 1 and 2 category. 19.1% patients developed major complications with a surgical re-intervention rate of 7.2%, which compares favourably with other studies.[10-13]

We are unable to undertake meaningful statistical analyses between the subgroups of patients with colorectal cancer and gynaecological cancer in terms of 90-day mortality, major morbidity, and recurrence, due to the small sample within each subgroup. However, we observe that greater proportion of patients with gynaecological cancer developed distant recurrence, which was also observed in Katory et al cohort study.[14] The gynaecological cohort comprised of diverse histology with differing disease patterns.

Complete resection margins (R0) were achieved in majority of patients with rectal cancers (86%) and most of patients with gynaecological cancers (68%). While rectal exenterations are performed with the curative intent of achieving complete resection margin, gynaecological exenterations could also be offered as palliative measure to halt disease progression in disseminated cancer, especially in young and fit women; therefore, the aim in such a palliative context may not be to pursue a radical resection margin. The higher rates of positive resection margin in our gynaecological cohort could be a potential factor in contributing to the greater distant recurrence rate observed in this subgroup.[13]

Many studies had been undertaken to assess factors impacting overall survival and progression-free survival after PE for pelvic malignancy. Positive resection margin, tumour size, pelvic side wall involvement and lymph node metastasis negatively impact overall survival.[4,13,15,16] Resection margin is consistently reported in the literature to be the most important factor in determining outcome and prognosis.[1,17,18]

Prospective analyses and patient-reported outcomes following PE is an area of continued interest.[19,23] Steffens et al, in their prospective cohort study reported that patients had recovered to their pre-operative quality of life (QOL) by six months and QOL remain unchanged among survivors during the five-year follow-up.[21] This highlights the evolution of PE from its inception in 1948, to a safe surgical modality in the treatment of advanced pelvic malignancy, owing to the advancement in oncological therapies, peri-operative care and judicious patient selection with MDT input. However, its associated morbidity cannot be overlooked and the role of clinicians in counselling patients as part of the informed-consent process cannot be understated.

Our study is limited by its small sample size from a single institution, therefore statistical analyses cannot be reliably performed comparing the subgroup of patients for rectal and gynaecological cancer. Furthermore, only a small cohort had completed five-year follow-up; therefore, there is paucity of data in long-term morbidity. Notably, the issue of small sample is not an uncommon limitation for exenteration studies in United Kingdom.[14,24]

CONCLUSION

PE for locally advanced and recurrent pelvic malignancies performed at our institution has low short-term mortality but is associated with high risks of overall complications, most of which Clavien-Dindo grades <3.

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Conflict of interest: None declared
Ethical approval: The study was approved by the Institutional Ethics Committee

REFERENCES

1. Grimes WR, Stratton M. Pelvic Exenteration. In: StatPearls. Treasure Island (FL): StatPearls Publishing; 2023. Available at: http://www.ncbi.nlm.nih.gov/books/NBK563269/. Accessed on 7 January 2024.
2. Brown KGM, Solomon MJ, Koh CE. Pelvic Exenteration Surgery: The Evolution of Radical Surgical Techniques for Advanced and Recurrent Pelvic Malignancy. Dis Colon Rectum. 2017;60(7):745-54.
3. Kontovounisios C, Tekkis P. Locally Advanced Disease and Pelvic Exenterations. Clin Colon Rectal Surg. 2017;30(5):404-14.
4. The PelvEx Collaborative. Factors affecting outcomes following pelvic exenteration for locally recurrent rectal cancer. Br J Surg. 2018;105(6):650-7.
5. Koh CE, Solomon MJ, Brown KG, Austin K, Byrne CM, Lee P, et al. The Evolution of Pelvic Exenteration Practice at a Single Center: Lessons Learned from over 500 Cases. Dis Colon Rectum. 201;60(6):627–3-5.
6. Traeger L, Bedrikovetski S, Oehler MK, Cho J, Wagstaff M, Harbison J, et al. Short-term outcomes following development of a dedicated pelvic exenteration service in a tertiary centre. ANZ J Surg. 2022;92(10):2620-7.
7. PelvEx Collaborative. Minimum standards of pelvic exenterative practice: PelvEx Collaborative guideline. Br J Surg. 2022;109(12):1251-63.
8. Dindo D, Demartines N, Clavien PA. Classification of Surgical Complications. Ann Surg. 2004;240(2):205-13.
9. Pellino G, Biondo S, Codina Cazador A, Enríquez-Navascues JM, Espín-Basany E, Roig-Vila JV, et al. Pelvic exenterations for primary rectal cancer: Analysis from a 10-year national prospective database. World J Gastroenterol. 2018;24(45):5144-53.
10. Platt E, Dovell G, Smolarek S. Systematic review of outcomes following pelvic exenteration for the treatment of primary and recurrent locally advanced rectal cancer. Tech Coloproctol. 2018;22(11):835-45.
11. PelvEx Collaborative. Changing outcomes following pelvic exenteration for locally advanced and recurrent rectal cancer. BJS Open. 2019;3(4):516-20.
12. Lago V, Poveda I, Padilla-Iserte P, Simón-Sanz E, García-Granero Á, Pontones JL, et al. Pelvic exenteration in gynecologic cancer: complications and oncological outcome. Gynecol Surg. 2019;16(1):1.
13. Moolenaar LR, van Rangelrooij LE, van Poelgeest MIE, van Beurden M, van Driel WJ, van Lonkhuijzen LRCW, et al. Clinical outcomes of pelvic exenteration for gynecologic malignancies. Gynecol Oncol. 2023;171:114-20.
14. Katory M, McLean R, Paez E, Kucukmetin A, Naik R. Short-and long-term outcomes following pelvic exenteration for gynae-oncological and colorectal cancers: A 9 year consecutive single-centre cohort study. Int J Surg Lond Engl. 2017;43:38-45.
15. Westin SN, Rallapalli V, Fellman B, Urbauer DL, Pal N, Frumovitz MM, et al. Overall survival after pelvic exenteration for gynecologic malignancy. Gynecol Oncol. 2014;134(3):546-51.
16. Park JY, Choi HJ, Jeong SY, Chung J, Park JK, Park SY. The role of pelvic exenteration and reconstruction for treatment of advanced or recurrent gynecologic malignancies: Analysis of risk factors predicting recurrence and survival. J Surg Oncol. 2007;96(7):560-8.
17. Pleth Nielsen CK, Sørensen MM, Christensen HK, Funder JA. Complications and survival after total pelvic exenteration. Eur J Surg Oncol. 2022;48(6):1362-7.
18. Surgical and Survival Outcomes Following Pelvic Exenteration for Locally Advanced Primary Rectal Cancer: Results from an International Collaboration. Ann Surg. 2019;269(2):315.

19. Radwan RW, Codd RJ, Wright M, Fitzsimmons D, Evans MD, Davies M, et al. Quality-of-life outcomes following pelvic exenteration for primary rectal cancer. Br J Surg. 2015;102(12):1574-80.
20. Young JM, Badgery-Parker T, Masya LM, King M, Koh C, Lynch AC, et al. Quality of life and other patient-reported outcomes following exenteration for pelvic malignancy. Br J Surg. 2014;101(3):277-87.
21. Steffens D, Solomon MJ, Young JM, Koh C, Venchiarutti RL, Lee P, et al. Cohort study of long-term survival and quality of life following pelvic exenteration. BJS Open. 2018;2(5):328-35.
22. Rausa E, Kelly ME, Bonavina L, O'Connell PR, Winter DC. A systematic review examining quality of life following pelvic exenteration for locally advanced and recurrent rectal cancer. Colorectal Dis Off J Assoc Coloproctol G B Irel. 2017;19(5):430-6.
23. Donovan KA, Albizu-Rivera A, Chon HS, Wenham RM. Quality of life and its correlates after pelvic exenteration for gynecologic cancer. J Clin Oncol. 2015;33(29):93.
24. Quyn AJ, Murthy S, Gould L, Said H, Tiernan J, Sagar P, et al. Clinical and oncological outcomes of pelvic exenteration surgery for anal squamous cell carcinoma. Colorectal Dis. 2023;25(11):2131-8.

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