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An analysis of the morbidity associated with abdominal wall resection and reconstruction after cytoreductive surgery and hyperthermic intraperitoneal chemotherapy (CRS/HIPEC)

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ABSTRACT

Purpose: CRS/HIPEC has evolved as an effective method for management of selected patients with peritoneal metastatic disease. Abdominal wall resection (AWR) is often required, and may require complex reconstructions, such as component separation (CST) leading to wound dehiscence (WD) and wound complications (WC). The purpose of our study was to analyse factors contributing to wound complications and wound recurrence (WR).

Methods: Retrospective review of a prospective database of 1074 patients undergoing CRS/HIPEC procedures from 1996 to 2017 at St George Hospital.

Results: AWR and reconstruction for abdominal wall metastases was performed in 197 (18.3%) patients. Tumour types included mesothelioma, appendiceal, colorectal and ovarian cancers. Grade III WC were found in 21 (10.6%). WD was found in 14 (7.1%) compared to 30 (3.4%) in 877 patients without AWR ($p = 0.028$). Midline WR was seen in 26 (13.3%) with AWR and mean time to recurrence of 18 months. Multivariable' regression analysis showed age (OR 1.06, 95%CI 1.01–1.11, $p = 0.022$) and CST (OR 9.63, 95% CI 2.55–36.23, $p = 0.001$) were independent predictors of Grade III WC, and CST (OR 4.19, 95%CI 1.27–13.86, $p = 0.019$) was an independent predictor of WD after AWR. The presence of a higher prior surgical score (PSS) 2–3 (OR 2.74, 95%CI 1.16–6.49, $p = 0.022$) was an independent predictor of midline WR post AWR.

Conclusion: This study demonstrates that patients undergoing AWR have a higher incidence of post-operative WD. CST was associated with an increased incidence of Grade III WC and WD. Patients with a higher PSS were more likely to develop midline wound recurrence.

Introduction

Cytoreductive surgery and heated intraperitoneal chemotherapy (CRS/HIPEC) has evolved as an effective method for the management of selected patients with peritoneal metastatic disease from mesotheliomas, ovarian, colorectal and appendiceal malignancies. In carefully selected patients, it has shown to improve survival and decrease recurrence of peritoneal metastasis [1–8]. The aim of every CRS procedure is to achieve complete cytoreduction (CC) which involves extensive surgical excision of involved organs, peritoneal

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surfaces and abdominal wall resections depending on the extent as well as localization of disease as depicted by the peritoneal carcinomatosis index (PCI) [8,9]. The PCI guides the extent of surgical resection required to achieve CC [10–12].

Most patients referred for CRS/HIPEC have had previous abdominal surgeries with different prior surgical scores (PSS) [13] and a substantial proportion of the patients present with associated abdominal wall morbidities such as incisional hernias, wound infections, wound and port site recurrences [14,15]. This sometimes necessitates extensive abdominal wall resection (AWR) to remove tumour deposits, including excision of the midline laparotomy wound, previous laparoscopy scars compromising the strength of the wound, weakening the abdominal wall, and making closure a challenging task [14]. Additionally, multiple studies have reported that HIPEC decreases local protein production, induces apoptosis, reduces abdominal wall strength and impairs wound healing [15–17]. Furthermore, studies have reported HIPEC to be associated with abdominal wall morbidities such as wound dehiscence (WD), infection, evisceration and other bowel morbidity including anastomotic leak and intra-abdominal abscesses [15,18,19].

To close these abdominal wounds without tension, complex reconstructions with tissue rearrangement flaps are often required including mesh repair and component separation techniques (CST) [14] and may be associated with substantial wound morbidities.

Finally, wound recurrence in open abdominal surgery for colorectal cancer is rare but are generally associated with poor outcomes and is thought to be from tumour seeding or an aggressive disease process with locoregional spread [20]. The data around incidence of wound recurrences after cytoreductive surgery and HIPEC in patients undergoing AWR and reconstructions is poor. This paper aims to discuss the incidence and factors affecting wound complications and wound recurrence in patients undergoing AWR with abdominal wall reconstructions.

Materials and methods

Patient characteristics

A retrospective review of a prospectively maintained database was conducted including 1074 patients with peritoneal carcinomatosis who underwent CRS/HIPEC from 1996 to 2017. Only, patients with full thickness AWR (Rectus sheath and muscle involved by tumour) and/or with midline wound excision were included. Patients with isolated port or drain site excision were excluded. Resection of the abdominal wall muscles and/or midline wound was based on either a suspicion or macroscopic evidence of tumour involvement.

All CRS/HIPEC procedures were performed by the same surgical team and the intraoperative chemotherapy (HIPEC) and Early postoperative chemotherapy (EPIC) agents were selected based on tumour histology. Preoperative disease burden was calculated with imaging and/or laparoscopy, and again noted at time of definitive surgery by calculating PCI. Extensive disease was defined as PCI $\geq$20. Parietal and visceral peritonectomy, bowel and organ resection were performed to achieve complete cytoreduction. The completeness of cytoreduction (CC) was defined as; no residual tumor nodules (CC-0), residual tumour nodules < 2.5 mm (CC-1), $\geq$2.5 mm but $\leq$2.5 cm (CC-2), and >2.5 cm (CC-3). Prior surgical score (PSS) was estimated based on the extent of previous surgical dissection categorized as PSS 3 (heavy) if $\geq$ 5, PSS 2 (moderate) if between 2 and 5, PSS 1(minimal) if 1 abdominopelvic regions were dissected respectively. PSS 0 (none) was defined as no previous surgery, or biopsy by laparoscopy, paracentesis or computed imaging (CT).

The type of abdominal wall reconstructions were grouped as follows: primary, biological and synthetic mesh repair, component separation with or without mesh and the repair of incisional hernias. Primary closure was achieved with continuous polydioxanone (PDS) suture of the fascia. Component separation was achieved by a lateral release through incision of the external aponeurosis to allow for medialization of the rectus sheath. If mesh was used to reinforce the midline, this was mostly used as in an onlay technique with a biological (in cases of severe intraoperative contamination) or synthetic mesh to ensure separation of mesh from abdominal organs.

Wound dehiscence (WD) was defined as dehiscence of the abdominal fascia. Patients were excluded if insufficient evidence of fascial dehiscence (e.g., serous wound exudate production without confirmed fascial dehiscence) was found in the clinical records. Wound complications that required surgical or radiological intervention under local or general anaesthesia (Grade III) and only under general anaesthesia (Grade IIIb) respectively (complications graded according to the Clavien-Dindo's classification) were noted [21]. Wound recurrence was defined as midline incisional wound/umbilical recurrence of tumour. Port or drain site recurrence was excluded and so was recurrence in the anterior abdominal wall where the surgical wound was not involved. The time to recurrence was noted.

The following variables were used to analyse their relationship with the incidence of WD, Grade III wound complications and wound recurrence: Age, gender, histology, length of surgery, blood transfusion requirement, PCI, CC score, PSS, preoperative serum albumin, use of EPIC, evidence of previous incisional hernias and type of abdominal wall reconstruction performed.

Statistical analysis

IBM SPSS v20 statistics program was used for the statistical analysis. Clinically relevant variables were expressed as integers and percentages (mean + range was used for continuous variables). The $\chi 2$ test and Fisher's exact tests were used for categorical variables. Student's *t*-test was used for normally distributed variables whereas the Mann-Whitney U tests was used for non-normally distributed continuous data. Variables with a $p \leq 0.2$ were entered into a step-wise backward elimination multiple logistic regression model to identify risk factors for WD, Grade III wound complications, and wound recurrence. All p-values <0.05 were regarded as statistically significant.

Results

Demographic, clinicopathological and operative variables

Analysis included 197 (18.1%) patients undergoing CRS/HIPEC with full thickness AWR and/or wound excision for abdominal wall metastasis. Tumour types included low and high grade appendiceal mucinous neoplasms, mesothelioma, colorectal and ovarian cancers. Extensive PCI $\geq$20 was found in 45 (22.9%) and CC (0–1) achieved in 192 (97.6%) of the patients with AWR. A high PSS (2–3) was found in 110 (55.8%) patients. Colorectal and high grade appendiceal neoplasms were the primary tumours in 94 (47.7%) and 62 (31.5%) patients respectively. Mean patient follow up was 84.7 months [Table 1].

Surgical variables

Full thickness AWR was performed in 119 (60.4%), midline wound excision in 77 (22.8%) and both in 33 (16.8%) patients. Primary fascial closure was performed in 116 (58.8%), biological mesh repair in 34 (17.3%), synthetic mesh repair in 26 (13.2%) and CST

Table 1
Relevant demographic, clinicopathological and operative characteristics of patients that underwent CRS/HIPEC.

	AWR (197)		No AWR (877)		P Value
Age (years) Mean (range)	53.8 (25–83)		54.7 (15–86)		0.192
Length of surgery (hours) Mean (range)	7.9 (1.9–19)		8.6 (2–24)		0.683
	N	%	N	%	
Gender					
Male	91	46.2	378	43.1	0.62
Female	106	53.8	499	56.9	0.67
Tumour origin site					
Colorectal	94	47.7	248	28.3	0.0003
Low grade Appendix	26	13.2	256	29.2	0.0003
Mesothelioma	11	5.6	87	9.9	0.0812
High grade Appendix	62	31.5	241	27.5	0.40
Ovarian	5	2	45	5.1	0.14
PCI score					
<20	152	77.1	511	58.3	0.02
≥20	45	22.9	366	41.7	< 0.0001
CC score					
CC 0 - 1	192	97.4	829	94.5	0.0006
CC 2 - 3	5	2.6	48	5.5	0.1
Redo CRS/HIPEC	42	21.3	164	18.7	0.49
PSS					
PSS 0 - 1	87	44.2	479	54.6	0.131
PSS 2 - 3	110	55.8	398	45.4	0.12
Preoperative albumin					
< 3.5 g/dl	35	17.8	267	30.4	0.0006
≥ 3.5 g/dl	162	82.2	610	69.6	0.157
Blood transfusion					
Yes	130	66	642	73.2	0.404
No	67	34	235	26.8	0.134
EPIC					
Yes	52	26.4	347	39.6	0.016
No	145	73.6	530	60.4	0.107

CRS/HIPEC Cytoreductive Surgery/Heated Intraperitoneal Chemotherapy, *AWR* Abdominal wall resection, *N* Number, *PCI* Peritoneal Cancer Index, *CC* Cytoreduction score, *PSS* Prior surgical score, *EPIC* Early postoperative intraperitoneal chemotherapy.

with or without mesh repair in 21 (10.6%) patients compared to 841 (95.9%), 10 (1.14%), 17 (1.9%) and 7 (0.79%) respectively in patients without AWR. Fourteen (7.1%) patients had concomitant incisional hernia repair of which 12 patients had mesh repair [Table 2].

Of the 77 patients that had midline wound excision for suspected macroscopic abdominal wall tumour involvement, 30 (38.9%) patients confirmed involvement on histology.

Wound complications and recurrence

Wound complications (Grade III) occurred in 21 (10.6%) of which 14 (7.1%) patients required surgical management under general anaesthesia (Grade IIIb). Patients requiring mesh closure were more likely to develop wound complications, than those undergoing non-mesh closures (18.3% vs. 6.3%, OR 2.88, 95%CI 1.14–7.29, p = 0.025). Furthermore, CST was also a significant risk factor for wound complications (33% vs. 8%, OR 4.19, 95%CI 1.52 to 11.55, p = 0.005).

Wound dehiscence occurred in 8.6% of patients undergoing AWR (n = 17/197) compared to 3.4% patients not requiring AWR (n = 30/877; OR 2.52, 95%CI 1.36–4.66, p = 0.0032). Mesh-assisted reconstruction with or without CST did not significantly reduce the rates of wound dehiscence than those undergoing closure without mesh (11.2% vs. 7.4%, OR 1.57, 95%CI − 0.58 to 4.27, p = 0.369). CST with or without mesh repair was associated with a significantly higher incidence of wound dehiscence compared to those without CST (23.8% vs. 6.8%, OR 1.39, 95%CI 1.12–10.88, p = 0.031).

There was no significant difference in incidence of wound complications in patients with biological compared to synthetic mesh repair (21.6% vs 11.7%, OR 2.06, 95% CI 0.56–7.62, p = 0.274).

Midline wound recurrence after AWR was seen in 26 (13.3%) with a mean time to recurrence of 18 months. Thirteen (50%) out of these 26 patients had colorectal cancer as the tumour type. Mesh assisted repair did not significantly increase the incidence of midline wound recurrence compared to those without mesh (15.4% vs. 18.2%, OR 1.30, 95%CI 0.56–2.98, p = 0.534). Recurrence in the anterior abdominal wall, separate to that of the wound was seen in 14 (7.1%) patients.

Development of incisional hernias postoperatively were seen in 16 (8.2%) patients. Mesh assisted repair did not demonstrate any significant reduction in their incidence compared to those without mesh (11.26% vs. 6.34%, OR 1.77, 95%CI 0.64–4.93, p = 0.271).

Multivariable' regression analysis showed that age (OR 1.06, 95% CI 1.01–1.11, p = 0.022) and CST (OR 9.63, 95%CI 2.55–36.23, p = 0.001) were significant predictors of wound complications, and CST (OR 4.19, 95%CI 1.27–13.86, p = 0.019) was a significant predictor of wound dehiscence. The presence of a PSS 2–3 (OR 2.74, 95%CI 1.16–6.49, p = 0.022) was a significant predictor of midline wound recurrence [Table 3].

Overall and recurrence free survival times were not significantly different between those patients with or without AWR (data not shown).

Table 2
Wound complications (WC) with type of abdominal wall resection (AWR) and repair.

	N (%)	Wound dehiscence (%)	Grade III WC (N)	Wound recurrence (N)	Incisional hernia (N)[a]
No AWR		30 (3.4)	NA	NA	NA
AWR					
Full thickness rectus excision	119 (60.4)	12 (6.1)	13	17	9
Wound excision	45 (22.9)	3 (1.5)	6	5	3
Both	33 (16.7)	2 (1)	1	4	4
Type of Abdominal reconstruction					
Mesh assisted					
Synthetic mesh repair	26 (13.2)	3 (1.5)	3	4	1
Biological mesh repair	34 (17.3)	3 (1.5)	6	7	6
Component Separation + mesh	11 (5.6)	2 (1)	4	0	1
Primary closure					
Primary fascial closure	116 (58.8)	6 (3)	5	15	6
Component Separation	10 (3)	3 (1.5)	3	0	2

[a] Incidence of developing post-operative incisional hernia; NA Data not available.

Table 3
Univariate and Multivariate analysis of wound recurrence, complications and clinicopathological variables.

	Wound Recurrence						Wound Dehiscence						Wound Complications					
	Univariate			Multivariate			Univariate			Multivariate			Univariate			Multivariate		
	OR	95%CI	p	OR	95%CI	p	OR	95%CI	p	OR	95%CI	p	OR	95%CI	p	OR	95%CI	p
Age	1.00	0.967–1.035	0.6				1.02	0.979–1.066	0.166	1.03	0.983–1.078	0.223	1.05	1.006–1.094	0.018	1.06	1.008–1.109	0.022
Blood transfusion	1.03	0.957–1.101	0.508				1.02	0.933–1.109	0.409				1.02	0.941–1.101	0.72			
Length of surgery	1.10	0.943–1.289	0.413				1.12	0.928–1.342	0.177	1.15	0.941–1.396	0.177	1.11	0.933–1.311	0.072	1.14	0.901–1.453	0.27
Tumour origin site																		
Colorectal	1.02	0.400–2.628	0.956				1.23	0.456–3.326	0.679				1.09	0.483–2.483	0.826			
Low grade appendix	1.54	0.482–4.959	0.463				0.41	0.052–3.231	0.398				1.97	0.724–5.370	0.213			
Mesothelioma	1.78	0.367–8.631	0.474				1.97	0.724–5.370	0.233				1.41	0.294–6.742	0.667			
High grade appendix	1.34	0.528–3.398	0.538				0.9	0.306–2.687	0.86				0.52	0.186–1.438	0.207			
Ovarian *																		
Redo CRS/HIPEC	2.27	0.926–5.547	0.118	1.28	0.525–3.098	0.591	1.15	0.355–3.729	0.816				2.01	0.756–5.366	0.155	1.8	0.585–5.511	0.306
PCI>20	1.27	0.497–3.248	0.923				1.46	0.485–4.385	0.5				2.31	0.892–5.992	0.078	1.72	0.465–6.383	0.415
CC score 2-3	4.61	0.733–29.025	0.274				2.75	0.29–26.098	0.359				2.15	0.229–20.189	0.493			
EPIC	1.02	0.400–2.576	0.789				0.35	0.077–1.571	0.152	0.38	0.081–1.787	0.221	0.12	0.016–0.937	0.063	0.29	0.058–1.427	0.127
Pre-operative Albumin	0.84	0.290–2.405	0.86				1.71	0.372–7.828	0.438				0.67	0.227–1.960	0.974			
PSS 2-3	3.87	1.393–10.731	0.006	2.74	1.158–6.487	0.022	1.5	0.532–4.232	0.441				0.86	0.346–2.118	0.736			
Mesh assisted repair	1.80	0.771–4.185	0.597				1.27	0.448–3.617	0.322				1.84	0.730–4.629	0.033	2.66	0.802–8.845	0.11
CST	0.85	0.799–0.905	0.006	0	0	0.998	4.27	1.335–13.661	0.009	4.19	1.265–13.856	0.019	5.79	2.007–16.681	<0.001	9.63	2.553–36.299	0.001
Incisional Hernia#	1.71	0.447–6.509	0.539				1.71	0.353–8.313	0.5				0.58	0.072–4.637	0.602			
Midline wound excision	0.76	0.295–1.975	0.577				0.64	0.215–1.875	0.412				0.81	0.352–1.903	0.625			

OR Odds Ratio, *CI* Confidence Interval, *PCI* Peritoneal Carcinomatosis Index, *CC* Complete cytoreduction, *EPIC* Early postoperative intraperitoneal chemotherapy, *PSS* Prior Surgical score, *CST* Component separation technique, * Nil events, # Concomitant incisional hernia repair.

Discussion

CRS/HIPEC is often associated with extensive AWR to achieve CC and sometimes requires complex reconstructions. This is associated with wound related complications from simple cellulitis or collections to wound dehiscence and are a significant cause of morbidity with a reported incidence of 5–35% in current literature [14,18,22–24]. This study looked at the incidence of and risk factors for major wound complications (Grade 3 and above), wound dehiscence and wound recurrence in patients undergoing AWR and reconstruction after CRS/HIPEC. To our knowledge, this is the first study discussing the factors associated with wound recurrence after CRS.

Wound complications

Our study reported a 10.6% of grade III wound complications, consistent with previous literature [18,23,24]. Our multivariable analysis found age, and CST to be significant, independent predictors of Grade III wound complications, whereby the requirement to perform CST was associated with a 9 times higher likelihood of developing such complications when adjusting for other confounding factors.

Mesh repair

Mesh assisted reconstruction can be performed with biological and/or synthetic mesh and is useful when the host native abdominal fascia is insufficient for closure without tension, when there is a lack of viable tissue, CST is not technically feasible or to reinforce the anterior abdominal wall [15]. Biological mesh offers a viable substitute to the patient's own tissue and is reported to be superior to synthetic meshes when the field is contaminated as they are more resistant to infection, providing a tissue remodelling matrix for host tissue and fibroblasts [15,25,26].

When the types of abdominal wall repair was compared, it was found that patients with mesh assisted repair had a significantly higher rate of wound complications than those without. This pattern is also observed after CRS/HIPEC in studies by Numez et al. and Tzivanakis et al. [14,27–29].

Although sublay technique for mesh repair has been described to be superior to onlay technique with decreased rates of incisional hernia recurrence [30], the latter technique was preferred in our patients for a few reasons. Firstly, a lack of peritoneal layer and frequently lack of posterior rectus sheath after complete cytoreduction did not allow for a retro-rectus placement of mesh. Secondly, given intraoperative contamination and risk of postoperative intrabdominal sepsis, mesh was placed away from the intraperitoneal space. Finally, intrabdominal placement of mesh in patients with metastatic peritoneal disease is associated with tumour recurrence [31]. In our study, mesh repair did not appear to decrease rates of incisional hernia recurrence. This may be multifactorial, related to varying abdominal wall defects, choice of technique, association with CST and patient follow-up.

Component separation technique (CST)

CST is a novel answer to closure of midline with live, active tissues with or without use of additional prosthesis such as mesh. Described by Ramirez in 1990 [32], this technique has undergone modification over the years and has been reported to have lower hernia recurrence rates and restoration of dynamic abdominal wall function in patients with large ventral hernias [27,32–34]. A major issue with this technique is wound related complications owing to a wide undermining of skin flaps [33]. Our study demonstrated that patients who underwent CST, had a more than four time higher incidence of wound complications and wound dehiscence on both

univariate and multivariate analysis.

Selection of technique of abdominal wall closure in these patients needs careful consideration and depends on many factors such as multiple previous repairs, extent of AWR, condition of local tissue, concomitant incisional hernia repair, intrabdominal environment, infected field and patients overall condition including nutritional status [35].

Wound recurrence

Abdominal wall metastasis and wound recurrence is uncommon after laparotomy for colorectal cancer surgery with a reported incidence of 0.8–2.5% [36–39]. This is usually seen in advanced cases with peritoneal metastasis and can present as an asymptomatic finding during surgery or can be discovered during routine follow-up [29,39].

Occurrence of wound recurrences depends on several variables including tumour stage, extent of manipulation during operation as well as the intensity of follow-up [35,38]. There is currently a paucity of data regarding the incidence of wound recurrence after CRS/HIPEC. A study by Tzivanakis et al. of 33 patient undergoing CRS and AWR, found eight (24.2%) patients with abdominal wall recurrence over a mean follow-up period of 48 months, of which seven were associated with extensive intra-abdominal disease; wound recurrence was not separately documented [29].

Our study showed a 13.3% wound recurrence rate. However, it is more than likely that this number is underestimated for several reasons such as lack of symptoms, microscopic recurrence, loss to follow-up and recurrences in other major organs such as lung, liver and bowel or local recurrence can distract most clinicians from wound recurrences. This is supported by the higher incidence of wound recurrences detected post colorectal cancers during autopsy studies when compared with those detected on routine follow-up [36,40].

A study by Numez et al. [14] routinely excised all scars from previous laparotomies and laparoscopies and found 35% of patients with tumour deposits on histology. In our study, only selected patients with imaging or macroscopic suspicion of wound recurrence had previous wounds excised. There was a positive histology in 38.9%. However, wound excision at time of CRS/HIPEC was not a predictor of wound recurrence in our study.

Although it is possible that microscopic tumour deposits in the wound may have been missed, routine midline wound, and port site excision is not without its morbidities. For example, the latter has been shown to be an independent predictor of wound complications [14]. Careful selection of patients and placement of initial ports (for example during diagnostic work-up), that can be later incorporated in the midline incision, have been suggested to prevent wound complications from multiple closures [14]. This could potentially decrease wound recurrences at different sites, however the initial surgery to diagnose peritoneal disease is often performed at other centres prior to referral to our unit, and as such this end goal may be difficult to achieve.

Our study showed that presence of a higher PSS (2–3) was more than twice as likely to predict wound recurrence on univariate and multivariate analysis. This can be explained by findings that the extent of a previous nondefinitive surgical intervention contributes to a poor prognosis in patients with peritoneal carcinomatosis [41]. Disease imbedded in scar because of progression deep to peritoneal surface is difficult to remove by peritonectomy or eradicate by HIPEC. Prior surgeries violate tissue planes and the resultant traumatized surface is an ideal site for cancer cell adherence, vascularization and progression, leading to cell entrapment phenomenon [41].

Wound recurrence has not been addressed in previous studies following wound and port site excision during CRS/HIPEC. Studies post colorectal cancer resection have shown most wound recurrences occur in association with local recurrences contiguous to the operative site or other distant sites of recurrence [40]. Further studies need to aim at detecting not only the incidence, but also the timing of wound recurrence compared to recurrence in other organs post CRS/HIPEC.

Limitations

There are clear limitations to this study. The first are same as those of any retrospective analysis including selection and information biases. Secondly, the impact of pre-operative chemotherapy or bevacizumab on the wound complication rates was not examined. The decision to use EPIC postoperatively was determined by the disease type (mostly low grade appendix cancers) and was used less frequently in patients undergoing CST. Thirdly, missed follow-up appointments may have underreported the true incidence of incisional hernias and wound recurrence. Furthermore, the size of the defects after AWR were not systematically recorded and may have influenced the type of repair and outcomes. Also, systematic data for wound recurrence was not available for the non-AWR group. Excision of midline wound/port sites, type of abdominal wall reconstruction and type of mesh repair was used at the discretion of surgeons and may be confounding factors. This study however, reflects the results of a single, large volume peritonectomy centre although we caution the extrapolation of our findings to other treatment centres.

Conclusion

To our knowledge this is the first study to report on incidence and factors affecting wound recurrence after CRS/HIPEC. A higher PSS is associated with a significantly higher incidence of wound recurrence. Abdominal wall resection is more commonly associated with colorectal and low grade appendiceal cancers, and albeit sometimes necessary, is associated with a significantly higher incidence of wound dehiscence. Although mesh repair and CST are associated with increased rate of wound complications, they are unavoidable in selected patients where primary fascial closure is not possible. A careful selection of patients with strict eligibility criteria, multidisciplinary approach and careful planning of surgical technique needs to be considered to achieve adequate wound clearance whilst reducing post-operative morbidity and improving overall patient outcomes.

Declarations of interest

The authors have no conflicts of interest or financial ties to disclose.

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