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Concurrent umbilical reconstruction during cytoreductive surgery; feasibility, technical approach, and outcomes

Ernest Cheng[1,2], Phillip F Yang[3,4], Steven Khor[3], Jasmine Mui[1] Ruwanthi Wijayawardana[1], Nabila Ansari[3,4], Cherry E. Koh[3,4,6], David L. Morris[1,2], Nima Ahmadi[1,3]

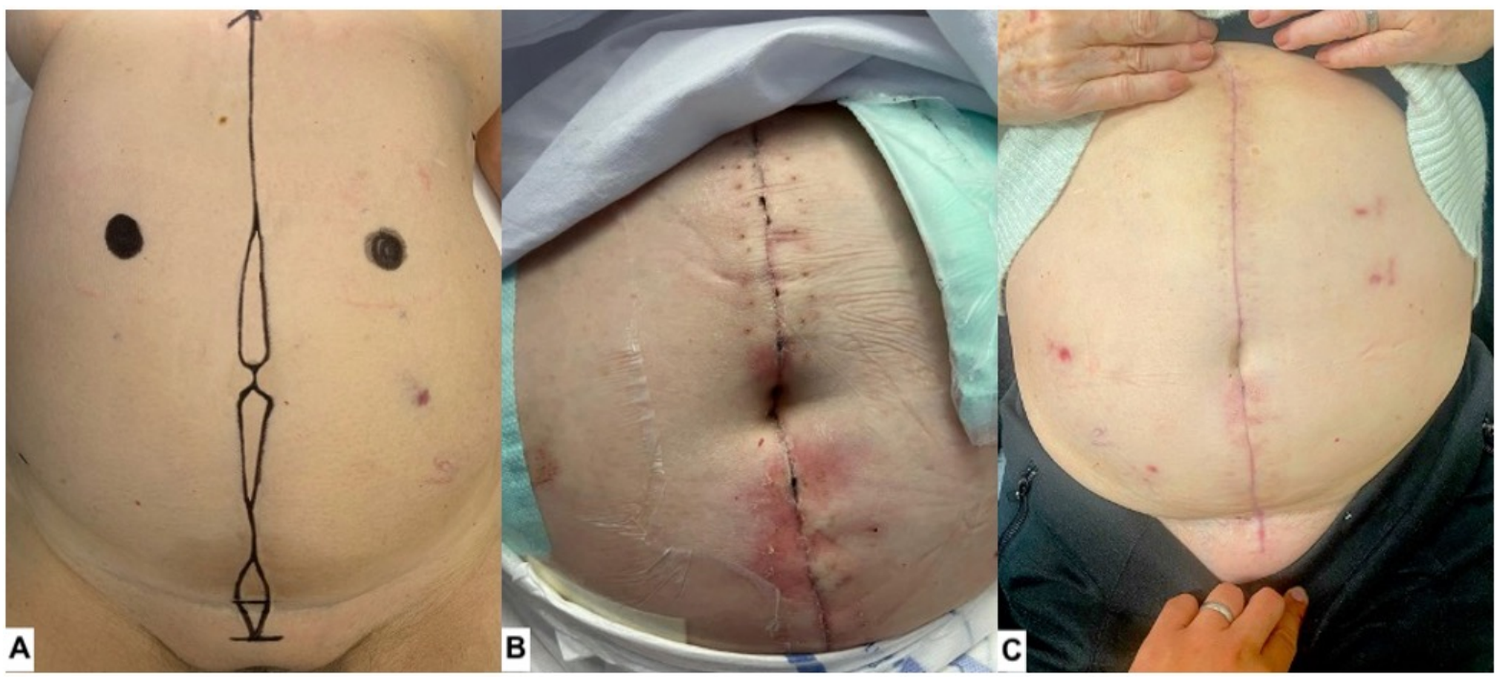
[1]Peritonectomy Department, St George Hospital, Sydney, NSW, Australia, [2]St George & Sutherland Clinical Campuses, University of New South Wales, Sydney, NSW, Australia, [3]Department of Colorectal Surgery, Royal Prince Alfred Hospital, Sydney, NSW, Australia, [4]Central Clinical School, The University of Sydney, Sydney, NSW, Australia

Introduction

- Cytoreductive surgery (CRS) is the mainstay treatment for removal of macroscopic disease in peritoneal malignancies. Complete cytoreduction through extensive disease excision and heated intraperitoneal chemotherapy (HIPEC) has shown improved survival for peritoneal surface malignancies.
- The umbilicus may be excised as part of CRS to ensure all macroscopic disease is removed. However, the umbilicus serves as a noticeable and essential landmark on the abdomen and therefore affects one's overall appearance and body confidence.
- In this pilot study, we evaluate our technique for umbilical reconstruction during CRS and HIPEC by assessing wound complications, cosmesis and patient satisfaction.

Material and methods

- Multi-centre prospective evaluation of patients undergoing CRS and HIPEC January 2021 and December 2023
- Patients were followed up regularly over a 12-month period and had their wound evaluated
- Operative technique is described on the right
- Primary outcome included wound complications
  - Inflammation
  - Dehiscence
  - Superficial and deep wound infections
  - Stenosis
  - Widening at the umbilicus
- Secondary outcome
  - Patient satisfaction



Results

- 30 patients underwent concurrent umbilical reconstruction during CRS and HIPEC using the described technique (Table 1 and 2)
- 9 patients experienced wound related complications (Table 3) Wound complication rate of 30% is consistent with reported 17% – 46% wound complication rate reported in the literature for cytoreduction surgery
- All patients expressed satisfaction with their umbilical reconstruction on follow up, and to date, none of them have sought further revisional surgery for their umbilicus.

Patient characteristics	
Age, mean (SD), y	55.5 (13.0)
Sex	
Male	7 (23)
Female	23 (77)
Origin of primary cancer	
Appendiceal	16 (53)
Colorectal	7 (23)
Other	7 (23)
ASA score	
1	0
2	2 (7)
3	24 (80)
4	4 (13)
BMI, mean (SD), kg/m²	26.4 (4.3)
Pre-operative skin height, mean (SD), mm	24.8 (10.9)
Smoking status	
Current smoker	0
Ex-smoker	2 (7)
Non-smoker	28 (93)
Diabetes, *n* (%)	
Yes	5 (17)
No	25 (83)

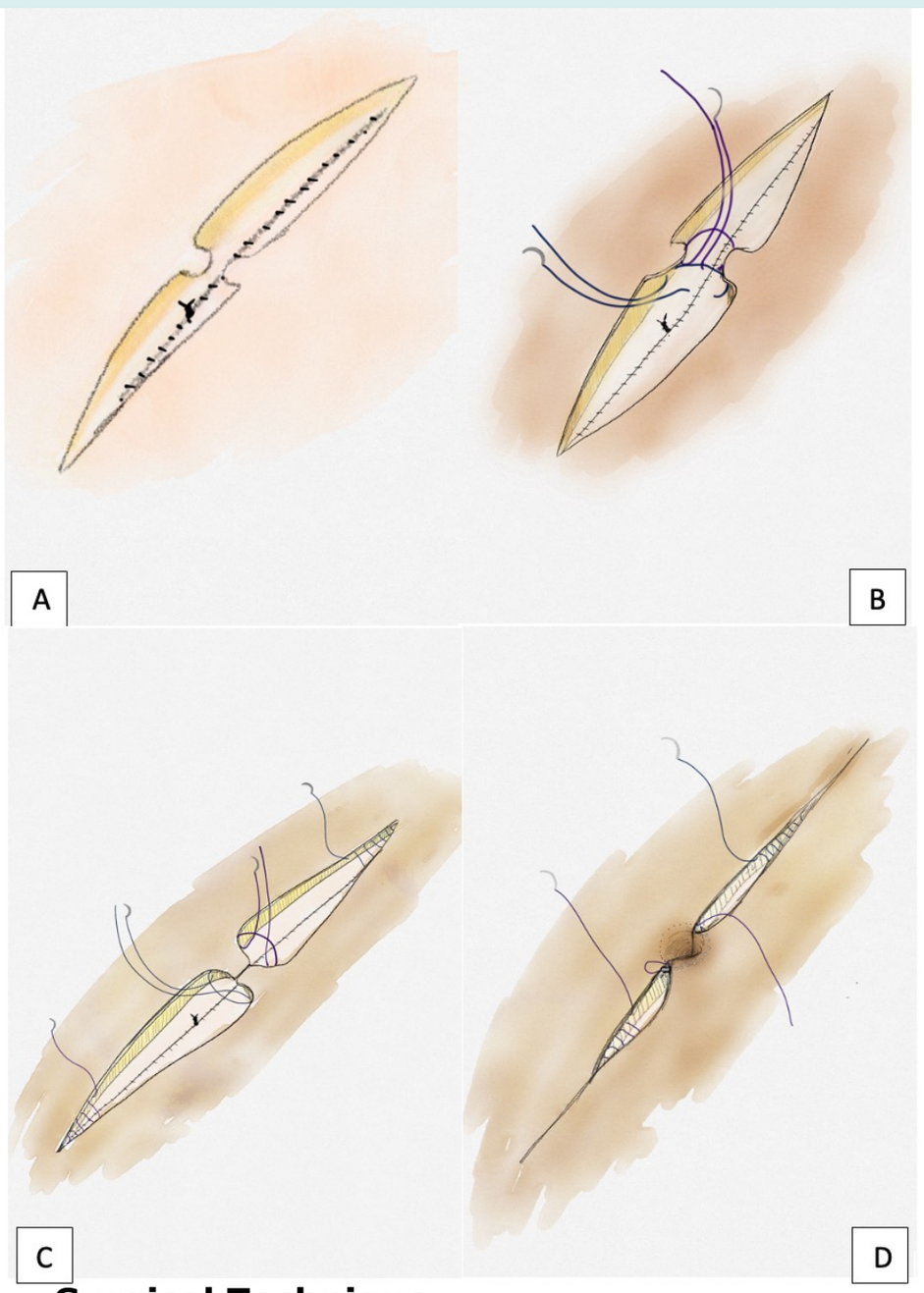
Table 1. Patient characteristics and demographics of recruited patients

Operative characteristics	
PCI score, median (IQR)	15 (5.5–27)
CC score	
0	27 (90)
1	2 (7)
2	1 (3)
Wound classification	
Clean	5 (17)
Clean-contaminated	24 (80)
Contaminated	1 (3)
HIPEC	
None	2 (7)
Mitomycin	23 (77)
Cisplatin	2 (7)
Oxaliplatin	2 (7)
Mitomycin + cisplatin	1 (3)
Use of mesh	3 (10)
Operative time, mean (SD), min	585.7 (140.3)

Table 2. Operative characteristics of those who had umbilical reconstruction with cytoreductive surgery

Conclusion

- Our technique in reconstructing the umbilicus after umbilical excision at time CRS and HIPEC is technically feasible
- We demonstrate no increase in wound complications compared to the literature
- All patients have demonstrated satisfaction with their umbilical reconstruction
- Future studies will need comparison with patients who did not undergo umbilical reconstruction



Surgical Technique

- Elliptical incision including umbilicus and creation of skin flaps for reconstruction **(Figure 1A)**
- Prior to HIPEC, subcutaneous fascial dissection exposing anterior sheath to allow for HIPEC to submerge fascia
- Continuous 1PDS® (polydioxanone) suture to close. Excess subcutaneous fat removed at the semioval flaps.
- 2x 1Vicryl® (polyglactin 910) mattress sutures at cranial and caudal of semioval flaps and fascia. Base of "new" umbilicus anchored **(Figure 1B)**
- 1Vicryl® sutures placed at the cranial and caudal base of the semioval flap on either side allowing skin re-approximation **(Figure 1C)**
- 1Vicryl® suture (48mm needle) passed at skin plane from cranial aspect, removed at the caudal end to create semicircular path. Performed both sides.
- Both sutures are tied slowly to narrow the aperture of the neo-umbilicus for cosmesis **(Figure 1D)**

Patient no.	Age (y)	Sex	BMI (kg/m²)	Skin height (cm)	PCI	Smoking status	Complication
1	62	M	31.2	26	8	Never	Deep SSI
2	69	F	29.5	18	10	Never	Superficial SSI + wound dehiscence
3	53	M	34.9	18	5	Never	Superficial SSI + wound dehiscence
4	46	F	28.3	37	16	Never	Superficial SSI
5	50	F	28.7	17	39	Ex-smoker	Inflammation
6	52	F	23.6	23	26	Ex-smoker	Inflammation + superficial SSI
7	59	F	29.3	28	31	Never	Inflammation
8	30	F	23.6	27	33	Never	Inflammation + superficial SSI
9	75	F	23.3	29	4	Never	Superficial SSI

BMI, body-mass index; PCI, peritoneal cancer index; SSI, surgical site infection
Table 3. Comparison of preoperative characteristics and wound complications

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