

Management of Peritoneal Surface Malignancy



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Pitfalls in the OR

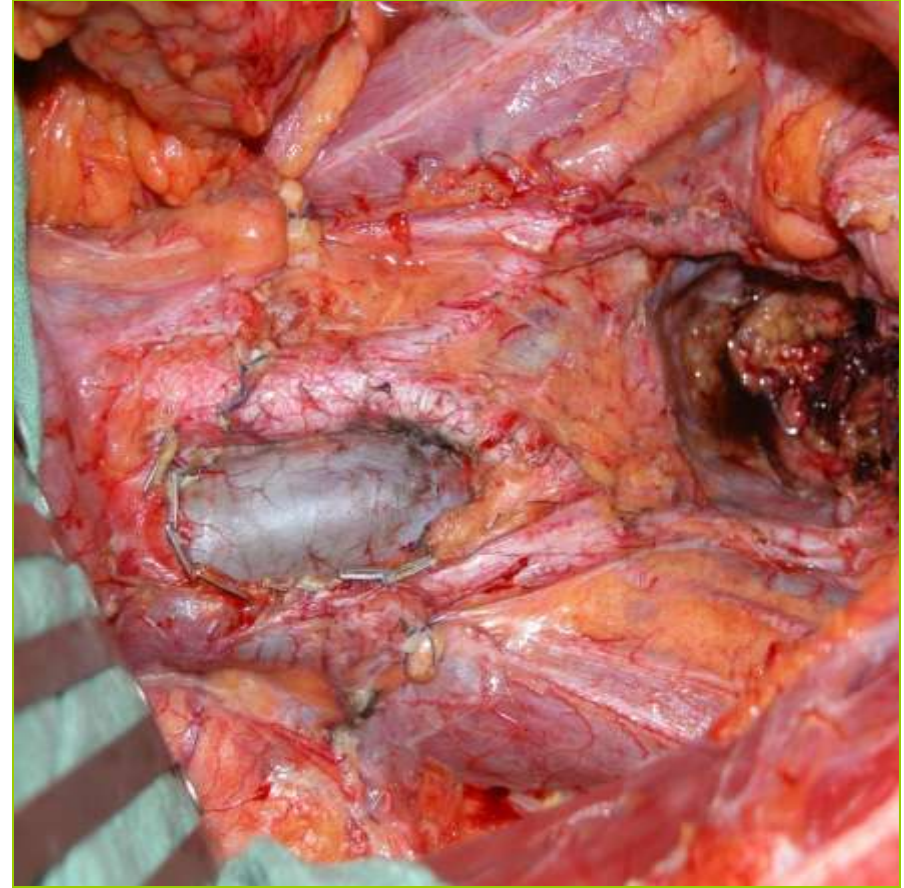
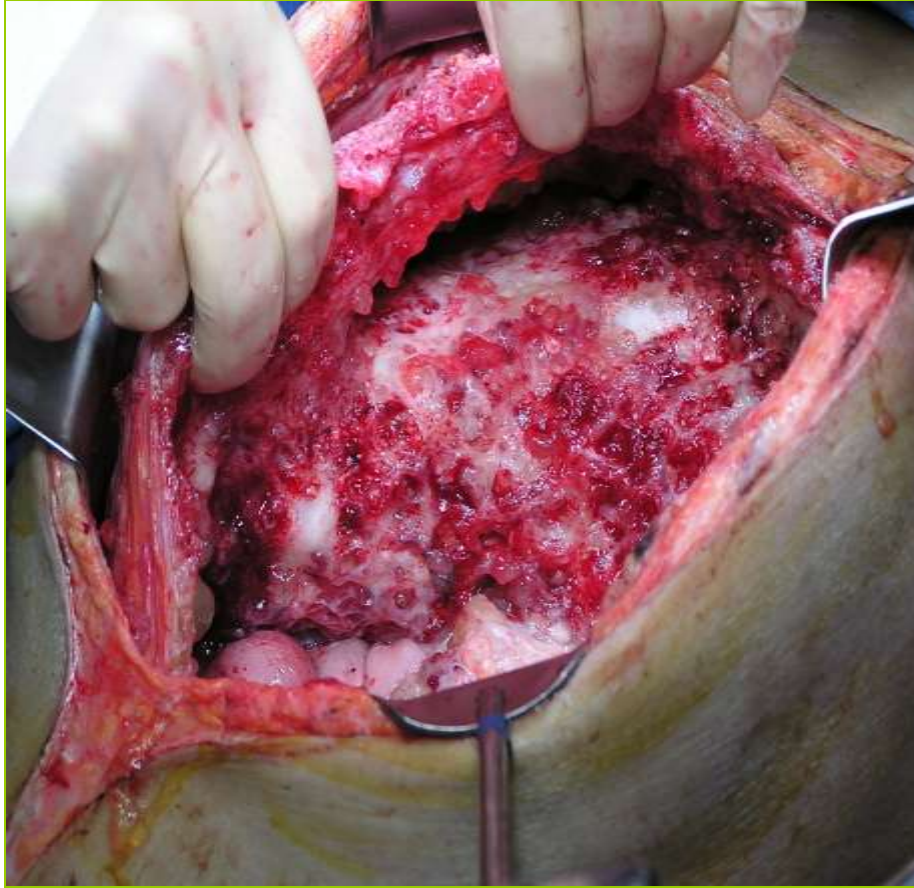
K. Van der Speeten, MD, PhD
Irkutsk, 10/08/17





- The price to be paid : Morbidity & Mortality(and how to avoid)
- Case 1 : positioning
- Case 2 : anesthetic pitfalls
- Case 3 : anastomotic leaks?
- Conclusions

The price to be paid : Morbidity & Mortality



Should the Treatment of Peritoneal Carcinomatosis by
Cytoreductive Surgery and Hyperthermic Intraperitoneal
Chemotherapy Still be Regarded as a Highly Morbid Procedure?

A Systematic Review of Morbidity and Mortality

Terence C. Chua, BScMed (Hons), Tristan D. Yan, BSc (Med), MBBS, PhD, Akshat Javaria, BMedSc,
and David L. Morris, MD, PhD

TABLE 5. Perioperative Factors and Mortality Outcomes of 24 Institutions Following Cytoreductive Surgery and Perioperative Intraperitoneal Chemotherapy

First Author	Mean Length of Hospital Stay (d)	Mean Length of ICU Stay (d)	Treatment Related Deaths (n)	Mortality (%)	Causes
Glehen et al ⁸	11.8	NR	7	3.2	Septic shock, peritonitis, pulmonary embolism, multi-organ failure, aplasia, myocardial necrosis, acute renal failure
Ahmad et al ⁹	11*	NR	0	0	—
Schmidt et al ¹⁰	25*	5*	3	4.5	Peritonitis, pneumonia, sepsis from bone marrow toxicity
Kecmanovic et al ¹¹	14.2	NR	0	0	—
Yonemura et al ¹²	NR	NR	3	2.8	Renal failure, multi-organ failure, and bleeding
Rufian et al ¹³	11*	NR	0	0	—
Kusamura et al ¹⁴	23	3	2	0.9	Duodenal perforation, colic perforation, and sepsis
Sugarbaker et al ¹⁵	21*	NR	7	2	Systemic inflammatory response, fistula, unknown (3), pulmonary embolus, neutropenia
Roviello et al ¹⁶	29	NR	1	1.6	Multiorgan failure
Zanon et al ¹⁷	NR	NR	1	4	Pulmonary embolus
Cavaliere et al ¹⁸	NR	NR	4	3.3	NR
Tuttle et al ¹⁹	9*	NR	0	0	—
Capone et al ²⁰	48*	NR	5	17	NR
Elias et al ²¹	24	NR	4	4	Postinhalation lung infection (3), ischaemic gut
Levine et al ²²	15	2	22	4.4	Wound infection, haematologic toxicity, sepsis, respiratory failure, anastomotic leak, pneumonia, enterocutaneous fistula
Smeenk et al ²³	17*	NR	18	5.8	NR
Kianmanesh et al ²⁴	27	NR	1	2.3	NR
Helm et al ²⁵	11.5	NR	1	6	Pulmonary embolus
Gusani et al ²⁶	12*	3*	2	1.6	Unknown, died of the malignancy
van Leeuwen et al ²⁷	15*	1*	1	1	Cerebral infarction
Di Giorgio et al ²⁸	22	2	2	4	Pulmonary embolus (2)
Harrison et al ²⁹	7	NR	0	0	—
Ceelen et al ³⁰	19*	3*	0	0	—
Morris [†]	31	5	5	2	Sepsis and multiorgan failure (5)
Range	7–48	1–5	0–22	0–17	—
Mean	19	3	3.7	2.9	—

*Refers to median.

†Unpublished data.

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A Systematic Review of Morbidity and Mortality

Terence C. Chou, BScMed (Hons), Tristan D. Yan, BSc (Med), MBBS, PhD, Akshat Saxena, BMedSc,
and David L. Morris, MD, PhD

TABLE 6. Perioperative Morbidity Outcomes of 24 Institutions Following Cytoreductive Surgery and Perioperative Intraperitoneal Chemotherapy

First Author	Combined Major or Grade III/IV Morbidity (%)	Re-Operation (%)	Sepsis (%)	Fistula (%)	Abscess (%)	Hematological Toxicity (%)	Ileus (%)	Renal Insufficiency (%)	Perforation (%)	DVT/PE (%)	Anastomotic Leak (%)
Glehen et al ⁸	25	NR	3	7	7	5	5	1	1	3	NR
Ahmad et al ⁹	26	6	0	9	9	0	2	0	3	3	0
Schmidt et al ¹⁰	NR	22	6	7	7	3	0	2	2	0	9
Kecmanovic et al ¹¹	0	0	0	0	0	11	17	0	0	0	0
Yonemura et al ¹²	NR	NR	—	1	6	—	—	2	2	—	6
Rufian et al ¹³	36	6	0	0	0	0	3	0	3	0	0
Kusamura et al ¹⁴	12	NR	2	1	NR	1	2	NR	3	0.5	8
Sugarbaker et al ¹⁵	14	11	NR	2	1	NR	NR	NR	NR	2	2
Roviello et al ¹⁶	28	8	0	9	3	9	2	3	NR	0	NR
Zanon et al ¹⁷	NR	8	0	0	0	0	0	4	0	0	8
Cavaliere et al ¹⁸	23	NR	NR	NR	NR	20	NR	NR	5	NR	3
Tuttle et al ¹⁹	NR	0	0	11	11	0	0	0	0	9	0
Capone et al ²⁰	27	NR	NR	NR	17	NR	10	7	10	NR	7
Elias et al ²¹	52	23	NR	23	8	11	86	3	0	NR	0
Levine et al ²²	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Smeenk et al ²³	51	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Kianmanesh et al ²⁴	NR	5	NR	9	14	NR	14	7	NR	NR	NR
Helm et al ²⁵	NR	22	11	6	6	28	0	0	0	6	0
Gusani et al ²⁶	30	NR	4	2	4	NR	NR	NR	0	2	7
van Leeuwen et al ²⁷	43	18	8	5	9	7	2	0	3	2	4
Di Giorgio et al ²⁸	26	13	0	9	0	0	0	0	0	2	0
Harrison et al ²⁹	NR	NR	0	0	5	0	10	0	0	0	5
Coelen et al ³⁰	24	10	0	0	0	0	0	0	4	0	4
Morris*	43	16	14	13	37	0	8	1	5	3	NR
Range	0–52	0–23	0–14	0–23	0–37	0–28	0–86	0–7	0–10	0–9	0–9
Mean	28.8	11.2	3	5.7	7.2	5.6	9.5	1.7	2.2	1.9	3.5

*Unpublished data.

Surgery complications *versus* HIPEC complications

- Combined multi-organ resections
- Peritonectomy-procedures



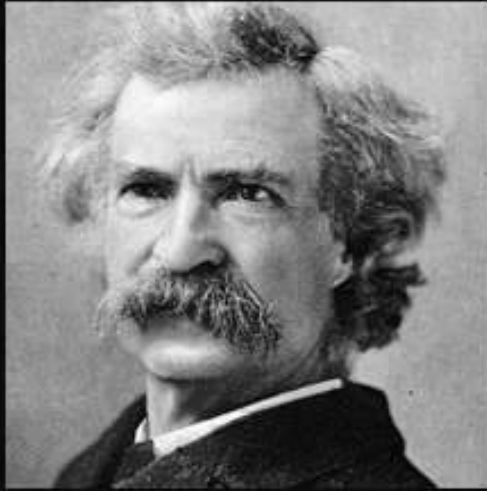
Treatment of
MACROSCOPIC
disease

- Intraperitoneal Chemotherapy



Treatment of
MICROSCOPIC
disease

‘ It’s not what the surgeon removes that kills the patients, but what he leaves behind ‘

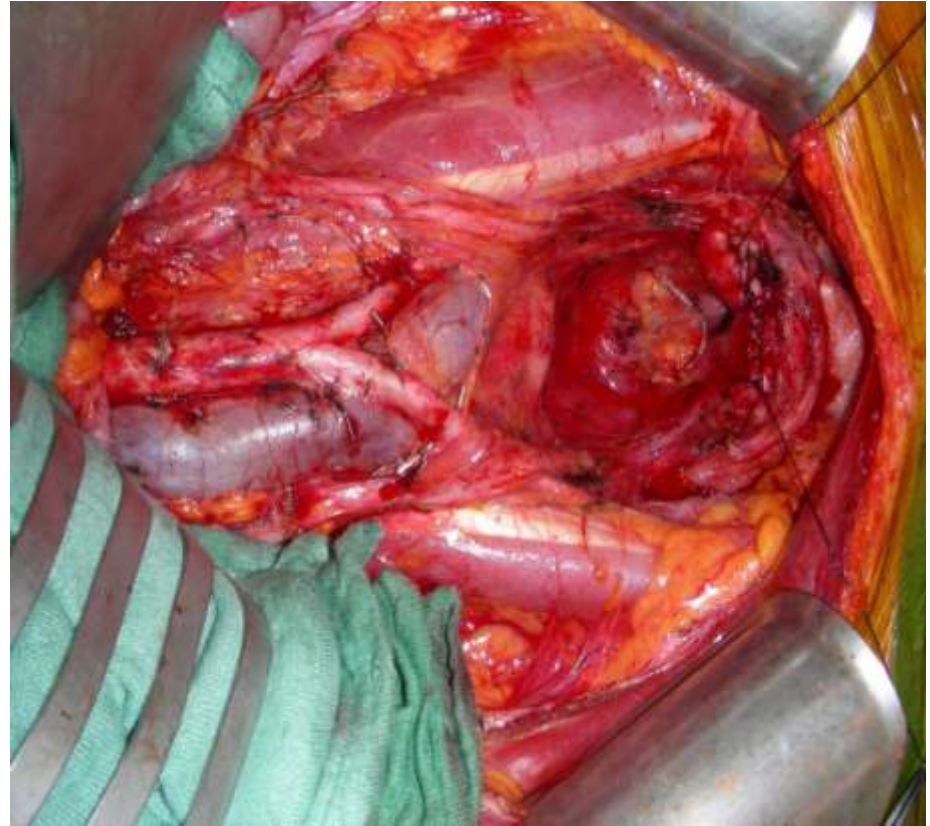


Good decisions come from
experience. Experience comes
from making bad decisions.

~ Mark Twain

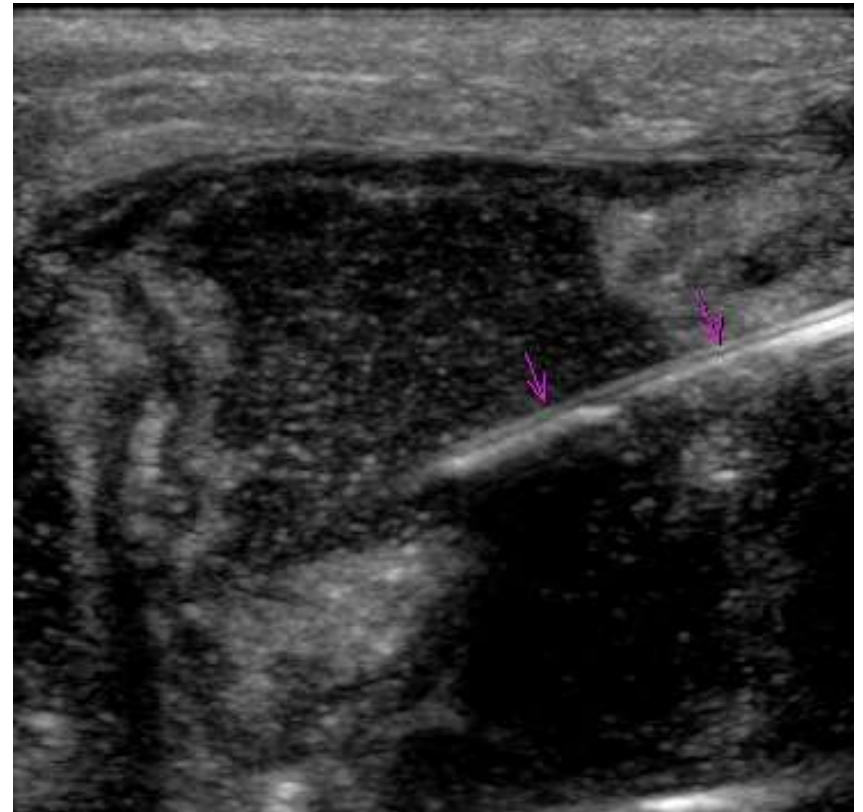
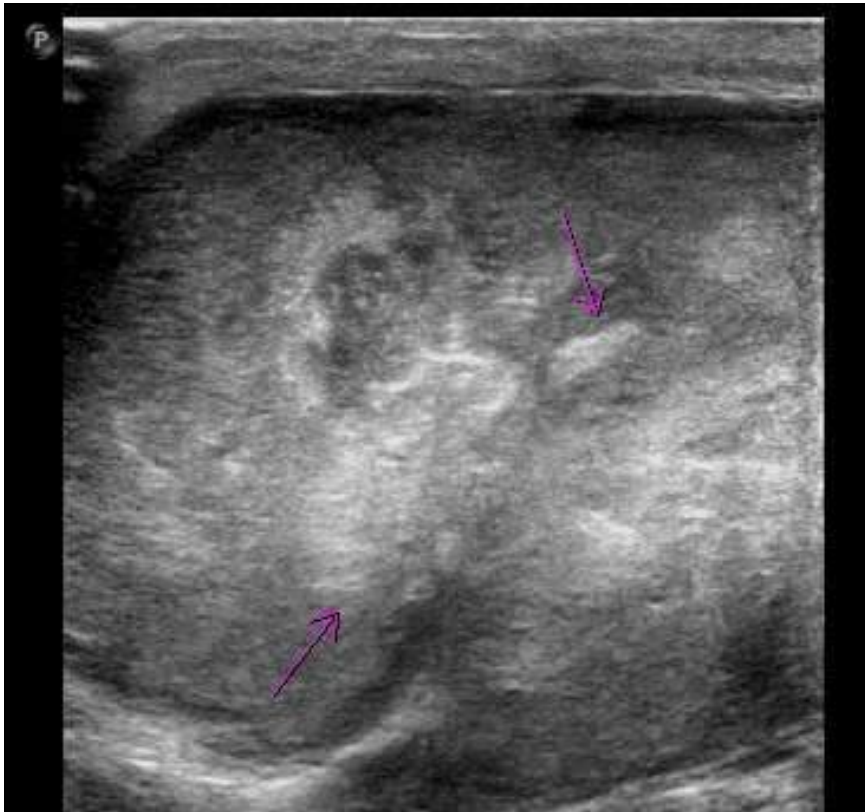
Positioning

CASE I



AVC, 54 yrs, ovarian PC, OVHIPEC Trial protocol, CC0 cytoreduction
Day 1 postop : pain ++ in both legs (calves)
Day 2 postop : acute renal failure (on the brink of needing dialysis)

CASE I

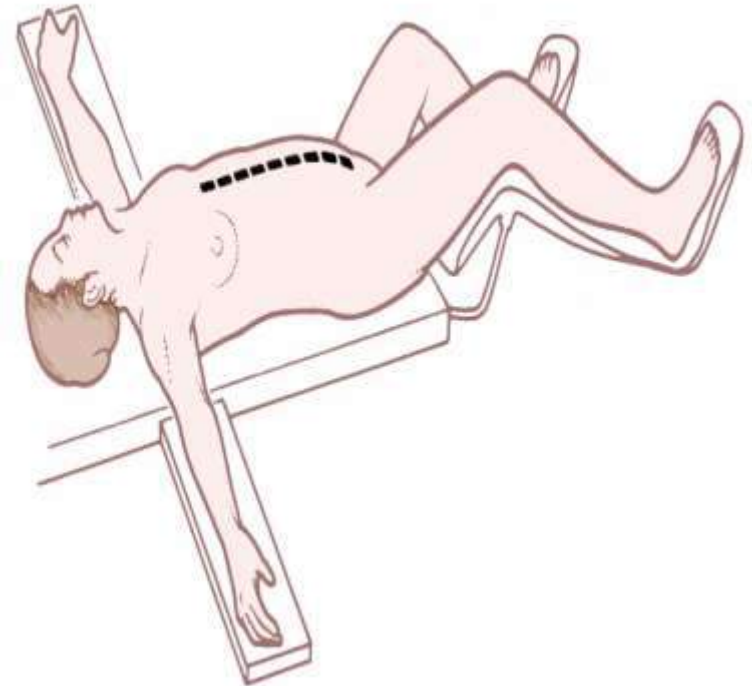


Rhabdomyolysis after Cytoreductive Surgery and Hyperthermic Intraperitoneal Chemotherapy: A Case Report

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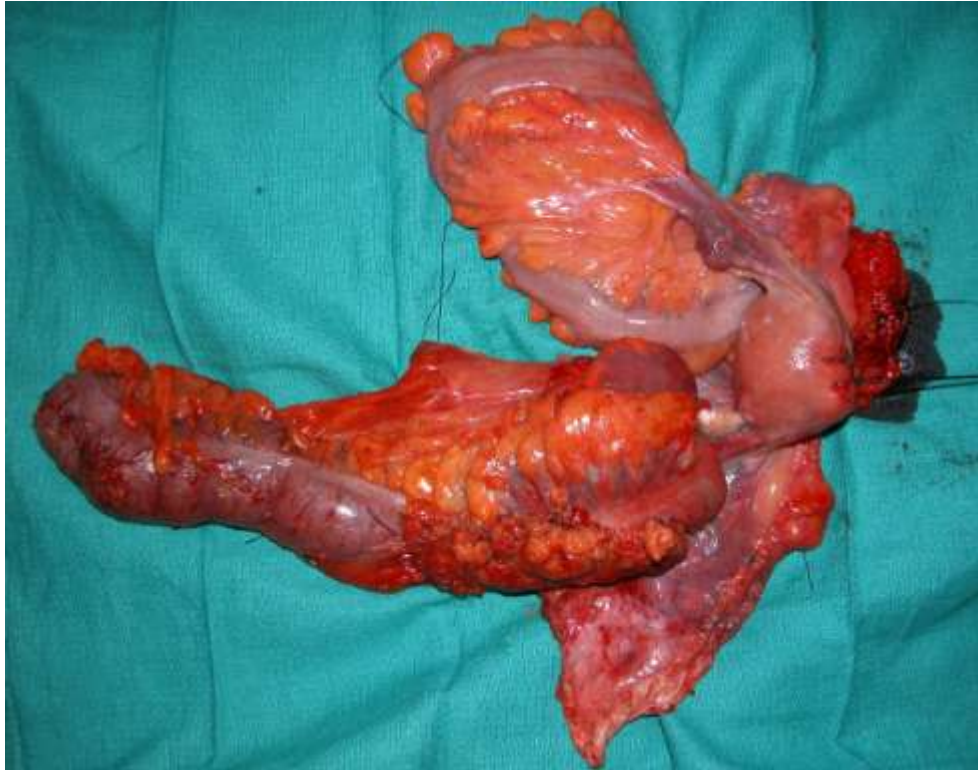
CASE I



- Do the positioning yourself
- Modified 'modified' lithotomy position
- Regular pausing of the pneumatic compression stockings

Anesthetic pitfalls

CASE II



KR, female, 58 yrs, colon PC , PCI 11, CC-0

During HIPEC (oxaliplatin 400 mg/m² in dextrose based carrier) : sudden VT..... VFib

CASE II

SEVERE HYPONATREMIA, HYPERGLYCEMIA, AND HYPERLACTATEMIA ARE ASSOCIATED WITH INTRAOPERATIVE HYPERTHERMIC INTRAPERITONEAL CHEMOPERFUSION WITH OXALIPLATIN

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Martin Vanackere,¹ Piet Pattyn,² and Eric Mortier⁴

*Departments of Cardiac Surgery,¹ Abdominal Surgery,² Central Laboratory,³ and
Anaesthesia,⁴ University Hospital Ghent, Ghent, Belgium*

CASE REPORT

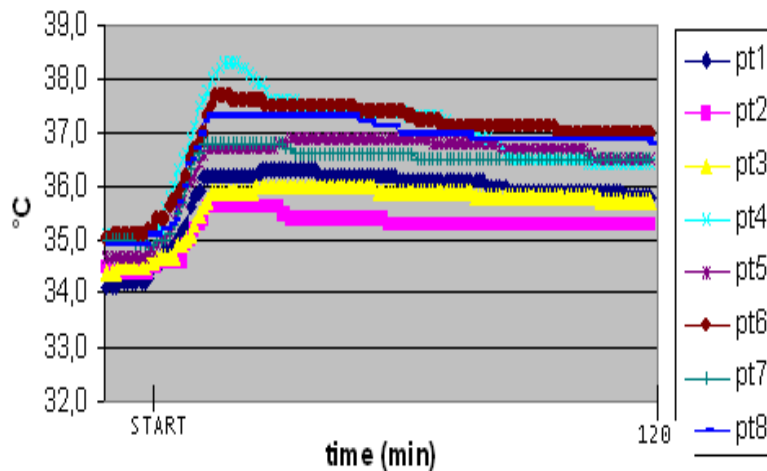
Ventricular tachycardia during hyperthermic intraperitoneal chemotherapy

C. A. Thix,¹ I. Königsrainer,² R. Kind,³ P. Wied¹ and T. H. Schroeder¹

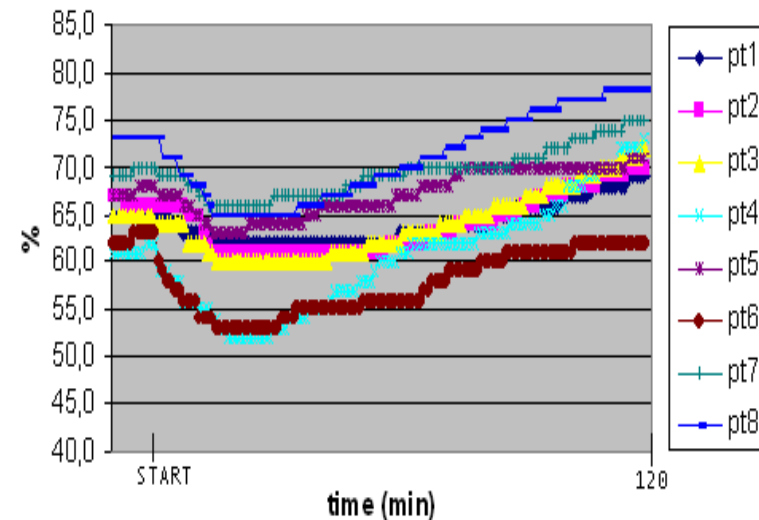
1 Department of Anaesthesiology and Critical Care Medicine, 2 Department of General, Visceral, and Transplantation Surgery, 3 Maquet Cardiovascular at the Department of Cardiothoracic and Vascular Surgery, Tuebingen University Hospital, Tuebingen, Germany

MONITORING OF BRAIN OXYGENATION DURING HYPERTHERMIC INTRAPERITONEAL CHEMOTHERAPY (HIPEC) PROCEDURES

body core temperature before/during and after
HIPEC procedure



SctO2 before/during and after HIPEC procedure



CONCLUSIONS

This is the preliminary report on non-invasive, absolute cerebral oxygenation monitoring during HIPEC procedures, where rapid increase in body temperature may be induced. These rapid increases in body temperature may result in mismatches in cerebral perfusion to cerebral metabolism ratio, possible inducing inadequacy of cerebral perfusion. However, more data are required to elucidate the relationship between rapid increases in body temperature and adequacy of cerebral perfusion, as monitored by cerebral oximetry.

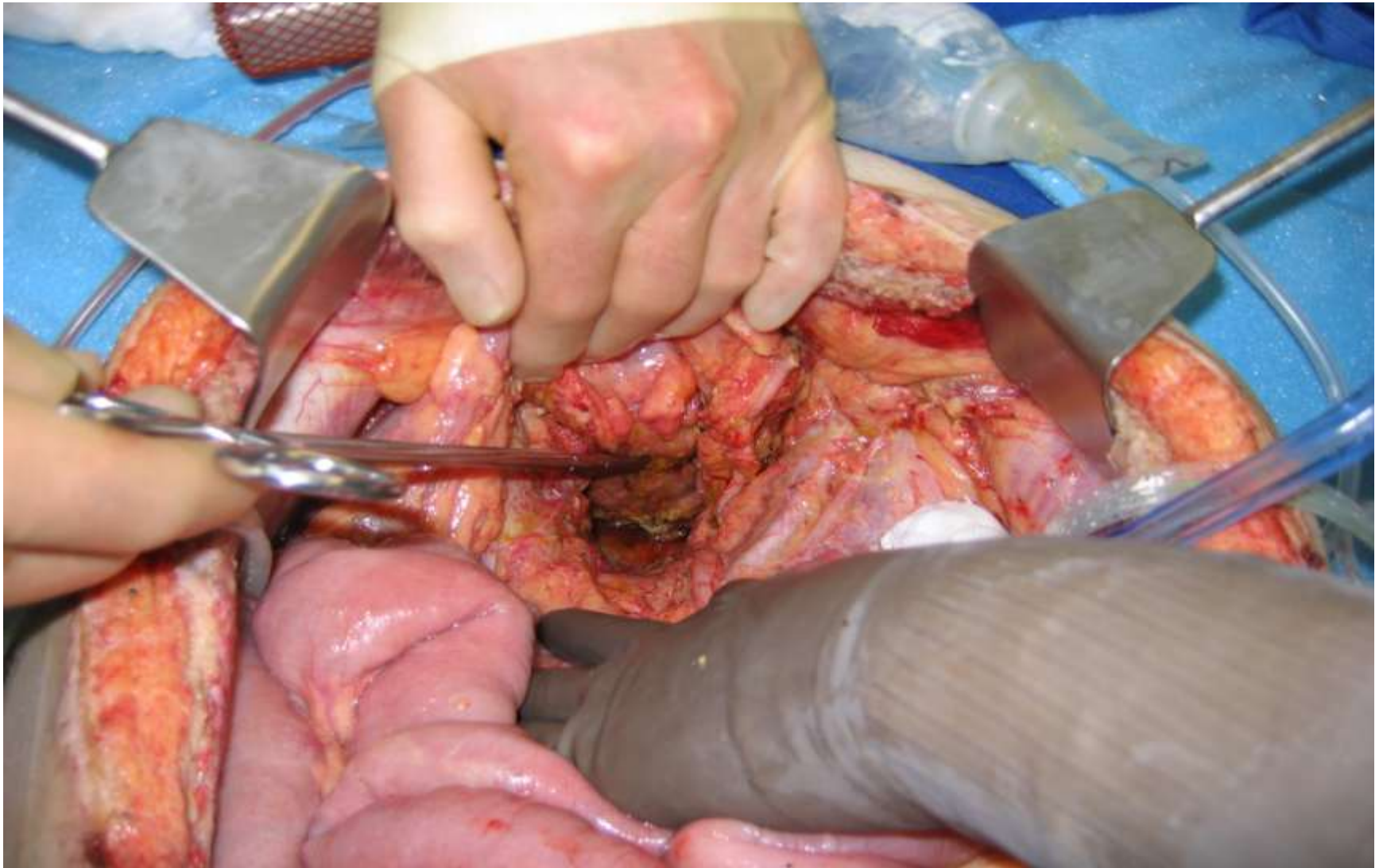
CASE II



- proper training of anesthesiologists is mandatory
- Train the whole team !!!

Anastomotic Leaks

CASE III



CASE III

Hyperthermic intraperitoneal chemoperfusion (HIPEC) decrease wound strength of colonic anastomosis in a rat model

J. O. W. Pelz • J. Doerfer • M. Decker • A. Dimmler •
W. Hohenberger • T. Meyer

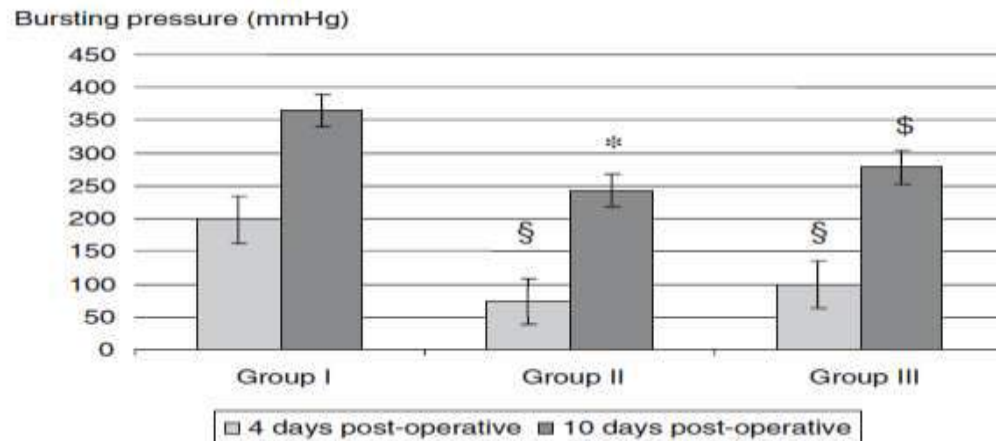


Fig. 1 Anastomotic strength post-operatively. The median are given for bursting pressure. (Group I: control without treatment; group II: anastomosis was performed before HIPEC; group III: anastomosis was performed before HIPEC) (\$: group III vs group I, $p=0.028$; *: group II vs group I, $p=0.03$; \$: group II and group III vs group I, $p=0.24$; Kruskal–Wallis)

CASE III

Cytoreductive Procedures—Strategies to Reduce Postoperative Morbidity and Management of Surgical Complications With Special Emphasis on Anastomotic Leaks

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TABLE III. Synopsis of Treatment Options of Anastomotic Leaks After Multivisceral Resections in Peritonectomy and HIPEC

Anastomotic leak	1st treatment option	2nd treatment option
Esophago-jejunostomy	Conservatively; interventional therapy of subphrenic abscess	Resection of the anastomosis
Gastro-jejunostomy	Resection and new anastomosis	Oversewing
Duodenal stump	Oversewing, Rouy-en-Y anastomosis	Interventional therapy
Small bowel	Resection and new anastomosis	Fistula development
Colon anastomosis	Diversion operation	Resection and new anastomosis, eventually percutaneous drainage
Rectal anastomosis	Diversion operation	New anastomosis percutaneous/transabdominal drainage VAC therapy

- **Protect all low rectal anastomoses**
- **More than 2 anastomoses: protect**
- **Aggressive treatment of all leakage**

M & M

Learning curve

Learning Curve in Cytoreductive Surgery and Hyperthermic Intraperitoneal Chemotherapy

BIJAN N. MORADI III, MS AND JESUS ESQUIVEL, MD, FACS*
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TABLE I. Overview of Studies Done on the Learning Curve of CRS With PIC

Refs.	Study design	Comparison groups, year range, number of patients (n)	Factors analyzed	Number of surgeons (n)	Same surgical team	Conclusions, learning curve?
Smeenk et al. [3]	Retrospective	Group 1 = 1996–1998 (n = 73); Group 2 = 1999–2002 (n = 121); Group 3 = 2003–2006 (n = 129)	Number of abdominal regions affected, Simplified Peritoneal Cancer Index Score, completeness of cytoreduction, morbidity, duration of hospital stay, and survival	2	Yes	Yes, the zenith of the curve being reached after 130 procedures and reflecting patient selection and treatment expertise
Yan et al. [6]	Retrospective	Group 1 = 1997–2004 (n = 70); Group 2 = 2004–2006 (n = 70)	Perioperative morbidity, delayed morbidity, perioperative mortality, transfusion requirement, length of operation, length of hospital stay, and 2-year survival	1	Yes	Yes, it is improved after 70 cases and addresses that there is a need for concentration of services
Cavaliere et al. [8]	Retrospective	n = 37	Completeness of cytoreduction, length of surgery, and 2-year survival	2	Yes	Yes, the zenith occurs after 19 months of conducting CRS with HIPEC
Moran [7]	Retrospective	Group 1 = 1994–2000 (n = 33); Group 2 = 2000–2002 (n = 33); Group 3 = 2002–2002 (n = 34)	Completeness of cytoreduction, major morbidity, and perioperative mortality	1	Yes	Yes, main components are decision-making and technical factors. Can be reduced by team work and two surgeons

CRS, cytoreductive surgery; PIC, perioperative intraperitoneal chemotherapy; HIPEC, hyperthermic intraperitoneal chemotherapy.

▪ Don't reinvent the wheel; 'surf' on the global learning curve

CONCLUSIONS

- CRS and HIPEC is associated with a considerable M&M
- M&M is correlated mostly with the extent of the CRS
- Positioning
- Anesthetic pitfalls
- Increased incidence of leaks (and their consequences)
- Shortcut your learning curve !! (mentoring, learn from the 'experts')



Every pilot (= surgeon) starts with a bag full of luck and a bag empty of experience. The trick is to fill the second bag before the first bag is empty