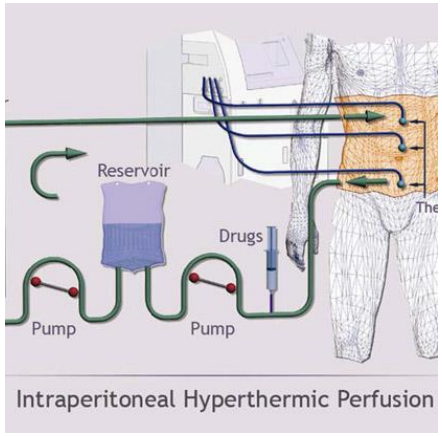
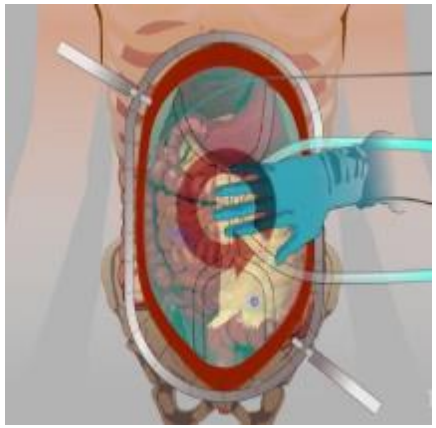
GESTIONE ANESTESIOLOGICA DEL PAZIENTE DA SOTTOPORRE A HIPEC

DOTT.SSA FALETTI – DOTT.SSA VENTURINI
DOTT. LORUSSO – DOTT.SSA TRAPASSO

1.

LA PROCEDURA CHIRURGICA





GESTIONE ANESTESIOLOGICA DEL PAZIENTE DA SOTTOPORRE A HIPEC

HIPEC

(CHEMIOTERAPIA IPERTERMICA INTRAPERITONEALE)

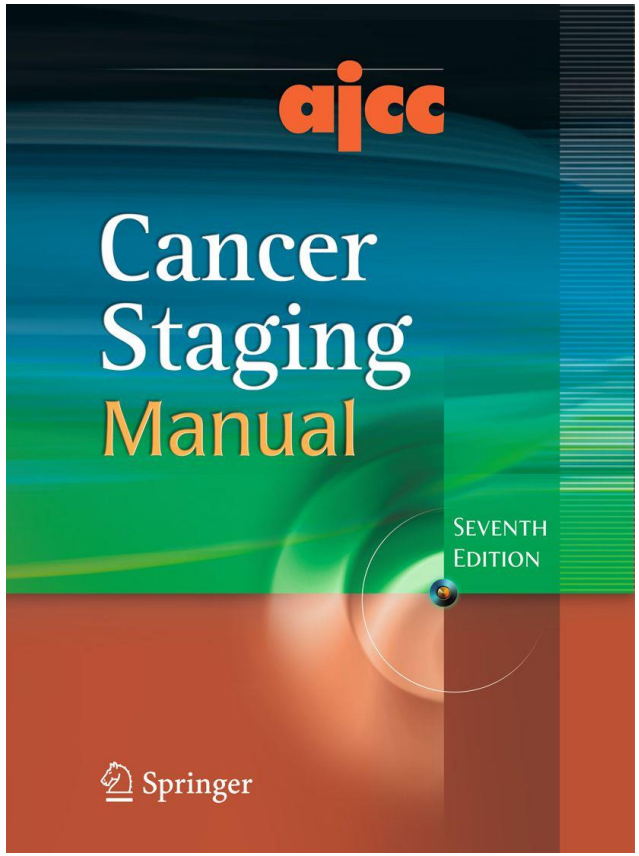
L'associazione

CHIRURGIA CITORIDUTTIVA (DEBULKING)

+

CHEMIOTERAPIA IPERTERMICA INTRAPERITONEALE

è stata sviluppata negli ultimi anni come alternativa di trattamento per pazienti selezionati con neoplasie che coinvolgono la superficie peritoneale.



HIPEC

(CHEMIOTERAPIA IPERTERMICA INTRAPERITONEALE)

Nelle neoplasie colo-rettali con carcinosi peritoneale: aumento della sopravvivenza di 16-24 mesi e del tasso di sopravvivenza libera da malattia a 5 anni (30-45%).

Il VI Workshop Internazionale sulle neoplasie della superficie peritoneale ha definito che la chirurgia citoriduttiva in associazione ad HIPEC è il **trattamento standard della carcinosi peritoneale** in pazienti e centri selezionati.

Trattamento della carcinosi peritoneale mediante citoriduzione chirurgica e chemioipertermia intraperitoneale

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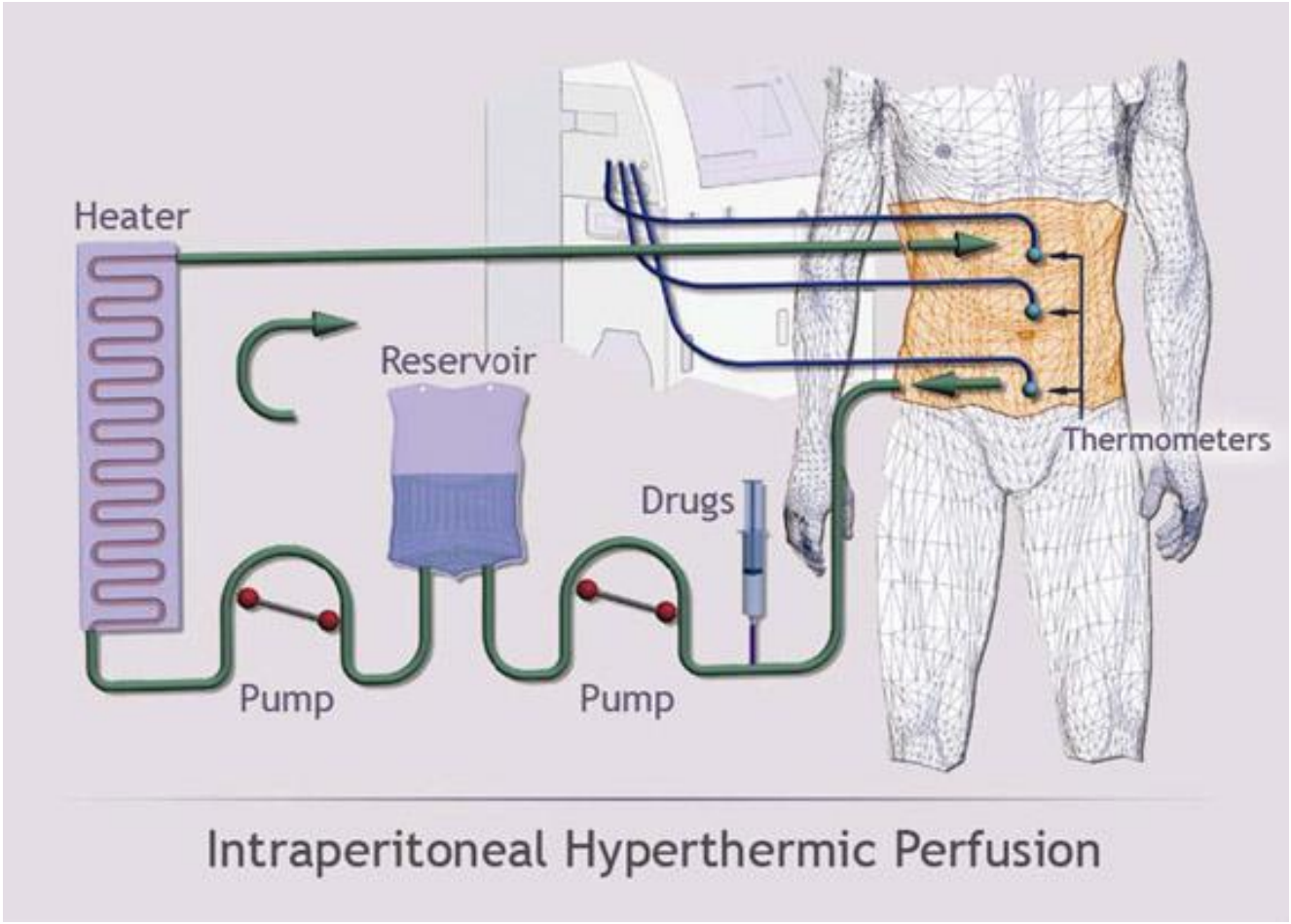
Sezione di Chirurgia Oncologica

HIPEC

(CHEMIOTERAPIA IPERTERMICA INTRAPERITONEALE)



HIPEC

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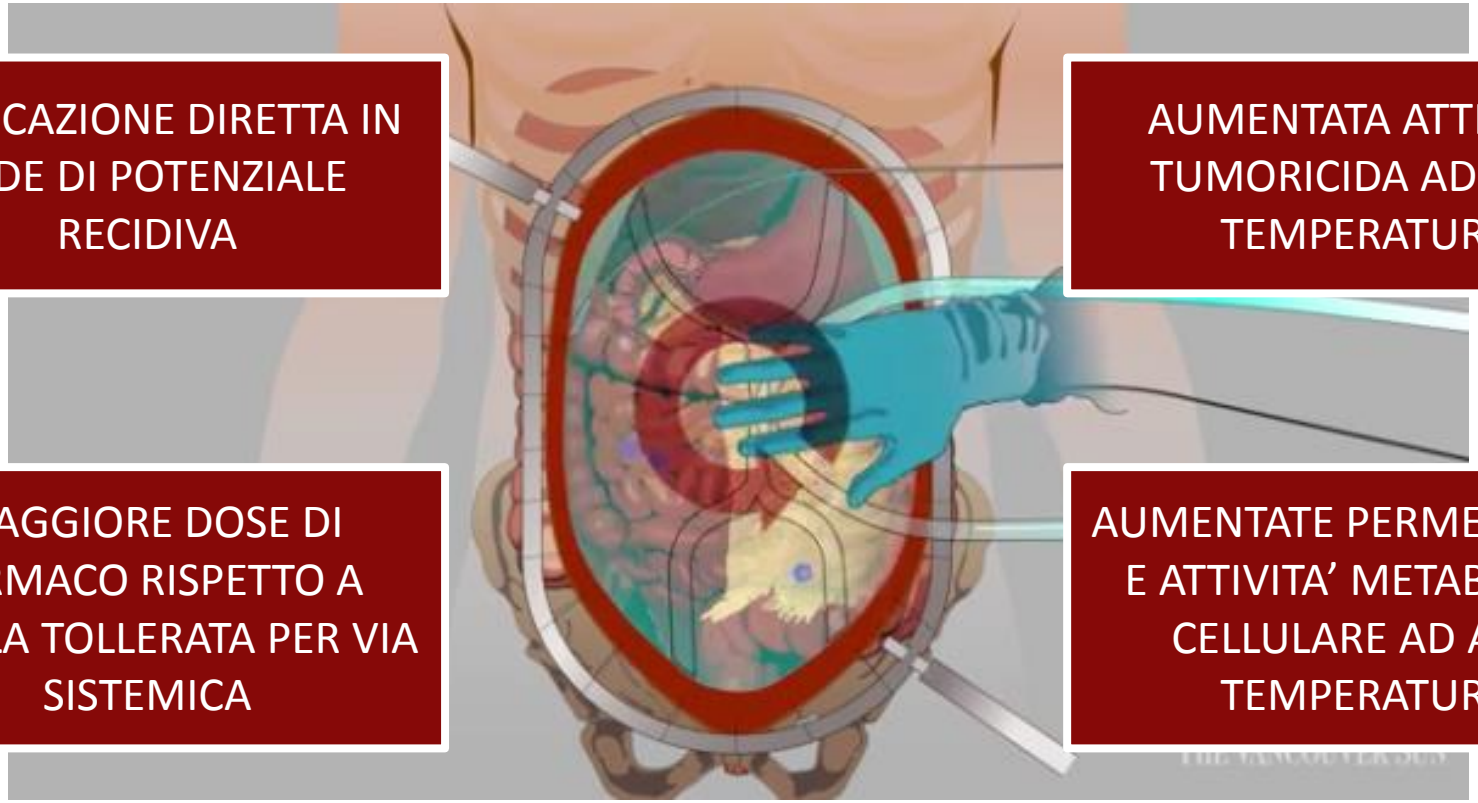
APPLICAZIONE DIRETTA IN SEDE DI POTENZIALE RECIDIVA

AUMENTATA ATTIVITA' TUMORICIDA AD ALTE TEMPERATURE



MAGGIORE DOSE DI FARMACO RISPETTO A QUELLA TOLLERATA PER VIA SISTEMICA

AUMENTATE PERMEABILITA' E ATTIVITA' METABOLICA CELLULARE AD ALTE TEMPERATURE

HIPEC

(CHEMIOTERAPIA IPERTERMICA INTRAPERITONEALE)

ADDOME APERTO vs ADDOME CHIUSO

PRO ADDOME APERTO

- distribuzione omogenea

PRO ADDOME CHIUSO

- ridotta perdita di calore
- maggiore penetrazione nei tessuti dell'agente chemioterapico per la maggior pressione intra-addominale
- minor contaminazione ambientale

NON EVIDENZA DI SUPERIORITA' DI UNA DELLE DUE TECNICHE,
MAGGIOR DIFFUSIONE DELLA TECNICA AD ADDOME CHIUSO.

REVIEW

CURRENT OPINION

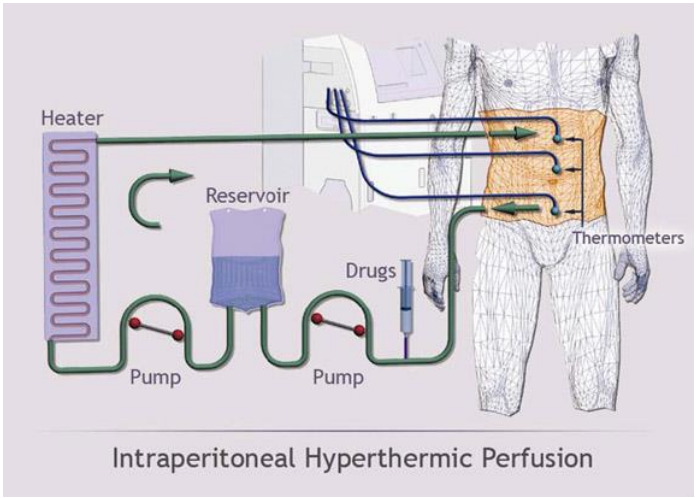
Anesthetic management in patients undergoing hyperthermic chemotherapy

Christoph Raspe[a], Pompilu Piso[b], Christoph Wiesenack[c], and Michael Bucher[a]

HIPEC

(CHEMIOTERAPIA IPERTERMICA INTRAPERITONEALE)

- 1 drenaggio in entrata
- 3 drenaggi in uscita
- 3 sonde termiche
- soluzione contenente l'agente chemioterapico
- pompa roller
- riscaldatore: **42-43°C**
- timer: **30-90 min**



HIPEC

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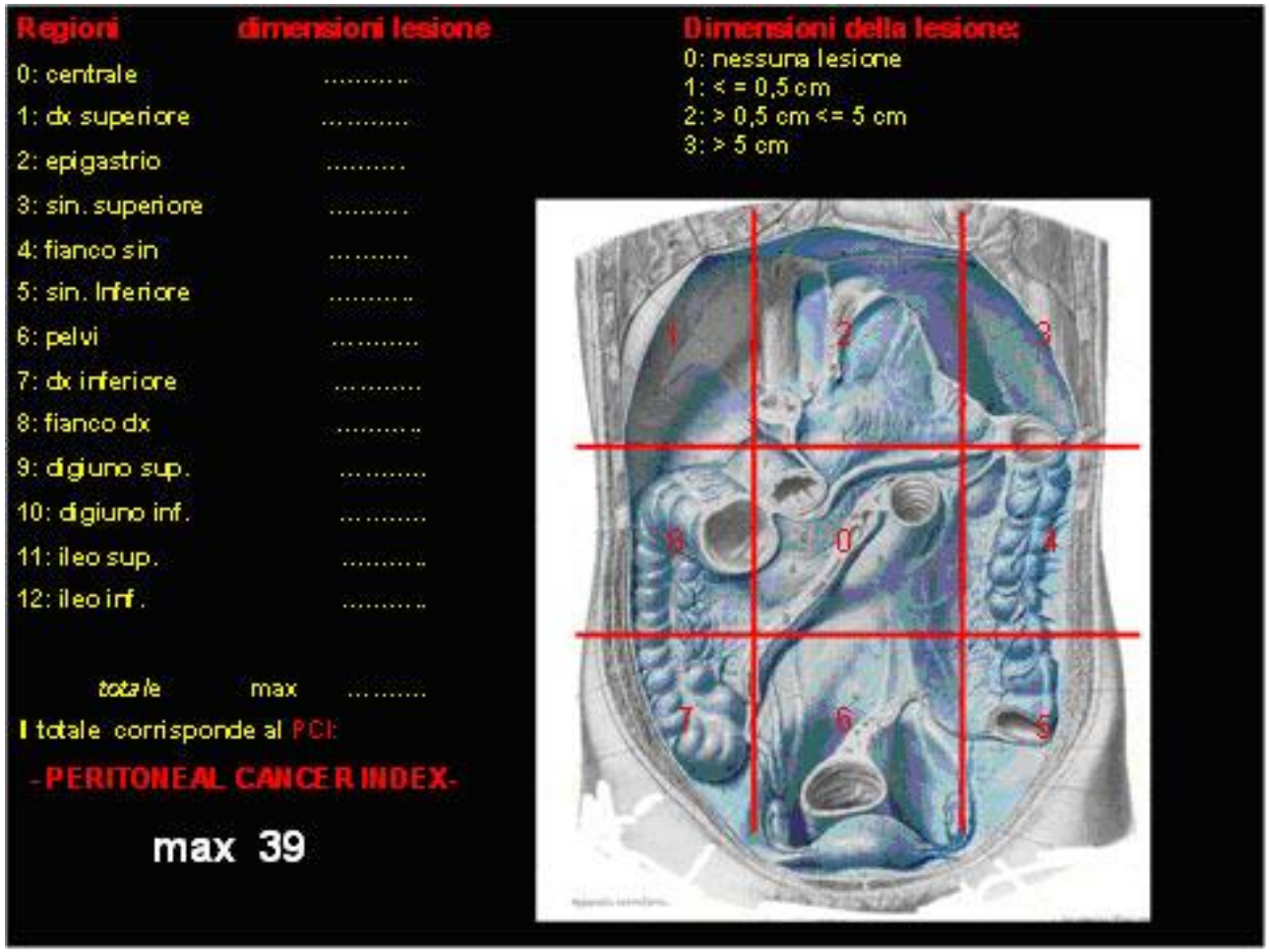
(1) Tumor entity:
   (a) peritoneal carcinomatosis due to colorectal cancer,
   (b) peritoneal carcinomatosis due to gastric cancers,
   (c) peritoneal carcinomatosis due to ovarial/ tube/cervix cancer,
   (d) pseudomyxoma peritonei,
   (e) malignant peritoneal mesothelioma,
   (f) peritoneal sarcomatosis,
   (g) adjuvant HIPEC (RO resection of colorectal/ gastric cancer), and
   (h) palliative HIPEC (due to uncontrolled ascites).

(2) No extra-abdominal metastases.

(3) High probability of complete macroscopical surgical cytoreduction, as assessed by computer tomography (CT), PET-CT, and laparoscopy – in particular, to exclude a disseminated small bowel disease.

(4) Limited tumor extent, with a peritoneal cancer index of less than 20 (maximum 39 possible).

Peritoneal Cancer Index (Jacquet-Sugarbaker)



HIPEC

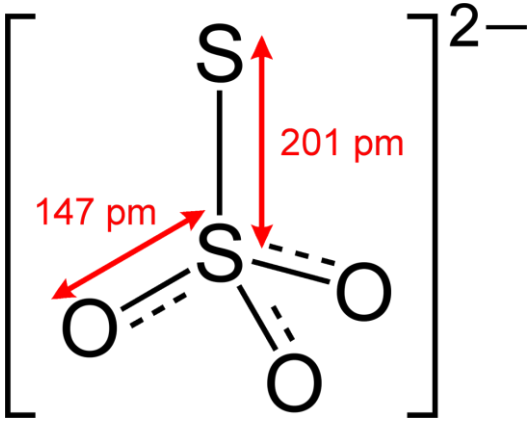
(CHEMIOTERAPIA IPERTERMICA INTRAPERITONEALE)

Table 1. Different intraperitoneally applied chemotherapy strategies

Entity of tumor	Chemotherapeutic solution
Colon	Oxaliplatin 300 mg/m^2 BSA i.p. + 5 FU 400 mg/m^2 BSA i.v. + 20 mg mg/m^2 BSA leucovorin i.v. 5 FU + leucovorin after fascia suture
Appendix	Oxaliplatin 300 mg/m^2 BSA i.p. + 5 FU 400 mg/m^2 BSA i.v. + 20 mg mg/m^2 BSA leucovorin i.v. 5 FU + leucovorin after fascia suture
Rectum	Oxaliplatin 300 mg/m^2 BSA i.p + 5 FU 400 mg/m^2 BSA i.v. + 20 mg mg/m^2 BSA leucovorin i.v. 5 FU + leucovorin after fascia suture
PMP	Oxaliplatin 300 mg/m^2 BSA i.p + 5 FU 400 mg/m^2 BSA i.v. + 20 mg mg/m^2 BSA leucovorin i.v. 5 FU + leucovorin after fascia suture
Ovarial	Cisplatin 75 mg/m^2 BSA i.p. Doxorubicin 15 mg/m^2 BSA i.p.
Stomach	Cisplatin 75 mg/m^2 BSA i.p. Doxorubicin 15 mg/m^2 BSA i.p.
Mesothelioma	Cisplatin 75 mg/m^2 BSA i.p. Doxorubicin 15 mg/m^2 BSA i.p.

The strategies applied depended on the entity of tumor (with kind recommendations of Professor Dr Piso). BSA, body surface area; FU, flurouracil; i.p., Intrapertitoneally; i.v., intravenous.

Sodio-Tiosolfato



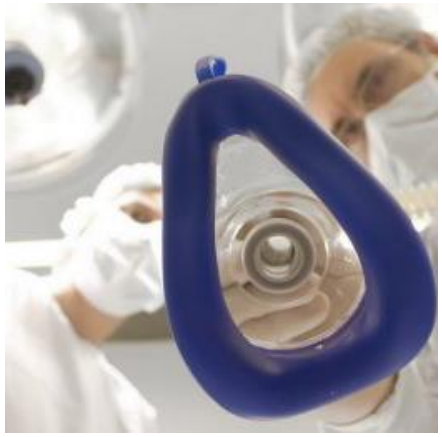
- **Profilassi della nefropatia da Cisplatino**: 9 g per m^2 di superficie corporea in bolo, seguiti da una infusione continua di 1,2 g/m^2/ora per 6 ore.

- Nella profilassi della nefropatia da cisplatino, Sodio Tiosolfato si concentra selettivamente nelle urine dove si forma un complesso tiosolfato-cisplatino non tossico per le cellule, sane o malate. Lo stesso meccanismo di azione (formazione di un complesso tiosolfato-cisplatino) è alla base dell'attività come desensibilizzante nello stravaso di medicinali chemioterapici.

- Effetti indesiderati: nausea, vomito, diarrea, ipotensione (se infuso troppo velocemente), ipovolemia, sensibilizzazione locale, bruciore.

2.

LA GESTIONE INTRAOPERATORIA



GESTIONE ANESTESIOLOGICA DEL PAZIENTE DA SOTTOPORRE A HIPEC

GESTIONE INTRAOPERATORIA

I. Valutazione preoperatoria

Assenza di comorbilità maggiori: ASA ≤2

Buone condizioni generali di salute (Karnofsky index > 80%).

100 %	ECOG = 0	Nessun disturbo, nessun segno di malattia.
90 %	ECOG = 0	Possibili le normali attività, Sintomatologia molto sfumata.
80 %	ECOG = 1	Normali attività possibili con difficoltà. Sintomi evidenti.
70 %	ECOG = 1	Cura di se stessi. Normali attività e lavoro non possibili.
60 %	ECOG = 2	Necessario qualche aiuto, indipendente nei bisogni personali.
50 %	ECOG = 2	Aiuto spesso necessario, richiede frequenti cure mediche.
40 %	ECOG = 3	Disabile. Necessario un aiuto qualificato.
30 %	ECOG = 3	Severamente disabile. Ospedalizzazione necessaria ma senza rischio di morte.
20 %	ECOG = 4	Estremamente malato. Richieste misure intesive di supporto alla vita.
10 %	ECOG = 4	Moribondo. Processi di malattia fatali rapidamente progressivi.
0 %	ECOG = 5	Morte.

REVIEW

CURRENT OPINION

Anesthetic management in patients undergoing hyperthermic chemotherapy

Christoph Raspe[a], Pompilu Piso[b], Christoph Wiesenack[c], and Michael Bucher[a]

GESTIONE INTRAOPERATORIA

I. Valutazione preoperatoria

VALUTARE LO STATO D'IDRATAZIONE
E L'INDICAZIONE AD EVENTUALE FLUIDOTERAPIA
PREOPERATORIA

VALUTARE LA FATTIBILITÀ DEL
POSIZIONAMENTO DI UN CATETERE
EPIDURALE TORACICO

GESTIONE INTRAOPERATORIA

II. Prevenzione delle complicanze

- MONITORAGGIO DELLA TEMPERATURA CORPOREA E DELLO STATO IPERMETABOLICO
- RIMPIAZZO VOLEMICO E MONITORAGGIO EMODINAMICO
- MONITORAGGIO DELL'EMOSTASI

Perioperative Management of Patients Undergoing Cytoreductive Surgery Combined with Heated Intraperitoneal Chemotherapy for Peritoneal Surface Malignancy: A Multi-Institutional Experience

John C. Bell, FRCA, FFICM, Barnaby G. Rylah, FRCA, MRCP, Robert W. Chambers, FRCA, Helen Peet, FRCA, MRCP, Faheez Mohamed, MD, FRCS, and Brendan J. Moran, MCH, FRCS

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Anesthesia Considerations During Cytoreductive Surgery and Hyperthermic Intraperitoneal Chemotherapy

Kenneth P. Rothfield, MD[a,b,*], Kathy Crowley, CRNA[a]

The perioperative course and anesthetic challenge for cytoreductive surgery with hyperthermic intraperitoneal chemotherapy

Jehan M. Kamal [a,*], Somaya M. Elshaikh [a], Dina Nabil [a], Ahmad M. Mohamad [b]

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MONITORAGGIO DELLA TEMPERATURA CORPOREA E DELLO STATO IPERMETABOLICO

TARGET ANESTESIOLOGICO: OMEOSTASI TERMICA

Preservare omeostasi metabolica

Mantenere l'efficacia del sistema coagulativo

Limitare l'eccessiva attivazione della cascata infiammatoria

FASE CITORIDUTTIVA

IPOTERMIA

HIPEC

IPERTERMIA

FASE CITORIDUTTIVA
IPOTERMIA

losses due to drainage of ascites and the long-lasting procedure (Fig. 1) and extreme surface exposure [6]. Despite the extensive debulking procedure and the large abdominal access hypothermia has to be prevented by using forced air warming with blankets, patient́s bedding on heated water driven thermal pads and warmed infusions, as

HIPEC
IPERTERMIA

In contrast, due to the hyperthermic intraperitoneal solution used during HIPEC, body temperature—measured esophageally, vesically, or tympanically—rises with values up to 40.5°C (mean 37.7°C) [1,4,10,11]. The increased body temperature resulted in corresponding effects on metabolic rate (Fig. 2). Patients develop an increased systemic oxygen demand [4] redounding to a steady increase in heart rate and end tidal CO_2 levels with concomitant metabolic acidosis and elevated arterial lactate values reaching their maximum at the end of the HIPEC phase [3,4,6,10,11]. Therefore, the aim of the anaesthetist should be the maintenance of normothermia by using cooled infusions and the perpetuation of metabolic standard values by adjusting respiratory ventilation to the hypermetabolic conditions during HIPEC.

Perioperative Management of Patients With Cytoreductive Surgery for Peritoneal Carcinomatosis

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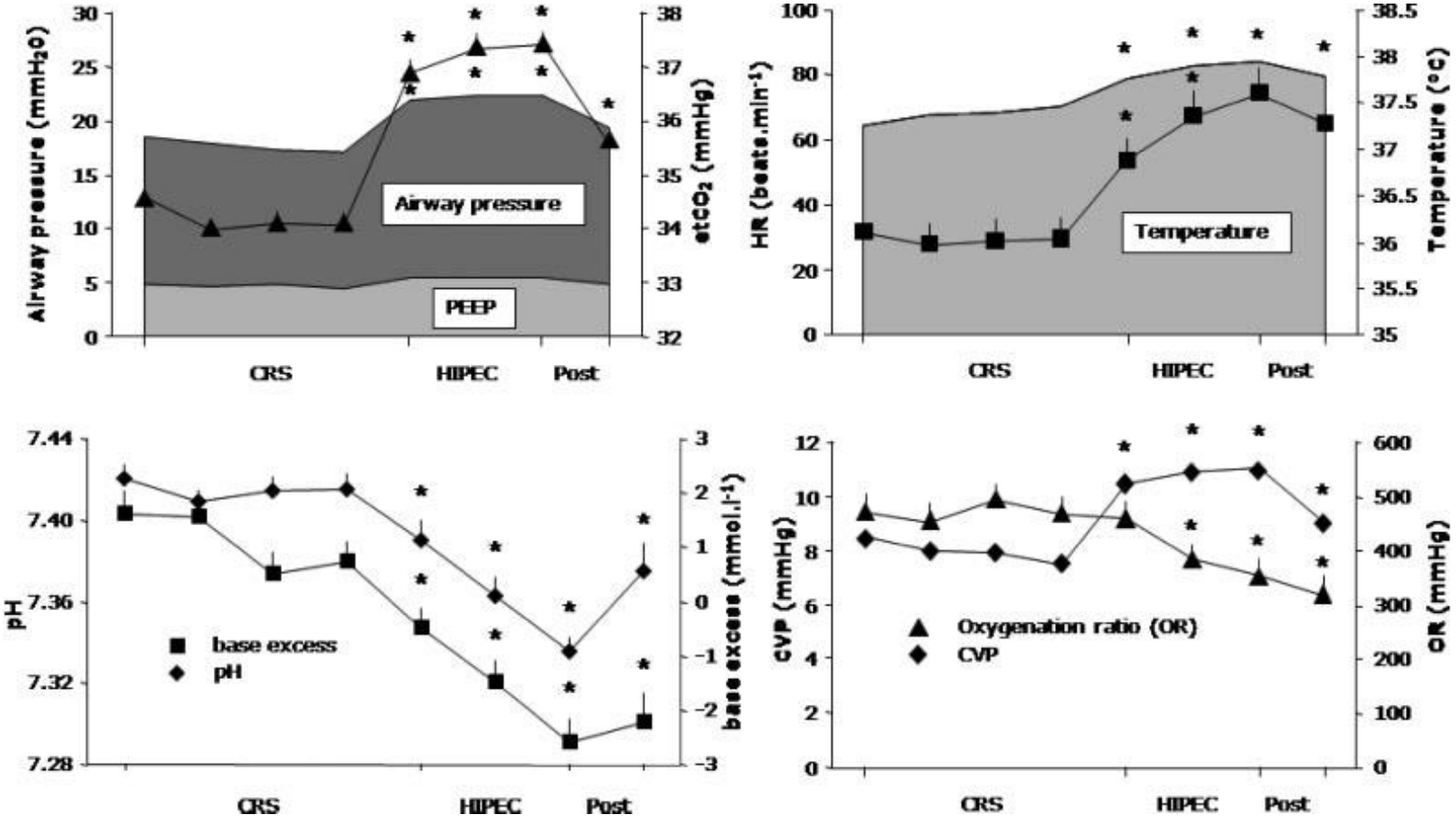

RIMPIAZZO VOLEMICO E MONITORAGGIO EMODINAMICO

TARGET ANESTESIOLOGICO: EUVOLEMIA

- perdite ematiche
- ascite
- perspiratio
- perdita proteica (700 g/die)

ml/Kg/h

1 – Durante la prima fase dell'intervento (debulking): reintegro dei liquidi persi **(da 6 a 12 ml/Kg/h)**

2 – Durante l'HIPEC: fluidoterapia goal directed **(≈ 12 ml/Kg/h)**

RIMPIAZZO VOLEMICO E MONITORAGGIO EMODINAMICO

CRISTALLOIDI vs COLLOIDI vs EMODERIVATI

= PRESSIONE ONCOTICA

= OUTPUT URINARIO

= Hb

NOTA BENE

Attenzione alle soluzioni impiegate durante l'HIPEC, possono favorire notevoli squilibri elettrolitici.

ES: *l'Oxaliplatino* è diluito in SOL GLUC 5% (5 litri di soluzione determinano iperglicemia e pseudoiponatriemia)

REVIEW

Anesthetic management in patients undergoing hyperthermic chemotherapy

Christoph Raspe[a], Pomipilu Piso[b], Christoph Wiesenack[c], and Michael Bucher[a]

To ensure colloid oncotic intravasal pressure, artificial colloids are a good alternative. Iso-oncotic hydroxyethyl starch of the third generation (6% HES 130/0.4) could demonstrate a reliable volume effect of 90–100% [41] and is nowadays also available as a balanced solution. Furthermore, in contrast to previous studies, even during severe sepsis, recent data could not demonstrate negative effects of new colloid preparations (CRYSTMAS-Studie, www.clinical-trials.gov) either on lethality or on kidney function. On the contrary, intravasal volume effects of isotonic crystalloid compound amount to less than 20%, which causes significant interstitial edema being an outcome-relevant risk factor for increased lethality [42,43] influencing renal tubulus cells negatively [44].

Perioperative Management of Patients With Cytoreductive Surgery for Peritoneal Carcinomatosis

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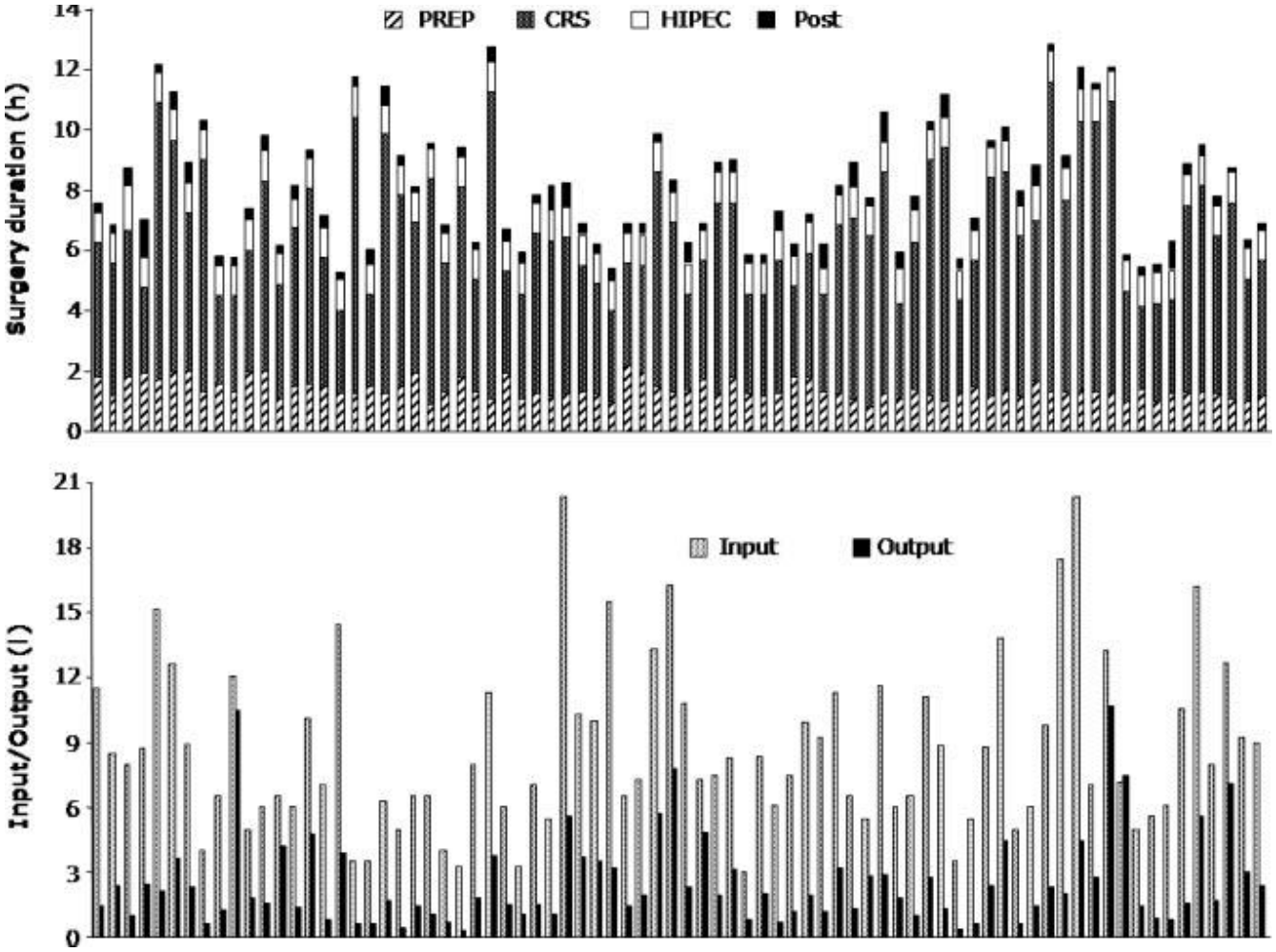

STATO IPERMETABOLICO +

RIMPIAZZO VOLEMICO +

COMPOSIZIONE VEC =

MONITORAGGIO EMODINAMICO

central venous catheter, urinary catheter), less-invasive hemodynamic monitoring such as the esopageal echo-doppler [6,10] or the FloTrac™/Vigileo™ device, which only requires access to a standard arterial catheter to measure CO and stroke volume variation (SVV) without the need of an external calibration mode [28], are interesting tools to experience more information about the patient's fluid and hemodynamic "real-time" status with an appropriate risk/benefit ratio.

Perioperative Management of Patients With Cytoreductive Surgery for Peritoneal Carcinomatosis

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[1]Department of Anesthesiology, University of Regensburg, Regensburg, Germany
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MONITORAGGIO DELL'EMOSTASI

patients. Blood loss is not only due to surgical reasons but also due an increased bleeding tendency, however the reasons for this are unknown so far. Impairment of coagulation due to the large volume shift and protein loss with high fluid turnover and possibly due to the hyperthermic chemotherapy is conceivable. Laboratory analysis revealed disturbance of coagulation with decreased INR, AT III and fibrinogen values as well as prolonged aPTT and a reduced number of thrombocytes [11]. Additionally, coagulation could be defective due to decreased levels of coagulation factors which are not measured by standard coagulation tests, such as factor XIII. The effects of cytoreductive surgery and HIPEC on the coagulation system are insufficiently understood so far and should be an issue for further investigations. Summarizing our experiences, salvage of cellsaver blood with subsequent irradiation is a good option to cut down on banked blood and therefore to prevent transfusion associated complications. Furthermore, the adoption of advanced coagulation monitoring such as thrombelastography with the roTEG® seems to be a helpful tool for detecting complex coagulation disorders such as hyperfibrinolysis or factor XIII deficiency.

MONITORAGGIO DELL'EMOSTASI

Anaesthesia, 2008, **63**, pages 389–395

Table 4 Laboratory parameters in 78 patients undergoing cytoreductive surgery and HIPEC. Data are expressed as mean (SD).

	Pre-operative values	Intra-operative values	Postoperative values Day 1	Postoperative values Day 2	Postoperative values Day 3
Antithrombin III; %	70 (4)	39 (3)*	48 (4)*	66 (6)	51 (5)*
Platelets; $10^9.l^{-1}$	346 (17)	205 (16)*	237 (15)*	244 (18)*	279 (23)*
INR	0.96 (0.02)	1.39 (0.05)*	1.21 (0.03)*	1.12 (0.04)*	1.01 (0.04)
aPTT; s	31.5 (1.2)	45.2 (3.1)*	49.7 (3.3)*	43.6 (3.2)*	39.2 (3.4)
Haemoglobin; $g.dl^{-1}$	12.9 (0.3)	9.4 (0.3)*	9.8 (0.3)*	9.5 (0.3)*	9.6 (0.3)*
Haematocrit; %	37.2 (0.8)	27.3 (1.0)*	28.1 (0.8)*	26.7 (0.8)*	27.7 (0.9)*
Serum albumin; $g.l^{-1}$	42.6 (4.8)	15.7 (2.2)*	19.6 (1.2)*	20.5 (2.5)*	23.6 (1.6)*
Serum creatinine; $\mu mol.l^{-1}$	73.0 (3.5)	71.3 (4.4)	76.6 (6.2)	73.9 (7.0)	75.7 (7.9)

INR, international normalised ratio; aPTT, activated partial thromboplastin time; *$p < 0.05$ vs pre-operative values.

HIPEC

(CHEMIOTERAPIA IPERTERMICA INTRAPERITONEALE)

Table 2. Chemotherapeutics used during hyperthermic intraperitoneal chemotherapy and possible chemotherapeutic-specific adverse effects

Chemotherapeutics	Adverse effects
Mitomycin C	Nephrotoxicity, pulmotoxicity
Cisplatin	Peripheral neuropathia, myelotoxicity
Doxorubicin	Cardiotoxicity (arrhythmia, cardiomyopathia), myelotoxicity
Oxyliplatin	Neurotoxicity (laryngeal/pharyngeal dysesthesia)
Irinotecan	Myelotoxicity