



Available online at
ScienceDirect
www.sciencedirect.com

Elsevier Masson France
EM|consulte
www.em-consulte.com/en



VISCERAL SURGERY VIDEOS

PIPAC: 8 key points for a good practice with video



G. Mariano*, M. Pocard, C. Eveno

Surgical Oncology and Digestive Unit, Lariboisière University Hospital, 75475 Paris, France

Available online 13 February 2019

Intraperitoneal chemotherapy pressurized by aerosols (PIPAC) was created in Germany in 2013 by Professor Marc-André Reymond. This innovative technique for the treatment of peritoneal carcinomatosis enables to increase the locoregional delivery of drugs to the peritoneum.

One of the principles is to try to increase the tissue penetration of chemotherapy by hyperpressure. In fact, the concentration of drugs used is lower than intravenously and should therefore reduce systemic side effects. Today, PIPAC is proposed for unresectable peritoneal carcinomatosis. It consists of spraying chemotherapy directly into the patient's abdomen during an abdominal laparoscopy in the form of an aerosol.

PIPAC can be offered: (i) to patients in which the disease is stabilized by systemic chemotherapy, but not resectable because too extensive involvement (impossible to achieve complete cytoreduction, i.e. CCO) and not eligible for CHIP and/or for whom wishing to stop IV-chemotherapy; (ii) it can be offered to patients who have resistance to systemic intravenous chemotherapy or (iii) in the first line to reinforce IV chemotherapy in order to make resectable an extensive peritoneal disease.

* Corresponding author. 2, rue Ambroise-Paré, 75475 Paris, France.

E-mail addresses: g.mariano@uniroma1.it (G. Mariano), marc.pocard@gmail.com (M. Pocard), clarisse.eveno@gmail.com (C. Eveno).



Figure 1. Right diaphragmatic dome invasion.

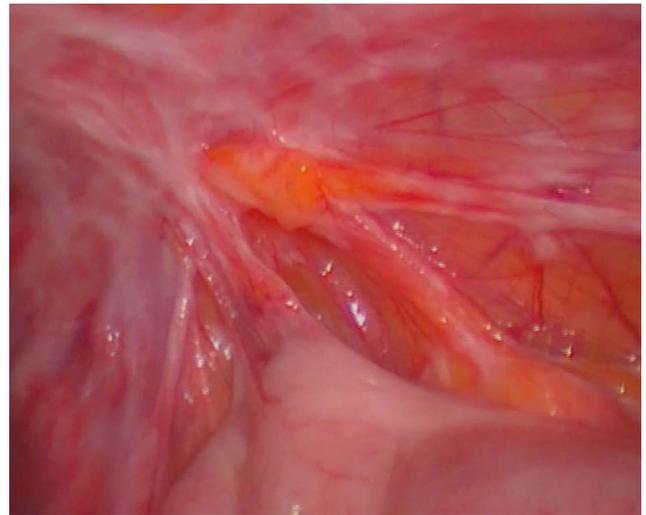


Figure 2. Right paracolic gutter invasion.

This video presents the main points of the procedure. The procedure starts with the insufflation a pneumoperitoneum until twelve mmHg. Two balloon trocars are positioned on the median line. This position should be repeated for each procedure to avoid metastatic parietal invasion, especially if a curative option is considered in the future. This laparoscopy allows exploring the abdomen and peritoneal carcinomatosis extension as well as realization of three biopsy sampling for PRGS-score evaluation. A nebulizer is then introduced to vaporize the chemotherapy in the form of fine droplets. This device, specially designed for PIPAC, is connected to a high-pressure injector. The safety's

procedure is video-monitored with a thirty degrees optic inserted thru the second trocar. The chemotherapy is nebulized for a two to five minutes and then left in suspension in the abdomen for thirty minutes. Finally, only the main surgeon enter the operating room to exsufflate the remaining chemotherapy in the pneumoperitoneum. This step is carried out in a closed circuit with a specific filter, which retains the residual chemotherapy molecules still in suspension. Once the whole quantity of chemotherapy is removed, the incisions are closed. This video shows the steps necessary to follow to perform an intraperitoneal chemotherapy pressurized by aerosols (PIPAC) (Figs. 1–4) [1–3].

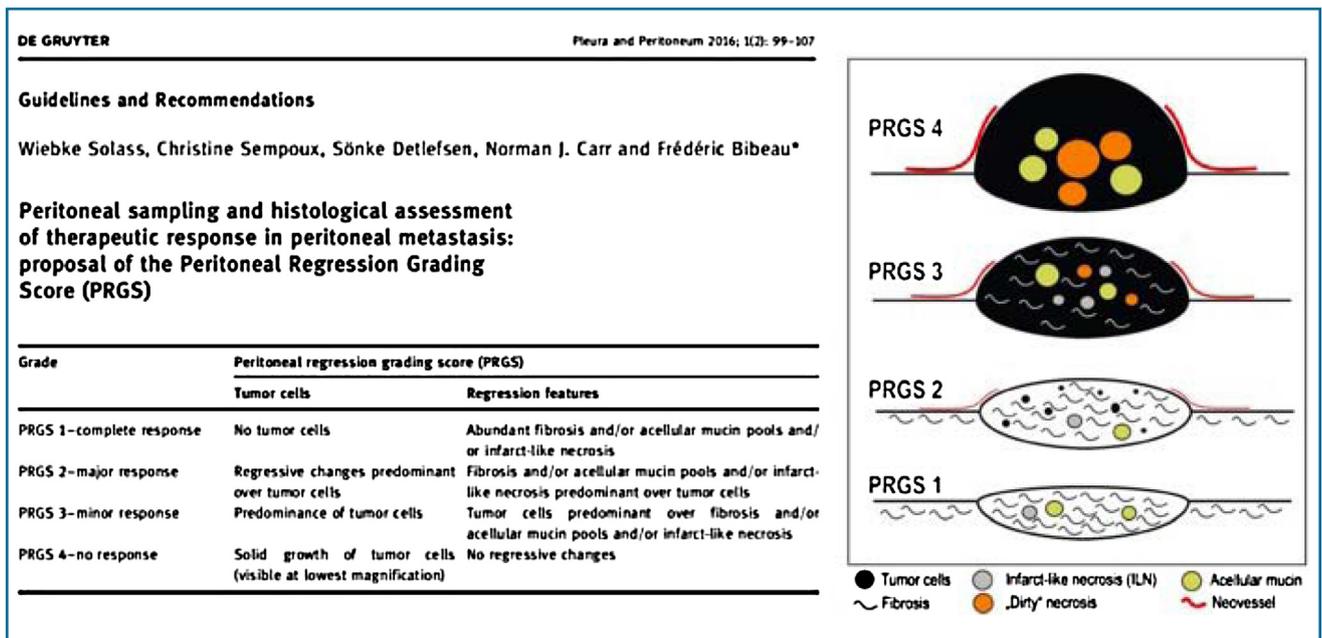


Figure 3. PRGS-score.



Figure 4. Operative room installation.

Appendix A. Supplementary data

Supplementary data associated with this article can be found, in the online version, at <https://doi.org/10.1016/j.jviscsurg.2019.01.006>.

Disclosure of interest

The authors declare that they have no competing interest.

References

- [1] Solaß W, Giger-Pabst U, Zieren J, Reymond MA. Pressurized intraperitoneal aerosol chemotherapy (PIPAC): occupational health and safety aspects. *Ann Surg Oncol* 2013;20(11):3504–11.
- [2] Grass F, Vuagniaux A, Teixeira-Farinha H, Lehmann K, Demartines N, Hübner M. Systematic review of pressurized intraperitoneal aerosol chemotherapy for the treatment of advanced peritoneal carcinomatosis. *BJS* 2017;104:669–78.
- [3] Solaß W, Sempoux C, Detlefsen S, Carr NJ, Bibeau F. Peritoneal sampling and histological assessment of therapeutic response in peritoneal metastasis: proposal of the Peritoneal Regression Grading Score (PRGS). *Pleura and Peritoneum* 2016;1(2):99–107.