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Original Article

Impact of perioperative care on the post-operative recovery of women undergoing surgery for gynaecological tumours

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To assess perioperative care in patients undergoing abdominal surgery for gynaecological tumours and how it relates to post-operative (PO) complications and oral PO feeding. Ninety-one women undergoing major abdominal surgery for gynaecological tumours were enrolled. Data included mechanical bowel preparation (MBP), prescribed diet, length of fast, start date of oral diet and progression of food consistency, anaesthetic technique, use of opioids and intravenous hydration (IH). Outcomes evaluated were nausea, vomiting and abdominal distension. The median pre-operative length of fast was 11.4 h. PO digestive complications occurred in 46.2% of the patients. Median intraoperative total IH and crystalloids were significantly higher in patients with abdominal distension during the first and second PO day. MBP with mannitol implied greater intraoperative IH and was significantly associated with a higher incidence of immediate PO nausea. Post-operative IH was also associated with gastrointestinal complications. The best cut-off point for the cumulative fluid load PO for determining a longer PO hospital stay was 4 L. Performing MBP before surgery and excessive IH are factors related to major digestive complications in our study population. Changes in pre-operative fasting time and PO refeeding should be considered to reduce the gastrointestinal complications and PO recovery time.

Keywords: perioperative care, surgery, gynaecological tumour, fluid therapy.

INTRODUCTION

Gynaecological cancer represents 10–15% of the tumours diagnosed in women worldwide (Lv *et al.* 2010). In Brazil, the estimated cancer rate for 2014 suggests that cervix, endometrium and ovary cancers are among the 10 cancers occurring most in women (Brasil, Ministério da Saúde 2014). Surgery is the first treatment option for most gynaecological cancers. Although vaginal and laparoscopic surgeries are found to have the quickest post-operative (PO) recovery time and shortest hospital stay, the conventional, open abdominal hysterectomy is still the most commonly performed surgical procedure (Chang *et al.* 2008).

The causes of morbidity in patients undergoing abdominal hysterectomies include nausea, vomiting, pain and paralytic ileus, although there is presently a dearth of information describing the occurrence, intensity and duration of the said symptoms in gynaecological surgery (Alkaissi *et al.* 2004; Chang *et al.* 2008). These complications delay PO recovery and confer a significant financial burden on healthcare institutions (Sidhu *et al.* 2012).

The occurrence of PO nausea and vomiting (PONV) is relatively common and potentially harmful, with an

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estimated 30% incidence in the general population, reaching as much as 70% of high-risk patients (Woodhouse & Mather 1998; Apfel *et al.* 1999; Peixoto *et al.* 2000). There are several factors causing PONV, generally related to the particular surgical procedure or patient-specific risk factors. Gynaecological surgery has been considered an independent risk factor of PONV (Woodhouse & Mather 1998; Apfel *et al.* 1999). However, perioperative care is also associated with a higher incidence of paralytic ileus and PONV. Enhanced Recovery After Surgery (ERAS) is an evidence-based multi-modal programme for optimal perioperative care, initially developed for patients undergoing colonic surgery. It includes a combination of different elements that are thought to possibly influence PO recovery time: pre- and PO length of fast, pre-operative mechanical bowel preparation (MBP), perioperative intravenous (IV) hydration, anaesthesia and analgesia (Fearon *et al.* 2005).

The convincing data from colorectal surgery has increased the interest in adopting this concept to other surgical patients. However, although limited data are available for gynaecological cancer surgery, there is supporting literature stating that the development of a fast-track protocol is achievable in a gynaecological oncology unit, with input from a multidisciplinary team. Effective implementation of the protocol can result in a short length of stay, with acceptable complication and readmission rates when applied to gynaecological oncology patients (Minig *et al.* 2015; Philp *et al.* 2015).

Given the above, the aim of this study was to relate the perioperative care of the multidisciplinary team caring for the patients undergoing abdominal surgery to the treatment of gynaecological tumours with PO complications and oral PO feeding.

METHODS

Study design

This is a consecutive cohort study in the form of a census, carried out by the Brazilian National Cancer Institute. The study protocol was approved by the ethics committee of National Cancer Institute. Patients were admitted into the study on providing formal authorisation through a free and informed consent agreement.

Patients

All the patients included in this study were adults (>19 years) and had been diagnosed with cervix, ovarian and endometrium tumours and registered at the Brazilian National Cancer Institute to undergo major open abdominal surgery between October 2011 and March 2012. The criteria for being major open surgery were that it lasted over 2 h and/or a lymphadenectomy was performed. Pelvic lymphadenectomy is defined as pelvic nodal dissection, whereas para-aortic lymphadenectomy is defined as the complete removal of all fat and nodal tissues surrounding the aorta, inferior vena cava and renal vessels from the left renal vain cranially to the midpoint of the common iliac vessels caudally (Pomel *et al.* 2012).

Excluded from the study were patients undergoing video laparoscopic or vaginal surgery, as well as those who underwent bowel resection during surgery.

Data collection

The data pertaining to tumour site and staging were gathered from the patient medical records. Staging was done according to the International Federation of Gynecology and Obstetrics (FIGO) system for tumour classification (Mutch 2009). Confirmation of tumour site and weight was obtained through histopathology reports.

On admission to hospital, the patients were assessed for weight status by measuring their body mass index (BMI). Nutritional diagnosis was made according to World Health Organizations guidelines for adults (World Health Organization 1995, 2004) and according to Pan American Health Organization standards for the elderly (Organización Panamericana de la Salud 2001). Afterwards, to homogenise the findings, the patients were classified in three groups: malnourished (BMI <18.5 kg/m^2), eutrophic (18.5–24.9 kg/m^2) and overweight (≥25.0 kg/m^2). To calculate the BMI of the patients with ovarian neoplasm, tumour weight – measured after surgical resection – was subtracted from the weight assessed at hospital admission.

During the perioperative period, the following variables were recorded: use and type of MBP, length of pre-operative fast, anaesthesia technique, duration of surgery, use of opioids and IV hydration. To classify intraoperative and PO IV hydration volume, two different cut-off values to dichotomise the IV hydration variable were used: 10 mL/kg/h and 30 mL/kg respectively (MacKay *et al.* 2006; Aguilar-Nascimento *et al.* 2008). The sum of the IV fluids infused during immediate post-operative (IPO) care up until the second post-operative day (POD), in this study denominated as 'fluid load', was also calculated.

The clinical outcome variables prospectively investigated between the PO period and release from hospital were existence and frequency of nausea, vomiting and abdominal distension, occurrence of infection at surgery site, date of first passage of flatus and first bowel movement, POD oral diet and progression of food consistency, length of PO hospital stay and occurrence of death.

Post-operative nausea and vomiting were assessed on a binary scale (yes/no) by a trained nutritionist, before and after every meal. Patients were considered nauseated if they responded to the question, 'Are you feeling nauseated?' Using similar questions, the number of vomiting episodes was assessed.

Once the start of oral diet was prescribed by the physician, patients were offered a liquid oral diet and, if well tolerated, as evidenced by absence of nausea and vomiting or by the patient's desire to progress the diet, they were then fed with a semisolid diet or with a regular diet consistency. The progression of the diet was considered successful when the patients ate more than 75% of the diet offered.

Abdominal distension and occurrence of infection at surgery site were assessed by physical examination. Length of PO hospital stay and occurrence of death were recorded from medical reports.

Statistical analysis

The SPSS (IBM, Chicago, IL, USA) version 17.0 statistical software package was used for statistical analysis. The Kolmogorov–Smirnov test for adherence to the normal distribution curve was used to assess distribution curve symmetry, identifying normal distribution only for the variable age. The quantitative variables were expressed in median, with a lowest and highest value, except for age, which was expressed in mean ± standard deviation. The categorical variables were expressed in percentages.

Comparison of the medians between two groups was done using the non-parametric Mann–Whitney test. The associations between categorical variables were done using the chi-square test or Fischer's exact test. *P* values were derived from two-tailed tests.

The receiver operating characteristic (ROC) curve was used to define the optimum fluid load for determining the length of PO hospital stay. The ROC curve was adjusted using an algorithm adapted from graphical methods for data analysis. In all statistical tests, a level of significance of 5% was adopted.

RESULTS

Two hundred eighty-five patients underwent surgical procedures during the data collection period: 88 of which were open abdominal hysterectomies; 39, video-laparoscopy hysterectomies; 36, conisations; 24, exploratory laparoscopies; 21, oophorectomies; 8, lymphadenectomies; and 8, vaginal hysterectomies. Besides those, there were 61 from the following array of procedures: vulvectomies, biopsies, colostomies, herniorraphies or bowel resection surgeries. Screened according to type of surgery and the other inclusion and exclusion criteria, 91 female patients were eligible to take part in the study.

The study group was 54.36 ± 13.04 (25–86) years old; 76.9% of the patients were diagnosed with malignant tumours, while 23.1% had benign tumours. The tumour type was found to be predominantly endometrium, and the greatest proportion of the cancer was at stage I. In relation to nutritional status, most of the patients were found to be overweight (Table 1).

Perioperative care

In relation to perioperative conduct, the median length of pre-operative fast was 11.4 (10.0–18.1) hours; the use of IV opioids was found in 85.6% of the cases during the intraoperative period; and general anaesthesia was the predominant anaesthesia method (80%). Phosphate enemas were used on more than one-half of the patients (53.8%) to empty out the rectum the day before surgery, and MBP with mannitol was prescribed in 24.2% of the cases.

Clinical outcome variables

The PO outcomes are described in Table 2. Digestive complications occurred in 46.2% of the patients and did not present an association with weight status ($P = 0.152$), when the oral diet started ($P = 0.715$) nor the consistency of the diet ($P = 0.230$). Despite the high incidence of digestive complications (Fig. 1), it was noteworthy that only 6.6% of the patients suspend their oral diet and one-half of the patients (50.5%) advanced to a regular diet on the second POD despite the occurrence of PONV.

Table 1. General characteristics of patients undergoing treatment for gynaecological tumours ($N = 91$)

Variables	*n*	%
Nutritional diagnosis		
Eutrophic	21	23.1
Overweight	65	71.4
Malnourished	05	5.5
Tumour site		
Cervix	23	25.2
Endometrium	38	41.8
Ovary	30	33.0
Staging		
Stage I	38	41.7
Stage II	06	6.6
Stage III	19	20.9
Stage IV	02	2.2
No stage*	26	28.6

*Benign tumour or carcinoma *in situ*.

Regarding oral diet start day, a significant decrease in length of hospital stay was found for patients who began the diet on the first POD compared with the second POD [3(2–10) versus 4(3–6); $P = 0.011$].

By analysing the different aspects of the perioperative routine and the surgical procedures most related to digestive complications during the PO period, it was found that performing the MBP with mannitol was significantly associated with a higher incidence of nausea IPO ($\chi^2 = 6.151$; $P = 0.046$). The median of intraoperative hydration was 2627 (700–4500) mL, reflecting great variability in the administration of fluids. We found that the use of mannitol during the pre-operative period was associated with higher median volume of total intraoperative IV hydration, compared with those given only phosphate enemas [15.29 (6.73–41.66) mL/kg/h versus 11.32 (2.48–20.63) mL/kg/h, $P = 0.005$].

By assessing the relationship between administration of fluids and digestive complications during the perioperative period, we found that the medians of total IV hydration and the crystalloid infusion, during the intraoperative period, were significantly higher in the patients with abdominal distension during the first and second POD (Table 3). When the volume of IV hydration was dichotomised as higher than or less than 10 mL/kg/h during the intraoperative period, a significant association was found between the administration of fluids above this value and the occurrence of abdominal distension on the second POD, with 100% of the cases of distension receiving hydration above this cut-off point ($\chi^2 = 4.379$; $P = 0.036$). Furthermore, 83% of patients who had to suspend oral diet had intraoperative hydration higher than the cut-off point.

In the PO period, 71.5% of the patients were given IV fluid infusions for 2 or 3 days. Despite the oral diet beginning predominantly on the first POD (79.1%), it is noteworthy that 93.4% of the patients continued to receive IV hydration once the oral diet was already under way. All patients who had to suspend oral diet ($n = 6$) or presented abdominal distention on the first and second POD ($n = 10$) did not remove the IV hydration on the first PO oral diet. IV hydration time ≥3 days also delayed the evolution of the diet consistency: half the patients (52%, $n = 26$) evolved to a regular diet on the third POD, different from that observed for the remaining patients, that predominantly were ordered to a regular diet on the second POD.

Although the median volume of IV hydration during the PO period had been less than 30 mL/kg, a higher variability was found in relation to the volume of fluids administered during the PO period. When the cut-off point of 30 mL/kg was considered, a statistically significant association was found in the incidence of nausea ($\chi^2 = 4.807$; $P = 0.044$), vomiting ($\chi^2 = 4.901$; $P = 0.049$) and abdominal distension ($\chi^2 = 5.831$; $P = 0.046$) during the second POD. There was also a statistically significant association between hydration over the cut-off point on the first POD and nausea on the second POD ($\chi^2 = 5.425$; $P = 0.024$).

The median of PO time was 3 (2–10) days. According to the ROC curve, the best cut-off point for classifying cumulative fluid load versus length of PO hospital stay was 4 L, with sensitivity of 71.9% and specificity of 63.8%. The area under the ROC curve was 0.688 (95% CI, 0.567–0.808; $P = 0.003$) (Fig. 2). Hence, patients who received more than 4 L IPO until the second POD spent more time in hospital, compared with patients who received a lower fluid infusion.

Pre-operative fasting time, use of opioids and type of anaesthesia did not associate with complications during the PO period ($P > 0.05$). Nor was there an association between pelvic and paraaortic lymphadenectomy and digestive complications ($\chi^2 = 0.207$, $P = 0.404$; $\chi^2 = 0.804$, $P = 0.272$ respectively).

Table 2. Incidence of digestive complications and other outcomes during post-operative period in patients undergoing surgery to treat gynaecological tumours ($N = 91$)

Variables	*n*	%
Digestive complications		
Yes	42	46.2
No	49	53.8
Type of complications		
Nausea	32	35.2
Vomiting	24	26.4
Abdominal distension	10	11.0
Need to suspend diet		
Yes	06	6.6
No	85	93.4
Date of the start of oral diet		
IPO	01	1.1
1st POD	72	79.1
2nd POD	16	17.6
≥3rd POD	02	2.2
Date of passage of flatus		
IPO	01	1.1
1st POD	41	45.1
2nd POD	32	35.2
≥3rd POD	17	18.7
Date of evacuation		
1st POD	03	3.3
2nd POD	03	3.3
3rd POD	08	8.8
4th POD	03	3.3
≥5th POD	04	4.4
Released from hospital before evacuation	70	76.9
Date of release from hospital		
2nd POD	22	24.4
3rd POD	36	40.0
4th POD	17	18.9
≥5th POD	15	16.7

IPO, immediately post-operation; POD, post-operative day.

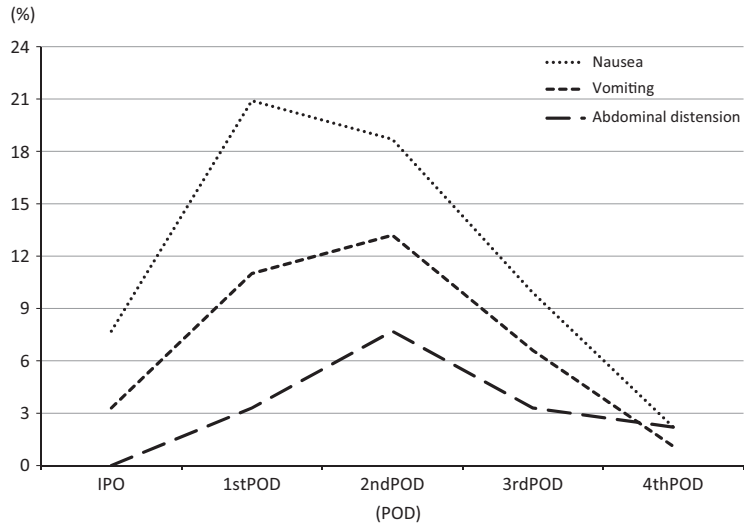

Figure 1. Rate of gastrointestinal complications by post-operative day in patients undergoing surgery for gynaecological tumours.

Table 3. Comparison of median intraoperative intravenous fluid infusion and post-operative complications in patients undergoing surgery to treat gynaecological tumours

POD	Post-operative complication	Yes/No	Total hydration (mL/kg/h)	*P*-value	Crystalloid (mL/kg/h)	*P*-value	Colloid (mL/kg/h)	*P*-value
IPO	Nausea	Yes	14.1 (9.7–20.2)	0.401	11.3 (6.1–20.2)	0.884	3.3 (0.0–5.0)	0.050
		No	12.7 (2.5–41.7)		10.2 (0.71–31.2)		1.8 (0.0–10.4)	
	Vomiting	Yes	9.8 (9.7–14.4)	0.647	6.5 (6.1–12.0)	0.264	3.3 (2.4–3.6)	0.218
		No	12.8 (2.5–41.7)		10.7 (0.7–31.2)		2.0 (0.0–10.4)	
1st POD	Nausea	Yes	13.7 (6.0–20.2)	0.947	8.8 (4.0–20.2)	0.313	2.3 (0.0–7.0)	0.077
		No	12.6 (2.5–41.7)		10.7 (0.7–31.2)		1.7 (0.0–10.4)	
	Vomiting	Yes	13.5 (7.1–21.0)	0.494	11.1 (5.7–21.0)	0.782	1.9 (0.0–5.5)	0.823
		No	12.6 (2.5–41.7)		10.4 (0.7–31.2)		2.0 (0.0–10.4)	
	Abdominal distension	Yes	20.6 (17.2–41.7)	0.007	20.6 (14.4–31.2)	0.006	2.9 (0.0–10.4)	0.426
		No	12.6 (2.5–25.4)		10.2 (0.7–22.6)		2.0 (0.0–9.0)	
2nd POD	Nausea	Yes	13.7 (6.0–21.0)	0.755	11.2 (4.0–21.0)	0.419	2.2 (0.0–7.0)	0.095
		No	12.5 (2.5–41.7)		10.2 (0.7–31.2)		1.8 (0.0–10.4)	
	Vomiting	Yes	13.2 (7.8–22.4)	0.932	9.2 (6.0–13.4)	0.301	2.2 (0.0–9.0)	0.070
		No	12.6 (2.5–41.7)		10.7 (0.71–31.2)		1.9 (0.0–10.4)	
	Abdominal distension	Yes	17.2 (15.6–24.5)	0.002	14.4 (8.8–20.6)	0.020	3.9 (0.0–7.0)	0.110
		No	12.5 (2.5–41.7)		9.98 (0.7–31.2)		2.0 (0.0–10.4)	

IPO, immediately post-operation; POD, post-operative day. Mann–Whitney test.

There was no record of death or surgery-site infection during the PO hospital stay until discharged from the hospital.

DISCUSSION

The assessment of perioperative routines practised at hospitals helps to establish intervention priorities according to the local reality, as well as to build the awareness of the team responsible for the perioperative handling of the patients.

In this study, the median length of pre-operative fasting was 11.4 (10.0–18.1) h, similar to that found in a recent multicentre study that assessed pre-operative fasting durations at hospitals in Brazil [12 (2–216) h] (Aguilar-Nascimento *et al.* 2014). This finding is above current pre-operative fast guidelines, which describe the administration of a clear liquid 2 hours prior to surgery as being safe and beneficial to the patient (American Society of Anesthesiologists Committee 2011).

General anaesthesia was the predominant anaesthesia technique, which, along with the IV administration of an opioid found in a significant percentage of the cases, contrasts with the current trend of using regional anaesthesia. In benign abdominal hysterectomies, spinal anaesthesia accelerated recovery times and reduced the costs and stress of surgery, when compared with general anaesthesia (Borendal Wodlin *et al.* 2011; Wodlin *et al.* 2011).

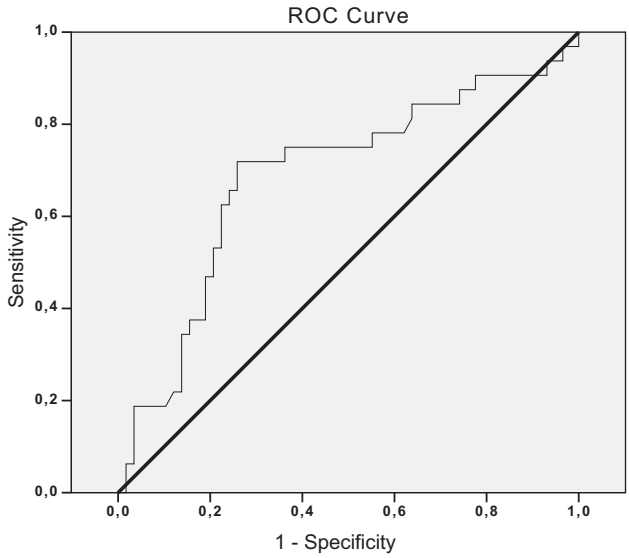

Figure 2. ROC curve for classifying cumulative fluid load immediately post-operation (IPO) through the second post-operative day.

However, the lack of a relationship between PO complications and anaesthetic technique, use of opioids and pre-operative fasting could be due to the homogeneity of the group studied in relation to the aforementioned practices.

In this study, we found a high frequency of patients using MBP with mannitol. Clinical trials found no benefit to MBP in patients undergoing colorectal and gynaecological surgeries (Miettinen *et al.* 2000; Fillmann *et al.* 2001; Zmora *et al.* 2003; Gadducci *et al.* 2010; Fanning & Valea 2011; Wodlin & Nilsson 2013), with MBP only recommended for intraoperative colonoscopies or when performing ostomies in rectal surgery (Gustafsson *et al.* 2013; Nygren *et al.* 2013). Nevertheless, MBP is still routinely performed in gynaecological oncology (Wells *et al.* 2011). In this study, MBP with mannitol was significantly associated with a higher rate of IPO nausea and more frequent administration of IV hydration, corroborating previous findings, where MBP was associated with dehydration and electrolyte disorders, hindering the balancing of fluids and electrolytes during the perioperative period, as well as being associated with a greater frequency of nausea, vomiting, paralytic ileum, abdominal discomfort, distension and pain (Wolters *et al.* 1994; Gründel *et al.* 1997; Jung *et al.* 2007). These gastrointestinal complications may delay the onset of diet or its progression, affecting the PO recovery time.

Another important finding in our study was the significant decrease in hospital stay for patients who started eating on the first POD, with no rise in morbidity or mortality. It should be noted that gastrointestinal complications arose independently of the oral diet start day and consistency, supporting the feasibility of early refeeding and advancement of the consistency according to individual tolerance during the PO period. This finding is consistent with previous research carried out in major studies on gynaecological surgery, where they did not find an increase in the rate of complications due to early refeeding during the PO period (Cutillo *et al.* 1999; MacMillan *et al.* 2000; Minig *et al.* 2009). Recently, a systematic review concluded that early PO feeding after gynaecological surgery for either benign or malignant conditions appears to be safe without increased gastrointestinal morbidities or other complications, and the benefits include shorter hospital stay (Charoenkwan & Matovinovic 2014). Furthermore, it is noteworthy that the relationship found in this study between early refeeding and hospital discharge, infection of surgery site and death rate is similar to the findings of other studies assessing the implementation of multimodal PO-recovery protocols in gynaecology, a positive aspect of our institution results (Marx *et al.* 2006; Chase *et al.* 2008; Sidhu *et al.* 2012).

We demonstrated for the first time in gynaecological surgery that all the patients receiving IV fluids over 10 mL/kg/h for intraoperative IV hydration suffered abdominal distension on the second POD. It is important to note that so far there is a dearth of evidence to guide the prescribing of intra- and PO hydration in this group of patients. There are no known studies on gynaecological surgery comparing different strategies for fluid therapy during the perioperative period and progressing into the PO period. A single study reported a modest increase in weight gain on the first POD, possibly due to excessive fluid infusions, being associated with complications in a fast-track hysterectomy (Nilsson *et al.* 2012). Moreover, the increase in the total IV hydration and the infusion of crystalloids during the intraoperative period were significantly associated with the occurrence of abdominal distension on the first and second PODs. Considering that one of the physiological responses to surgical trauma is sodium and water retention, the excessive IV infusion of crystalloid solution can cause adverse effects in gastrointestinal function, as we found in this study, due to harm done to the intestinal mucosa perfusion and splanchnic oedema (Macafee *et al.* 2005). Our findings corroborate those of Moretti *et al.* (2003) who found a greater incidence of PONV in the group given the crystalloid solution, with suggestive clinical evidence of splanchnic oedema in this group.

In this study, 79.1% of the patients started oral diet on the first POD; however, we found that almost all the patients studied (93.4%) continued to receive IV hydration, even after beginning the oral diet. Past studies

support the recommendation that euvolemic and hemodynamically stable patients should return to receiving fluids orally as soon as possible, with the suspension of IV fluid infusion, unless there is a specific reason to maintain it (Brandstrup *et al.* 2003). In fact, in a recent study on patients subjected to a PO recovery acceleration protocol, less than 2% of the patients were given IV fluids after the day the abdominal hysterectomy was performed (Macafee *et al.* 2005). Moreover, a study evaluating the use of a fluid-restriction protocol during the PO period found a decrease in the length of hospital stay and PO morbidity. Therefore, this suggests that controlling fluids both intra- and post-operatively may influence the clinical progression of the patient (Lobo *et al.* 2002; Aguilar-Nascimento *et al.* 2009).

Thus, we find in this study that prolonging IV hydration during the PO period combined with excessive fluid infusion during the intra- and PO periods may contribute to the higher rate of digestive complications. Rahbari *et al.* (2009) underscores the need to make uniform practices for IV hydration in colorectal surgery, and in agreement with the findings of this study, we suggest that there is a need to define uniform IV hydration practices for gynaecological surgery as well.

According to ROC curve, a quantity of IV fluids greater than 4 L IPO to the second POD resulted in a longer PO hospital stay. We found nothing in the literature about scientific studies performing this type of analysis on patients undergoing gynaecological surgery. In a study on patients with oesophageal cancer, there was an association between high cumulative fluids balance and greater morbidity and mortality. Therefore, cumulative fluid balance can be used as a tool for evaluating the risk of negative effects during the PO period (Wei *et al.* 2008).

This study has limitations: it was conducted with a small sample of patients and the use of mannitol was not prescribed for most patients. Although not recommended in guidelines for gynaecological surgeries, mannitol prescription is still a routine practice in our institution. However, it is expected that institutions that perform multimodal protocols for gynaecological cancer surgeries have different results from those found in this study. PONV was measured by patient self-report, and not by a Likert scale, which prevented the assessment of symptom severity. Moreover, pain medications can cause PONV *per se*, which probably exacerbates the negative effects of other perioperative routines. Nevertheless, when assessing whether there was a significant association between the occurrence of PONV and use of opioids, after controlling for the use of antiemetic medication, we did not find a significant association (data not shown).

CONCLUSIONS

Performing pre-operative MBP and excessive IV hydration during the intra- and PO periods are factors that relate to the increase in digestive complications in the study population. Considering that optimal nutritional oral feeding can prevent PO stress response and is related to marked improvements in nitrogen balance and maintenance of lean body mass, changes in pre-operative fasting time and PO refeeding also should be considered to reduce the gastrointestinal complications and, consequently, PO recovery time, as supported by our results and systematic reviews. This highlights the importance of multidisciplinary care in the perioperative period. Studies considering the fluid regime for patients with gynaecological tumours to evaluate the deleterious effects and the impact on PO recovery, as well as to establish IV fluid-infusion regimes specifically for this population, need to be performed.

CONFLICT OF INTEREST

None.

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