

UNIVERSITE DE GENEVE

FACULTE DE MEDECINE
Section de médecine Clinique
Département de Gynécologie et
d'Obstétrique
Service d'obstétrique

–
Thèse préparée sous la direction du Dr Antoine Weil, PD

**DETECTION ECHOGRAPHIQUE DES COLLECTIONS LIQUIDIENNES APRES CESARIENNE ET
HYSTERECTOMIE ET MORBIDITE POSTOPERATOIRE ASSOCIEE**

Thèse

Présentée à la Faculté de Médecine

de l'Université de Genève

pour obtenir le grade de Docteur en médecine

par

Eric Antonelli

de

Genève (GE)

Thèse n° 10412

Table des matières

Introduction française	3
Résumé de l'étude	9
Introduction	11
Methods	12
Results	15
Discussion	18
Legends for illustration	21
Bibliography	22
Tables	24

Détection échographique des collections liquidiennes après césarienne et hystérectomie et morbidité postopératoire associée.

Introduction :

La césarienne et l'hystérectomie sont les interventions chirurgicales les plus fréquemment pratiquées en gynécologie-obstétrique et ont chacune un impact et une signification particulière sur la vie des femmes.

D'un point de vue purement médical, la césarienne et l'hystérectomie, quelle que soit sa voie d'abord, sont classiquement associées à certaines complications. A court terme, la morbidité majeure concerne principalement le risque opératoire (plaies des structures avoisinantes) et l'hémorragie. La fréquence des complications dites mineures est élevée et touche 30-50% des femmes après césariennes, et peut atteindre 85% lorsque les patientes sont interrogées à domicile : endométrite, infection urinaire, anémie, asthénie, douleurs abdominales et fièvre inexplicée.

A long terme, la réalisation d'une césarienne expose à un risque de césarienne d'environ 50% lors de l'accouchement suivant, et ceci contribue probablement à une diminution du nombre total de grossesses désirées par les femmes au total. On observe en effet une diminution de la fécondité ultérieure après une césarienne chez les femmes multipares. Par ailleurs, la cicatrice utérine expose à un risque de rupture utérine en cas de tentative d'accouchement par voie basse. Les taux rapportés dans la littérature varient de 0,3 à 2,3% pour les ruptures vraies; ces taux sont doublés pour les déhiscences de cicatrices. Ce risque augmente en fonction du nombre de cicatrices utérines. La rupture utérine augmente également la morbidité néonatale et peut être parfois fatale pour l'enfant (environ 1% des cas de

rupture utérine). L'antécédent de césarienne semble également être associé à une nette augmentation du risque ultérieur d'anomalie de l'insertion placentaire (praevia) et des complications hémorragiques qui lui sont liées. Notons aussi l'augmentation du risque de placenta accreta, menaçant la vie maternelle et nécessitant la réalisation d'une hystérectomie en urgence.

De nombreuses études observationnelles ont étudié la morbidité à long terme après réalisation d'une hystérectomie et démontré la relation que pouvait avoir cette intervention sur la qualité de vie générale et la fonction sexuelle. Ces études ont aussi clairement montré l'augmentation du risque d'incontinence urinaire et de développement d'une insuffisance ovarienne précoce.

Parmi les complications mineures précoces liées à la césarienne et à l'hystérectomie, l'état fébrile postopératoire en est un des plus fréquent. Cette morbidité fébrile, définie comme une température de plus de 37.5° à deux reprises, mesurée dès le premier jour postopératoire, est classiquement associée à des infections urinaires, des surinfections ou abcès de plaies ou à des complications thromboemboliques. En dehors de ces diagnostics, l'état fébrile postopératoire pourrait être associé à la présence d'un état inflammatoire transitoire, à une nécrose tissulaire ou à la présence de collections liquidiennes postopératoires. Ces collections se situent soit dans le pelvis, soit dans la paroi abdominale.

En cas de suspicion de collection liquidiennne postopératoire, l'échographie transabdominale ou endovaginale peut être utilisée comme moyen d'investigation et de diagnostic. Lorsque ces collections sont infectées et volumineuses, l'examen échographique permet dans certains cas de réaliser un drainage.

La revue de la littérature retrouve très peu d'études prospectives ayant été réalisées afin d'évaluer l'association entre des collections liquidiennes détectées par échographie et un état fébrile postopératoire.

Concernant l'évaluation échographique de collections liquidiennes après césariennes et la morbidité postopératoire, seules deux études ont étudié cette association. La première, de Faustin et al., incluant cent femmes après césarienne retrouve 29% de collections postopératoires, sans que leur localisation soit indiquée. Parmi celles-ci, plus de 75% développent un état fébrile postopératoire, alors que parmi les patientes qui ne présentent pas de collections, 54% développent une morbidité fébrile. De plus l'administration d'antibiotique n'était pas systématique, créant un certain biais entre les groupes. Les résultats de cette étude suggèrent que seuls de volumineux hématomes, dont la taille serait égale ou plus grande à 3,5 cm, seraient en relation avec une morbidité postopératoire, en particulier un état fébrile. Mais seules huit femmes présentaient cette condition. La deuxième étude, plus récente, de Gemer et al., qui inclus également une centaine de patientes, confirme que l'état fébrile postopératoire est fréquent puisque 25% des femmes présentent cette complication. Toutefois, le taux de collections liquidiennes détectées par échographie est moins important que dans l'étude de Faustin, puisque seules 15% des patientes présentent une collection. Les auteurs suggérèrent que seules les collections sous-aponévrotiques sont associées à un état fébrile postopératoire, mais cette conclusion n'est basée que sur cinq femmes présentant cette complication.

Ces deux études, confirme que l'état fébrile postopératoire est une complication fréquente de la césarienne sans toutefois clairement démontrer l'association entre

cette morbidité fébrile et la présence de collection (antibiothérapie non systématique et localisation de la collection non précisée dans l'étude de Faustin et très faible échantillon de patientes présentant une association dans l'étude de Gemer et al.).

Concernant la détection échographique de collections liquidiennes après hystérectomies et la morbidité postopératoire, six études évaluent cette association.

Leurs résultats sont controversés et contradictoires (tableau A).

Tableau A :

AUTEURS	Année	N	Evaluation	Hystérectomies	Collections	% EF	Relation Coll/ EF
Toglia et al.	1994	38	Clinique+US vag.	Abdo. et vag.	34%	69%	+
Haines et al.	1995	71	Endovaginale	Non spécifié	42%	?	-
Slavotinek et al.	1995	32	Endovaginale	Abdo. et vag.	59%	19%	-
Eason et al.	1997	58	Endovaginale	Abdominale	62%	56%	-
Thomson et al.	1998	223	Endovaginale	Vaginale	25%	31%	+
Pardo et al.	2004	32	Non spécifié	Non spécifié	9%	0%	-

L'incidence de collections pelviennes varie nettement entre les études (9-62%) indiquant que des critères différents sont utilisés pour définir ces collections. Certains auteurs suggèrent que la présence de collections liquidiennes après hystérectomie soit associée à une morbidité fébrile alors que d'autres ne retrouvent pas cette association.

Deux études retrouvent une association significative entre la présence d'une collection postopératoire et la morbidité fébrile. L'étude de Toglia et al. vise à déterminer l'incidence des collections pelviennes chez 38 patientes après hystérectomies abdominales et vaginales détectées par toucher vaginal et échographie endovaginale et à corréliser ces examens au développement d'une morbidité postopératoire. Les auteurs évaluent la présence d'une collection uniquement par abord échographique vaginal, alors que certaines patientes ont eu une hystérectomie abdominale avec possibilité de collections pariétales. Ce biais peut également être mentionné pour deux études (Slavotinek et al. et Eason et al.) qui ne retrouvent pas d'association entre le développement de collections et une morbidité fébrile mais qui utilisent la même approche méthodologique (échographie vaginale dans le cadre d'hystérectomie abdominale). La seule publication dont la méthodologie semble correcte est le travail de Thompson et al. qui a évalué les suites opératoires de 223 hystérectomies vaginales. Le but de cette étude est de déterminer si le développement d'un hématome de la tranche vaginale permet de prédire l'apparition de complications postopératoires et en particulier d'un état fébrile. Les résultats de cette étude démontrent que la présence d'un hématome de la cicatrice vaginale détecté par échographie est associée de façon significative à un état fébrile postopératoire, à la nécessité de transfusions sanguines et à l'augmentation de la durée du séjour hospitalier. Toutefois, seules les hystérectomies vaginales sont incluses dans cette étude.

Dans la plupart des études, les facteurs de risque liés au développement de ces collections tels que le poids de la femme, le type d'opération (césarienne programmée ou d'urgence, voie d'abord de l'hystérectomie), les pertes sanguines

en cours d'intervention ou l'utilisation des drains ou d'antibiotiques sont rarement évalués ou discutés.

En conclusion, la revue de la littérature montre qu'il n'existe pas de preuve claire quant à l'existence d'une association entre la mise en évidence d'une collection par échographie et le développement d'une morbidité postopératoire, raison pour laquelle cette étude est réalisée.

Résumé de l'étude :

Cette étude prospective a été réalisée conjointement dans trois maternités de Suisse romande (Genève, Neuchâtel, La Chaux-de-Fonds) entre janvier 1999 et décembre 2000. Le protocole d'étude a été approuvé par le comité d'éthique de ces institutions et un consentement éclairé a été obtenu de chaque patiente.

Objectifs : Le but de cette étude est d'évaluer la signification clinique de collections liquidiennes détectées par échographie après césarienne et hystérectomie, et d'identifier des facteurs de risque liés au développement de ces collections.

Méthode : Nous avons réalisé une étude prospective incluant 280 femmes, dont 145 ont eu une césarienne et 135 une hystérectomie abdominale ou vaginale. Une échographie était pratiquée systématiquement au quatrième jour postopératoire afin de déterminer la présence d'une collection liquidienne, soit au niveau de la paroi abdominale, soit dans le pelvis. Les échographistes étaient tenus à l'écart de l'évolution clinique de patientes et n'étaient impliqués dans aucune décision clinique. Le diagnostic de collection était corrélé aux données cliniques et à la morbidité postopératoire.

Résultats : Une collection liquidienne a été retrouvée chez 69 femmes (48%) dans le groupe césarienne et chez 59 femmes (44%) dans le groupe hystérectomie. Nous n'avons pas identifié de facteurs de risque liés au développement de collections postopératoires, que ce soit après césarienne ou hystérectomie. Le risque de développer un état fébrile après ces interventions, n'est pas associé à la présence, la taille ou la localisation d'une collection.

Conclusion : Les collections liquidiennes détectées par échographie après césarienne et hystérectomie sont fréquentes. Au vu de l'absence d'association entre

ces collections et une morbidité postopératoire, en particulier un état fébrile, il ne semble pas utile de les rechercher systématiquement par échographie en cas de fièvre postopératoire.

Introduction

Caesarean section and hysterectomy are the most frequent surgical operations in obstetrics and gynaecology. The occurrence of postoperative febrile morbidity is often observed.¹⁻³ In addition to specific conditions such as urinary tract infection, wound abscess or thrombophlebitis, postoperative fluid collections may be associated with febrile morbidity. Endovaginal or transabdominal sonography may be used to detect and, eventually, drain fluid collections.

Few prospective studies have been conducted to evaluate the association between postoperative fluid collections detected by ultrasonography and febrile morbidity. A study of women after caesarean section suggested that large haematomas are associated with postoperative morbidity, including fever.⁴ Gemer et al. suggested that subfascial haematoma are associated with febrile morbidity, but this conclusion is based on only 5 women presenting with this condition.⁵ Results of studies conducted after hysterectomy are controversial. The incidence of pelvic fluid collections vary greatly between studies, which may indicate that various definitions (and criteria) were used.⁶⁻⁹ Some authors suggested that the presence of ultrasonographically-diagnosed pelvic fluid collections is associated with febrile morbidity^{8,9}, while others were unable to demonstrate such a relationship.^{6,7,10} Risk factors for developing postoperative fluid collections were rarely assessed or discussed.

Our objective was to evaluate the clinical significance of ultrasonographically-diagnosed fluid collections after caesarean section and hysterectomy, and to identify risk factors associated with their formation.

Methods

A prospective study was conducted between January 2000 and December 2001 in the obstetric and gynecology departments of a Swiss university tertiary care hospital and two public teaching hospitals. The study protocol was approved by the institutional ethics committees and written informed consent was obtained from all women before inclusion in the study.

One hundred and forty five women who had a caesarean section and 135 who had abdominal or vaginal total hysterectomy participated in the study. Women were included consecutively, except when the participating sonographers were unavailable. Exclusion criteria included any preoperative infection, administration of anticoagulants other than prophylaxis for thrombophlebitis (subcutaneous nadroparin 2850 IU/day), and symptomatic postoperative urinary tract infection. Specific exclusion criteria in the caesarean section group were rupture of the membranes for more than 36 hours and, in the hysterectomy group, neoplasia, ascitis or endometriosis.

For both groups, indication for operation, surgical technique, duration and amount of blood loss were recorded. Collected data included age, preoperative weight, parity (for women who had a caesarean section), and number of years after menopause for women who had an hysterectomy. Type of caesarean section (i.e., elective or emergency) and of hysterectomy (i.e., abdominal or vaginal) were also recorded.

Postoperative morbidity included fever, blood loss and subcutaneous serous flow. Body temperature was measured every 8 hours. Febrile morbidity was defined as a temperature of at least 37.5°C on any two hospital days after surgery, excluding the first 24 hours. All women who underwent caesarean section received prophylactic antibiotics. Antibiotic prophylaxis was not administered systematically during

hysterectomy. Significant blood loss was defined as a difference of at least 20 g/L between the preoperative and the day 3 postoperative haemoglobin level. Subcutaneous serous flow was considered present if additional wound care was needed.

All women underwent a sonographic examination on day 4 postoperatively to assess the presence of parietal or pelvic fluid collection. Sonographic evaluation was performed by one of 3 investigators (EA, PD or MM) who were blinded to the women clinical course before examination and were not involved in any clinical decision making. Health care providers were unaware of the results of the ultrasonography. Examination was performed with a real-time ultrasound scanner (Toshiba vssA-270a, Nasu, Japan) using either a 3.5 MHz or a 5MHz abdominal probe, or with a 6.5 MHz vaginal probe. The caesarean section group had only abdominal ultrasonography. Women in the vaginal hysterectomy group had only vaginal ultrasonography and the abdominal hysterectomy group had both vaginal and abdominal ultrasound scanning. In the latter group, vaginal examination was carried out first with the woman in semi-recumbent position and with an empty bladder. Transabdominal examination was then conducted in the recumbent position. The three main diameters of any detected echo-free areas were measured (the radius was obtained by dividing this measurement by two). Volume of fluid collection was calculated using the formula for an ellipse ($\frac{4}{3}\pi \times r_1 \times r_2 \times r_3$).⁶ The vaginal vault, the Douglas pouch, the bladder flap area, and the abdominal wall were systematically examined. Characteristics of the fluid collection were recorded. A parietal wall collection was defined as any subcutaneous or subfascial echo-free area. Pelvic collections were diagnosed when the volume of the echo-free area was superior to 20 mL. This cut-off value was chosen because it represents the average volume of fluid found in women undergoing laparoscopic tubal sterilisation.¹¹

Measurement of fluid collection by vaginal ultrasonography was considered as a valid method when compared with direct laparoscopic measurement.^{12,13}

Statistical significance was assessed with the χ^2 test or the Fisher exact test in the case of proportions and with the Student t test in the case of continuous variables. A P value of less than 0.05 was considered as indicating statistical significance. Data analysis was performed with EpiInfo software (CDC, Atlanta, GA).

Results

Two hundred and ninety-six women were eligible for the study. Sixteen were subsequently excluded for postoperative urinary tract infection (9 after caesarean section, and 7 after hysterectomy). Of the remaining 280 participants, 145 underwent a caesarean section and 135 underwent an hysterectomy. Most of these operations were performed by residents. In the caesarean section group, the mean age was 29.6 years and the mean weight was 79.5 kg. In the hysterectomy group, the mean age was 51.8 years and the mean weight was 67.6 kg.

Following caesarean section, we detected a fluid collection in 69 women (48%), 58 located in the abdominal wall and 11 in the pelvis. None of the women had collections in both sites. The median volume of abdominal wall fluid collections was 25 mL (range, 3-387 mL), and the median volume of pelvic fluid collections was 59 mL (range, 41-274 mL). Most of the latter were described as fixed, hypoechogenic and heterogeneous, suggesting a diagnosis of pelvic haematoma. In two cases, free peritoneal fluid was observed. We have not identified risk factors for the development of fluid collections after (Table 1). Obstetric data, surgical technique (closure of the peritoneum), and operative drainage were not statistically associated with the presence of a fluid collection. There was also no association between the size of the collection and febrile morbidity following caesarean section, even when the fluid collection was greater than 50 mL (Table 4).

Following hysterectomy, a fluid collection was diagnosed in 59 women (44%). Nineteen women had fluid detected in the abdominal wall only, 33 in the pelvis only and 7 women had both pelvic and abdominal wall collections. The median volume of the abdominal wall fluid collections was 21 mL (range, 3-227 mL) and of the pelvic

fluid collections was 44 mL (range, 20-554 mL). The two largest collections (297 and 554 mL) were diagnosed as free peritoneal fluid by sonography (Figure 1). All other collections were fixed, and hypoechogenic, suggesting the diagnosis of haematoma. We have not identified risk factors for developing fluid collections after hysterectomy (Table 2). Menopausal status, type of hysterectomy, associated incontinence surgery and postoperative drainage were not statistically associated with the presence of a fluid collection.

The risk of developing febrile morbidity was not related to the presence of a fluid collection in any of the groups (Table 3). Febrile morbidity was diagnosed in 60 women following caesarean section. Thirty women (44%) diagnosed with a collection developed fever, compared with 30 (40%) without fluid collection. Women who had abdominal wall collection were no more likely to develop fever than those who had a pelvic collection (39% and 42%, respectively). Following hysterectomy, 24 women with a fluid collection (41%) had febrile morbidity, compared to 36 (47%) without a fluid collection. There was also no association between the size of the collection and febrile morbidity following hysterectomy, even when the fluid collection was greater than 50 mL (Table 4).

Twenty-four women (17 after caesarean section and seven after hysterectomy) developed serous cutaneous flow during hospitalisation and required ambulatory care. There was no association between the ultrasonographically-detected fluid collections and serous cutaneous flow (Table 3). Duration of stay in hospital was not increased because of this complication.

Seven women developed severe complications. Two women who underwent caesarean section and one who had abdominal hysterectomy had wound complications which required surgical drainage, antibiotics and prolonged hospital

stay. All three had a large subcutaneous haematoma, clinically evident. Following caesarean section, two women had persistent fever and wound abscess not requiring surgical drainage. Two women who underwent hysterectomy developed a fistula. One had a vesico-vaginal fistula after vaginal hysterectomy, but no fluid collection was diagnosed by ultrasonography; the second had ileo-vaginal fistula 10 days following surgery and underwent surgical repair.

Discussion

Our results show that fluid collections are frequently detected by ultrasonography both after caesarean section and after hysterectomy. However, their significance remains unclear, given the absence of an association between presence, location and size of a fluid collection, and postoperative fever or serous cutaneous flow.

The definition of postoperative febrile morbidity is controversial.⁸ We chose a relatively low cut-off (at least 37.5°C twice, excluding the first postoperative day) to increase the sensitivity of the detection of fever.

Ultrasonographic examinations were performed on day 4 postoperatively to minimise discomfort and to detect the presence of fluid collections not resorbed soon after surgery. To minimise the risk of bacterial contamination with vaginal probes, only transabdominal ultrasonography was performed after caesarean section. The disadvantage of this approach is related to the difficulty to detect small pelvic collections, thus leading to a possible underestimation of total fluid volume detected. Intraoperative blood loss was assessed by recording both estimated intraoperative blood loss and differences in haemoglobin levels measured before and after surgery.

Few data are available on fluid collections following caesarean section. In a study including 100 women who underwent caesarean section, fluid collection was detected in 29.⁴ The association between fluid collection and postoperative morbidity was found to be statistically significant in eight women who presented a large haematoma (largest diameter >3.5 cm). Antibiotics were administered not only to these eight women, but also as a prophylaxis when membranes were ruptured for more than 6 hours. In our study, we have not found an association between large collection and febrile morbidity. More recently, a report including 111 women

showed fluid collection in 14%.⁵ Five women with subfascial haematoma had fever. Unfortunately, antibiotic prophylaxis, surgical techniques and risk factors for the development of fluid collection were not reported.

Association between morbidity and fluid collections after hysterectomy is a controversial issue. Recent studies showed that the incidence of fluid collection varies from 25% to 62%.⁶⁻¹⁰ Different criteria and methods used to assess fluid collection might account for these variations. Toglia et al. performed transvaginal sonography in 38 women after hysterectomy, of whom 34% developed pelvic fluid collections.⁹ They reported an association between fluid collection and febrile morbidity. The majority of women (32/38) had undergone abdominal hysterectomy, but possible parietal wall collection was not investigated. Recently, an association between fluid collection and postoperative morbidity following vaginal hysterectomy was reported.⁸

In contrast, three studies reported an absence of association between fluid collection detected by sonography and postoperative morbidity following hysterectomy. In a study including 58 women who had abdominal hysterectomy, 62% had pelvic fluid collection detected by endovaginal sonography.⁶ Slavotinek et al. performed endovaginal sonography in 32 women to determine the incidence of pelvic collection after abdominal and vaginal hysterectomy.⁷ However, they failed to show a significant association between the presence of fluid collection and postoperative pyrexia or other clinical parameters. Haines et al. performed endovaginal sonography in 66 women after abdominal or vaginal hysterectomy and reported an incidence of 42% of vault haematoma, which was not associated with postoperative morbidity.¹⁰

The incidence of postoperative fever with no obvious cause is common. Our study did not demonstrate any association between postoperative morbidity and fluid collection detected by ultrasonography, even when a cut-off greater than 20 mL was used to define a pelvic collection. Therefore, a systematic search for postoperative collection by sonography in case of transient fever might not be justified. A more useful approach may be to perform ultrasonography only in women presenting prolonged or recurring fever, after common causes of postoperative pyrexia are ruled out. Similarly, the presence of a fluid collection was not a good predictor of serous subcutaneous flow or other postoperative morbidity. As almost half of all women had an ultrasonographically-detected fluid collection following caesarean section or hysterectomy without increased morbidity, such a finding in asymptomatic women may be ignored. Only rare conditions require surgical drainage, such as abscess refractory to antibiotic treatment. Our results do not justify a systematic search for postoperative collection by sonography.

Legends for illustration

Figure 1:

Panel A: Sagittal view of the pelvis showing a large hypoechoic fluid collection



Panel B: Transverse view of the same fluid collection



References

1. van Ham MA, van Dongen PW, Mulder J. Maternal consequences of caesarean section. A retrospective study of intra-operative and postoperative maternal complications of caesarean section during a 10-year period. *Eur J Obstet Gynecol Reprod Biol* 1997;74:1-6.
2. Hill DJ. Complications of hysterectomy. *Baillieres Clin Obstet Gynaecol* 1997;11:181-97.
3. Harris WJ. Early complications of abdominal and vaginal hysterectomy. *Obstet Gynecol Surv* 1995;50:795-805.
4. Faustin D, Minkoff H, Schaffer R, Crombleholme W, Schwarz R. Relationship of ultrasound findings after cesarean section to operative morbidity. *Obstet Gynecol* 1985;66:195-8.
5. Gemer O, Shenhav S, Segal S, Harari D, Segal O, Zohav E. Sonographically diagnosed pelvic hematomas and postcesarean febrile morbidity. *Int J Gynaecol Obstet* 1999;65:7-9.
6. Eason E, Aldis A, Seymour RJ. Pelvic fluid collections by sonography and febrile morbidity after abdominal hysterectomy. *Obstet Gynecol* 1997;90:58-62.
7. Slavotinek J, Berman L, Burch D, Keefe B. The incidence and significance of acute post-hysterectomy pelvic collections. *Clin Radiol* 1995;50:322-6.
8. Thomson AJ, Sproston AR, Farquharson RG. Ultrasound detection of vault haematoma following vaginal hysterectomy. *Br J Obstet Gynaecol* 1998;105:211-5.
9. Toglia MR, Pearlman MD. Pelvic fluid collections following hysterectomy and their relation to febrile morbidity. *Obstet Gynecol* 1994;83:766-70.

10. Haines CJ, Shan YO, Hung TW, Chung TK, Leung DH. Sonographic assessment of the vaginal vault following hysterectomy. *Acta Obstet Gynecol Scand* 1995;74:220-3.
11. Koninckx PR, Renaer M, Brosens IA. Origin of peritoneal fluid in women: an ovarian exudation product. *Br J Obstet Gynaecol* 1980;87:177-83.
12. Khalife S, Falcone T, Hemmings R, Cohen D. Diagnostic accuracy of transvaginal ultrasound in detecting free pelvic fluid. *J Reprod Med* 1998;43:795-8.
13. Nichols JE, Steinkampf MP. Detection of free peritoneal fluid by transvaginal sonography. *J Clin Ultrasound* 1993;21:171-4.

Table 1: Characteristics of women according to the diagnosis of fluid collection. Caesarean section group (n=145).

	Collection present (n=69)	Collection absent (n=76)	<i>P</i> value
Age (mean, SD)	29.7 (4.68)	29.6 (5.30)	0.90
Weight in kg (mean, SD)	77.9 (13.61)	75.2 (13.25)	0.23
Weight \geq 75 kg	34 (49.3%)	29 (38.2%)	0.17
Nulliparity	40 (58.0%)	43 (56.6%)	0.86
Emergency caesarean	32 (46.4%)	39 (51.3%)	0.55
Past history of caesarean	17 (24.6%)	20 (26.3%)	0.81
Operative time \geq 45 minutes	36 (52.2%)	38 (50.0%)	0.79
Meconium stained fluid	10 (16.7%)	8 (9.4%)	0.19
Blood loss \geq 500 mL	41 (59.4%)	40 (52.6%)	0.41
Non closure of peritoneum	49 (71.0%)	51 (67.1%)	0.61
Use of drainage	31 (44.9%)	38 (50.0%)	0.54
Delta Hb* \geq 20 g/L	23 (33.3%)	24 (31.6%)	0.82

* Delta Hb: difference between the preoperative and the day 3 postoperative haemoglobin level.

Table 2: Characteristics of women according to the diagnosis of fluid collection.

Hysterectomy group (n=135)

	Collection present	Collection absent	<i>P</i> value
	(n=59)	(n=76)	
Age (mean, SD)	50.5 (8.7)	52.9 (12.4)	0.22
Weight in kg (mean, SD)	70.2 (20.2)	65.7 (9.7)	0.09
Weight \geq 75 kg	14 (23.7%)	11 (14.5%)	0.17
Premenopause	41 (69.5%)	47 (61.8%)	0.35
Abdominal hysterectomy	43 (72.9%)	49 (64.5%)	0.30
Vaginal hysterectomy	16 (27.1%)	27 (35.5%)	0.30
Incontinence surgery	14 (23.7%)	21 (27.6%)	0.61
Operative time \geq 120 min	31 (52.5%)	39 (51.3%)	0.88
Antibiotic prophylaxis	35 (59.3%)	43 (56.6%)	0.74
Blood loss \geq 500 mL	19 (32.2%)	24 (31.6%)	0.93
Use of drainage	39 (66.1%)	45 (59.2%)	0.41
Delta Hb \geq 20 g/L	36 (61.0%)	40 (52.6%)	0.33

* Delta Hb: difference between the preoperative and the day 3 postoperative haemoglobin level.

Table 3: Incidence of febrile morbidity and serous cutaneous flow, according to the presence of a fluid collection

	Caesarean section (n=145)			Hysterectomy (n=135)		
	Collection present	Collection absent	<i>P</i> value	Collection present	Collection absent	<i>P</i> value
	(n=69)	(n=76)		(n=59)	(n=76)	
Febrile morbidity	30 (43.5%)	30 (39.5%)	0.74	24 (40.7%)	36 (47.4%)	0.49
Serous cutaneous flow	6 (8.7%)	11 (14.5%)	0.31	3 (5.1%)	4 (5.3%)	1.0

Table 4: Incidence of febrile morbidity according to the size of a fluid collection

	Fever present	Fever absent	<i>P</i> value
Abdominal Hysterectomy (n=92)			0.08*
0 mL	29 (59%)	20 (41%)	
> 0mL to ≤ 50 mL	7 (27%)	16 (73%)	
≥ 50mL	10 (50%)	10 (50%)	
Vaginal hysterectomy (n=43)			0.15*
0 mL	7 (26%)	20 (74%)	
> 0mL to ≤ 50 mL	3 (30%)	7 (70%)	
≥ 50mL	4 (67%)	2 (33%)	
Caesarean section (n=145)			0.64*
0 mL	29 (39%)	46 (61%)	
> 0mL to ≤ 50 mL	20 (42%)	28 (58%)	
≥ 50mL	11 (50%)	11 (50%)	

* df=2