We evaluated the clinical significance and possible association of febrile morbidity with sonographically detected post-hysterectomy fluid collections. Transvaginal ultrasound examinations were performed to assess the presence of fluid collections and correlated to clinical data. Fluid collection was detected in 27 (64%) women at postoperative day 2, in 15 (35%) at postoperative day 7 and in 5 (12%) at the fourth to fifth postoperative week. Febrile morbidity was not related to the presence, location or size of fluid collection. Postoperative pelvic fluid collections are common sonographic findings after hysterectomy and are not associated with postoperative febrile morbidity.

Keywords
Hysterectomy, pelvic fluid collection, ultrasound.

Introduction

Hysterectomy is one of the most common gynaecologic operations. Postoperative febrile morbidity after hysterectomy is an often-observed complication, which can be attributed to infection at various sites, such as the intravenous line, the urinary tract and the surgical wound, or to thrombophlebitis. Postoperative pelvic fluid collections (PFC) and haematomas may also be considered a possible source of febrile morbidity. Endovaginal or transabdominal sonography are used to detect and sometimes guide the drainage of these fluid collections in an attempt to resolve this suspected source of postoperative fever. Few studies have been conducted to evaluate a possible association between febrile morbidity and post-hysterectomy PFC, as detected by ultrasound, and their results are controversial. Some studies support the view that post-hysterectomy PFC as diagnosed by ultrasound are related to febrile morbidity, while others reject such an association. Moreover, the reported total and time-related incidence of PFC varies greatly between these studies, possibly due to different diagnosis criteria. Finally, risk factors for developing post-hysterectomy PFC still remain undefined.

The objectives of the present study were to evaluate the total and time-related incidence of sonographically diagnosed PFC after abdominal and vaginal hysterectomy, to identify risk factors for such occurrences and to evaluate their clinical significance and any association with postoperative febrile morbidity.

Methods

This retrospective longitudinal study was conducted from January 2003 to December 2005 at the Tel Aviv Sourasky Medical Center, a 1200-bed tertiary care university-affiliated hospital. The study protocol was approved by the institutional ethics committee. A total of 78 patients who underwent either abdominal or vaginal hysterectomy during the study period were included into the study. Exclusion criteria were any preoperative infection or preoperative pelvic fluid documented by ultrasonography.

The data were extracted from patients’ medical charts and included the patients’ age, preoperative body mass index (BMI), past operations, indication for hysterectomy and type of planned surgery (vaginal/abdominal), uterus size, duration of operation, surgeon’s estimation of blood loss, pre- and postoperative haemoglobin concentration and the use of blood products.
Postoperative follow up included routine haemoglobin measurements, twice daily temperature measurements, record of serous fluid discharge and readmission to hospital after discharge following the index procedure. Febrile morbidity was defined as a body temperature of at least 38°C following surgery.

All patients underwent routine follow-up visits at our clinic, which included physical examination and sonographic examination on days 2 (in hospital), 7 and 24–30 postoperatively (in clinic). Sonographic evaluation was performed by the gynaecological ultrasound unit’s technicians and physicians who were unaware of the patient’s clinical course and were not involved in any clinical decision making. The ultrasonographic examinations were performed by a 6.5-MHz vaginal probe. PFC volume was calculated using the formula for an ellipse \((4\pi/3 \times r_1 \times r_2 \times r_3)\).

Statistical significance was evaluated with the chi-square test or Fisher’s exact test in the case of proportions and with Student’s t test in the case of continuous variables. P value <0.05 was considered statistically significant.

**Results**

From a total of 78 suitable subjects, 12 women had preoperative pelvic fluid (mostly ascites) during the study period and were excluded from the study. Another 24 women did not complete the three follow-up ultrasounds, leaving 42 women who comprised the final cohort. There were technical difficulties in performing the ultrasonographic examination on three women, two related to obesity and one to dense abdominal adhesions.

The mean age of the 14 women in the vaginal hysterectomy group was 63.3 years (±5.1; mean ± SD) and their mean BMI was 27.4 (±2.4) kg/m². The mean age of the 28 women in the abdominal hysterectomy group was 56.4 (±4.4) years and their mean BMI was 25.1 (±2.2) kg/m².

The mean duration of surgery was 118.3 (±22.1) minutes for vaginal hysterectomy, and the average uterine size was that of 8 (±1.2) weeks of gestation. The mean duration of surgery was 53.5 (±14.3) minutes for abdominal hysterectomy, and the average uterine size was that of 13.2 (±2.4) weeks of gestation. Five of the women in the vaginal hysterectomy group (34%) and seven of the women in the abdominal hysterectomy group (25%) had undergone previous abdominal surgery. The surgical indications for the current operations were fibroids (24/42, 57%), menometrorrhagia and anaemia (11/42, 26%) or malignancy/premalignant lesion (7/42, 17%).

Blood loss, as estimated intraoperatively by the surgeon, was significantly higher in the vaginal hysterectomy group compared with the abdominal hysterectomy group (350 ± 120 versus 180 ± 90 cc, respectively, \(P < 0.05\)). Nevertheless, neither the preoperative nor the postoperative haemoglobin levels were significantly different between the groups (preoperative: 10.8 g/dl for abdominal versus 11.2 g/dl for vaginal; and postoperative: 10.2 g/dl for abdominal versus 10.4 g/dl for vaginal). The drop in haemoglobin level was also not significantly different between the two groups (16% abdominal versus 18% vaginal, \(P = \) not significant [NS]). Three women in each group received blood products postoperatively, and surgical drains were left in one woman in the abdominal hysterectomy group and in two women in the vaginal hysterectomy group.

Collection of fluid on postoperative day 2 was detected in 27 women (64%). The development of PFC was not related to patients’ age, BMI, type of surgery (vaginal/abdominal), duration of operation or blood loss. Seventeen out of 42 patients (40%) developed postoperative fever. The risk of developing febrile morbidity was not associated with the diagnosis of PFC.

Dividing the groups according to the presence or absence of postoperative febrile morbidity also demonstrated its lack of association with the presence of PFC: 11/17 (64%) of women diagnosed with febrile morbidity on postoperative day 2 had fluid collection compared with 16/25 (64%) of women without febrile morbidity who developed PFC.

The fluid collection diameter on sonography was also not significantly different between the women who developed postoperative febrile morbidity and those who did not (2.9 versus 2.6 cm, \(P = \) NS).

Follow up at postoperative day 7 revealed that 13 of the 27 (48%) detected PFC that had been present at day 2 were still present. Of the 15 women who were free of postoperative PFC at day 2, only two developed pelvic collections at day 7 (13%; Table 1). Noteworthy, 11 of the 15 (73%) PFC present at postoperative day 7 resolved by the fourth to fifth postoperative week.

**Discussion**

The issue of an existing association between post-hysterectomy PFC and development of febrile morbidity is currently a matter of considerable controversy. This study shows no association between the presence of PFC post-hysterectomy and febrile morbidity. Fluid collection diameter on sonography was also not significantly different between the women who did and did not develop postoperative fever, nor were age, BMI, type of surgery, duration of operation or blood loss risk factors for PFC development. Our study demonstrated the

<table>
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<th>Table 1. Presence of PFC over time</th>
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<td>Postoperative day</td>
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<td>Collection (n)</td>
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natural course of convalescence of these pelvic collections during the 1 month of follow up. Interestingly, fluid collection detected at postoperative day 2 was still present at day 7 in almost one-half (48%) of the women while only 13% of women developed new PFC at day 7 and 73% of the collections that were present at day 7 were resolved by days 24–30. Almost all (96%) of the women who had no PFC at postoperative day 7 were still free of collection at postoperative days 24–30.

The reported incidence of post-hysterectomy fluid collections ranges from 25% to as high as 98%.1–6 These wide variations could probably be explained by the different criteria for assessing fluid collections and differentiating between physiologic fluid and a true collection. Toglia and Pearlman1 found PFC in 34% of women after hysterectomy, of whom 70% developed fever. Thomson et al.2 observed 223 women after vaginal hysterectomy and reported that 25% of them developed vault haematoma and had significantly higher rates of postoperative fever (31 versus 7% for women without haematoma). Kuhn and de Crespigny3 found that 49 out of 50 women developed vault haematoma after vaginal hysterectomy and that 70% of them had febrile morbidity. In contrast, others reported no association between fluid collections detected by sonography and postoperative febrile morbidity. Antonelli et al.6 found a fluid collection incidence of 44% in a study that included 135 women who underwent hysterectomy. They showed no association between the presence of fluid collections and postoperative fever: fever developed in 41% of women with fluid collection and in 47% of women without fluid collection. That study also revealed similar results for women after caesarean section. Haines et al.5 reported an incidence of 42% of fluid collection post-hysterectomy as diagnosed by transvaginal sonography: no association was found with the development of postoperative fever. Eason et al.4 also failed to demonstrate any association between post-hysterectomy fluid collection and febrile morbidity.

**Conclusion**

Our results show that fluid collections are ubiquitous after vaginal and abdominal hysterectomy. Our study also reveals the natural course of convalescences that these collections demonstrate over time, even though some collections can persist and were still present 1 month after surgery. Risk factors associated with developing PFC post-hysterectomy were not identified. The presence, size and location of PFC were not related to postoperative febrile morbidity. These findings should be taken into account while performing the workup for postoperative fever. Thus, although it has been assumed that a PFC may be the source of infection in the febrile patient post-hysterectomy and represent an infected haematoma or abscess, which requires drainage, we conclude that this finding may be nonspecific and one that does not always necessitate treatment. The criteria for diagnosing a true post-hysterectomy pelvic infection and which febrile patient requires surgical drainage of PFC need more refinement.

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**References**


