

Frequency and Yield of Postoperative Fever Evaluation

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ABSTRACT

Objective: In women undergoing major gynecologic surgery, we wish to determine the frequency and yield of blood culture, urine culture, and chest X-ray evaluation of postoperative fever.

Methods: A retrospective review of 537 consecutive patients undergoing major gynecologic surgery was performed. In patients who developed postoperative fever, it was determined whether blood culture, urine culture, and/or chest X-ray were performed, and, if so, the frequency of positive results was evaluated.

Results: Two hundred eleven patients (39%) developed postoperative fever. Blood cultures were obtained in 77 of 211 (37%) febrile patients, urine cultures in 106 of 211 (50%) febrile patients, and chest X-ray in 54 of 211 (26%) febrile patients. Zero of 77 blood cultures were positive, 11 of 106 (10%) urine cultures were positive, and 5 of 54 (9%) chest X-rays were positive. Logistic regression revealed that late onset fever predicted for positive urine cultures and early onset fever and advanced age predicted for pneumonia. Eighty percent of patients with pneumonia were symptomatic. In 92% of patients with postoperative fever, no infections or pathologic process were diagnosed.

Conclusion: Although postoperative fever is frequently evaluated by blood culture, urine culture, and chest X-ray, evaluation rarely yields positive results. *Infect. Dis. Obstet. Gynecol.* 6:252-255, 1998. © 1999 Wiley-Liss, Inc.

KEY WORDS

postoperative fever; urine culture; blood culture; chest X-ray

There are multiple studies evaluating the incidence of postoperative fever following major gynecologic surgery, with rates of febrile morbidity reported as 32-52%.¹⁻⁴ Most studies contain less than 100 patients.²⁻⁴ These studies routinely state that urine culture, blood culture, and chest X-ray are obtained to evaluate postoperative fever.¹⁻⁴ However, evaluation of postoperative fever by blood culture, urine culture, and chest X-ray is based on anecdotal evidence and not on scientific analysis. Basic science research has shown that

postoperative release of cytokines is a major cause of postoperative fever.⁵ Routine use of preoperative prophylactic antibiotics has significantly decreased the incidence of operative site infection following major gynecologic surgeries.^{1,6}

To our knowledge, there are no large studies that have analyzed the yield of postoperative fever evaluation after major gynecologic surgery. Because of lack of scientific analysis, basic science evaluation of cytokines, use of prophylactic antibiotics, and increased pressure for cost control, we

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wish to determine the frequency of postoperative fever evaluation and determine the yield of blood culture, urine culture, and chest X-ray evaluation of postoperative fever.

SUBJECTS AND METHODS

We conducted a retrospective analysis of all major gynecologic surgeries performed from January 1995 through January 1996. Major gynecologic surgical procedures included abdominal hysterectomy, vaginal hysterectomy, laparotomy, operative laparoscopy, hysterectomy with lymphadenectomy, ovarian cytotoreduction, radical hysterectomy, and vulvectomy. No patients were excluded. Data collected included: fever, age, weight, smoking history, associated medical diseases, type of surgical procedure, blood loss, transfusions, operative time, length of bladder catheterization, length of hospitalization, and use of preoperative prophylactic antibiotics. We defined postoperative fever as any temperature $\geq 38^{\circ}\text{C}$ excluding the day of surgery. Although the conventional definition of febrile morbidity is two temperatures $\geq 38^{\circ}\text{C}$ taken six hours apart excluding the day of surgery,¹ we chose to evaluate any temperature $\geq 38^{\circ}\text{C}$ excluding the day of surgery because we were interested in the frequency and yield of any fever evaluation. It is our belief that some gynecologic residents and gynecologists evaluate fevers without waiting six hours for a second temperature evaluation. However, for completeness, we also evaluated febrile morbidity. In patients who developed postoperative fever, it was determined whether urine culture, blood culture, and/or chest X-ray were performed, and the results of these evaluations were examined. Because this was a retrospective study evaluating patients treated by a large number of clinical and full-time faculty members, no criteria existed for fever evaluation. This study was approved under expedient review by the Institutional Review Board.

Statistics were analyzed using the SPSS for Windows. Logistic regression analysis was used to determine if any preoperative or operative variables would significantly identify positive urine culture, blood culture, or chest X-ray.

RESULTS

Hospital records of 537 consecutive patients who underwent major gynecological procedures were

TABLE 1. Patient characteristics of febrile patients (n = 211)

Median age (range)	48 y (19–98 y)
Median weight (range)	160 lb (107–330 lb)
Smoker	73 (37%)
Medical diseases	
None	159 (75%)
Cardiac	27 (13%)
Respiratory	20 (9%)
Diabetes	17 (8%)
Gastrointestinal	3 (1%)

reviewed. The incidence of postoperative fever was 39% (211/537). The incidence of febrile morbidity was 37% (197/537). Excluding the day of surgery, only 14 patients had a single fever spike that lasted less than six hours. Febrile patient characteristics are described in Table 1. Median age of patients was 48 years (range: 19–98 years), and median weight was 160 lb (range: 107–330 lb). Seventy-three out of 211 (37%) postoperative febrile patients had a smoking history. One hundred fifty-nine of 211 patients (75%) had no significant associated medical illness. Surgical characteristics of febrile patients are listed in Table 2. Seventy-nine percent (166/211) of febrile patients had major gynecological surgery for benign disease, and the remaining 45/211 (21%) had surgery for gynecologic cancer. The median blood loss was 250 mL (range: 50–1,100 mL). Median operating time was 140 min (range: 30–400 min). Ten percent (21/211) of febrile patients received blood transfusions. Seventy-four percent (157/211) of febrile patients were given preoperative prophylactic antibiotics. Median length of bladder catheterization was two days (range: 1–11 days), and median length of hospitalization was four days (range: 1–20 days).

Table 3 lists the results of postoperative fever evaluation. Blood cultures were obtained in 37% (77/211) of febrile patients and 39% (77/197) of febrile morbidity patients with 0/77 positive blood cultures. Fifty percent of febrile patients (106/211) and 53% (105/197) of febrile morbidity patients had urine cultures obtained, with 10% (11/106) yielding positive cultures. Fifty-four of 211 (26%) febrile patients and 54/197 (27%) of febrile morbidity patients had a chest X-ray, with 5/54 (9%) demonstrating results consistent with pneumonia. Of the five febrile patients with chest X-ray evidence of pneumonia, the median length of postoperative fever was three days (range: 2–4 days). Four of five

TABLE 2. Surgical characteristics of febrile patients (n = 211)

Surgery	
Hysterectomy	97 (46%)
Laparotomy/operative laparoscopy	28 (13%)
Vaginal hysterectomy	41 (19%)
Benign	166 (79%)
Hysterectomy with lymphadenectomy	19 (9%)
Ovarian cytorreduction	16 (8%)
Radical hysterectomy	7 (3%)
Vulvectomy	3 (1%)
Oncologic	45 (21%)
Median blood loss (range)	250 mL (50–1,100 mL)
Transfusions	21 (10%)
Median operative time (range)	140 min (30–400 min)
Median length of bladder catheterization	2 days (1–11 days)
Median length of hospitalization (range)	4 days (1–20 days)
Prophylactic antibiotics	157 (74%)

TABLE 3. Fever evaluation

	Fever	Febrile morbidity
Patients	211/537 (39%)	197/537 (37%)
Blood cultures obtained	77/211 (37%)	77/197 (39%)
Positive blood cultures	0/77	0/77
Urine cultures obtained	106/211 (50%)	105/197 (53%)
Positive urine cultures	11/106 (10%)	11/105 (10%)
Chest X-ray obtained	54/211 (26%)	54/197 (27%)
Pneumonia on chest X-ray	5/54 (9%)	5/54 (9%)

patients were symptomatic, with shortness of breath and/or chest pain. Of the 11 patients with urinary tract infections, the median length of postoperative fever was two days (range: 1–7 days). Only two of 11 patients were symptomatic. Two patients with negative blood culture, urine culture, and chest X-ray had significant pathology causing postoperative fever. One patient with daily spiking temperatures developed clinical features of lower extremity deep venous thrombosis, which was confirmed by Doppler. Another patient with daily spiking temperatures and significant malaise had a pelvic mass detected on physical exam, which was confirmed by computed tomography to be a pelvic abscess. Of the 211 patients with postoperative fever, only 8% were diagnosed with an infectious or pathologic process (11 urinary tract infections, five pneumonias, one pelvic abscess, one deep venous thrombosis).

Logistic regression for predicting positive urine culture or pneumonia based on surgical characteristics (Table 1) and patient characteristics (Table 2) was performed. The only characteristic that helped

predict a positive urine culture was the day of temperature elevation ($P = .04$). The later the temperature occurred, the more likely a urine culture would be positive. The chance of a chest X-ray being positive was also influenced by the day of temperature elevation ($P = .05$). The earlier a temperature occurred postoperatively, the more likely the diagnosis of pneumonia. Also, the older the patient, the more likely a chest X-ray would be positive ($P = .03$).

At our hospital, the charge for 77 blood cultures was \$9,394; for 106 urine cultures, \$7,950; and for 54 chest X-rays, \$8,154. In this study, the charge for postoperative fever evaluation for one year was \$25,498.

DISCUSSION

In our retrospective review, the incidence of postoperative fever after major gynecological surgery was 39%, and the incidence of febrile morbidity was 37%, which is consistent with other publications.^{1–4} Thirty-seven percent of febrile patients had blood cultures obtained with no positive results. Fifty percent of febrile patients had urine cultures obtained with only 10% yielding positive results. Chest X-rays were obtained in 26% of febrile patients, with pneumonia documented in only 9%. Patients with postoperative pneumonia had early onset fever of a median length of three days and were usually symptomatic. Patients with postoperative urinary tract infection had late onset fevers of a median length of two days and were rarely symptomatic. Although not evaluated, because 92% of patients with postoperative fever had no infectious or pathologic process diagnosed, we must assume that the majority of postoperative fevers were secondary to noninfectious processes, such as cytokine release, atelectasis, hematoma reabsorption, etc.

We searched Medline from 1966 to 1998 for postoperative fever, postoperative blood cultures, postoperative urine cultures, and postoperative chest X-ray. A total of 1,407 articles were reviewed. Although there were multiple studies evaluating postoperative fever following gynecologic surgery,^{1–4} we identified only one additional study evaluating postoperative fever evaluation following gynecologic surgery. Swisher et al.⁷ reviewed 342

hysterectomies and identified 62 patients who had blood cultures obtained as part of postoperative fever evaluations. No positive blood cultures were obtained.

In conclusion, although we present the largest study analyzing postoperative fever evaluation following major gynecologic procedures, no definite conclusions can be made, because this study was retrospective. However, because of increasing cost restraints and the findings of no positive blood cultures and few positive urine cultures or chest X-rays, we cannot recommend routine evaluations of postoperative temperatures by urine culture, blood culture, and/or chest X-ray. It is our opinion that postoperative fever evaluation should be based on symptoms and physical examination. In symptomatic, older patients with persistent early postoperative temperature elevations, chest X-ray evaluation seems appropriate. In patients with persistent late postoperative temperature elevations, urine cultures may be appropriate. We are presently performing a prospective trial of postoperative fever evaluation based on the above recommendations.

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