

Fever and Abnormal Chest X-ray Findings After Cesarean Section

Thomas R. Miller, USAF, MC, W. Douglas Everett, USAF, MC, MPH, and Samuel B. Mehr, MD
Omaha, Nebraska

DR. THOMAS R. MILLER (*Second-Year Family Practice Resident*): A 16-year-old single woman presented to the labor and delivery ward at approximately 3 AM for the third time in two days with the complaint of increasing labor pains. She had been examined twice before, including monitoring and a vaginal examination with the diagnosis of Braxton-Hicks contractions; however, on this visit, she was found to have poor variability with persistent late decelerations on both external and internal monitoring. With obstetrical consultation, bedside ultrasound examination of the abdomen revealed a marked paucity of amniotic fluid. Upon further questioning, the patient's mother stated that the patient had been "urinating" with her contractions beginning early the previous afternoon. Both the mother and the patient had denied fluid loss on earlier questioning. Physical examination and past medical history were unremarkable. A cesarean section was performed, and a healthy male infant was delivered with Apgars of 7 and 9 at 1 and 5 minutes, respectively, without meconium staining.

Following an uneventful first 24 hours, the patient developed a persistent low-grade temperature of 100 to 101.7 °F (37.7 to 38.7 °C). Physical examination did not reveal a source of infection, as the lung sounds were clear and equal bilaterally, the abdomen was not inappropriately tender, Homan's sign was negative bilaterally, and the head and neck examination was unremarkable. A white blood cell count was $6.8 \times 10^9/L$ (6,800 mm^3), and the urinalysis was negative for evidence of infection, so blood cultures were not drawn and antibiotics were not started. The patient continued to run a low-grade temperature despite encouragement to increase her activities and use incentive spirometry to decrease the risk of atelectasis,

which was believed to be contributing to her fever. An infectious cause had not been unmasked, and the physical examination did not reveal evidence of deep venous thrombosis or pulmonary embolism.

On the afternoon of the third day after the cesarean section, the patient was noted to have a decrease in breath sounds over her left hemithorax. A chest roentgenogram (Figure 1) showed a diffuse homogeneous opacity throughout the left thorax without air bronchograms. Clinical circumstances suggested that opacity may be caused by a mucous plug. A specialist in pulmonary medicine was consulted by telephone, and inhalation treatments with aerosolized metaproterenol and acetylcysteine with chest percussion were started. Physical examination revealed an improvement in the quality of the breath sounds over the left hemithorax, although most of the left thorax continued to be opaque on a repeat chest x-ray examination after two treatments. Another chest x-ray examination was obtained early the next morning, which showed almost complete resolution of the atelectasis, except for the left basilar segments (Figure 2). The left hemidiaphragm still remained elevated.

DR. W. DOUGLAS EVERETT (*Family Physician*): Let us stop and consider what has happened up to this point. First, we have a 16-year-old primipara, who after a cesarean section has an unexplained fever on the second postoperative day and now on the third postoperative day develops abnormal findings on chest x-ray films that clear almost completely with vigorous breathing treatments consisting of aerosolized metaproterenol and acetylcysteine and chest percussion. The pulmonary medicine consultant and radiologist have advised that the picture is consistent with mucous plugging. Likewise, the obstetric resident and staff concur.

Fever may be caused by infection or inflammation. When the patient was examined, was there any evidence of inflammation or infection?

DR. MILLER: On the second and third day the wound was slightly tender, but not felt to be inappropriate, as the tenderness was localized to the incision. Lochia was unremarkable, and the only abnormal thoracic findings were

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From the Department of Family Practice and the Department of Radiology, Creighton University School of Medicine, Omaha, and the Ehrling Bergquist Strategic Hospital, Offutt Air Force Base, Nebraska. At the time this paper was written, Dr. Miller was a second-year resident in Family Practice. Requests for reprints should be addressed to Colonel W. Douglas Everett, Ehrling Bergquist Strategic Hospital (SGE) Offutt AFB, NE 68113-5300.

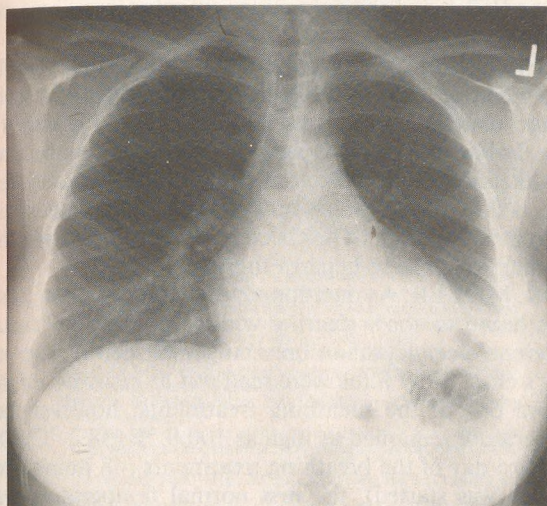


Figure 1. Initial chest x-ray film obtained when decreased breath sounds were noted on her left thorax. The elevated left hemidiaphragm, mediastinal shift to the left, and anterior herniation of the right lung indicate marked loss of volume of the left lung, probably due to total obstruction of the left main bronchus, eg, a mucous plug

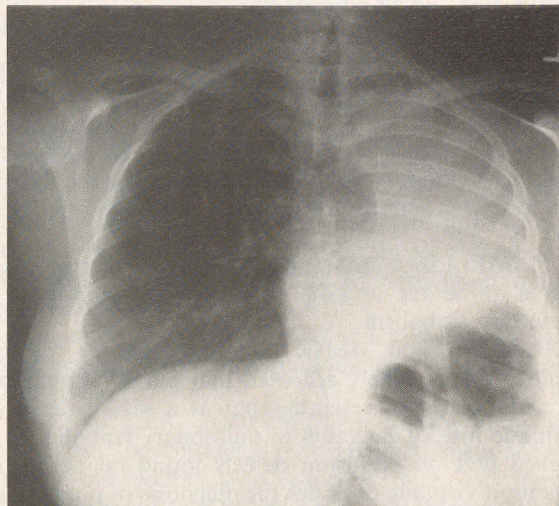


Figure 2. Chest x-ray film obtained the next morning after instituting metaproterenol and acetylcysteine breathing treatments. Note still considerable loss of volume, as shown by the persistent elevation of the left hemidiaphragm

decreased aeration to the left lung field on the evening of the third day.

The patient continued to have good bowel sounds and experience flatulence, though no bowel movement. Ear, nose, and throat examination continued to be unremarkable. As far as inflammation was concerned, there was no joint swelling, the calves were nontender, and Homan's sign was negative. The laboratory workup revealed a normal leukocyte count, and the urine culture remained negative for growth.

DR. EVERETT: That is a very complete report. In the postpartum patient, however, phlebitis of the ovarian or other pelvic veins, which might not provide any physical findings other than a low-grade fever, is not uncommon. The presence of a low-grade fever is of concern.

Let us view the x-ray films and consider the cause of this extraordinary amount of atelectasis, assumed to be secondary to mucous plugging (Figures 1 and 2). We must also consider serious causes of atelectasis, such as pulmonary embolism.

Davis and colleagues¹ reviewed the radiographic signs of pulmonary embolus in 1980 and stated that, contrary to popular belief, findings on chest x-ray examination are abnormal in most patients with documented pulmonary emboli. Although radiographic signs of pulmonary em-

bolism are nonspecific, they may provide the first clue to diagnosis.

Pulmonary emboli occur most frequently in the lower lung zones; thus, the majority of associated infiltrates are in the lower lobes. The infiltrates vary in size and density, and their radiographic appearance often resembles that of pneumonia or localized pulmonary edema. Occasionally a patient shows complete lobar consolidation. The diaphragm is elevated in approximately 40 percent of the patients with pulmonary embolism. Atelectasis results from splinting, bronchoconstriction, and a decrease in surfactant. Atelectasis, like other radiographic signs of embolism, is nonspecific and may be seen in mucous plugging, pneumonia, and peritonitis. Hypoxemia in pulmonary embolus is very nonspecific. Virtually all parenchymal pulmonary processes resembling pulmonary embolus, such as platelike atelectasis, contusion, bronchopneumonia, and so on, cause hypoxemia. In many cases of pulmonary embolus, the hypoxemia may be masked by compensatory hyperventilation.

The clearing x-ray findings are not reassuring to me. I would like to know the vital signs and the results of a blood gas determination.

DR. MILLER: Pulse rate at that time was 100 beats per minute, oral temperature 100.8 °F (38.2 °C), and blood pressure 96/50 mmHg. Blood gas determinations were obtained and revealed a pH of 7.46, a carbon dioxide

partial pressure (pCO₂) of 30 mmHg, and oxygen partial pressure (pO₂) of 73.6 mmHg.

DR. EVERETT: The blood gas results are suggestive of a pulmonary embolus. In young patients, however, this is not always a help. McNeil et al² found no significant difference in arterial oxygen tension (pO₂) in young patients with pleuritic chest pain who did or did not have a pulmonary emboli. We still need to consider the hypoxemia in this patient as nonspecific.³ What was your next step?

DR. MILLER: A lung scan was ordered, which revealed an area in the left lung that had a low probability for a pulmonary embolism.

DR. SAMUEL B. MEHR (*Associate Professor, Nuclear Medicine*): It is widely accepted that planar ventilation perfusion pulmonary scintigraphy is a highly sensitive technique for the detection of pulmonary embolus. It is believed that no perfusion defects found on perfusion evaluation virtually excludes the diagnosis of pulmonary embolus. Using single photon emission computed tomography (SPECT), we have demonstrated that the sensitivity of conventional scintigraphic pulmonary imaging may be increased. An inherent disadvantage of conventional planar scintigraphy is that different geometric regions of the lungs overlap, diminishing contrast. Studies characterized as "low probability" may represent pulmonary embolus in up to 10 percent of patients.

For this reason SPECT was utilized in this case. Perfusion abnormalities were demonstrated on the left. It was hoped that additional peripheral activity could be identified that would exclude pulmonary embolus in certain portions of the lung. It was serendipitous that a perfusion defect was identified in the right lung. This perfusion defect was not identified on planar images because of its location and because of superimposed normal bronchopulmonary segments.

DR. EVERETT: So what you are saying is that we now had an area that could possibly represent a pulmonary embolism but this area was on the contralateral side and in no way was connected with the atelectasis.

DR. MEHR: Using SPECT, we eliminated the problem of overlapping by obtaining 6-mm tomographic sections. This sectioning unmasked a wedge-shaped perfusion defect that was confirmed by pulmonary angiography to represent pulmonary embolus. Angiography revealed a loss of pulmonary vascularity above the right diaphragm consistent with the defect demonstrated by SPECT. We conclude that SPECT imaging should be utilized whenever the ventilation perfusion evaluation is indeterminate or when the ventilation perfusion evaluation is negative in the face of a high clinical suspicion of pulmonary embolic disease.

DR. EVERETT: Very well, we have established the diagnosis of pulmonary embolism. The atelectasis was

probably caused by a mucous plug that cleared with pulmonary toilet, and the pulmonary embolus was a separate problem.

Atelectasis in cases of pulmonary embolism is usually subsegmental, with the radiologic appearance of discoid (platate, platelike) atelectasis, also known as Fleischner's lines. Lobar atelectasis is rare in pulmonary embolism. The likelihood that atelectasis of an entire lung, as seen here, is due to pulmonary embolism is extremely small. Appropriate treatment has been instituted. What was the patient's response to heparin therapy?

DR. MILLER: As mentioned, the patient's chest x-ray films began to show clearing within the first few meta-proterenol-acetylcysteine breathing treatments. The patient's chest x-ray films were read out as resolved on the second day of the breathing treatments; however, her temperature remained as high as 100.8 °F (38.2 °C). On the third day of the breathing treatments (48 hours after heparin was started), the first normal temperature was recorded. Pulse decreased from 104 to 80 beats per minute. Respirations continued to vary from 24 to 32/min. The respirations stabilized between 16 and 24 beats per minute and the heart rate remained below 90/min. The patient remained afebrile after this. It is my belief that cessation of thrombus formation was the cause for the patient's temperature returning to normal, as the mucous plug was pretty much resolved by the time heparin therapy was instituted, though this is debatable.

DR. EVERETT: Let us now consider the relationship between the cesarean section and the pulmonary embolus, as well as fertility control, in a patient with a history of pulmonary embolus. As we all know, births by cesarean section have increased significantly over the last two decades. Delivering physicians have become quite cavalier in using this procedure, and only recently have efforts been taken to try and reverse this trend by recommending vaginal birth after repeat cesarean section.⁴

It is advisable occasionally to review the risks to the mother associated with cesarean birth. Rubin et al⁵ reported on maternal death after cesarean section in Georgia during 1975 and 1976. The mortality rate for vaginal delivery was 9.7 per 100,000, and for cesarean section, 105.3 per 100,000. The cesarean-attributed deaths had a rate of only 59.3 per 100,000, however. Of the 16 deaths reviewed, seven had a pulmonary embolus, and four had a cardiopulmonary arrest during anesthesia, two of whom had an associated pneumonitis and one a high spinal anesthetic. Associated other conditions were a cesarean section hysterectomy with profuse bleeding, two cases of eclampsia (one with disseminated intravascular coagulopathy [DIC]), another DIC, and a case of hepatic necrosis and acute tubular necrosis.

Clearly the risk of death from pulmonary embolus is increased after cesarean section, and we must remain alert

continued on page 265

(clobetasol propionate)

Cream, 0.05% Ointment, 0.05%
(potency expressed as clobetasol propionate)**For Dermatologic Use Only — Not for Ophthalmic Use.**

The following is a brief summary only. Before prescribing, see complete prescribing information in TEMOVATE® Cream and Ointment product labeling.

CONTRAINDICATIONS: TEMOVATE® Cream and Ointment are contraindicated in patients who are hypersensitive to clobetasol propionate, to other corticosteroids, or to any ingredient in these preparations.

PRECAUTIONS: General: TEMOVATE® is a highly potent topical corticosteroid that has been shown to suppress the HPA axis at doses as low as 2 g per day. Systemic absorption of topical corticosteroids has resulted in reversible HPA axis suppression, manifestations of Cushing's syndrome, hyperglycemia, and glucosuria in some patients.

Conditions that augment systemic absorption include the application of the more potent corticosteroids, use over large surface areas, prolonged use, and the addition of occlusive dressings. Therefore, patients receiving a large dose of a potent topical steroid applied to a large surface area should be evaluated periodically for evidence of HPA axis suppression by using the urinary free cortisol and ACTH stimulation tests. If HPA axis suppression is noted, an attempt should be made to withdraw the drug, to reduce the frequency of application, or to substitute a less potent steroid.

Recovery of HPA axis function is generally prompt and complete upon discontinuation of the drug. Infrequently, signs and symptoms of steroid withdrawal may occur, requiring supplemental systemic corticosteroids.

Children may absorb proportionally large amounts of topical corticosteroids and thus be more susceptible to systemic toxicity (see PRECAUTIONS: Pediatric Use).

If irritation develops, topical corticosteroids should be discontinued and appropriate therapy instituted.

In the presence of dermatologic infections, the use of an appropriate antifungal or antibacterial agent should be instituted. If a favorable response does not occur promptly, the corticosteroid should be discontinued until the infection has been adequately controlled.

Certain areas of the body, such as the face, groin, and axillae, are more prone to atrophic changes than other areas of the body following treatment with corticosteroids. Frequent observation of the patient is important if these areas are to be treated.

As with other potent topical corticosteroids, TEMOVATE Cream and Ointment should not be used in the treatment of rosacea and perioral dermatitis. Topical corticosteroids in general should not be used in the treatment of acne.

Information for Patients: Patients using TEMOVATE should receive the following information and instructions:

1. This medication is to be used as directed by the physician and should not be used longer than the prescribed time period. It is for external use only. Avoid contact with the eyes.
2. This medication should not be used for any disorder other than that for which it was prescribed.
3. The treated skin area should not be bandaged or otherwise covered or wrapped so as to be occlusive.
4. Patients should report any signs of local adverse reactions to the physician.

Laboratory Tests: The following tests may be helpful in evaluating HPA axis suppression:

Urinary free cortisol test
ACTH stimulation test

Carcinogenesis, Mutagenesis, Impairment of Fertility: Long-term animal studies have not been performed to evaluate the carcinogenic potential or the effect on fertility of topical corticosteroids.

Studies to determine mutagenicity with prednisolone have revealed negative results.
Pregnancy: Teratogenic Effects: Pregnancy Category C: Corticosteroids are generally teratogenic in laboratory animals when administered systemically at relatively low dosage levels. The more potent corticosteroids have been shown to be teratogenic in animals after dermal application. Clobetasol propionate has not been tested for teratogenicity by this route; however, it appears to be fairly well absorbed percutaneously, and when administered subcutaneously it proved to be a relatively potent teratogen in both the rabbit and mouse.

There are no adequate and well-controlled studies of the teratogenic effects of topically applied corticosteroids in pregnant women. Therefore, topical corticosteroids should be used during pregnancy only if the potential benefit justifies the potential risk to the fetus. Drugs of this class should not be used extensively on pregnant patients in large amounts or for prolonged periods of time.

Nursing Mothers: It is not known whether topical administration of corticosteroids could result in sufficient systemic absorption to produce detectable quantities in breast milk. Systemically administered corticosteroids are secreted into breast milk in quantities not likely to have a deleterious effect on the infant. Nevertheless, caution should be exercised when topical corticosteroids are prescribed for a nursing woman.

Pediatric Use: Use of TEMOVATE Cream and Ointment in children under 12 years of age is not recommended.

Pediatric patients may demonstrate greater susceptibility to topical corticosteroid-induced HPA axis suppression and Cushing's syndrome than mature patients because of a large skin surface area to body weight ratio.

HPA axis suppression, Cushing's syndrome, and intracranial hypertension have been reported in children receiving topical corticosteroids. Manifestations of adrenal suppression in children include linear growth retardation, delayed weight gain, low plasma cortisol levels, and absence of response to ACTH stimulation. Manifestations of intracranial hypertension include bulging fontanelles, headaches, and bilateral papilledema.

ADVERSE REACTIONS: TEMOVATE® Cream and Ointment are generally well tolerated when used for two-week treatment periods.

The most frequent adverse reactions reported for TEMOVATE Cream have been local and have included burning sensation (4 of 421 patients) and stinging sensation (3 of 421). Less frequent adverse reactions were itching, skin atrophy, and cracking and fissuring of the skin (1 of 421).

The most frequent adverse events reported for TEMOVATE Ointment have been local and have included burning sensation, irritation, and itching (2 of 366 patients). Less frequent adverse reactions were stinging, cracking, erythema, folliculitis, numbness of fingers, skin atrophy, and telangiectasia (1 of 366).

The following local adverse reactions are reported infrequently when topical corticosteroids are used as recommended. These reactions are in an approximately decreasing order of occurrence: burning, itching, irritation, dryness, folliculitis, hypertrichosis, acneiform eruptions, hypopigmentation, perioral dermatitis, allergic contact dermatitis, maceration of the skin, secondary infection, skin atrophy, striae, and miliaria. Systemic absorption of topical corticosteroids has produced reversible HPA axis suppression, manifestations of Cushing's syndrome, hyperglycemia, and glucosuria in some patients. In rare instances, treatment (or withdrawal of treatment) of psoriasis with corticosteroids is thought to have provoked the pustular form of the disease.

OVERDOSAGE: Topically applied TEMOVATE® can be absorbed in sufficient amounts to produce systemic effects (see PRECAUTIONS).

continued from page 264

to the fact that pregnancy is a clinically hypercoagulable state.⁶ The rate of cesarean sections went from 5.5 percent in 1970 to 20.3 percent in 1983.⁴ A variety of factors have been suggested as contributing to this trend. Society has an increased emphasis on delivering the "perfect baby" in an environment where there is a greater choice about childbearing and fewer children per family. The introduction of new medical technologies, especially the fetal heart monitor, has been cited, as well as changes in maternal age and parity. Fear of malpractice suits, economic incentives, and increases in obstetric specialization and intervention-oriented obstetric training programs have contributed as well.

The question of birth control in an unwed 16-year-old mother poses interesting consequences. What was the patient advised?

DR. MILLER: Birth control is one of many social problems to be considered in this patient. She is an unwed 16-year-old woman who comes from an environment where early multiple pregnancies are common and birth control is infrequent. Her pulmonary embolus seriously limits our choice of birth control. I have discussed this problem with the perinatology staff, and they contend that we cannot use estrogen oral contraception. Also the new progesterone-only pills do not have information regarding use after pulmonary embolism. We definitely must avoid the progesterone intrauterine device while she is on anticoagulants.

What we are left with is barrier methods, which are unpopular with this age group and therefore unreliable. The patient was instructed to use condoms with spermicide gel until being fitted for a diaphragm at six weeks, if she so chooses. She was instructed to seek medical care if she thought she might be pregnant again, as she might be considered for anticoagulation with any future pregnancies.

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Glaxo Inc.
Research Triangle Park, NC 27709

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