Unexpected outcome (positive or negative) including adverse drug reactions

Therapeutic pneumoperitoneum in a patient with pulmonary tuberculosis and persistent fever

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Summary

Artificial pneumoperitoneum represents a therapeutic technique first applied in the treatment of pulmonary tuberculosis (TB) in prechemotherapy antimycobacterial era. A 25-year-old patient presented with pulmonary TB diagnosed during the 8th month of her pregnancy. She was febrile and in severe clinical condition. An antituberculous regimen of four primary drugs was initiated immediately after the caesarean section. There was no clinical improvement after 3 months despite full drug sensitivity of *Mycobacterium tuberculosis* isolates. An artificial pneumoperitoneum was applied along with the drug treatment for 6 months. Soon the patient became afebrile, her body weight increased and sputum smears gave negative results. The combination of the old technique of therapeutic pneumoperitoneum along with the current antituberculosis treatment proved to be effective in this advanced case of pulmonary TB initially unresponsive to drug therapy alone.

BACKGROUND

The antiquated method of artificial pneumoperitoneum deserves a place in the current therapy of difficult-to-treat pulmonary tuberculosis even in drug-sensitive cases.

CASE PRESENTATION

A 25-year-old female Albanian patient of Caucasian origin suffering from pulmonary tuberculosis during the 8th month of her pregnancy was admitted to our department. By the time of the diagnosis, the patient had extensive disease; the left lung was almost totally damaged (figure 1). A complete blood count revealed a haemoglobin level of 9.8 g/dl, a white cell count of 9600/mm³ with 92% neutrophils and a platelet count of 442 000/mm³. Prothrombin time was 12.8 s (with a control of 12.5 s) and activated partial thromboplastin time was 38 s. Other laboratory studies included serum glucose of 59 mg/dl, urea 19 mg/dl, creatinine 0.66 mg/dl, potassium 3.6 mEq/l, sodium 134 mEq/l, total calcium 8.5 mg/dl, aspartate transaminase 13 U/l, alanine transaminase 8 U/l, alkaline phosphatase 115 U/l, creatine kinase 16 U/l, lactate dehydrogenase 231 U/l, total protein 6.7 g/dl, albumin 2.8 g/dl, uric acid 5.1 mg/dl and serum iron 14 µg/dl. Erythrocyte sedimentation rate was 120 mm/h and C reactive protein 11.7 mg/l. Bronchoscopy showed thick white coating and a reddened, swollen and widened bifurcation of the left main bronchus. The pathologic examination revealed caseating granulomatous lesions and inflammation with epithelioid cells, lymphocytes, neutrophils and giant cells. The patient underwent a caesarean section and antituberculosis therapy consisting of isoniazid, rifampicin, pyrazinamide and streptomycin was initiated immediately. This regimen changed due to hepatotoxicity in pyrazinamide and the new combination involved isoniazid, rifampicin, ethambutol, streptomycin and levofloxacin. The results of the drug-sensitivity tests

revealed sensitivity of the *Mycobacterium tuberculosis* in all the above drugs.

However, this therapy was administered for about 3 months with poor results in the clinical condition of the patient, who remained febrile and infectious. A high-resolution CT (HRCT) of the chest revealed new lesions at the upper right lobe and the beginning of a cavity formation (figure 2). The possibility of a surgery intervention diminished because of the multifocal spread of the disease. As a desperate therapeutic effort, pneumoperitoneum was applied (figure 3). More specifically, 1000–1200 cc of air was administered via a 14G syringe into the peritoneal cavity every 15 days for a period of 6 months. This technique has been well described by Mitchell and co-workers.¹ Except mild abdominal discomfort no other complication was observed in our patient.

OUTCOME AND FOLLOW-UP

The clinical response of the patient was prompt; just 1 week after the first application of pneumoperitoneum, the high body temperature decreased and her appetite improved. Sputum smear was negative about 1 month later. At the end of the 6th month, the patient had gained 3.5 kg and was afebrile. A chest x-ray 6 months after the first application of pneumoperitoneum showed extensive consolidation of the left lung without any new productive lesions (figure 4). Total duration of antituberculous treatment was one year. A new HRCT was performed one year after the first application of pneumoperitoneum showing significant improvement of the lesions in the upper right lobe (figure 5).

DISCUSSION

Pneumoperitoneum, an old method of collapse therapy, reduces the pulmonary volume by the elevation of the diaphragm, thus permitting the collapse of the diseased

Figure 1 Chest x-ray of the patient at the date of admission: Left lung presents multiple fibrotic lesions.

Figure 2 Chest HRCT 1 month before the introduction of pneumoperitoneum, showing an area of lesion located in the upper right lobe with the formation of a small cavity.

areas and the closure of cavities that act as reservoirs of microorganisms.² Collapse therapies were gradually abandoned after the introduction of effective antituberculous drugs. Relative indication for artificial pneumoperitoneum in the era of effective antimycobacterial chemotherapy is

restricted to a few cases of multiple or even extensively drug-resistant tuberculosis.^{3–5} In these cases, the clinician comes up with a situation similar to the one before the advent of the antituberculous therapy, as there may be no reliable chemotherapeutic regimen to treat the patients.⁴

Figure 3 Chest x-ray on the day of the first application of pneumoperitoneum.

Figure 4 Chest x-ray 6 months after the first application of pneumoperitoneum (at the end of the sessions).

However, in the present case, the isolated *M tuberculosis* was sensitive to all first- and second-line drugs.

At first glance, despite the presence of persistent fever and extensive lung involvement, there was no indication to institute collapse therapy in our patient. Certainly, after delivery, the patient was deprived of the beneficial influence of pregnancy on the course of her disease, given the effect of the gravid uterus on the diaphragm, an action similar to pneumoperitoneum effect. The critical parameter

that led to the decision of application of artificial pneumoperitoneum was the persistent severe condition of the patient and the lack of response despite a 3-month theoretically effective antituberculous drug therapy. Indeed, full drug susceptibility of *M tuberculosis* in our patient justifies, even retrospectively, the decision to not offer collapse therapy immediately after caesarian. Taking into account that a patient with a susceptible strain of *M tuberculosis* should become afebrile after about 1 month of therapy, we

Figure 5 Chest HRCT 1 year later, showing closure of the cavity and tissue scarring as well as reduction of the contralateral lesions.

Learning points

- Artificial pneumoperitoneum deserves a place in the current therapy of difficult-to-treat pulmonary tuberculosis even in drug-sensitive cases.

considered that the observed clinical improvement represented a true therapeutic effect of collapse therapy and not a delayed response to antituberculous drugs. Moreover, other therapeutic manoeuvres such as surgical intervention had been excluded. Surgical approach represents a logical therapeutic option only in cases of single lobe or even single lung-limited disease, although Iseman and co-workers demonstrated that the decision for resection (lobectomy or pneumonectomy) can be taken even in patients with a limited contralateral disease.⁶

In our patient, except mild abdominal discomfort no other complication was observed. Indeed, therapeutic pneumoperitoneum is a well tolerated, relatively safe procedure, without serious complications and capable of favourably influencing the course of difficult-to-treat

pulmonary tuberculosis.^{2 4 5} In conclusion, the clinical improvement can be attributed to both chemotherapy and therapeutic pneumoperitoneum in this advanced case of severe pulmonary tuberculosis initially unresponsive to drug treatment.

Competing interests None.

Patient consent Obtained.

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