Complications following Measurement of Maximal Expiratory Pressure (Manco, Terra, Silva)

**DISCUSSION**

Phrenomediastinal echinococcosis is the term coined to describe hydatid cysts that arise in the subphrenic space or diaphragm and expand into the mediastinum. Although Prad et al described such a transdiaphragmatic transgression of an echinococcal cyst 33 years ago, this entity has not since been reported. Even large series on hydatid disease do not make any mention of such a presentation of posterior mediastinal echinococcosis.  

Hydatid disease most frequently involves the liver and lungs and one of these organs is usually involved if a cyst is present anywhere else in the body. Retropertitoneal cysts are almost always secondary to traumatic or surgical rupture of a hepatic cyst. Primary retropertitoneal echinococcal cysts without involvement of any other organ are extremely rare. It has been suggested that such a cyst may arise in the liver, but by the time the daughter cyst is discovered, the parent cyst may collapse completely leaving no trace in the primary organ of involvement.  

Primary mediastinal echinococcosis is also uncommonly reported and its existence has even been questioned. Differential diagnosis in such a case would include diaphragmatic, dermoid, neurenteric or enterogenous duplication cyst or pararenal pseudocyst. Although characteristic appearances of hydatid cyst have been described on US, CT and MR, this diagnosis was not entertained as the cyst was unilocular, showed no characteristic features, and there was no associated hepatic or pulmonary involvement. The object of this communication is to highlight this rare entity and to illustrate the value of MR in demonstrating the extent of the cyst. It is suggested that hydatid disease must be considered in the diagnosis of a cyst, irrespective of its location, especially in endemic areas.

**REFERENCES**


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**Pneumomediastinum, Pneumothorax and Subcutaneous Emphysema Following the Measurement of Maximal Expiratory Pressure in a Normal Subject**

José C. Manço, M.D.; Joao Terra-Filho, M.D.; and Gerusa A. Silva, M.D.

Mediastinal and subcutaneous emphysema have been reported as a consequence of deliberate manipulations of the breathing pattern producing a Valsalva-like maneuver in healthy subjects. We present a case of pneumomediastinum, pneumothorax and subcutaneous emphysema occurring in a normal volunteer after repeated measurements of the Pmax.

(Chest 1990; 98:1530-32)

\[ P_{max} = \text{maximum static expiratory pressure}; \ P_{i max} = \text{maximum static inspiratory pressure}; \ RV = \text{residual volume}; \ TLC = \text{total lung capacity}; \ P_{es} = \text{esophageal pressure}; \ P_{o} = \text{oral pressure} \]

The simplest noninvasive and widely applied method for respiratory muscle strength assessment is the measurement of Pmax and Pimax pressures generated at the mouth during static efforts. The Pimax usually is measured at RV after full expiration and Pmax at TLC after maximal inspiration. We report the findings in a normal subject who presented with pneumomediastinum, pneumothorax and subcutaneous emphysema following repeated measurements of Pmax.

**CASE REPORT**

As a part of the investigation to establish the normal values for some pulmonary function tests in our laboratory, a healthy 25-year-old male physician, who was a nonsmoker, was studied after informed consent. The study protocol was approved by the Ethical Committee of our institution. After standard spirometric procedures, the Pmax was measured while the subject was seated and wearing nose clips. We used an apparatus similar to that described by Black and Hyatt and all the determinations of Pmax were repeated after full inflation to TLC. Pressures were measured with a direct reading dial gauge having a pressure range of 0 to 300 cm H2O and simultaneously, through a lateral line, with a differential pressure transducer (Statham PM 131 TC ±5–350). During the expiratory efforts we also measured the esophageal pressure using a 10-cm long balloon containing 1 ml of air and connected to another Statham differential pressure transducer of the same model. The signals of both transducers were recorded on a direct writing recorder (Beckman R-611). In a series of five measurements of expiratory pressures the highest values achieved were 330 cm H2O for Pmax at the mouth and 308 cm H2O for the Pes (Fig 1); the pressure difference between the Po and the Pes corresponded to the recoil pressure of the lungs at the volume where the measurement was carried out. A few minutes after Pmax measurements were done, the subject reported discomfort in the neck, where the

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physical examination had revealed crepitations. A roentgenogram of the neck confirmed the diagnosis of subcutaneous emphysema and the chest roentgenogram demonstrated small mediastinal emphysema and bilateral pneumothorax (Fig 2). During the next 24 h the subject complained of mild dysphagia and dysphonia, but denied any kind of pain. All the symptoms and abnormal signs disappeared in about three days and the subject remained asymptomatic during the next eight weeks of follow-up.

DISCUSSION

Previous results from our laboratory and the results reported by Black and Hyatt are in agreement in that values of $P_{\text{Emax}}$ higher than 300 cm H$_2$O are not uncommon for normal male adults. In fact, four subjects in our series of 30 normal men generated mouth pressures in excess of 300 cm H$_2$O during maximal static expiratory efforts. In spite of the high levels of pressures attained during the test, we did not observe any complications with extensive use of this technique in normal subjects and patients until we studied the case herein reported. Ringqvist, in his classic study on maximal respiratory pressures, stated that "no complications of any importance were observed during the whole study." In other studies, we could find no previous reports wherein complications such as pneumomediastinum, pneumothorax and subcutaneous emphysema have occurred in association with $P_{\text{Emax}}$ measurements.

Most cases of pneumomediastinum probably are the result of alveolar rupture into the bronchovascular sheath, from momentary shearing force due to a sudden pressure discrepancy between them, mainly in the presence of alveolar overdistention. From the bronchovascular sheath, the extra-alveolar air moves centripetally to the mediastinum and eventually may reach the pleural cavities and the soft tissue components of the neck. Pneumomediastinum some-

![Figure 1](image1.png)

**Figure 1.** Simultaneous recordings of the Po and the Pes during $P_{\text{Emax}}$ measurement.

times can be induced by acute changes in the breathing pattern so that the lung volume is increased or sudden pressure changes occur. Deliberate manipulations of the breathing pattern producing a Valsalva-like maneuver can result in mediastinal and subcutaneous emphysema in healthy subjects. Mediastinal emphysema has been reported following marijuana smoking, probably as a consequence of the straining against a closed glottis after inhalation to TLC. Other circumstances in which normal subjects developed pneumomediastinum, presumably related to ventila-
Management of Brucella Endocarditis with Aortic Root Abscess

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Three cases of Brucella endocarditis with aortic root abscess are reported. Two patients were successfully managed by a combination of medical therapy and surgery. The third patient died suddenly 36 hours after admission to hospital.

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Endocarditis is an uncommon, but serious, complication of brucellosis; the aortic is the most frequently affected cardiac valve. 1. We report the successful management of two complex cases of Brucella endocarditis with aortic root abscess, using a combination of medical therapy and surgery; a third seriously ill patient died within 36 hours of admission to hospital.

CASE REPORTS

Case 1

A 45-year-old man was admitted to another hospital for seven weeks in 1987 with clinical and bacteriologically proven Brucella melitensis endocarditis involving the aortic valve; two-dimensional echocardiography revealed a 3 x 4 mm vegetation on the valve. His Brucella agglutination titer was originally >1:20,000, but fell to 1:1,280 within six weeks of medical treatment with rifampicin, tetracycline, and ceftizoxime, all continued for two months. He was readmitted to the same hospital nine months later with a two- to three-week history of recurrence of the symptoms and signs suggesting Brucella infection (Table 1). Table 2 contains the results of the investigations. The chest x-ray film showed mild cardiomegaly with clear lung fields. Two-dimensional echocardiographic findings are listed in Table 1 and illustrated in Figure 1.

On transfer to this hospital, medical therapy with gentamicin, 3

Figure 1. Two-dimensional echocardiography; left parasternal view, showing the aortic root abscess (Ab), and vegetation (V) on the right coronary cusp. LA is left atrium; LV, left ventricle; RV, right ventricle; and S, septum.

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