fourth and fifth fingers, and less than 31°C (black) in the distal two phalanges of the second, third and fourth fingers. The patient reported subjective improvement after both blocks.

COMMENT

The arteriogram showed severe arterial occlusive disease of the left forearm and hand, with scint circulation to the third, fourth and fifth fingers. The liquid-crystal thermogram showed a vasoplastic component in the forearm, palm, and first and second fingers, which was relieved by the sympathetic block. However, circulation to the distal two phalanges of the third, fourth and fifth fingers failed to improve after the sympathetic block.

The thermogram complements the arteriogram, indicating that the patient may be expected to benefit from surgical sympathectomy, with the exception of the third, fourth and fifth fingers.

The subjective improvement reported by the patient after the blocks indicates either a placebo effect or an increase in blood flow, sufficient to relieve the pain, that was not recorded by the thermogram. The 31–34°C range of the crystals precluded measurement of temperature increases below 31°C. That there was only a modest increase of circulation to the proximal phalanges of the three involved digits speaks against any increase in circulation to the distal phalanges.

The thermogram provided quantitative information about the extent of circulatory improvement obtained at every point in the hand. Thus, it proved to be a better tool in assessing the results of sympathetic block than any of the other available tests. Liquid-crystal thermography is a simple, inexpensive and readily available technique that increases the accuracy of sympathetic block as a diagnostic–prognostic test in peripheral vascular disease.

Informed consent was obtained for this procedure after full explanation to the patient. This study was approved by the Human Experimentation Committee of the Miami Veterans Administration Hospital.

REFERENCES


Severe Hyperthyroidism Associated with Hydatidiform Mole

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In 1955, Tisse and associates reported three cases of hydatidiform mole associated with clinical hyperthyroidism that disappeared within a few days after delivery of the mole. Since that time, similar cases with increasingly sophisticated hormonal studies have been reported.

Three different normal thyroid stimulators, i.e., pituitary thyrotropin, chorionic thyrotropin, and long-acting thyroid stimulator (LATS) have been described. Kenimer and associates reported that when human chorionic gonadotropin activity fell below 150–170 units/ml, thyroid-stimulating activity was undetectable, and they calculated human chorionic gonada-
tropin itself contains approximately 1/4,000 the thyrotropic activity of human pituitary thyroid-stimulating hormone. The thyrotropin extracted from the tumor and serum of the patient with hydatidiform mole differs from chorionic thyrotropin by being larger in molecular size, longer in action, and immunologically distinct.\textsuperscript{1–3}

We report a case in which hyperthyroidism progressed to thyroid storm after emergency evacuation of the mole and then disappeared in 3 days.

**REPORT OF A CASE**

A 27-year-old Caucasian woman, gravida 0, para 0, was transferred from another hospital by helicopter. She had a history of 2½ months’ amenorrhea, nausea, vomiting, and progressive vaginal bleeding for 3 weeks, recently becoming profuse. This was associated with abdominal distention that had become marked 24 hours prior to transfer. She had received 4 units of whole blood in the other hospital.

Examination in the emergency room revealed the blood pressure to be 150/50 torr, pulse 148/min, respiratory rate 30/min, and oral temperature 38 C. Both lungs were clear to auscultation. The abdomen was distended and tender to palpation with a firm, enlarged uterus. Laboratory data included hemoglobin 10 g/100 ml, hematocrit 31.4 per cent, leukocyte count 6,400 mm\(^3\) with 82 per cent neutrophils and adequate platelet count. Prothrombin time, partial thromboplastin time and serum electrolytes were within normal limits. The diagnosis of hydatidiform mole and right polycystic ovarian nases was made by sonography. Two more units of whole blood were administered preoperatively.

The patient was taken to the operating room for evacuation of the mole without premedication and without being seen by an anesthesiologist. In the operating room, she appeared to be acutely ill, apprehensive, pale and shivering. Blood pressure was 140/80 torr and pulse 160/min. Tachycardia of sinus origin was revealed by monitor. Central venous pressure was 17 cm H\(_2\)O. Before the central venous pressure was obtained, about 500 ml of 5 per cent dextrose in Ringer’s lactate solution was infused without a change in heart rate. An additional 400 ml of the same solution was administered during the procedure. After the administration of d-tubocurarine, 6 mg, and preoxygenation, intubation of the trachea was performed rapidly following intravenous administration of thiopental, 225 mg, and succinylcholine, 100 mg. Anesthesia was maintained with nitrous oxide-oxygen (3:5:1.5 l/min); d-tubocurarine, 24 mg, and fentanyl, 0.15 mg, were administered in fractional doses. Central venous pressure increased to 25 cm H\(_2\)O just after induction, and decreased gradually until it stabilized at about 18–20 cm H\(_2\)O. Blood pressure was in the range of 110–150 torr systolic and 50–90 torr diastolic. The sinus tachycardia ranged from 130 to 160/min and persisted. Approximately 2,000 ml of dark red material containing old...
blood and molar tissue were evacuated within a 2-minute period without a change in the vital signs and the central venous pressure. The intravenous fluid administration was slowed and furosemide, 20 mg, iv, was given. At the end of the procedure, the muscle relaxant was reversed with atropine, 1.0 mg, and neostigmine, 3.0 mg. The trachea was extubated in the operating room. The operative procedure lasted 20 minutes.

The patient stayed in the recovery room for 5 hours. Blood pressure was stable at 140/80 torr, and the sinus tachycardia of 150–170/min persisted. Central venous pressures ranged from 13 to 15 cm H₂O, and oral temperature rose gradually from 37.5 to 39.7°C during the ensuing 5-hour period. Urinary output was 170 ml for the first hour and decreased to 20 ml in the fifth hour. Because hyperthyroidism was not anticipated, no specific therapy was given in the recovery room. The temperature, central venous pressure, and pulse decreased progressively, and were 37°C, 9.4 cm H₂O, and 130/min, respectively, 17 hours postoperatively.

All the variables had returned to normal by the third postoperative day. The chest x-ray on the first postoperative day (fig. 1) showed an infiltration of both lower lobes, which had cleared considerably by the third postoperative day (fig. 2), and had disappeared by the eighth postoperative day. Sputum culture, obtained on the first postoperative day, failed to demonstrate growth of pathogenic organisms. On the fifth postoperative day, hemoglobin was 10.5 g/100 ml and the leukocyte count was 8,300/mm³ with 62 per cent neutrophils. Serum thyroxine values were 19.3, 13.7, and 9.1 µg/100 ml on the first, sixth, and fortieth postoperative days, respectively (normal range 4.5–11.5 µg/100 ml). Serum pituitary-thyroid-stimulating hormone on the fifth postoperative day was within normal limits. The patient had another dilatation and currettage on the eighth postoperative day under general anesthesia, without problem. She was discharged on the ninth postoperative day. However, 3 months later because of increasing serial serum chorionic gonadotropin titers, search for metastatic choriocarcinoma failed to show involvement of any organ except the uterus. Chemotherapy with methotrexate was initiated.

**DISCUSSION**

The common clinical manifestations of hyperthyroidism are high-output cardiac failure, tachycardia, and vasodilation, i.e., hyperkinetic circulatory state. Hershman and associates reported two young women with hydatidiform moles who showed severe thyrotoxic manifestations and spontaneous development of pulmonary edema. If we had not monitored central venous pressure preoperatively, gross pulmonary edema might have developed from further fluid overloading.

Persistent sinus tachycardia, with high fever and bilateral basilar infiltration on chest x-ray on the first postoperative day, might lead one to make a diagnosis of pneumonia, aspiration pneumonitis, or metastatic choriocarcinoma. However, decreasing size of the heart, disappearing vascular congestion, and rapid clearing of infiltration in the lung bases were demonstrated on serial chest x-rays taken two days apart (figs. 1 and 2). This suggested acute pulmonary congestion rather than pneumonitis or metastatic choriocarcinoma. Both pre- and postoperative leukocyte counts (6,400 and 8,300/mm³, respectively) and a negative sputum culture were further evidence of congestive failure.

Atropine, 1.0 mg, administered at the time of muscle relaxant reversal, might be a cause of rapid elevation of temperature in the recovery room; however, antisuomotor effect should be reversed by neostigmine and this dose of atropine should not produce a detectable central pyrogenic effect. Retrospectively, intermittent positive-pressure or positive end-expiratory pressure ventilation through an endotracheal tube with full muscular relaxation, together with more sedation if needed, should be beneficial to the congested lungs and to provide oxygen to supply the high oxygen requirement induced by thyrotoxicosis.

In view of these factors, the patient’s hyperthyroidism could have progressed to the level of thyroid storm, the acute accentuation of all the symptoms of hyperthyroidism. It is characterized by hyperpyrexia, marked tachycardia, and cardiac decompensation, and may result in death. It may occur after extra-thyroidal operations on an uncontrolled thyrotoxic patient, or without surgical provocation, the so-called “medical” thyroid storm. The serum thyroxine value of 19.3 µg/100 ml on the first postoperative day might be less than the patient’s peak level, as the serum half-life of thyroxine is shortened to 3–4 days in hyperthyroidism, compared with 6–7 days in the euthyroid person. Retrospectively, the patient should have been treated more actively as experiencing thyroid storm. However, all thyrotoxic manifestations cleared spontaneously without specific medical treatment in three days, and serum thyroxine had returned to near the normal range on the fifth day following evacuation of the mole.
In summary, even classic thyrototoxic manifestations can be misdiagnosed in unexpected hyperthyroidism associated with hydatidiform mole. The alert and informed anesthesiologist, confronted with such an emergency situation, will make the appropriate anesthetic preparation to forestall the appearance of the life-threatening manifestations of uncontrolled thyrotoxicosis.

REFERENCES


Tension Pneumocephalus after Posterior-fossa Craniotomy, a Complication of the Sitting Position

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The sitting position provides optimal operating conditions for surgical procedures on the cervical spinal column, posterior fossa, and gasserian ganglion, but is associated with some potential complications. The risks of air embolism and postural hypotension have been well recognized.† More recently, several instances of position-related venous obstruction and consequent edema of the tongue or head and neck have been reported.‡ To our knowledge, tension pneumocephalus resulting from the sitting position during posterior-fossa craniotomy has not been previously described.

REPORT OF A CASE

A 66-year-old man was admitted for evaluation of ataxia and dementia. The patient had been well until 5 months prior to admission, when he had suffered what was thought to be a seizure. There had been no residual neurologic deficit following this episode, and treatment with diphenylhydantoin, 100 mg, three times daily, had been instituted. During the ensuing four-month period, the patient had noticed increasingly severe ataxia and difficulty with memory, and the onset of a chronic left frontal headache. A neurologic examination one month prior to the present admission had

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Fig. 1. Lateral skull x-ray taken one day after pneumoencephalogram. There is no residual intracranial gas.

disclosed no abnormality except that an electroencephalogram showed excessive diffuse slowing and paroxysmal activity during hyperventilation. On physical examination, the patient was disoriented as to time and place. There were grossly discernible deficits of gait and station and fine motor coordination, worse on the left side than on the right. There was no sensory or cranial nerve deficit. Pneumoencephalogram performed six days prior to operation with 45 ml oxygen) and vertebral arteriogram demonstrated a mass in the