

# Awake Fiberoptic Intubation and General Anesthesia in a Parturient with Mirror Syndrome and a Predicted Difficult Airway

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In 1892, John William Ballantyne described a rare condition during pregnancy, characterized by massive edematous swelling of the fetus (fetal hydrops), placentomegaly, and maternal edema [1]. The term “Mirror syndrome” reflects the maternal edema that “mirrors” the hydropic fetus and placenta. We discuss the pathophysiology of mirror syndrome and the anesthesiological considerations.

## PATIENT DESCRIPTION

A 26 year old woman, gravida 1 para 0, presented at 25 weeks gestation with fetal meconium ileus, echogenic dilated bowel, intrauterine growth restriction, right persistent umbilical vein oligohydramnios and hydrops fetalis, and fetal ascites consistent with mirror syndrome. The patient was admitted to the hospital at 27 weeks gestation because of elevated blood pressure (150–170/100–110 mmHg), proteinuria, headache, diffuse edema and features of HELLP syndrome. She elected to terminate the pregnancy. Induction of labor was initiated, her blood pressure was aggressively controlled with labetalol, and she was treated with magnesium sulfate

for seizure prophylaxis. The delivered male fetus weighed 830 g and had hydrops fetalis, with severe total body edema and accumulation of a large amount of exudate in both the abdominal and pleural cavities [Figure]. The third stage of the delivery was complicated by an undelivered placenta retained in the uterus, which necessitated manual revision of the uterus and lysis under anesthesia. The patient had no epidural catheter in situ.

Pre-anesthetic evaluation showed morbid obesity (body mass index 34) and significant anasarca including the neck and face. The patient had dyspnea, orthopnea, and a respiratory rate of 22/min. Auscultation revealed diffuse crepitations at the base of both lungs. Blood pressure was 145/95, heart rate 110/min, and blood oxygen saturation 90% on room air that rose to 97% with a non-rebreathing mask.

The chest X-ray findings were suggestive of pulmonary congestion. Laboratory tests showed the following: hemoglobin 9.5 g/dl, hematocrit 28%, platelets 106 x 10<sup>9</sup>/L, creatinine 0.63 mg/dl, magnesium 5.5 mg/dl, aspartate aminotransferase 97 U/L, alanine aminotransferase 50 U/L, lactate dehydrogenase 1134 U/L, sodium 138 mEq/L and potassium 3.5 mEq/L. Evaluation of the airway predicted a potentially difficult intubation: Mallampaty score III, micrognathia, moderately prominent incisors, and short thyromental distance (3 cm). There was no visible edema of the upper airway. The patient had fasted for more than 8 hours.

The decision was made to establish a definitive airway prior to induction of anesthesia using awake fiberoptic intubation. An arterial line was placed prior to induction. Local anesthesia for



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AFOI included oral and pharyngeal topical irrigation with lidocaine spray 10%, a bilateral superior laryngeal nerve block with 3 ml of 2% lidocaine, and percutaneous transtracheal irrigation with 4 ml of 2% lidocaine. Oxygen was delivered continuously via a face mask. The patient could not tolerate the supine position because of respiratory failure, and AFOI was performed while the patient was in the sitting position and the anesthesiologist performing the AFOI was behind the patient and standing on a high stool. Visualization of the landmarks of the upper airway was achieved without difficulty, and no significant edema interfering with intubation was noted. A cuffed endotracheal tube with internal diameter of 6.5 mm was easily slid down over the fiberoptic scope into the trachea and the endotracheal tube cuff was immediately inflated. General anesthesia was induced with propofol bolus at a dose of 1.5 mg/kg. No muscle relaxant was used. Maintenance of anesthesia was accomplished with isoflurane at 0.5% in 100% oxygen. Mechanical ventilation was initiated with the following parameters: volume control ventilation, tidal volume 500 ml, respiratory rate 12 breaths/min, and positive end-expiratory pressure 7 cm H<sub>2</sub>O. With the initiation of mechanical ventilation, the patient's blood oxygen saturation reached 100%. Manual revision of the uterus was achieved uneventfully in approximately 10 minutes. After cessation of the revision, the isoflurane was turned off, and the patient was woken up and extubated when she was fully awake.

The early postoperative period in the post-anesthesia care unit was uneventful. The patient remained moderately hypertensive (140–150/80–90 mmHg), and the blood oxygen saturation was 98% with oxygen delivered via a nasal cannula. Arterial blood gases analysis revealed the following: pH 7.45, PaO<sub>2</sub> 140 mmHg, hemoglobin 8.2 g/dl, HCO<sub>3</sub> 19.5 mM/L, base excess -3 mM/L, FiO<sub>2</sub> 0.4. The patient

was discharged from the hospital in good condition after 2 days.

### COMMENT

Mirror syndrome shares many characteristics with preeclampsia, including edema, proteinuria and hypertension, and despite varying criteria in the literature to differentiate between the two syndromes, it is often difficult to make the distinction [1]. Additionally, it is believed that preeclampsia coexists in as many as 50% of patients presenting with mirror syndrome [2]. It has been suggested that hemodilution is a distinct pathophysiological feature of the syndrome, although hemoconcentration has been seen in preeclampsia [1,3]. Other important clinical features of mirror syndrome are pruritus, formation of abdominal blebs, progressive dyspnea, elevated uric acid, and high plasma sodium and chloride levels [1].

The exact mechanism of mirror syndrome is unknown, but the fetus is believed to play an important role in the pathogenesis. The mechanism is attributed to alloimmunization or non-immunological fetal hydrops. The development of fetal hydrops is preceded by an initial insult to the placenta or fetus that has been described in the context of cytomegalovirus and parvovirus B19 infections, alpha-thalassemia, sacrococcygeal teratoma, placental chorioangioma, Ebstein's anomaly, aneurysm of the vein of Galen, and fetal supraventricular tachycardia [1,3]. The placenta or fetus releases angiogenic factors, including soluble endothelial growth factor receptor-1, which in turn leads to endothelial cell dysfunction and maternal edema. The important role of the fetus in mirror syndrome was further supported by the amelioration of maternal symptoms when the cause of the fetal hydrops was corrected in utero [2].

In view of the patient's generalized edema, hypertension and anemia, as well as fetal hydrops, we felt that our patient probably had features consistent with both mirror syndrome and preeclampsia complicated by HELLP syndrome.

Because mirror syndrome is rare, there is little in the literature relating to anesthesiological considerations in these patients. McCann et al. [3] reported the successful use of an epidural in a patient with mirror syndrome in whom labor was induced. It is clear that the anesthetic management of patients needs to be carefully planned because mirror syndrome involves multiple maternal organ systems, including the respiratory, cardiovascular, renal and neurological systems. The multi-organ involvement in mirror syndrome mandates that the anesthesiologist obtain a detailed history, review relevant laboratory values and radiologic studies, and examine the airway and cardiopulmonary status. In our patient several anesthesiological considerations warrant special mention. Because the patient had an increased risk of bleeding due to suspicion of placenta accreta, which might necessitate an emergent airway under suboptimal conditions, she required general anesthesia for the procedure. She also had a predicted difficult intubation, which necessitated the use of AFOI. This was further complicated by her significant respiratory compromise and inability to tolerate lying flat. Therefore, the AFOI was performed while the patient was in a sitting position. Many anesthesiologists prefer AFOI to regional anesthesia in the parturient with a predicted difficult airway. They argue that the use of regional anesthesia in a patient with an expected difficult airway does not solve the airway problem, and regional anesthesia-related complications may result in a difficult airway emergency situation [4].

Alternative airway devices have been described for managing the parturient with a predicted difficult airway, including video laryngoscopes such as Pentax, Airtraq, Bullard, and Glidescope [5] and video stylets such as Bonfils, Shikani, Levitan, and SensaScope. With proper topical anesthesia of airway and explanation to the patient, these airway devices can be used in an awake patient as an alternative to AFOI. It should be noted that every airway device requires some

AFOI = awake fiberoptic intubation

degree of skill, and the choice of airway management should be based on the operator's preference and experience. Thus, any of these airway devices could have been considered in our patient, subject to its availability and proper training in its use. When preparing to manage these patients' airways, supraglottic airway devices such as the I-gel and laryngeal mask airway should be readily available in the event that a secure airway cannot be established. Supraglottic airways are inserted blindly and allow for ventilatory support until spontaneous breathing resumes and the patient can be woken. Lastly, the anesthesiologist should be prepared for the rare "cannot intubate, cannot ventilate" scenario, in which case emergent transtracheal ventilation must be established [5]. In our case, we decided not to use any muscle relaxant because we chose AFOI, the procedure was short, and

the surgery did not require any muscle relaxation.

Although it is thought that seizures are very rare in patients with mirror syndrome [1], the patient's clinical features of preeclampsia prompted treatment with magnesium sulfate for seizure prophylaxis. It is well known that magnesium prolongs the effects of non-depolarizing neuromuscular relaxants by increasing the sensitivity of the motor end-plate to relaxants. Muscle relaxants can be used with caution in patients who have received magnesium treatment, in smaller doses and with reduced frequency. The use of neuromuscular monitoring with a nerve stimulator is mandatory in such cases.

In conclusion, general anesthesia may be safely administered to a parturient with mirror syndrome, although it should be carefully planned due to multisystem organ involvement, and special precau-

tions should be implemented for managing a predicted difficult airway.

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