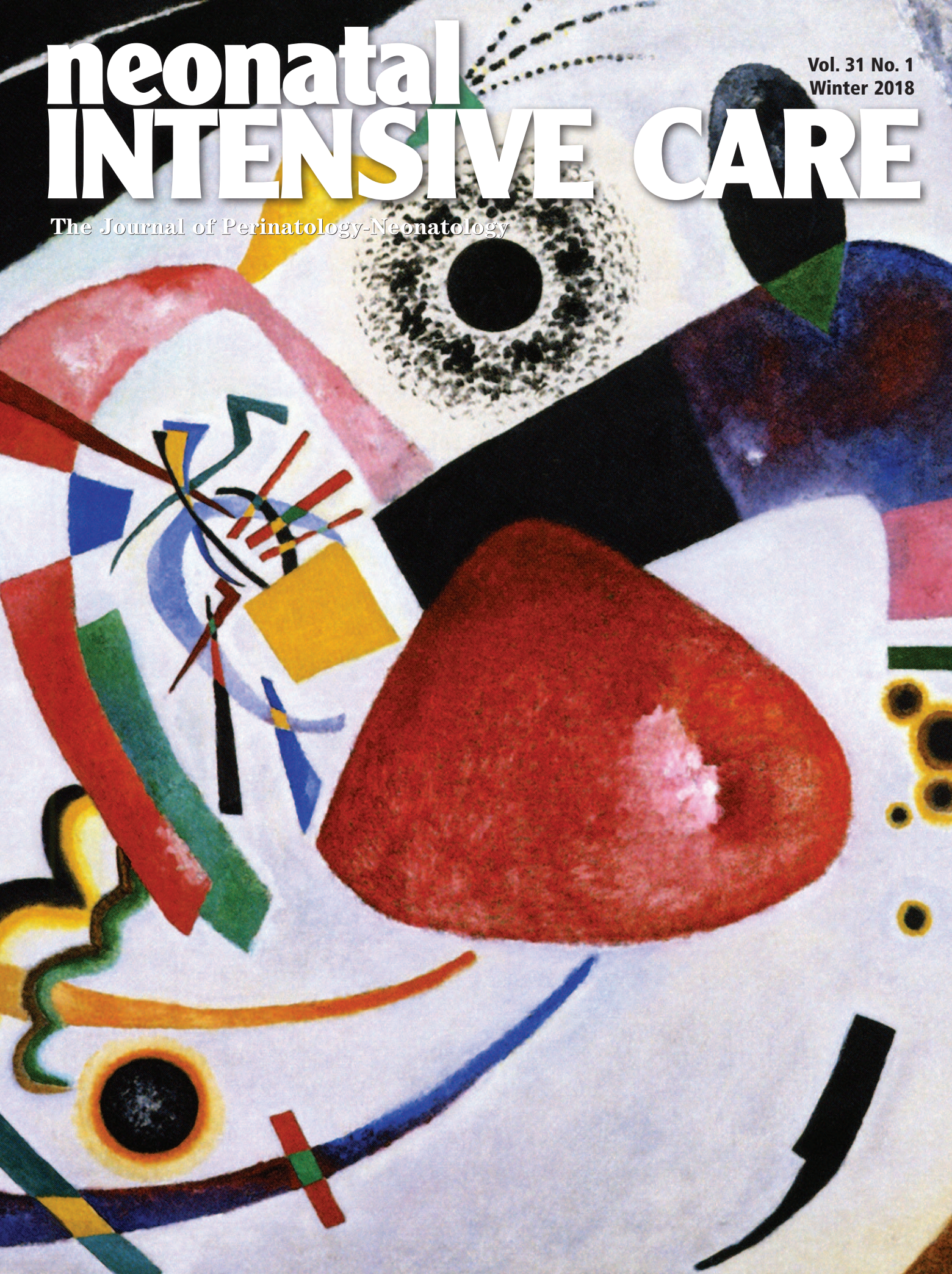


neonatal INTENSIVE CARE

Vol. 31 No. 1
Winter 2018

The Journal of Perinatology-Neonatology



Fetal Intubation in Management of Nearly Fatal Shoulder Dystocia

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By definition, the diagnosis of shoulder dystocia requires a time delay (60 seconds or more) between the delivery of the baby's head and shoulders.¹ The American College of Obstetricians and Gynecologists (ACOG) defines shoulder dystocia as a condition requiring special maneuvers to deliver the shoulders. Traditionally, brachial plexus palsies injuries have been attributed to the impaction of the shoulder behind the symphysis and to excessive force applied to the fetal head in an attempt to release the shoulder. Whether or not they are the result of a "difficult" delivery, brachial palsies are a major source of obstetrical litigation.² Nearly 30% of infants with brachial plexus palsy have no identifiable risk factors.^{1,2} As a result, the prediction and prevention of shoulder dystocia remains difficult. Macrosomia, one of the major risk factors for shoulder dystocia, remains hard to predict with either Leopold maneuvers or ultrasound examination. ACOG guidelines recommend a cesarean section delivery for fetuses having an estimated weight greater than 5,000 g in non-diabetic mothers, and over 4,500 g for mothers with diabetes. Despite an increase in cesarean section deliveries, the incidence of brachial plexus injury has not decreased.^{1,2}

Case report

A 16-year-old primigravida with poorly controlled type I diabetes was diagnosed with shoulder dystocia. Initial management included the McRoberts maneuver combined with simultaneously applied suprapubic pressure. Both took approximately 1 minute and failed. Next rotational maneuvers were applied, then "Wood's corkscrew", followed by attempts to deliver a posterior arm. This took approximately 4 minutes and also were unsuccessful. At this point, the fetal head turned blue and became very edematous. Maternal soft tissue was very swollen as well, effectively ruling out Zavanelli maneuver. At this point, the decision was made to intubate the fetus once the head and upper portion of the neck had been delivered. After the first attempt of orotracheal intubation failed, a transoral intubation was performed successfully using a rigid bronchoscope. Improvement of fetal head and face color was noted within 60 seconds. The additional time allowed the team to resume the efforts and finally resolve the condition successfully. The newborn was finally born weighing 4,250 g and Apgar score of 3 at 1 minute, 8 at 5 minutes. The newborn was diagnosed with mild brachial palsy and was discharged home on day 9. Symptoms of brachial palsy resolved by 6 months of age.

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Discussion

Over 90% of cases of shoulder dystocia can be resolved within minutes by the sequential use of the McRoberts maneuver and suprapubic pressure, rotational maneuvers, and finally the delivery of the posterior arm. The greatest efficacy was seen with delivery of the posterior arm, which decreased anterior nerve stretch by 71% and showed an 80% decrease in delivery force.² However, severe shoulder dystocia may become a perilous complication for the fetus causing severe asphyxia. Hope et al.³ reviewed autopsy results on 56 cases of fatal shoulder dystocia. Maternal obesity and large babies were overrepresented in labors complicated by fatal shoulder dystocia. Fetal distress was recorded in 26% of cases. Animal studies would suggest that a healthy fetus could withstand at least 5-10 minutes of hypoxia and still respond to resuscitation. Mechanisms of fetal demise in severe cases of shoulder dystocia may be different from the mechanisms seen in cerebral hypoxia due to umbilical cord prolapse or placental abruption.³ In cases of shoulder dystocia, compression of the neck causes cerebral venous obstruction, further aggravated by excessive vagal stimulation and fetal bradycardia. From the clinical standpoint, when all the efforts to resolve shoulder dystocia appear fruitless, the Zavanelli maneuver remains the last hope. The Zavanelli maneuver consists of cephalic replacement with subsequent delivery by cesarean section.⁵ However, the Zavanelli maneuver is not always doable and in the best scenario, requires additional time. In our case, significant maternal soft tissue and fetal neck edema ruled out the Zavanelli maneuver. At this point, the decision was made to perform fetal head intubation to allow more time for the resolution of shoulder dystocia while maintaining fetal oxygenation. Intubation of the fetus before severing the umbilical cord has previously been reported and named the EXIT procedure.⁶⁻⁸ The EXIT procedure offers the advantage of insuring uteroplacental gas exchange while on placental support.^{6,7} Skarsgard et al.⁸ first described EXIT procedure for management of fetuses with in-utero airways obstruction. The EXIT procedure is now used for a variety of entities, including teratomas and laryngeal atresia, among others.⁹⁻¹² The EXIT procedure is based on a multidisciplinary approach, looking for maintaining airway patency in extrauterine life. It uses the nasotracheal intubation, laryngeal mask, or tracheostomy, while uteroplacental circulation is maintained. So in this way, you can avoid asphyxia due to tumor compressive effect, and in a second time, you will treat the obstruction. The EXIT surgery gives to you a 45-60 minutes working time, to ensure the control of the neonatal airway, while the fetus has uteroplacental perfusion. This technique involves many risks. You must maintain

an adequate uteroplacental perfusion with a good uterine relaxation, a mean arterial pressure above a 65 mmHg with CVP around 10 cmH₂O is recommended.¹⁴ So, you get an excellent fetal blood perfusion, but it is frequent with a poor uterine relaxation, the appearance of arterial desaturation, bradycardia, placental abruption, or umbilical cord compression.^{16,17}

Our previous experience with in-utero excess to fetal oropharynx^{13,14} lead us to consider intubation of the fetal head as a temporary measure to maintain fetal oxygenation, which allows more time to resolve shoulder dystocia. Details of measurement of severe shoulder dystocia is beyond the scope of the report. Our goal was to present head intubation as a step to allow extra time for further measures while sustaining fetal oxygenation.

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