Summer 2015

Nonimmune Hydrops Fetalis

Heather Walker
Otterbein University, heather.walker@otterbein.edu

Nonimmune Hydrops Fetalis

Heather Walker, BSN, RN, CCRN
Otterbein University, Westerville, Ohio

Introduction

Hydrops fetalis is an excessive accumulation of fluid within the fetal extravascular compartments and body cavities generally characterized by:

- placental enlargement
- ascites
- pericardial effusions
- pleural effusions

(Bellini, 2014, p. 1082).

Nonimmune hydrops fetalis (NIHF) develops as a result of one or more nonimmune factors, distinguishing it from immune hydrops fetalis that results from a maternal antigen-body fetal antigen-mediated red blood cell hemolysis (Randenberg, 2010, p. 281).

Pathophysiology

The main pathophysiologic factor implicated in the development of NIHF is abnormal fluid movement between the plasma and tissues (Randenberg, 2010, p. 281). Any disruption in the balance of fluid can result in excess fluid in both the body tissues and cavities, thus leading to edema, ascites, and pleural and pericardial effusions. Perinatal mortality with this severe diagnosis is high, between 50-98% (Kayiran, 2013, p. 168). Four main theories have been suggested to explain the distribution of fluids that occur with hydrops fetalis:

1. an increase in hydrostatic capillary pressure (resulting from heart failure or from obstruction of venous return)
2. a reduction in plasma osmotic pressure (from decreased albumin production or increased albumin loss)
3. obstruction of lymphatic flow
4. damage to peripheral capillary integrity

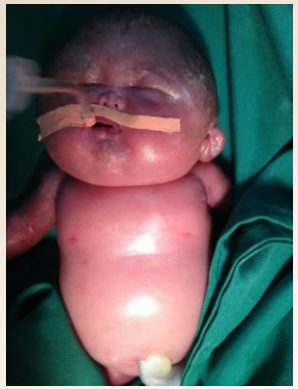
(Randenberg, 2014, p. 282).

Cardiac Anomalies

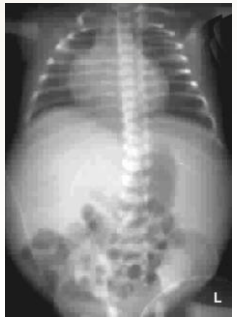
Fetal echocardiography should be performed when the diagnosis is made of hydrops fetalis since fetal cardiac anomalies are among the highest cause of NIHF (Norton, 2015, p. 25). The incidence of cardiac defects and rhythm abnormalities make up 19-25% of NIHF (Kayiran, 2013, p. 168). The cardiac anomaly is present due to the development of fetal heart failure; this can be a rhythm issue or a structural defect. Fetal supraventricular tachycardia is the most common tachyarrhythmia causing NIHF, accounting for 35-60% of all cases presenting with rhythm disturbances (Kayiran, 2013, p. 169). Fetal supraventricular tachycardia results in decreased ventricular filling time during diastole which further reduces cardiac output resulting in poor perfusion, inadequate tissue oxygenation, elevated central venous pressure, and hepatic venous congestion (Randenberg, 2010, p. 287). The treatment of choice for fetal arrhythmias is the administration of medications to the mother such as digoxin or beta-blockers. Structural heart defects can affect both the right and left side of the heart in an infant born with hyrdops fetalis. Right-sided heart defects such as Hypoplastic right heart syndrome, Tetralogy of Fallot, and Ebstein's anomaly all result in right-sided outflow tract obstruction thus impeding blow flow to the lungs. Left-sided heart defects such as Hypoplastic left heart syndrome, and aortic valve abnormalities all result in left-sided outflow tract obstruction resulting in severely decreased oxygen rich blood flow to the body. All of these structural heart defects associated with NIHF are indicative of open-heart surgical intervention, most of them within several days of life. Poor prognosis of survival of NIHF is associated with structural cardiac defects and fetal arrhythmias diagnosed before 24 weeks gestation (Turgal, 2015, p. 357).

Clinical Management

Clinical management is indicative for the fetus and the infant in the setting of NIHF. Once a prenatal diagnosis has been made, focus is aimed at the coordination and collaboration with obstetrics/gynecology, social work, cardiology, genetics, and neonatology specialists. The information gathered is used to help with education and possible causes so the family can make an informed choice regarding treatment options. Supportive care measures and education are vital goals in the prenatal period. The parents must be kept informed of what to expect during labor and delivery and especially in the neonatal management in the delivery room; particularly subsequent tests and procedures.



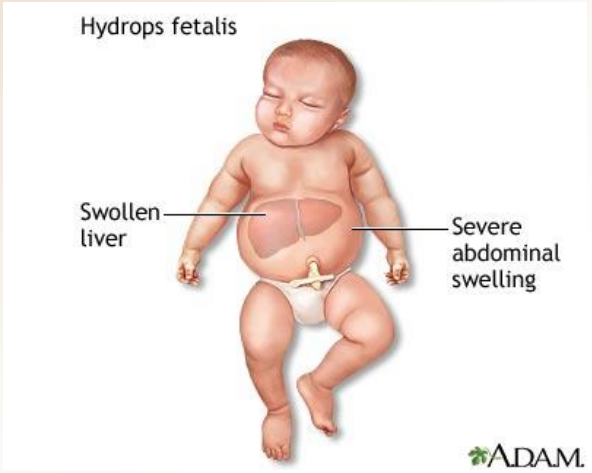
Hyrdops Fetalis [Online Image]. (2012). Retrieved July 29, 2015 from https://drclintonb.wordpress.com/tag/hydrops-fetalis/



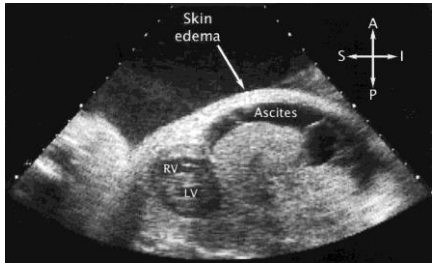
Plain radiograph of chest and abdomen of an infant [Online Image]. (2013). Retrieved July 30, 2015 from http://emedicine.medscape.com/article/403962-overview

Nursing Implications

Nursing implications are directed at maximizing neonatal resuscitative measures. Preventing cold stress with the use of radiant warmers and a warmed room will help in decreasing added stress to an already compromised infant. Respiratory support with the help of endotracheal intubation, high peak inspiratory pressures and 100% FiO2, umbilical arterial and venous catheter placement for management of hemodynamics and blood gas interpretation, helping in the procedure of bilateral thorancentesis for fluid removal in the pleural space, initiation of volume resuscitation with albumin or other colloids, and cardiovascular support with inotropes to improve cardiac output are all vital by nursing and medical staff to aid in the support and survival of NIHF. Neonatal management requires a skilled and coordinated resuscitative team by a well-equipped birthing hospital and neonatal intensive care unit.



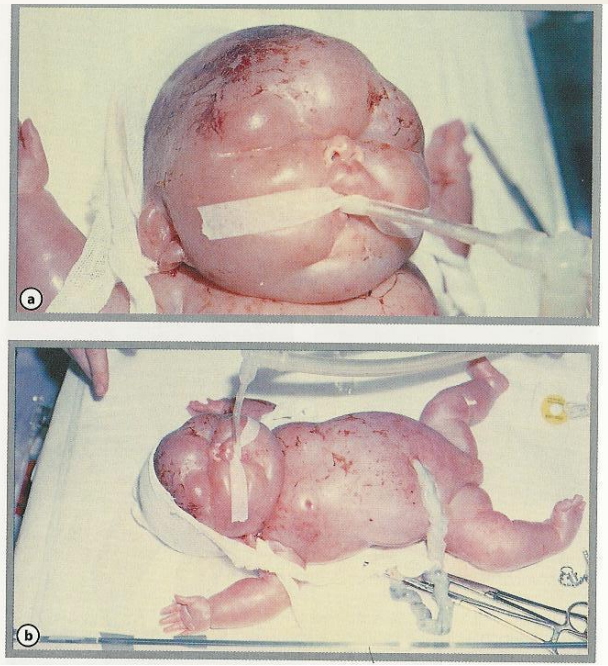
Hydrops Fetalis [Online Image]. (2015). Retrieved July 29, 2015 from http://www.nlm.nih.gov/medlineplus/ency/imagepages/19874.htm



Untitled illustration of an ultrasound of a fetus with hydrops fetalis [Online Image]. (2014). Retrieved July 29, 2015 from http://flipper.diff.org/app/items/info/7088

Conclusion

In conclusion, despite many advances made in the treatment, management and diagnosis, NIHF still carries a high mortality rate. Further research is still needed to help with the management and treatment of NIHF to decrease intrauterine and perinatal mortality.



Infant (a) and (b) with hydrops fetalis [Online Image]. Retrieved July 29, 2015 from http://www.motherbabyuniversity.com/outreach/outreach/peapods/HemolyticDiseaseNewborn/RhIncompatibility.htm

References

Audibert, F. D., Valérie. (2013). Investigation and management of non-immune fetal hydrops. *Society of Obstetricians and Gynaecologists of Canada, 297*, 1-14.

KAYIRAN, P., GÜRSOY, T., & GÜRAKAN, B. (2013). Non immune hydrops fetalis: Two premature infants with favorable outcome. *Marmara Medical Journal, 26*(3), 168-170. doi:10.5472/MMJ.2013.02956.0

Lee, K. G. (2013). Hydrops fetalis. Retrieved from http://www.nlm.nih.gov/medlineplus/ency/article/007308.htm

Ng, Z., Seet, M., Erng, M., Buendia, F., Chang, A., & Sriram, B. (2013). Nonimmune hydrops fetalis in a children's hospital: A six-year series. *Singapore Medical Journal, 54*(9), 487-490. doi:10.11622/smedj.2013169

Norton, M., Chauhan, S., P., & Dashe, J. (2015). SMFM clinical guideline: Nonimmune hydrops fetalis. *Contemporary OB/GYN, 60*(2), 24-26.

Randenberg, A. L. (2010). Nonimmune hydrops fetalis part I: Etiology and pathophysiology. *Neonatal Network, 29*(5), 281-295.

Randenberg, A., L. (2010). Nonimmune hydrops fetalis part II: Does etiology influence mortality? *Neonatal Network, 29*(6), 367. doi: 10.1891/0730-0832.29.6.367

Sosa, M. (1999). Nonimmune hydrops fetalis. *Journal of Perinatal & Neonatal Nursing, 13*(3), 33-44.

Turgal, M., Ozyuncu, O., Boyraz, G., Yazicioglu, A., & Sinan Beksac, M. (2015). Non-immune hydrops fetalis as a diagnostic and survival problems: What do we tell the parents? *Journal of Perinatal Medicine, 43*(3), 353-358. doi:10.1515/jpm-2014-0094

Verklan, T., & Walden, M. (2010). Hydrops. *Core curriculum for neonatal Intensive care nursing* (4th ed., pp. 633-635) Saunders.

OTTERBEIN UNIVERSITY