Impact of Neonatal Consultation on Prenatal Diagnosis

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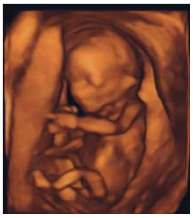
Fetal Patient

- Two patients within one:
  - The management of each of the patients affect the other.



- Fetal Medicine:
  - Fetus, rather than the pregnancy, is the principal focus of attention.

"Here's your sonogram. It's a girl, her name is Chelsea, she has a talent for music and she hates broccoli."

Fetal Patient

- Management of the fetal patient requires the expertise of various clinicians:
  - Geneticists and genetic counselors.
  - Neonatologists.
  - Pediatric surgeon.
  - Medical subspecialists.
  - Experts in medical imaging.

Prenatal Diagnosis of Structural Anomalies

- Influence on perinatal management:
  - Changing the site of delivery for immediate postnatal treatment
  - Mode of delivery to prevent hemorrhage or dystocia
  - Early delivery to prevent ongoing fetal organ damage; or treatment in utero to prevent, reverse, or minimize fetal organ injury as a result of structural defect

Semin Perinatol 1994; 18, 385-397
Curr Probl Surg 1994; 31:1-68

Influence of Prenatal Surgical Consultations

- 221 fetuses were referred for their 234 congenital anomalies:
  - genitourinary (36%)
  - thoracic (16%)
  - intraabdominal (14.5%)
  - abdominal wall (10.6%)
  - neurological (9%)
  - skeletal (6%)
  - head and neck tumors (2.5%)
  - Twin pregnancies (2.5%)

Crombleholme TM, et al. J pediatr Surg 1996;31(1):156-163

Influence of Prenatal Surgical Consultations

- The decision to terminate was changed in 3.6%.
- The site of delivery was changed in 37% to facilitate postnatal evaluation and initiate immediate treatment.
- The mode of delivery was changed in 6.8% to prevent dystocia, hemorrhage into a tumor or to provide an emergency airway as in a case with cervical teratoma.
- The timing of delivery changed in upto 4.5% cases.

Crombleholme TM, et al. J Pediatr Surg. 1996; 31(1):156-62

Influence of Prenatal Surgical Consultations

- Provides obstetric colleagues and families with valuable insight into the surgical management of anomalies.
- Allows fetal intervention when appropriate.
- The diagnosis and management of complex fetal anomalies require a team effort because no single discipline is fully equipped to deal with all the maternal and fetal ramifications of a diagnosis of a structural defect.

J PediatrSurg 1996;31(1):156-163

Prenatal Diagnosis of Congenital Heart Disease

- Studies show improved postnatal outcome when a prenatal diagnosis of congenital heart disease is made.
- A detailed explanation of the potential cardiac surgical procedures that the infant will require and their timing can be provided by the cardiac surgeon, with the opportunity for parents to prepare emotionally before birth.
- Neonatal hypoxemia and acidosis can be prevented by early institution of prostaglandin E infusion for ductal dependent lesions immediately after delivery.

Circulation

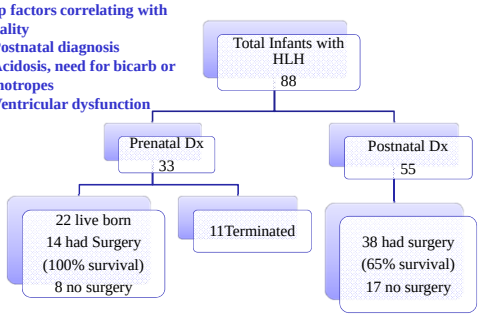
JOURNAL OF THE AMERICAN HEART ASSOCIATION

American Heart Association.

Improved Surgical Outcome After Fetal Diagnosis of Hypoplastic Left Heart Syndrome
Wayne Tworetzky, Doff B. McElhinney, V. Mohan Reddy, Michael M. Brook, Frank L. Hanley and Norman H. Silverman

Circulation. 2001;103:1269-1273
University of California, San Francisco

- **Preop factors correlating with mortality**
  - **Postnatal diagnosis**
  - **Acidosis, need for bicarb or inotropes**
  - **Ventricular dysfunction**



Outcome, in part, depends on the success of transition from in-utero to postnatal life, and depends on both the anatomy and predictions of postnatal physiology.

Tworetzky, Circulation. 2001;103:1269-1273

Fetal Diagnosis CHD: Improved Outcome

- 257 with CHD/49 diagnosed prenatally in Berlin
- Prenatal diagnosis care plan:
  - Initiation of appropriate management in the DR
  - Immediate transfer to CICU after delivery
- Postnatal diagnosis:
  - 27% had been already discharged at time of diagnosis
  - Acidosis and cardiac dysfunction: 50%
  - Murmur or other exam findings: 50%

Fuchs, et al Ultrasound Obstet Gynecol. 2007;29(1):38-43

Fetal Diagnosis CHD: Improved Outcome

- **Prenatal vs. Postnatal Diagnosis:**
  - Higher preop O2
  - Fewer cases with cardiac failure
  - Fewer cases with preop ductus closure
  - Shorter duration of postop ventilation
  - Shorter stay in the CICU
  - Less post-discharge heart failure

Fuchs, et al Ultrasound Obstet Gynecol. 2007;29(1):38-43

Multidisciplinary Management

- The multidisciplinary management model used in management of cancer patient, popularly known as tumor board.
- It functions as a forum for exchange of up-to-date scientific information, development of evidence-based treatment protocols and continuity of care.

Experience with a Multidisciplinary Antenatal Diagnosis and Management (MADAM) Model in Fetal Medicine

J Mat Fetal and Neonatal Med 2003;14:333– 337

- During a 5-year period, 114 pregnant women who required consultations with individual pediatric and pediatric surgical specialists were referred to one of 77 MADAM bi-weekly conferences for consensus recommendation.
- Of the 77 discussions:
  - 42% led to an alteration in prenatal management
  - 18% led to co-ordination of postnatal management
  - 16% led to the establishment of a new treatment guideline, or the modification of an existing one.
- In all, perinatal management was altered in 75% of cases.

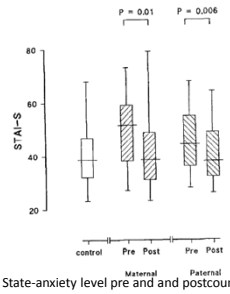
Advantages of Multidisciplinary Team Involvement

- Fetal management protocols established for numerous conditions:
  - Work-up of echogenic bowel
  - Optimized strategies for the pre- and postnatal management of:
    - Congenital diaphragmatic hernia
    - Alpha-thalassemia major (Med Health RI 2001;84:152)
    - Abdominal wall defects (Obstet Gynecol 2002;100:695)
    - Congenital cystic adenomatoid malformations of the lung (J Pediatr Surg 2000;35:801)
    - Congenital renal failure

Team Approaches Improves Patient Safety and Quality of Care

1. Mazza F, et al. The road to zero preventable birth injuries. Jt Comm J Qual Patient Saf 2008;34(4):201–5.
2. Fisch JM, et al. Labor induction process improvement. Obstet Gynecol 2009;113:797–803.
3. Pettker CM, et al. Impact of a comprehensive patient safety strategy on obstetric adverse events. Am J Obstet Gynecol 2009;200:492, e1–e8.
4. Reisner DP, et al. Reduction of elective inductions in a large community hospital. Am J Obstet Gynecol 2009;200:674, e1–e7.

Counseling by Specialist Staff



State-anxiety level pre and and postcounseling) in controls (n = 20), subjects (n = 26) and fathers (n = 19). J Pediatr Surg 1998; 33:1376-1379.

- Antenatal counseling by a pediatric surgeon and neonatal nurse was given after ultrasound diagnosis of a fetal surgical malformation
- Anxiety levels were measured using the Spielberger State-Trait Anxiety Inventory, a tool used by psychologists to assess the inherent level of anxiety.

Does Who Counsels Matter?

Practices and attitudes of maternal- fetal medicine (MFM) and fetal care pediatric (FCP) specialists regarding fetal abnormalities. Self-administered survey of 434 MFMs and FCPs (response rate: MFM 60.9%; FCP 54.2%).**Brown, et al. Am J Obstet Gynecol 2012; 206:409.e1-11., Boston**

	Support termination		Termination: Important Option	
Condition	**MFM**	**FCP**	**MFM**	**FCP**
Downs Syndrome (%)	52	35	90	70
Congenital Diaphragmatic Hernia (%)	49	36	88	69
Spina Bifida (%)	54	35	88	70

- MFMs report higher termination rates among patients only for DS (DS 51% vs 21%, P < .001).
- MFMs were less likely to think that FCP consultation should be offered prior to a decision regarding termination (54% vs75%, P < .001).

Differing Attitudes Toward Fetal Care

- Pediatric and obstetric specialists'attitudes regarding whether and when pediatrics consultation should be offered
- Survey of 434 maternal-fetal medicine specialists (MFMs) and fetal care pediatric specialists (FCPs) (response rate: MFM, 60.9%; FCP, 54.2%).

	FCP	MFM	P
Alcohol abuse	63%	36%	.001
Cocaine use	60%	32%	.001
Seizure meds	62%	33%	.001
Diabetes	56%	27%	.001

- For all conditions, MFMs were more than twice as likely as FCPs to think that no pediatric specialist consultation was ever necessary.

Pediatrics 2012;130:e1534–e1540 (Boston)

What Information Do Parents Want From The Neonatologist?

Paediatr Child Health 2007;12(3):191-196. Canada

- Fifty women with pregnancies of GA between 25 and 32 weeks with an antenatal consultation about the medical risks and treatments relative to their potentially premature infant.
- Within 48 h following the consultation, patients were asked to respond to a questionnaire to assess their recall of the information provided, information expectations and their anxiety level.

What Information Do Parents Want From The Neonatologist?

Paediatr Child Health 2007;12(3):191-196.

- 92% thought that the antenatal consultation increased their knowledge and understanding of what might happen if their infant was born preterm.
- 78% agreed that the consultation relieved some of their worry and anxiety about their baby.
- Respondents wanted information about chances of survival, likely medical problems and the risk for disability, followed by medical treatments and breastfeeding.
- They consistently recalled receiving information about chances of survival, likely medical problems and medical treatments.

Pregnant Women's Experiences of Received Information in Relation to Fetal Malformation Detected on Ultrasound

- An exploratory descriptive study.
- Semi-structured interviews with 27 women who continued their pregnancy and women who chose to terminate were audiotaped and the text subjected to qualitative content analysis.
- Most of the women experienced the information given as insufficient, often misleading, conflicting, or incoherent, and sometimes negative.
- Women expressed dissatisfaction regarding the care-givers' methods of giving information.

N. Asplin et al. Sexual & Reproductive Healthcare 3 (2012) 73–78. Sweden

Pregnant Women's Experiences of Received Information in Relation to Fetal Malformation Detected on Ultrasound

- The women wished for more and explicit information given both verbal and written including best-and worst-case scenarios.
- They also wished information from different specialists and continuity of care.
- A good access to integrated care at specialized care units for pregnant women carrying babies with malformations would advance the quality of care.

N. Asplin et al. Sexual & Reproductive Healthcare 3 (2012) 73–78. Sweden

Parental Expectations of Prenatal Consultation with a Neonatologist After Diagnosis of Fetal CA

- Parents referred to neonatology for prenatal consultation after the diagnosis of a congenital anomaly (CA).
- 22 mothers (42 interviews)
  - No fathers
  - Interviews
    - 1 week after consult
    - 1 week after delivery
- Interviews were analyzed for themes by using the constant comparative method associated with the grounded theory method
- Five main themes: (1) preparation; (2) knowledgeable physician; (3) caring providers; (4) allowing hope; and (5) time.

Miquel-Verges F, et al. Pediatrics 2009, Johns Hopkins University School of Medicine

Prenatal Consultation With a Neonatologist for Congenital Anomalies: Parental Perception

- Mothers perceived that a consultation with a neonatologist, which included a NICU tour, prepared them for the perinatal course.
- Mothers wanted realistic information, regardless of how grim, yet wanted to retain hope.
- All mothers would recommend a prenatal consultation with a neonatologist.

Miquel-Verges F, et al. Pediatrics 2009;124:e573–e579.

Indications for Prenatal Consultation with a Neonatologist

- Complex delivery-room management anticipated
- Fetal anomalies present
- Fetal intervention indicated
- Postnatal need for multiple pediatric subspeciality
- Difficult or prolonged NICU course anticipated
- Complex social situation
- High degree of prognostic uncertainty present
- Fetal diagnosis not compatible with long-term survival

LP Halamek. J Perinatol 2001;21:116

Elements of Prenatal Consultation Discussed by the Neonatologist

- Explanation of the role of neonatologist
- Review of prenatal findings
- Description of events in the delivery room
- In depth discussion of diagnosis, etiology, pathophysiology, therapy, prognosis
- Potential impact of of premature delivery
- Breast feeding
- Blood transfusion and directed donation
- Identification of pediatrician for post NICU care
- Tour of NICU

J Perinatol 2001,21:116

Supplemental Written Information Improves Prenatal Counseling: A Randomized Trial

- Sixty pregnant participants assessed to be at risk for premature delivery between 23 and 34 weeks' gestation.
- Counseling in the control group consisted of gestational age–specific verbal information, and counseling in the intervention group consisted of written gestational age–specific information 1 hour before the verbal gestational age–specific information.
- Both groups completed a Prematurity Knowledge Questionnaire after counseling and the State-Trait Anxiety Inventory before and after counseling.

AD Muthusamy, et al. Pediatrics 2012;129:e1269–e1274. Wisconsin

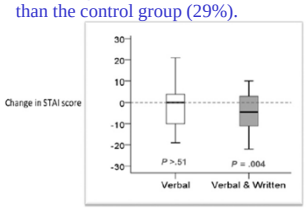
Supplemental Written Information Improves Prenatal Counseling: A Randomized Trial

- The Prematurity Knowledge Questionnaire consisted of questions regarding:
- Short-term problems (immature lungs, IVH, ROP, feeding problems, infection, apnea, and jaundice)
- Long-term problems (CLD, postdischarge respiratory infections, visual impairment, hearing impairment, brain damage, and learning and behavior problems)
- Numerical outcome data (probabilities of survival, survival without significant morbidity, severe IVH, severe ROP, and CLD).

Pediatrics 2012;129:e1269–e1274

Supplemental Written Information Improves Prenatal Counseling: A Randomized Trial

- Knowledge of short-term problems was not statistically different between the intervention (82%) and control groups (67%).
- Knowledge of long-term problems was better in the intervention (71%) than the control group (45%).
- Knowledge of numerical data was better in the intervention (48%) than the control group (29%).



Positive value = increased anxiety, negative value = decreased anxiety, 0 = no change. Whisker ends represent extreme changes. By using paired t test, in the verbal + written group anxiety decreased, P = .004; no change in the verbal only group, P >.51.

Effect of Prenatal Consultation (PC) with a Neonatologist on the Incidence and Duration of Human Milk Feeding (HMF) in Preterm Infants.

- Matched case-control study of 46 preterm infants (23–35 wk), whose mothers (n= 29) had received PC emphasizing the importance of HMF.
- Control infants were matched by Bweight, GA and multiplicity.
  - Mean GA was 30.1 ± 3 wk in both groups.
  - Mean B weight was 1329 ± 489 (PC) and 1334 ± 441 g (control).
- PC infants received HMF for significantly longer, both in the hospital and after discharge:
  - Hospital: PC **37** ± 34 d vs control **15** ± 19 d, p = 0.001
  - Discharge PC **60** ± 57 d vs control **21** ± 32 d; p = 0.0001.
- PC is associated with significantly longer HMF in preterm infants, both in hospital and after discharge.

Friedman S, et al. Acta Pædiatr 2004; 93: 775–778. Israel

Are Obstetricians and Neonatologist Attuned to Eachother?

- Evaluated the perinatal management decisions made in a multidisciplinary setting, and to what extent, in clinical practice, decisions about obstetric (OB) management are attuned to those about neonatal management.
- Data on perinatal management of 318 consecutive singleton pregnancies presented to a multidisciplinary perinatal team (MPT) in a tertiary centre were collected retrospectively.

Hilmar H, Prenat Diagn 2004; 24: 890–895 (Dutch Study)

Actual Obstetric Management by Planned Obstetric Management, Actual Neonatal Management by Planned Neonatal Management

	Planned obstetric management				
	Standard management (*n* = 210)	Non-aggressive management (*n* = 64)	Pregnancy termination (*n* = 32)	Other (*n* = 7)	Total (*n* = 313)
Actual obstetric management					
Standard management	207 (99%)	6 (9%)	—	1 (14%)	214 (68%)
Non-aggressive management	2 (1%)	57 (89%)	1 (3%)	1 (14%)	61 (19%)
Pregnancy termination	1 (1%)	1 (2%)	31 (97%)	2 (29%)	35 (11%)
Other	—	—	—	3 (43%)	3 (1%)
	Planned neonatal management[a]				
	Standard management (*n* = 100)	No life-sustaining treatment (*n* = 12)	No decision (*n* = 201)	Total (*n* = 313)	
Actual neonatal management					
Standard management	96 (100%)	1 (9%)	130 (87%)	227 (87%)	
No life-sustaining treatment	—	9 (91%)	20 (13%)	29 (11%)	
Stillbirth/death during delivery	4	2	51	57	

Why the Disconnect?

- Different perspectives of obstetricians and neonatologists might account for these differences.
  - Neonatologists encounter infants who at least survived until birth, whereas obstetricians generally see a population with a worse prognosis — Allan LD, Heart 1998,79:371–373
- Whose best interests should be primarily served?
  - The mother's or the infant's
    - » Lenard, Brain Dev1995, 17: 44–47.
- In case of (complete) non-aggressive OB management, the infant is not monitored:
  - OB will not be confronted with signs of fetal distress.
  - The neonatologist may be confronted with a live child in distress.

Importance of Obstretics and Neonatology Keeping Attuned to Each Other

- Both, obstetric and neonatal management affect the infant's well-being and they should be considered together in order to not worsen the outcome.

Why Consult a Neonatologist?

- Generalist
  - "whole baby"
- Cares for infant from delivery room to NICU
  - And beyond
- Continuity
  - Familiar face in intimidating environment
- Get the basics out of the way
  - Allows for more in depth discussions

Why Consult a Neonatologist?

- In our hospital, OB as well as the NICU, have adopted a policy whereby all antepartum admissions before 34 weeks' gestation automatically get a neonatal consult.
  - These consults are updated weekly in patients who undergo long-term hospitalization
- OB and Neonatologists meet weekly to discuss the care of all high risk pregnancies.
- Once a month we have joint OB/NICU morbidity /mortality conference.

"None of us is as smart as all of us."

--Ken Blanchard

THANK YOU