

What makes maternal fetal imaging with Hudson Valley Radiology unique?

The 2008 Obstetrical Imaging Census

A work in progress documenting imaging and pathologic diagnoses.

- **Practice Demographics**
- **14-16 Week Level II Fetal Ultrasound**
- **Fetal Cardiac Ultrasound**
- **Fetal MR**
- **Ultrasound and MR for placenta increta/percreta**
- **Maternal Uterine Artery Doppler**
- **False Negatives**

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What makes maternal-fetal imaging with Hudson Valley Radiology Associates unique?

I - Our protocols are uniquely designed to detect the 2-3% of all pregnancies that have clinically significant cardiac and non-cardiac malformations – the profound majority of which will be found in couples with no identifiable risk factors.

II - An evidence based, pregnancy outcome verified program that:

- Reduces transferring of sick newborns at 4 to 5 times the national average based on superior detection rate of cardiac malformations during the mid second trimester anatomy scan.
- Reduces your medical legal exposure to stillbirths – the second most common cause for obstetrical litigation – based on universal fetal cardiac ultrasound and universal umbilical cord color Doppler for velamentous cord insert patterns.

III - The volume of abnormal cases we detect, diagnose and co-manage rivals many university MFM departments and frequently exceeds that of freestanding MFM practitioners. The knowledge gleaned from such cases is applied to every patient we image.

Partial List of Fetal and Maternal Imaging Abnormalities, 2008, as Collected by a Single Practitioner

During 2008, the following “snapshot” overall demographics of our practice is as follows:

- Number of detailed OB ultrasound exams – 2,718
- Number of maternal and fetal obstetrical MR exams - 158
- Number of nuchal translucency first trimester screens – 2,855
- Number of 2D fetal cardiac studies – 2,275

2008 pregnancy outcome quality assurance program:

- 1,642 pregnancy outcome letters mailed out
- 381 pregnancy outcome letters returned for a 22% response rate
- Amongst the returned outcome letters, we were informed of no additional fetal or maternal pathologies identified postnatally that were not established prenatally.

The following categories attempt a partial enumeration of abnormal studies for which we provided the imaging diagnosis and/or imaging co-management. Pathologies were chosen as to those that were considered most clinically significant.

Fetal cardiovascular malformations – 22 cases:

- Transposition of the great vessels – 2
- Truncus arteriosus – 2
- Tricuspid atresia with pulmonary stenosis – 2
- Tetralogy of Fallot – 2
- Double outlet ventricle with coarctation – 1
- Aortic coarctation – 1
- Atrioventricular septal defect – 1
- Large atrial septal defect - 1
- 2:1 atrioventricular block – 1
- Agenesis of the ductus venosus with aberrant course to the intraabdominal umbilical vein
 - In association with metabolic storage disorder – 1
 - Part of multi-malformative syndrome – 1
 - In association with large atrioseptal defect – 1
- Right aortic arch with no structural heart disease – 2
- Aberrant right subclavian artery with left aortic arch, normal variant – 2
- Aberrant right subclavian artery as part of Down syndrome with tetralogy of Fallot – 1
- Cardiac rhabdomyomas with tuberous sclerosis - 2

MOST FREQUENTLY QUOTED INCIDENCE OF
CLINICALLY SIGNIFICANT CONGENITAL HEART
DISEASE AMONGST NEWBORNS - 1:200-1:300

HVRA'S 2008 DETECTION RATE

All cardiovascular malformations –
 $22/2,718 = 2.4$ cases per 300 newborns

Not including isolated right aortic arch and isolated agenesis
ductus venosus both with normal heart – $16/2,718 = 1.8$ cases per
300 newborns.

14-16 week ultrasound diagnosed malformations – 3 cases:

- Fetus with megacystis, dysplastic unilateral kidney, clubfoot, micromelia and single umbilical artery
- Fetus with tricuspid regurgitation, retrograde diastolic flow in ductus venosus, SUA, jugular lymphatic distention – final diagnosis placental karyotype abnormality – 2q deletion
- Twin fetus with congenital diaphragmatic hernia.

Fetal CNS MR malformations – 31 cases:

- Abnormal calvarium – chromosome 9 abnormality on CGH
- Neurodevelopmental anomalies – 6 cases
 - Case 1 – schizencephaly, cerebellar hypoplasia, partial agenesis of inferior vermis, negative CGH
 - Case 2 – hypoplastic cerebellum, vermis, pons
 - Case 3 – Septo-optic dysplasia versus “isolated” agenesis of cavum septum pellucidum
 - Case 4 – Agenesis of inferior vermis with heterogeneous cortical mantle (? pseudostratified ventricular epithelium). CGH negative
 - Case 5 – Bilateral complete lissencephaly
 - Case 6 – Agenesis inferior vermis, normal outcome
- Aqueductal stenosis – 4 cases
- Dandy Walker malformation with neurodevelopmental malformation including hypoplastic brainstem, pons, aqueductal stenosis and hydrocephalus – 1 case
- Arachnoid cyst of choroidal fissure – 2 cases
 - Pineal recess – 1 case
 - Choroidal fissure – 1 case
- Abnormal corpus callosum – 4 cases
 - Complete agenesis – 2 cases
 - Partial agenesis – 1 case
 - Dysgenetic shortened, thick corpus callosum – 1 case
- Intracranial hemorrhage – 2 cases
- Mild ventriculomegaly – 6 cases
 - 5 cases – normal outcome
 - 1 case – tetrasomy 9P
- Open neural tube defect – 5 cases
 - Lumbar, sacral – 4 cases
 - Encephalocele – 1 case

Fetal MR – extracranial face and neck – 6 cases:

- Coloboma, CHARGE syndrome – 1 case
- Soft palate defect – 3 cases
 - 1 case – isolated
 - 3 cases – associated with
 - a) Dandy-Walker malformation and aqueductal stenosis.
 - b) Skeletal dysplasia
 - c) Agenesis of inferior vermis
- Occipital hemangioma – 1 case
- Lymphangioma – 1 case

Fetal MR – thorax – 6 cases:

- 5 cases of CCAM/BPS
- 1 case congenital diaphragmatic hernia

Fetal MR – urinary tract – 5 cases:

- PCK with anhydramnios
- Renal agenesis
- Multicystic dysplastic kidney
- Normal variant elongated bladder with patent urachal cyst
- Isolated unilateral renal agenesis

Fetal MR – abdomen (non-urinary tract) – 4 cases:

- Megacolon – Hirschsprung's versus anal atresia (postnatal diagnosis pending)
- Situs inversus totalis with right-sided colon
- Choledochal cyst
- Enlarging RUQ cyst bordering porta hepatis with normal gallbladder in male fetus – pending postnatal diagnosis – choledochal cyst versus gut duplication cyst

Fetal musculoskeletal MR – 5 cases:

- Ehlers-Danlos: bilateral hip flexion with knee extension (associated CCAM)
- Unilateral calcaneal valgus
- Arthrogyrosis
- Klippel-Feil and Sprengel's deformity
- Thigh mass – pending postnatal clinical and/or surgical follow-up

Imaging of adherent placentation – increta/percreta: Obstetrical MR, TA and TV ultrasound with color Doppler – 19 cases:

- True positive increta/percreta – 11 cases (including one maternal death)
- True negative – 5 cases
- False positive – 2 cases
- False negative – 1 case (missed increta posterior lower uterine segment)

Abnormal uterine artery Doppler in association with clinical sequela of UPVI (one or several of the following conditions – PTD less than 36 weeks, early preeclampsia, IUGR, abruption, stillbirth, NICU admission) – 8 cases with abnormal uterine artery mean resistive index 18-22 weeks:

- 6 true positives
- 2 false positives

Obstetrical imaging false negatives – all false negatives have prompted specific changes in imaging protocols and departmental review – 4 cases:

- Micrognathia – facial profile on mid second trimester exam obtained in neck flexion with chin “tucked” down against chest – 1 case
- Unilateral radial hypoplasia with absent thumb – 1 case
- Velamentous site of placental cord insertion – 2 cases
 - Case 1 – focal cluster of vessels on placental surface falsely interpreted as site of PCI without documentation of connecting segment of umbilical cord.
 - Case 2 – blood clot that looked nearly identical to adjacent placental tissue was up against site of PCI, therefore, making PCI appear non-eccentric