07.27.2010

This document has been prepared as a patient counseling and dictation guideline for the Prenatal Diagnosis and Genetics Clinic regarding ultrasound findings. This information is based on literature review and group consensus.

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Isolated Two Vessel Cord/Single Umbilical Artery

We discussed that a two vessel cord, also called a single umbilical artery (SUA), is when the cord has one artery and one vein. Studies suggest that the absence of one vessel of the umbilical cord is found in approximately 1% (studies range from 0.48-4.8%) of singleton fetuses. The presence of SUA has been associated with an increased risk (not more than 20%) of chromosome abnormalities. Therefore, a detailed fetal anatomy survey is recommended. We discussed that in the presence of _ (age-related factor/abnormal serum screen/abnormal ultrasound finding) the risk of a chromosome abnormality is increased. If no other additional factors are noted, the pregnancy is not expected to be at increased risk for a chromosome abnormality above that of _ (screen result). Some studies suggest that SUA is associated with increased rates of intrauterine growth retardation and fetal mortality. Fetal surveillance is at the discretion of the provider based on clinical progress of the pregnancy.

Recommendations:

1. **Fetal surveillance is at the discretion of the provider based on clinical progress of the pregnancy.**

Isolated Pyelectasis/Pelviectasis

We discussed that renal pyelectasis is defined as dilation of the renal pelvis, measuring ≥4mm at 16-20 weeks gestation. The incidence of fetal renal pyelectasis in the general population is approximately 1% (ranging from 0.3% - 7%) and occurs three times more frequently in male fetuses than female fetuses. Pyelectasis is seen in 25% of fetuses with Down syndrome. In the presence of other fetal ultrasound anomalies, the risk of chromosome aneuploidy is expected to increase.

Recommendations:

1. **Referral for Genetic Counseling and Maternal Fetal Medicine Consult**
2. **If the renal pyelectasis is isolated and measures greater than 4 mm at 16-20 weeks, a follow-up ultrasound is recommended at 28-33 weeks gestation.**

Increased nuchal translucency

We discussed that the nuchal translucency is the space or fluid in the back of the baby's neck. This space is measured and when there is an increased amount of

fluid in this space there is a concern for a chromosome abnormality, such as Down syndrome or trisomy 18. We discussed that increased nuchal translucency has also been associated with structural defects, such as cardiac abnormalities and a few rare genetic syndromes, including hemoglobinopathies. We discussed that even if the karyotype is normal, a detailed ultrasound around 18-20 weeks to assess fetal anatomy and possibly a fetal echocardiogram are recommended for follow-up. The chance that the baby will have a chromosomal or structural abnormality increases with the size of the nuchal translucency (reference table below).

Recommendations:

1. **Referral for Genetic Counseling and Maternal Fetal Medicine Consult**
2. **Offer fetal karyotype via CVS or amnio**
3. **Follow-up ultrasound at 18-20 weeks**
4. **Fetal echo may be considered**
5. **If all evaluations do not identify an etiology, discuss risk of adverse outcome based on NT size (see table below)**
6. **Check maternal RBC indices and/or hemoglobin electrophoresis, if patient ethnically at risk (African, Asian, Mediterranean)**
7. **Follow-up: as clinically indicated and appropriate.**

Table I Relation between nuchal translucency thickness and prevalence of chromosomal defects, miscarriage, or fetal death and major fetal abnormalities

Nuchal translucency	Chromosomal defects[2]	Fetal death[8-10]	Major fetal abnormalities[8-10]	Alive and well
<95th centile	0.2%	1.3%	1.6%	97%
95th-99th centiles	3.7%	1.3%	2.5%	93%
3.5-4.4 mm	21.1%	2.7%	10.0%	70%
4.5-5.4 mm	33.3%	3.4%	18.5%	50%
5.5-6.4 mm	50.5%	10.1%	24.2%	30%
>6.5 mm	64.5%	19.0%	46.2%	15%

In the last column is the estimated prevalence of delivery of a healthy baby with no major abnormalities.

Souka, Athena, et al; Increased nuchal translucency with normal karyotype; American Journal of Obstetrics and Gynecology; 2005; 192:1005-21

EIF Dictation Paragraph:

I reviewed with _ that an EIF is found in approximately 3-5% of all pregnancies during the mid-trimester. It is a focus of echogenicity comparable to bone, in the region of the papillary muscle, which correlates with mineralization within a papillary muscle. EIFs are most commonly seen in the left ventricle, although bilateral and right-sided EIFs can be seen. The incidence of EIF varies with ethnicity, being more common amongst Asians (~5-30%) and African-Americans (~6-7%). I counseled _ that the presence of an EIF is associated with an increased risk of Down syndrome. An EIF is seen in 18-30% of fetuses with Down syndrome, and in 6-10% of cases the EIF is the only abnormal finding. An isolated EIF may increase the risk of Down syndrome by up to 2-fold. Based on _'s *a priori* risk of Down syndrome of 1 in _ based on _, her revised risk of Down

syndrome is at most 1 in _ (_%). I reassured _ that an EIF is not a cardiac defect and will not affect cardiac function in any way. No follow up is needed for this finding alone.

Recommendations:

1. **No follow up is needed for this finding alone.**

Echogenic bowel

I counseled the couple that echogenic bowel (grade 3), defined as echogenicity of the bowel equal to or greater than that of surrounding bone, is seen in about 1% of fetuses at the mid-trimester. I counseled the couple that echogenic bowel has been associated with fetal chromosome abnormalities, cystic fibrosis, structural abnormalities, fetal infection, intrauterine growth restriction (IUGR), and vaginal bleeding. [*Insert info regarding anything known about cystic fibrosis carrier testing results.*] The chromosome abnormality most commonly found with echogenic bowel is Down syndrome, although triploidy, trisomy 18, trisomy 13, 45,X, and sex chromosome aneuploidies have also been reported. The finding of isolated echogenic bowel increases the risk of Down syndrome by 6-fold. Given _'s *a priori* risk of Down syndrome of 1 in _ based on her _, I counseled her that the risk of Down syndrome has increased to 1 in _. [*Insert any other relevant findings from ultrasound that would guide differential diagnosis.*]

Recommendations:

1. **Referral for Genetic Counseling and Maternal Fetal Medicine Consult**
2. **Offer amniocentesis for karyotype and CMV PCR**
3. **Maternal TORCH titers-Toxoplasmosis and CMV IgG and IgM; convalescent specimen submitted in 2-4 weeks**
4. **msAFP if it hasn't been done (some papers report increased risk of adverse fetal outcome with EB and elevated msAFP)**
5. **CF carrier testing**

Down syndrome risk reduction:

We discussed that approximately 50% of fetuses with Down syndrome are identifiable on ultrasound due to the presence of soft markers or structural defects. The patient's ultrasound today was normal. While the patient's risk is likely lower given a normal ultrasound, her _ screen is still the best estimate of risk.

Recommendations:

1. **None**

Cystic hygroma←→ Fetal hydrops

We discussed that a cystic hygroma (CH) is the finding an accumulation of fluid within the fetal neck. We discussed that approximately 50% of fetuses with cystic hygroma have a chromosome abnormality. CH has also been associated with structural abnormalities, fetal infection, and a few rare genetic syndromes.

There is also concern that a fetus with CH will progress to hydrops, which is total body edema. If the fetus develops hydrops this is associated with a poor prognosis. We discussed that the prognosis for this fetus will depend on the cause of the CH and/or hydrops. While the rate of abnormality is high in fetuses with CH, some pregnancies continue with a good outcome. The outcome for this fetus will depend on the underlying etiology.

Recommendations-Cystic hygromas, <u>NO hydrops</u>

1. **Referral for Genetic Counseling and Maternal Fetal Medicine Consult**
2. **Offer fetal karyotype via CVS or amnio**
3. **When karyotype is normal, 18-20 week scan for structural anomalies or signs of a genetic syndrome**
4. **Fetal echo may be considered**
5. **Follow-up: If CH persists recommend serial ultrasounds to evaluate growth and expansion.**
6. **If testing does not identify an etiology, discuss with patient risk of adverse outcome**

Recommendations-Cystic hygroma <u>WITH HYDROPS INITIALLY OR DEVELOPS LATER</u>

1. **Referral for Genetic Counseling and Maternal Fetal Medicine Consult**
2. **Offer fetal karyotype via CVS or amnio**
3. **Maternal viral serology-CMV and Parvovirus IgG and IgM; Convalescent specimen in 2-4 weeks**
4. **18-20 week scan for structural anomalies or signs of a genetic syndrome**
5. **Fetal echo may be considered**
6. **Follow-up: If CH persists, serial ultrasounds to evaluate growth and expansion.**
7. **If testing does not identify an etiology, discuss with patient risk of adverse outcome**

<u>Choroid plexus cyst (CPC)</u>

Complete ultrasound >18 weeks

We discussed that a choroid plexus cyst (CPC) is found within the choroid plexus, which is an area in the ventricles of the brain where cerebrospinal fluid (CSF) is produced. It results from an entanglement of villi within the choroid plexus allowing CSF to become trapped. We discussed that CPCs are found in isolation in about 1-2% of all pregnancies. CPC is usually a normal variant with no clinical consequence, but is found more commonly in fetuses with trisomy 18. About 40-60% of all fetuses with trisomy 18 have a CPC, however, this is usually not in isolation, and most fetuses with trisomy 18 would have other anomalies such as cardiac defects, clenched hands, or growth restriction. We reviewed the etiology and natural history of trisomy 18. We discussed that the finding of an isolated CPC does not increase the risk of trisomy 18. Therefore her risk

remains at _(serum screen, age, etc). We discussed that the only way to eliminate the risk of trisomy 18 is with an amniocentesis. We discussed that CPCs are expected to resolve by the end of the second trimester, even in fetuses with trisomy 18. No follow-up is recommended for isolated CPCs.

Recommendations:

1. **No follow-up is recommended for isolated CPCs.**

Ultrasound <18 weeks

We discussed that a choroid plexus cyst (CPC) is found within the choroid plexus, which is an area in the ventricles of the brain where cerebrospinal fluid (CSF) is produced. It results from an entanglement of villi within the choroid plexus allowing CSF to become trapped. We discussed that CPCs are found in isolation in about 1-2% of all pregnancies. CPC is usually a normal variant with no clinical consequence, but is found more commonly in fetuses with trisomy 18. About 40-60% of all fetuses with trisomy 18 have a CPC, however, this is usually not in isolation and most fetuses with trisomy 18 would have other anomalies such as cardiac defects, clenched hands, or growth restriction. We reviewed the etiology and natural history of trisomy 18. We reviewed that while an isolated CPC does not usually mean the fetus has trisomy 18, her ultrasound was done prior to 18 weeks, which does not have as high a detection rate for trisomy 18 as those done after 18 weeks. Therefore a growth scan is recommended in _ (number of weeks). We discussed that the only way to eliminate the risk of trisomy 18 is with an amniocentesis. We discussed that CPCs are expected to resolve, by the end of the second trimester, even in fetuses with trisomy 18.

Recommendations:

1. **Growth scan is recommended in 3-4 weeks.**
2. **If CPC still isolated after growth scan, no follow-up is recommended.**

Incomplete ultrasound

We discussed that a choroid plexus cyst (CPC) is found within the choroid plexus, which is an area in the ventricles of the brain where cerebrospinal fluid (CSF) is produced. It results from an entanglement of villi within the choroid plexus allowing CSF to become trapped. We discussed that CPCs are found in isolation in about 1-2% of all pregnancies. CPC is usually a normal variant with no clinical consequence, but is found more commonly in fetuses with trisomy 18. About 40-60% of all fetuses with trisomy 18 have a CPC, however, this is usually not in isolation and most fetuses with trisomy 18 would have other anomalies such as cardiac defects, clenched hands, or growth restriction. We reviewed the etiology and natural history of trisomy 18. We reviewed that while an isolated CPC does not usually mean the fetus has trisomy 18, her ultrasound was incomplete and a follow-up fetal anatomy scan is recommended in _(gestation range). We discussed that the only way to eliminate the risk of trisomy 18 is with

an amniocentesis. We discussed that CPCs are expected to resolve by the end of the second trimester, even in fetuses with trisomy 18.

Recommendations:

1. **Ultrasound to complete anatomy is recommended in 3-4 weeks.**
2. **If CPC isolated, once anatomy is complete, no follow-up is recommended.**

Isolated Cleft lip and palate

Cleft lip and palate (CL/CP) occurs at an incidence of about 0.5-2/1000. Isolated cleft palate is rare (incidence of 1 in 2500) and usually not identified on ultrasound. The etiology of CL/CP is varied with many chromosomal and genetic syndromes reported. There are also other risk factors for clefting, including antiepileptic medications, maternal cigarette smoking, binge alcohol drinking, and folate deficiency. In fetuses with CL/CP and other ultrasound findings, a chromosome abnormality is found in 40-60%. In fetuses with what appears to be an isolated CL/CP, 20% will have other findings identified at birth.

Recommendations:

1. **Referral for Genetic Counseling and Maternal Fetal Medicine Consult**
2. **Offer fetal karyotype via amniocentesis for isolated or non-isolated CL/CP**

Ambiguous genitalia

Disorders of sexual development (DSD) are defined as: congenital conditions in which the development of chromosomal, gonadal, or anatomical sex is atypical and occur at an incidence of about 1 in 5,500. There are a number of different chromosomal and genetic disorders associated with DSD as well as teratogenic exposures. When ambiguous genitalia are suspected on prenatal ultrasound, karyotype to determine genotypic sex should be performed. Based on the ultrasound findings and genotypic sex, additional genetic studies may be performed as appropriate.

Recommendations:

1. **Referral for Genetic Counseling and Maternal Fetal Medicine Consult; evaluation of ambiguous genitalia is very complicated**

Absent nasal bone (second trimester)

Absent nasal bone has been recognized as a feature seen in fetuses with Down syndrome. We reviewed with the patient that an absent nasal bone is seen in approximately 1% (Viora et al) of normal fetuses, and in approximately 40-60% of fetuses with Down syndrome. There are ethnic differences in the presence/absence of nasal bone. For example, studies indicate that an underdeveloped nasal bone is more commonly noted in individuals of African Caribbean descent (up to 9% in this population). Studies have shown a strong association of absent nasal bone with Down syndrome. However, there have

only been a few studies published, it is unclear whether the marker was isolated in the fetuses with Down syndrome, and the range of likelihood ratios reported is wide (17-83). We discussed that that the literature supports a strong association of absent nasal bone with Down syndrome, but based on current data a specific risk estimate based on an isolated absent nasal bone can not be provided. We also reviewed this finding in the context of other clinical information (ie maternal age, serum screen, etc).

Recommendations

1. **UWMC radiology assesses presence or absence of nasal bone, and does not comment on nasal bone length.**
2. **Counseling of absent nasal bone should be in the context of other risks factors (ie: other ultrasound findings, maternal age, serum screen result)**

Elevated amniotic fluid AFP, normal ultrasound and karyotype, negative AChE

afAFP < 5.0 MoM with an incomplete fetal anatomy ultrasound

Elevated afAFP: I discussed with the patient that her amniotic fluid AFP was higher than normal at _ MoM (normal range < 2.0 MoM). We discussed that acetylcholinesterase was negative, making an open neural tube defect extremely unlikely. Fetal blood contamination was ruled out. I counseled the patient that the likelihood of an adverse outcome, including a congenital anomaly, is increased with an unexplained elevation in afAFP. We reviewed that high-resolution ultrasound is not able to detect all abnormalities. Because _'s anatomy ultrasound was incomplete, we have scheduled her to return to clinic for a follow-up ultrasound to complete the fetal anatomy assessment. We also discussed that some studies have suggested that elevated af-AFP increases the risk of IUGR and preeclampsia. Therefore, third trimester surveillance should be based on clinical findings and progress of the pregnancy.

Recommendations:

1. Third trimester surveillance should be based on clinical findings and progress of the pregnancy.

afAFP < 5.0 MoM with a complete and normal fetal anatomy ultrasound

Elevated afAFP: I discussed with the patient that her amniotic fluid AFP was higher than normal at _ MoM (normal range < 2.0 MoM). We discussed that acetylcholinesterase was negative, making an open neural tube defect extremely unlikely. Fetal blood contamination was ruled out. I counseled the patient that the likelihood of an adverse outcome, including a congenital anomaly, is

increased with an unexplained elevation in afAFP. However, many of these anomalies have been ruled out by her normal fetal karyotype and normal, complete fetal anatomy ultrasound. We again reviewed that high-resolution ultrasound is not able to detect all abnormalities. We also discussed that some studies have suggested that elevated af-AFP increases the risk of IUGR and preeclampsia. Therefore, third trimester surveillance should be based on clinical findings and progress of the pregnancy.

Recommendations:

1. **Third trimester surveillance should be based on clinical findings and progress of the pregnancy.**

afAFP > 5.0 MoM

Elevated afAFP: I discussed with the patient that her amniotic fluid AFP was higher than normal at _ MoM (normal range < 2.0 MoM). We discussed that acetylcholinesterase was negative, making an open neural tube defect extremely unlikely. Fetal blood contamination was ruled out. I counseled the patient that the risk of certain abnormalities is increased when the afAFP is in this range. The most common is congenital nephrosis, although elevated afAFP has also been associated with epidermolysis bullosa with pyloric atresia and Lowe oculocerebrorenal syndrome. We discussed that congenital nephrosis is a hereditary condition that usually causes a significantly elevated afAFP level. There are usually no abnormal ultrasound findings. It is autosomal recessive and is due to mutations in *nephrin* (NPHS1). The placenta is frequently enlarged, but this may not be evident until the third trimester. Congenital nephrosis has an onset in the first days to weeks of life, with death within one year without a renal transplant. Clinical testing is now available for *NPHS1* mutations, so we offered _ this testing on amniocytes. Turnaround time may be up to three weeks. Crandall and Chua (1997) demonstrated that afAFP levels tend to decrease in a later amniotic fluid sample if the fetus is normal, while it tends to remain elevated or increase when there are anomalies. Therefore, we also offered _ a repeat amniocentesis to help further refine her risks. We also discussed that some studies have suggested that elevated af-AFP increases the risk of IUGR and preeclampsia. If no fetal abnormality is identified, an ultrasound at 32 weeks to assess fetal growth and anatomy is recommended.

Recommendations:

1. **Review possible etiologies above; determine if additional testing is appropriate based on clinical context of pregnancy**
2. **If no fetal abnormality is identified, an ultrasound at 32 weeks to assess fetal growth and anatomy is recommended.**

<u>Elevated maternal serum hCG</u>

An elevated hCG is considered to be ≥4.0 MoM. Studies have suggested that elevated hCG is associated with an adverse perinatal outcome, including IUGR,

maternal hypertension, preterm labor, and stillbirth; however, other studies suggest that an elevated hCG alone, without other elevated analytes, is not considered a significant risk factor for adverse perinatal outcome. Therefore, fetal surveillance is at the discretion of the provider based on clinical progress of the pregnancy.

Recommendations:

1. **Fetal surveillance is at the discretion of the provider based on clinical progress of the pregnancy.**

Increased Nuchal fold

We discussed that the nuchal fold is the space behind the back of the fetal neck that normally increases with gestational age. We discussed that the nuchal fold is considered to be abnormally increased when greater than ≥5mm before 20 weeks gestation. An increased nuchal fold is more common in fetuses with Down syndrome, but is rarely seen in isolation. The finding of an isolated nuchal fold in the second trimester does not increase the risk of Down syndrome. Therefore, _'s risk remains at (serum screen, age, etc). We reviewed the etiology and natural history of Down syndrome and that the only way to eliminate the risk of Down syndrome is with an amniocentesis. We discussed that an increased nuchal fold may also be seen in fetuses with other conditions, such as trisomy 18, triploidy, and Noonan's syndrome; however, other features of these conditions are usually seen on ultrasound.

Recommendations:

1. **No follow-up is needed for this finding alone.**

PYELECTASIS

❖ Definition

Renal pelvis dilation with pelvic anteroposterior (AP) dimension of 5mm – 10 mm.

Renal pelvis of ≥ 10 mm is known as hydronephrosis. On fetal ultrasound, hydronephrosis looks like extreme ballooning of the kidney.

Fetal pyelectasis can be classified according to the gestational age:
Between 15-20 weeks - ≥ 4mm
Between 20 – 30 weeks - ≥ 5mm
Between 30 and 40 weeks - ≥ 7mm

Edith's notes:
4 mm to 10 mm is clinically relevant
4 mm to 7 mm - 80% resolve
7 mm to 10 mm - intermediate range
Greater than 10 mm - 30-40% need postnatal intervention

If greater than 4 mm, order repeat ultrasound at 28-33 weeks

❖ Epidemiology

Mild pelectasis is a common finding which is often incidental with no significant long term complications. The incidence of Down syndrome is 3.3% when fetal peylectasis is present but 25% of fetuses with trisomy 21 have peylectasis.

Male fetuses exhibit a significantly increased frequency of renal pelvis dilation compared with females (3:1).

Dilation of fetal renal pelvis is a common finding at 2nd trimester ultrasound with an incidence of 0.3 – 4.5% (average around 1%). Mild pelectasis is diagnosed when the renal pelvis measures ≥ 4mm and < 10 mm in anteroposterior dimensions in axial scans of the abdomen, in the 2nd trimester.

Incidence of pyelectasis during normal pregnancy is between 4.5 – 7%.

Fetal pyelectasis can be unilateral or bilateral but is more frequently reported as bilateral. Male: female ratio is 2:1.

Fetal pyelectasis is more common in the left kidney and in males.

Fetuses with significant pelectasis/hydronephrosis (≥ 10 mm) are clearly at risk for having structural abnormalities that require postnatal evaluation.

Although the incidence of pyelectasis and calyceal dilatation is higher in boys, the outcome of the two sexes is similar.

Mothers with fetal pelectasis in the 1st pregnancy have a relative risk of 6.1 to have a recurrence of this finding in their next pregnancy.

Richard Hall - from polyclinic
Level 2B

- Reliability
  - Likelihood ratio: The likelihood ratio for trisomy 21 in a group of fetuses with isolated peylectasis is 3.79. Among fetuses with peylectasis and other associated markers/structural anomalies the likelihood ratio for trisomy 21 is 19.2.

- Teratogens- No known teratogenic agents reported

- Screening/testing –fetal pyelectasis can be identified as early as 16 weeks gestation

- Outcome

Most peylectasis resolve spontaneously in the 1st year of life and invasive procedures are not required. Reflux is common in neonates with urinary tract infection.

Follow-up - Those patients in whom the pyelectasis resolves in utero, generally require no further antenatal or postnatal follow-up. In cases in which the pyelectasis has not resolved or has progressed, these patients may then be referred for subspecialty care through the pediatric urology or pediatric nephrology department in the postnatal period. Although most of these patients will not have any uropathy, some will have other conditions, including mild forms of ureteropelvic junction obstruction and ureterovesicular reflux.

Although pyelectasis can be transient in approximately 1/3rd of cases with spontaneous regression of the renal pelvis dilatation, especially in the case of bilateral involvement, fetuses with persistent dilatation beyond 28 weeks gestation should undergo full urologic evaluation postnatally.

Coco et al:

Prevalence = 2.9% (366/12,672)
Sensitivity = 9.09% (
Specificity = 97.1% (12,306/12672)
PPV = 0.33%
NPV = 99.9%

Benacerraf and colleagues studied 210 cases of fetuses with peylectasis and found tri 21 in seven of the 210 cases (3.33%)

Pyelectasis

	Cases (n)	Chromosome abnormalities (n)	Cut-off value	Weeks
Benacerraf et al. (1990)[53]	210	7 (3.33%)	≥4 mm	15–20
			≥5 mm	21–30
			≥7 mm	31–40
Corteville et al. (1992)[54]	127	7 (5.51%)	≥4 mm	≤33
			≥7 mm	>33
Nicolaides et al. (1992)[56]	258	35 (13.57%)	≥5 mm	
Gonen et al. (1995)[49]	58	0 (0.00%)		
Wickstrom et al. (1996)[55]	121	3 (2.48%)	≥4 mm	≤33
			≥7 mm	>33
Chudleigh et al. (2001)[57]	737	12 (1.63%)	≥5 mm	

Bornstein et al:

Retrospective case control study based on Genzyme genetics database from 1995-2004.
Study group comprised of specimens/amniotic fluid samples obtained after the sonographic detection of peylectasis. The group was divided into several subgroups according to the presence or absence of an abnormal maternal serum screen and/or additional sonographic markers of trisomies. Controls were women who had a normal sonogram, normal maternal serum screen and underwent amnio solely for maternal anxiety or advanced maternal age.

Study group was 671 amnions with fetal u/s finding of isolated peylectasis.

Variable	Study group	Control group	P
N	671	671	
Maternal age	29.5 ± 22.0	30 ± 22.0	.07
Total trisomies	35 (5.2%)	2 (0.3%)	< .001
Trisomy 21	24 (3.6%)	2 (0.3%)	< .001
Trisomy 18	2 (0.3%)	0 (0%)	.13
Trisomy 13	9 (1.3%)	0 (0%)	< .001

Variable	N	Trisomies N (%)	OR (95% CI)	P
Isolated pyelectasis	320	3 (0.9)	3.2 (0.4-17.3)	.39
Peylectasis + single sonographic marker	177	4 (2.2)	7.7 (1.2-32.6)	.02
Peylectasis + abnormal serum screen	57	5 (8.8)	32.3(5.3–94.8)	<.001
Pyelectasis + multiple sonographic markers	96	15 (15.6)	61.9(13.2-144.6)	<.001
Peylectasis + multiple sonographic markers + abnormal serum screen	21	8 (38.0)	205.8(37.9-427.6)	<.001

Results indicate that whereas isolated peylectasis does not appear to increase the risk of a major trisomy, the presence of additional sonographic markers or an abnormal maternal serum screen in fetuses with

peylectasis significantly increases the risk of a major trisomy. Additional sonographic markers included echogenic bowel, heart defect, CP cyst and club feet.

Guariglia, L, et al:

Study performed between April 1994 and November 1997 and included 1093 pregnant women undergoing genetic amniocentesis because of advanced maternal age (greater than 37 years). Retrospective study that included only women who underwent both an early transvaginal scan (11-16 wks GA) and a transabdominal (16-20 wks GA) scan at the time of the amniocentesis. It did not include pregnant women identified at the early scan who subsequently aborted spontaneously, chose to terminate the pregnancy, or proceeded with pregnancy without amniocentesis.

Isolated fetal pyelectasis (33 bilateral and 23 unilateral) was detected at the 1st scan in 56 women (5.1%) in early pregnancy, in 32(18 bilateral and 14 unilateral) (2.9%) at the time of the amniocentesis. Subsequently, ultrasound examinations in 795 women at 22-24 weeks gestation showed persistence of the anomaly in 18 women and appearance of the finding in five new cases (total 23 cases, 2.9%).

Cytogenetic analysis identified one case of tri 21 and one of triploidy 69,XXX among 56 cases (3.6%) of fetal pyelectasis detected transvaginally. Transabdominal scan at 22-24 weeks confirmed kidney anomaly in the triploid fetus but it had disappeared in the fetus with trisomy 21.

Two fetuses with diagnoses of mild pyelectasis at the first transvaginal ultrasound demonstrated abnormal karyotypes at amniocentesis. In one case, the pyelectasis disappeared at 22-24 weeks gestation.

This retrospective study shows that pyelectasis is more frequently detectable by high resolution transvaginal sonography in the 1st half of the pregnancy; the finding is frequently transient and not associated with an increased risk of abnormal fetal karyotypes.

Fetal pyelectasis defined as at least 3 mm AP diameter on transvaginal scan, 4mm by transabdominal scan and 5mm at 22-24 weeks.

- Differential diagnosis
  - Multicystic kidney diseases, duplex system, posterior urethral valves (11).
  - Normal

❖ References

1. Coco,C., et al. Isolated fetal pyelectasis and chromosomal abnormalities. American Journal of Obstetrics and Gynecology 2005 193: 290-297.

2. Wickstrom, E, et al. A prospective study of the association between isolated fetal pyelectasis and chromosomal abnormality. Obstetrics and Gynecology 1996 88: 125.

3. Langer, B, et al. Fetal Pyelectasis. Ultrasound in Obstetrics and Gynecology 2000 16:288-296.

4. Chudleigh, T. Mild Pyelectasis. Prenatal Diagnosis 2001 101:936-941.

5. Benacerraf, B, et al. Fetal Pyelectasis: A possible association with Down syndrome. Obstetrics and Gynecology 1990 76:58.

6. Corteville, J, et al. Fetal Pyelectasis and Down syndrome: is Genetic Amniocentesis warranted? Journal of Obstetrics and Gynecology 1992 79(5):322-328.

7. Guariglia, L, et al. Isolated mild fetal pyelectasis detected by transvaginal sonography in advanced maternal age. Journal of Obstetrics and Gynecology 1998 92(5):833-836.

8. Broadley, P, et al. The 4 year outcome following the demonstration of bilateral renal pelvic dilation on pre-natal renal ultrasound. The British Journal of Radiology 1999 72:265-270.

9. Bornstein, E, et al. The risk of a major trisomy in fetuses with pyelectasis: the impact of an abnormal maternal serum screen or additional sonographic markers. American Journal of Obstetrics and Gynecology 2007 196(5): 263-269.

10. Beke, A. Ultrasound markers which indicate chromosome analysis. Ultrasound review of obstetrics and gynecology 2003 3(4):259-272.

11. www.fetus.net

12. Raniga, Sameer, et al. Ultrasonographic soft markers of aneuploidy in second trimester: are we lost? Medical Genetics 2006 8(1): 178.

13. Yamamuro, Yasuko, et al. Management of mild fetal pyelectasis: A comparative analysis. Journal of Ultrasound Medicine 2007 26:1539-1543.

14. Ouzounian, J, et al. Prognostic significance of antenally detected fetal pyelectasis. Ultrasound in Obstetrics and Gynecology 1996 7:424-428.

15. Adra, A, et al. Fetal Pyelectasis: Is it always "physiologic"? American Journal of Obstetrics and Gynecology 1995 6:1263-1266.

16. Institute for Fetal Health. www.childrensmemorial.org. Children's Memorial Hospital, Chicago, IL.

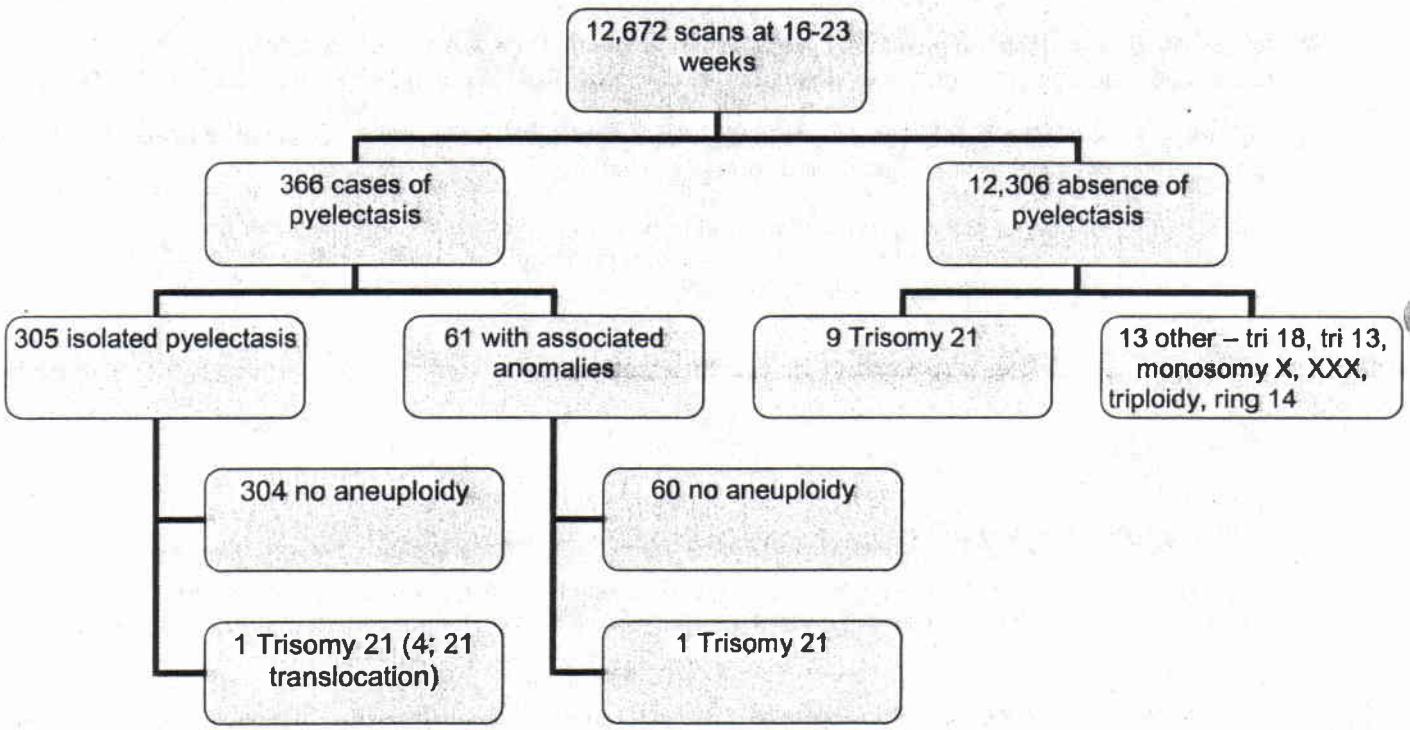
Coco C, Jeanty, P. Isolated fetal pyelectasis and chromosomal abnormalities. American Journal of Obstetrics & Gynecology 2005; 19 3(3 Pt 1): 732-8.

Definition of pyelectasis: ≥ 4mm

Sample size: 12,672 patients between 16-23 gestational age were included in the study from January 1998 – December 2002.

Mean maternal age: 27.2 ± SD 5.5, ranging from 15-42 years old

The **likelihood ratio** for Down syndrome in a group of fetuses with isolated peylectasis is 3.79. Among fetuses with peylectasis and other associated markers/structural anomalies the likelihood ratio for trisomy 21 is 19.2



Wickstrom EA. A prospective study of the association between isolated fetal pyelectasis and chromosomal abnormality. Obstetrics & Gynecology 1996;88(3): 379-382.

Definition: ≥ 4mm before 33 weeks gestation and ≥ 7mm at 33 weeks or thereafter.

Study sample: 121 cases of isolated fetal pyelectasis were identified between March 1991 and March 1994.

Likelihood ratio of 3.9 for trisomy 21 and 3.3 for all chromosomal abnormalities

Van den Hof M. SOGC Clinical Practice Guidelines. Society of Obstetrics and Gynecology of Canada 2005; 27(6):592-612.

Definition of pyelectasis: ≥ 5mm and ≤ 10mm. Measurements < 5mm are normal; should not be designated as pyelectasis, and should not be reported.

The **likelihood ratio** for Down syndrome in cases of isolated pyelectasis is 1.9 but the 95% CI does cross 1 (0.7-5.1), indicating lack of significance. In the absence of other risk factors, the chance of Down syndrome in the presence of isolated mild pyelectasis remains small and does not justify an invasive diagnostic procedure.

Smith-Bindman, R. Second trimester prenatal ultrasound for the defection of pregnancies at increased risk of Down syndrome. Prenatal Diagnosis 2007; 27:535-544.

Definition of renal pyelectasis: > 4mm

Sample size: 9244 women with singleton pregnancies who were identified as having abnormal 2nd trimester serum biochemistry.

Likelihood ratio for Down syndrome in the presence of isolated renal pyelectasis is 1.8 (0.75, 4.2) at 95% CI

M Bethune. Literature Review and suggested protocol for managing ultrasound soft markers for Down syndrome: Thickened nuchal fold, echogenic bowel, shortened femur, shortened humerus, pyelectasis and absent of hypoplastic nasal bone. Australasian Radiology 2007; 51:218-225.

Definition: ≥ 4mm

Quoted likelihood ration of 1.9 – from Smith-Bindman and Van den Hof articles. As the CI crosses 1, there is a chance, on the basis of the studies analyzed, that the presence of pyelectasis may actually reduce rather than increase the risk of Down syndrome.

Bromley B. The genetic sonogram. Journal of Ultrasound in Medicine 2002; 21:1087-1096.

Definition: ≥ 4mm

Study sample: 164 fetuses with Down syndrome and 656 fetuses with normal karyotypes

Likelihood ratio is 1.5 (0.6-4.3) at 95% confidence interval

Nyberg DA. Age-adjusted ultrasound risk assessment for fetal Down's syndrome during the second trimester: description of the method and analysis of 142 cases. Ultrasound in Obstetrics & Gynecology 1998; 12:8-14.

Definition: > 3mm

Study sample: 142 fetuses with Down syndrome and 930 control fetuses with normal karyotype

Likelihood ratio of 1.6

Nyberg DA. Isolated sonographic markers for detection of fetal Down syndrome in the second trimester of pregnancy. Journal of Ultrasound in Medicine 2001; 20:1053-1063.

Definition: ≥ 3mm

Study sample: second trimester (14-20 weeks) sonographic findings in 186 fetuses with trisomy 21 were compared with a control group of 8728 consecutive control fetuses.

Likelihood ratio of 1.5 (CI, 0.6-3.6). Renal pyelectasis was confirmed to be associated with trisomy 21 overall, but it did not reach statistical significance as an isolated finding.

Benacerraf, BR. The role of the second trimester genetic sonogram in screening for fetal Down syndrome. Seminars in Perinatology 2005; 29(6):389-94.

Definition: ≥ 4mm

Likelihood ratios from 4 studies –

Marker	Smith-Bindnam	AAURA	Nyberg	Bromley
Pyelectasis	1.9	1.5	1.5	1.5