Postnatal outcomes of genitourinary abnormalities diagnosed on antenatal ultrasound

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Background

- Fetal genitourinary abnormalities (FGUA) are the most common diagnosis discovered as part of standard obstetric ultrasound (US) screening[1].
- Dilation of the genitourinary system is found in 1% of all pregnancies and comprise 20-30% of all congenital abnormalities[1].
- There has historically been variability in management of these patients[2]. Most lesions do not require antenatal or postnatal intervention, however some FGUA can be devastating.
- Certain characteristics have been associated with need for postnatal intervention such as type of FGUA, laterality, and amniotic fluid volume.
- The degree of antenatal hydronephrosis may be used to elucidate likelihood of need for postnatal interventions[3]. These have been used to guide counseling, but exact criteria have not been used to predict outcomes[4].

Problem Statement

This study describes a cohort with prenatally diagnosed FGUA with the hypothesis that increased severity of upper urinary tract dilation will be associated with increased need for postnatal intervention.

Methodology

- This is a retrospective cohort study of pregnant women with a FGUA identified on prenatal ultrasound interpreted at Maternal Fetal Medicine at Lehigh Valley Health Network (LVHN) with estimated due dates from October 2016 to November 2018 who subsequently delivered at LVHN and had available neonatal and delivery information.
- Patients were identified by querying the ultrasound database for fetuses with a prenatally detected FGUA and other information was gathered by review of the electronic medical record (Epic and CPO).
- Data collected included ultrasound, maternal, and postnatal categories encompassing type of abnormality, severity of abnormality, delivery data, neonatal information, requirement of additional imaging and need for additional evaluation or treatment.
- Statistical analysis was completed by Dr. Rochon.

Results

- 274 women met inclusion criteria
- FGUA were common in our population, complicating 3.4% of pregnancies
- 97.4% of pregnancies resulted in liveborn neonates, pregnancies that ended in demise had comorbid FGUA and other significant abnormalities
- Most common FGUA was upper urinary tract dilation (82.5%)
- 59.2% of all FGUA resolved prior to delivery, 72.7% of upper urinary tract lesions resolved

Table 1. Natural history of prenatal genitourinary abnormalities by lesion on prenatal exam*

Lesion	F/u exam	Progressed	No change	Improved	Resolved
Upper urinary tract dilation/obstruction (n=226)	209	25	30	2	152
Pyelectasis/Hydronephrosis	198	22	26	2	148
UPJ obstruction	7	1	2	0	4
UVJ obstruction	1	0	1	0	0
Isolated megaureter	3	2	1	0	0
Duplicated collecting system					
Lower urinary tract dilation/obstruction (n=10)	10	3	4	1	2
Bladder outlet obstruction	8	3	2	1	2
Ureterocele	2	0	2	0	0
Abnormal kidney location/number (n=19)	19	2	13	0	3
Pelvic kidney	12	2	6	0	3
Horseshoe kidney	3	0	3	0	0
Unilateral renal agenesis	4	0	4	0	0
Abnormal kidney appearance (n=28)	27	8	14	5	0
Multicystic dysplastic kidney (MCDK)	9	3	6	0	0
Renal cyst	2	1	0	1	0
Small	1	0	1	0	0
Echogenic	12	4	6	2	0
Large and echogenic	4	0	1	2	0
Total	265	38	61	8	157

*Includes patients that had a follow-up exam and excludes pregnancies resulting in miscarriage or termination

- Postnatal imaging was available for 85 of FGUA lesions that persisted to term
- 18.8% (16/85) of fetuses with abnormalities that persisted to term required postnatal intervention
- 6% (16/268) of total neonates observed with FGUA required postnatal intervention

Table 2. Predictors of need for postnatal cystoscopic or surgical intervention for liveborn infants with prenatal diagnosis of genitourinary abnormality

	OR (95% CI)	p-value
Abnormal genetic screening/testing result	8.468 (2.148,33.385)	0.002
Third trimester initial diagnosis	3.583 (1.227,10.467)	0.020
Seen on third trimester ultrasound (initial or f/u exam)	4.926 (1.544,15.715)	0.007
Type of lesion Isolated megaureter Bladder outlet obstruction	 51.581 (2.017,1318.861) 28.731 (4.410,187.181)	 0.017 0.0004

Data are in OR (95% CI)

- Subgroup analysis of upper urinary tract dilation showed renal pelvis dilation < 7mm in third trimester resolved in 83% of cases, and dilation > 7mm in third trimester resolved in 18% of cases ($p < 0.00001$)

Table 3. Isolated UPJ obstruction outcomes by renal pelvis dilation and trimester*

	Resolved on last exam		Postnatal intervention	
Second trimester 4 – 6 mm 7 – 9 mm ≥ 10 mm	133/160 (83.1%) 12/20 (60%) 0/2 (0%)	p<0.00001	6/160 (3.8%) 0/20 (0%) 0/2 (0%)	p=0.856
Third trimester 7 – 9 mm ≥ 10 mm	2/29 (6.9%) 0/26 (0%)	p=0.492	2/29 (6.9%) 3/26 (11.5%)	p=0.492

*Data is for liveborn neonates. P-values calculated with Fisher exact.

Discussion

- FGUA were common in our population, complicating 3.4% of pregnancies, which is slightly higher than the 1-2% reported in the literature[1].
- Six percent of neonates with FGUA required postnatal intervention, consistent with other studies[2,3].
- Our study confirmed that upper urinary tract lesions are the most common diagnosis, and these frequently resolve spontaneously
- Fetuses least likely to require postnatal intervention had renal pelvis dilation < 7mm in the third trimester and had no other associated abnormalities. This numeric limit matches currently reported literature[5,6]
- This study will allow more precise counsel for patients receiving diagnosis of FGUA. They will have increased US and genetic surveillance, but should feel reassured that most FGUA resolve without medical intervention.
- This study also informed that degrees of anterior-posterior renal pelvis dilation, that is ≥ 4mm in second trimester and ≥ 7mm in third trimester, can confer predictability of requirement for postnatal intervention.

Prognosis of FGUA tends to be favorable, especially for upper urinary tract lesions. We identified several predictors of need for postnatal intervention including renal pelvis dilation present in third trimester US, abnormal genetic screening result, and presence of more severe lesions such as bladder outlet obstruction. This study also informed that increasing severity of degrees of renal pelvis dilation can confer predictability of postnatal intervention. This study did change protocols in Maternal Fetal Medicine at LVHN, with new protocols requiring less frequent exams for mild lesions. This has the potential to decrease cost of care by requiring fewer visits and increase access by increasing available scheduling for MFM patients.

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