Original article

PRENATAL AND PERINATAL OUTCOME OF CONGENITAL FETAL OBSTRUCTIVE UROPATHY

Sonja Pop-Trajkovic, Vladimir Antic and Milan Trenkic

Abnormalities of the urinary tract account for less than 25% of any detected congenital anomaly during pregnancy, and approximately 60% of them are obstructive uropathies. After the diagnosis of obstructive uropathy is made, there is a need for making a decision whether or not to terminate a pregnancy and to determine further diagnostic procedures and best management before and after birth. Making the decision includes multidisciplinary approach, and we have to know the outcome of anomalies. The aim of this study was to determine the outcome of antenatally detected obstructive uropathies in order to optimize counseling of the parents, and to give the right direction to the physician for managing that particular pregnancy. This study included all patients presented to the Consilium for fetal anomalies of Institute for Gynecology and Obstetrics of Clinical Center of Serbia and University Children Hospital, during the three-year-period. Antenatal diagnoses were compared with the results of autopsy, if the pregnancy was determined, or with the information obtained from the parents and clinical and operative findings if the pregnancy was continued. Of 111 antenatally detected urinary tract anomalies, 60 patients were diagnosed with fetal obstructive uropathy. Six pregnancies were terminated, and from 54 surviving infants, 5 had impaired renal function. Most of the children needed two to three surgical interventions on average. The overall conclusion for obstructive uropathies that can be drawn from this series is that the prognosis for renal function is excellent when oligohydramnios is absent before birth and when proper urological care is given postnatally. Almost all renal failures were in the group with progressive oligohydramnios in which labor was induced preterm. Poor outcome of fetuses with bilateral urinary tract obstruction combined with prolonged periods of olygohydramnios has been repeatedly described. *Acta Medica Medianae 2008;47(1):47-51.*

Key words: *congenital anomaly, obstructive uropathy, outcome*

Clinic for Gynecology and Obstetrics, Clinical Center Nis

Contact: Sonja Pop-Trajkovic
24-21 Oblacica Rada Street
Phone: 063-1095819: 062-777002
E-mail: ivdiso@sbb.co.yu

Introduction

Congenital anomaly is a disorder in the fetal development which can appear in any time of pregnancy, and can be expressed in antenatal as well as in postnatal period of life. The prevalence of any detected congenital anomaly during pregnancy is approximately 1-2%. Abnormalities of the urinary tract account for less than 25%, and near 60% of them are obstructive uropathies. Depending on the site of obstruction we differentiate hydronefrosis, ureterohydronefrosis and megabladder. Ultrasonography is the best noninvasive method for detection the anomalies. During the ultrasound examination we can not only detect the anomaly, but also the site of obstruction, and using some ultrasound parameters (the amount of amniotic fluid, the echogenicity of renal parenchyma and corticomedular cysts), we can estimate renal function. Since only 25% of the cases with renal dysplasia are detected by ultrasound, biochemical assessment of fetal urine obtained by the punction of fetal bladder, represents a complementary tool for assessing renal function and for diagnosis and prediction renal dysplasia. Biochemical parameters that are used are: sodium, chlor, calcium and beta 2-microglobuline. Isotonic fetal urine is indicative for irreversible pathologies of the proximal tubules. Amniocentesis and chordocen-tesis are used in order to exclude chromosomal abnormalities, since pyelectasis and lazy ureters are soft markers of trizomy, especially trizomy 21. Data of antenatal diagnosis are important for assessing prognosis. They may be helpful in making difficult decisions as to whether or not to terminate a pregnancy before viability, in determining the need for further diagnostic procedures and on the best management before and after birth. For making that decision we need multidisciplinary approach, and we have to know the outcome of anomalies.

Aims

The aim of this study was to determine the outcome of antenatally detected obstructive uropathy in order to optimize the counseling of parents.

Material and methods

This study included all patients presented to the Consilium for fetal anomalies of Institute of Gynecology and Obstetrics of Clinical Center of Serbia and University Children Hospital. The members of the Consilium are: gynecologist, perinatologist, pediatrician-cardiologist, pediatric surgeon, pathologist, and depending on the type of anomaly, surgeons from different fields were consulted. From all pregnant women who were presented to the Consilium between January 1, 2005 and December 31, 2007 because they were suspected to have some type of congenital fetal anomaly, we separated only those with fetal urinary tract anomaly, especially those with fetal obstructive uropathy. All patients underwent expertise ultrasound examination, and some of them underwent amniocentesis, chordocentesis or fetal bladder puncture. Patients who were diagnosed with fetal renal anomaly incompatible with life were advised to terminate pregnancy. Patients with good prognosis for the infant were referred to the Institute for Gynecology and Obstetrics for delivery, and after delivery the infants were referred to the University Children Hospital. Follow-up data were obtained by chart review of Pediatric Urology and by contacting the pediatricians and general practitioners for information having obtained consent from parents. Clinical findings and/or autopsy reports were used to determine the postnatal outcome. Prenatal diagnoses were confirmed by postnatal ultrasound scans, radiological investigations, biochemical data on kidney function and surgical records.

Results

Table 1. The list of antenatally detected obstructive uropathies, number of survivors and mortality rate

Type of anomaly	Total number	Survivors	Mortality
Unilateral hydronephrosis	16(26,6%)	16	
Bilateral hydronephrosis	29(48,3%)	26	3
Unilateral megaureter with hydronephrosis	3(5%)	3	
Bilaterall megaureter with hydronephrosis	4(6,66%)	4	
Megabladder	8(13,3%)	5	3
Total	60	54(90%)	6(10%)

During the three-year period, 391 patients were examined, and 111 of them were confirmed to have some fetal urinary tract anomaly (28,1%). All patients were classified into three groups: fetal obstructive uropathy, fetal structural renal anomalies and fetuses with the anomaly of kidney number, fusion and position. Sixty patie-nts were diagnosed with fetal obstructive uropathy (59, 4%) (Table 1).

Mortality

In 6 cases (10%), pregnancy was terminated before viability. The average time of termination was 24th week of pregnancy. There were two cases of obstructive uropathy associated with some other anomaly, then three cases with megabladder and severe oligohydramnios and one case of bilateral hydronephrosis, severe oligohydramnios and biochemical parameters which were pointed out to renal dysplasia. All fetuses were males (Table 2).

Table 2. The list of terminated pregnancies, average time of termination, gender and autopsy findings

Mortality	Average time of termination	Gender	Autopsy finding	
			Urinary tract anomalies	Extrarenal anomalies
6 (10%)	26 week of gest.	male (100%)	6 (100%)	3 (50%)

Survivors

Fifty-four infants (90%) survived the antenatal period (Table 3). In one case (1,85%), the diagnosis was false positive. In two cases (3,78%), the diagnosis was wrong. Thirty infants (55,5%) had a solitary uni/or bilateral renal pelvis dilatation. In most cases, the size of dilated pyelon was between 10 and 25 mm. The cause of dilatation was pyeloureteric junction obstruction in 19 infants, and in the rest 11 VUR. Eleven infants (36,6%) underwent surgery, and needed two to three surgical interventions on average. One child (3,33%) has hypertension. Another 16 infants (29,6%) had a uni/or bilateral hydronephrosis in combination with uni/or bilateral megaureter. The causes of obstruction were: one case of vesicoureteric junction obstruction, 6 cases of ureter and pyelon duplex, 1 case congenital megaureter, 2 cases of posterior urethral valves and the rest infants had VUR or combination of VUR and contralateral pyelo-ureteric junction obstruction. Ten infants underwent surgery (62,5%), and needed two to three surgical interventions on average. Five infants (9,25%) had hydronephrosis in combination with mega-ureter and megabladder. In 4 cases the cause was posterior urethral valve and in one case narrowed urethra. All infants undergone surgery (100%) and also needed on average two to three interventions. Two infants (40%) had impaired renal function after the surgical interventi-ons. In 4 cases (7,4%), labor was electively induced before 37 weeks of gestation because of the development of anhydramnions, and all infants had fist surgical interventions in the first days of life. Two infants with impaired renal function are in this group.

Table 3. The list of survived children, causes of obstruction, number of children who underwent surgery and with impaired renal function

Postnatal diagnose	cause	Number of infants	Number of infants who underwent surgery	Number of infants with impaired renal function
Solitary uni/bilatera hydronephrosis	-pyelo-ureteric junction obstruction -VUR	30(55,5%)	11(36,6%)	1(3,33%)
Hydronephrosis associated with megaureter	- pyelo-ureteric junction obstruction - vesico-ureteric junction obstruction -congenital megaureter -pyelon et ureter duplex -posterior urethral valve -VUR	16(29,6%)	10(62,5%)	2(12,5%)
Megabladder	- posterior urethral valve -narrowed urethra	5(9,25%)	5(100%)	2(40%)

Discussion

The mortality rate was relatively low (10%). The rate was highest in the cases of megabladder and bilateral hydronephrosis and severe olygohydramnios. All pregnancies were terminated before viability (mean 26 week of gestation). Similar data can be found in the great study of the University of Utrecht.

Outcome in the surviving infants was generally good, with impaired renal function in 7% of infants. Approximately, half of survivors needed on average two to three surgical interventions. Postnatal examination of infants revealed that the most frequent causes of obstructive uropathies are pyelo-ureteric junction obstruction, VUR and posterior urethral valves, and less frequent are congenital megaureter, ureter and pyelon duplex, narrowed uretra, and vesico-ureteric junction obstruction. VUR accounted for nearly 12% of antenatally diagnosed obstructive uropathies, which is slightly lower than 15% described by others. Kurjak et al. reported that fetuses with unilateral obstructive uropathy had 27% chance of having contralateral renal anomalies. Our percent is slightly lower (near 21%). Nearly half of infants underwent surgery. Surgery was needed in cases of hydronephrosis and megaureter (near 60%), especially in those infants who were postnatally diagnosed with pyelo-ureteric junction obstruction. Intervention rate was high in the group of infants with antenatal diagnose of hydronephrosis when the cause was VUR. VUR predisposes to urinary tract infection and can lead to renal scarring and chronic renal failure and approximately 60% of kidneys with reflux already have an abnormal renogram even in the absence of urinary tract infection. Therefore, all children with anteroposterior renal pelvis dilatation > 10 mm around 32 weeks of gestation should be carefully managed postnatally with low-dosed antibiotics. The highest intervention rate was in the group of infants with megabladder who were postnatally diagnosed with PUV. Four fetuses were diagnosed with this anomaly and all of them undergone surgery, and one infant had impaired renal function after intervention. Surgical interventions in this group of children were: pyeloplasty, reimplantation (mega-) ureter, incision posterior urethral valves. Generally, the outcome was good in all cases when proper urological care was given postnatally. All cases of impaired renal function was in the group of fetuses with isolated megabladder and progressive severe olygohydramnios, when labor was induced preterm.

Conclusion

The overall conclusion for obstructive uropathy that can be drawn from this series is that regardless of the presence of 1 or 2 kidneys and regardless of the degree of urinary tract dilatation, the prognosis for renal function is excellent when olygohydramnios is absent before birth and when proper urological care is given postnatally. Almost all renal failures were in the group with progressive oligohydramnios in which labor was induced preterm. Poor outcome of fetuses with bilateral urinary tract obstruction combined with prolonged periods of olygohydramnios has been repeatedly described. Our policy of preterm induction of labor when olygohydramnios develops seems to result in a relatively favorable outcome although the timing of induction is still uncertain and the proof that we actually gave them better chances is still non-existent.

References

1. Pinto V, Wankelmuth M, D'Addario V. General aspects on ultrasound screening of congenital anomalies. In: Kurjak A, Chervenak FA, editors. Donald school textbook of ultrasound in obstetrics and gynecology. 1th ed. New Delhi: Yaypee brothers medical publishers; 2004.p.365-72.
2. Levi S. Ultrasound in prenatal diagnosis: polemics around routine ultrasound screening for second trimester fetal malformations. Prenat Diagn 2002;22(4):285-95.
3. Levi S. Mass screening for fetal malformations: the Eurofetus study. Ultrasound Obstet Gynecol 2003;22(6):555-8.
4. Troyano Luque JM, Clavijo Rodriguez MT. Ultrasound-guided fetal invasive procedures: current status. In: Kurjak A, Chervenak FA, editors. Donald school textbook of ultrasound in obstetrics and gynecology. 1th ed. New Delhi: Yaypee brothers medical publishers; 2004.p.526-41
5. Clark T, Martin W, Divakaran T, Whittle M, Killy M, Khan K. Prenatal Bladder drainage in the management of fetal lower tract obstruction: a systematic review and meta-analysis. Obstet Gynecol 2003;102(2):367-82.
6. Antsaklis AJ. Amniocentesis and fetal blood sampling for prenatal diagnosis. In: Kurjak A, Chervenak FA, editors. Donald school textbook of ultrasound in obstetrics and gynecology. 1th ed. New Delhi: Yaypee brothers medical publishers; 2004.p.550-62.
7. Havutcu AE, Nikolopoulos G, Adinkra P, Lamont RF. The association between fetal pyelectasis on second trimester ultrasound scan and aneuploidy among 25,586 low risk unselected women. Prenat Diagn 2002 ;22(13):1201-6.
8. Antonia Maria H. Fetal renal anomalies: diagnosis, management and outcome. Utrecht: Henry Damen Elias; 2004.
9. Scott JE. Fetal, perinatal and infant death with congenital renal anomaly. Archives of disease in childhood 2002; 87: 114-7.
10. Shokeir AA, Nijman RJ. Primary megaureter: current trends in diagnosis and treatment. BJU Int 2000; 86(7): 861-8.
11. Shukla AR, Cooper J, Patel RP. Prenatally detected primary megaureter: a role for extended followup. J Urol 2005; 173(4): 1353-6.
12. McEwing R. Fetal renal dilatation - a poor predictor for high grade vesicoureteric reflux. Ultrasound in Obstetrics and Gynecology 2005; 26(4):406–7.
13. Nicholl RM. Antenatally diagnosed renal pelvis dilatation. Arch Dis Child Fetal Neonatal Ed 1999; 81:F160.
14. Iaswon MS, Dibble L, Purie S. Prospective study of outcome in antenatally diagnosed renal pelvis dilatation. Arch Dis Child Fetal Neonatal Ed 1999; 80: F135-F138.
15. Anderson NG, Allan RB, Abbott GD. Fluctuating fetal or neonatal renal pelvis: marker of high-grade vesicoureteral reflux. Pediatr Nephrol 2004;19(7): 749-53.
16. Hodson EM, Wheeler DM, Vimalchandra D, Smith GH, Craig JC. Interventions for primary vesicoureteric reflux. Cochrane Database of Systematic Reviews 2004; Issue 3. Art. No: CD001532.
17. Isaksen CV, Eik-Nes SH, Blaas HG, Torp SH. Fetuses and infants with congenital urinary system anomalies: correlation between prenatal ultrasound and postmortem findings. Ultrasound Obstet Gynecol 2000;15(3):177-85.
18. Feldman DM, DeCambre M, Kong E, Borgida A, Jamil M, McKenna P et al. Evaluation and follow-up of fetal hydronephrosis. J Ultrasound Med 2001;20(10):1065-9.
19. Cendron M, Cromblie-holme M. Prenatal diagnosis and management of the fetus with hydronephrosis. Semin perinatol 2004; 24: 204-6.
20. Gloor JM. Management of prenatally detected fetal hydronephrosis. Mayo clinic proceedings 1995; 70: 145-52.
21. Coplen DE. 10-year experience with prenatal intervention for hydronephrosis. J Urol 1996; 156:1142-5..

PRENATALNI I PERINATALNI ISHOD KONGENITALNE FETALNE OPSTRUKTIVNE UROPATIJE

Sonja Pop-Trajković, Vladimir Antić i Milan Trenkić

Anomalije urinarnog sistema čine nešto manje od četvrtine svih anomalija detektovanih antenatalno, a čak 60 % svih anomalija urinarnog sistema čine opstruktivne uropatije. Nakon postavljanja dijagnoze opstruktivne uropatije in utero, donosi se odluka o prekidu trudnoće ukoliko je anomalija inkopatibilna sa životom, odnosno ukoliko nije, odluka o daljem vođenju i načinu praćenja takve trudnoće. Za donošenje ovakve odluke neophodan je multidisciplinaran pristup i poznavanje ishoda pojedinih anomalija. Cilj ovoga rada bio je da se utvrdi ishod opstruktivnih uropatija čime će se informacija pružena roditeljima utemeljiti u preciznom prognostičkom modelu, a kliničaru dati jasnu ideju o daljem vođenju trudnoće. Retrospektivno-prospektivnom studijom obuhvaćene su pacijentkinje prezentovane Konzilijumu za fetalne anomalije Instituta za ginekologiju i akušerstvo Kliničkog centra Srbije i Univerzitetske dečje klinike u periodu od tri godine. Prenatalne dijagnoze upoređivene su sa nalazima obdukcije onda kada je trudnoća prekinuta, odnosno onda kada je trudnoća nastavljena sa kliničkim i operativnim nalazima rođene dece i podacima dobijenim od roditelja. Od 111 bolesnica sa anomalijom urinarnog sistema kod 60 je postavljena dijagnoza opstruktivne uropatije. Kod 6 bolesnica izvršen je prenatalni prekid trudnoće a od 54 preživele dece kod petoro je došlo do pogoršanja bubrežne funkcije. Preživela deca imala su u proseku dve do tri hirurške intervencije.

Zaključak, koji se tiče opstruktivnih uropatija a može se izvući iz ove serije dece je, da je prognoza renalne funkcije odlična kada je oligoamnion odsutan pre rođenja i kada je pravovremena hirurška nega data postnatalno. Gotovo sva pogoršanja bubrežne funkcije bila su u grupi sa progresivnim oligoamnionom ili lošim rezultatima analize fetalnog urina kod kojih je porođaj morao biti indukovan prevremeno. Takođe, ishod je bio loš i kod fetusa sa bilateralnom dilatacijom urinarnog sistema koja je kombinovana sa prolongiranim periodom oligoamniona. *Acta Medica Medianae 2008;47(1):47-51.*

Ključne reči: *kongenitalna anomalija, opstruktivna uropatija, ishod*