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Antenatal diagnosis of urological disorders by ultrasound: a critical review

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Abstract. The suspected diagnosis of urological disorders made on the basis of antenatal ultrasonography was compared with the final outcome in 23 cases. In 18 cases the initial diagnosis could be confirmed, whereas 5 showed no postnatal urological anomalies. Further efforts should be undertaken to improve prenatal diagnosis in order to facilitate treatment as early as possible.

Key words: Fetal – Urology – Ultrasound

Introduction

The accuracy of antenatal ultrasonography of the fetal urogenital tract is compared with the results of postnatal observations. Ultrasonography used for screening all pregnant women in order to determine gestational age has proved to be of benefit in detecting fetal anomalies.

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Methods

The following criteria were used in patient selection: (1) all women underwent antenatal ultrasonography in the obstetrics and gynaecology unit of the Akademisch Ziekenhuis, Vrije Universiteit, Brussel; (2) antenatal ultrasonography was performed with a real time Toshiba SAL 77 A (Antwerp, Belgium); (3) all women delivered in hospital; (4) the neonates were observed during the first 7 days of life; (5) a least one postnatal ultrasound control and cystourethrography were performed; (6) the children were followed up for 3 years.

Results

During 1985, a total of 900 women were selected according to the above-described criteria. Urogenital disorders were observed in 23 fetuses between 28 and 34 weeks of gestation. The antenatal findings can be divided into five categories (Table 1).

Table 1. Postnatal evaluation of antenatal diagnosis

	Antenatal diagnosis	*n*	Postnatal diagnosis	*n*
Group 1	Isolated cystic image	9	Multicystic kidney	3
			Multicystic kidney on pelviureteric junction obstruction	1
			Mega-ureter	1
			Duplicated ureter	1
			Ovarian cyst	1
			Normal	2
Group 2	Hydronephrosis uni- or bilateral	10	Pelviureteric junction obstruction	3
			Mega-ureter	1
			Duplicated ureter with ureterocoele	1
			Ureter stenosis	1
			Anatomical variant (partial extrarenal pelvis)	2
			Normal	2
Group 3	Hydronephrosis with oligohydramnios	2	Bilateral vesico-ureteral junction obstruction	1
			Posterior urethral valve	1
Group 4	Megacystis	1	Normal	1
Group 5	Absent kidney	1	Ectopic kidney and vesicoureteral reflux	1
		23		23

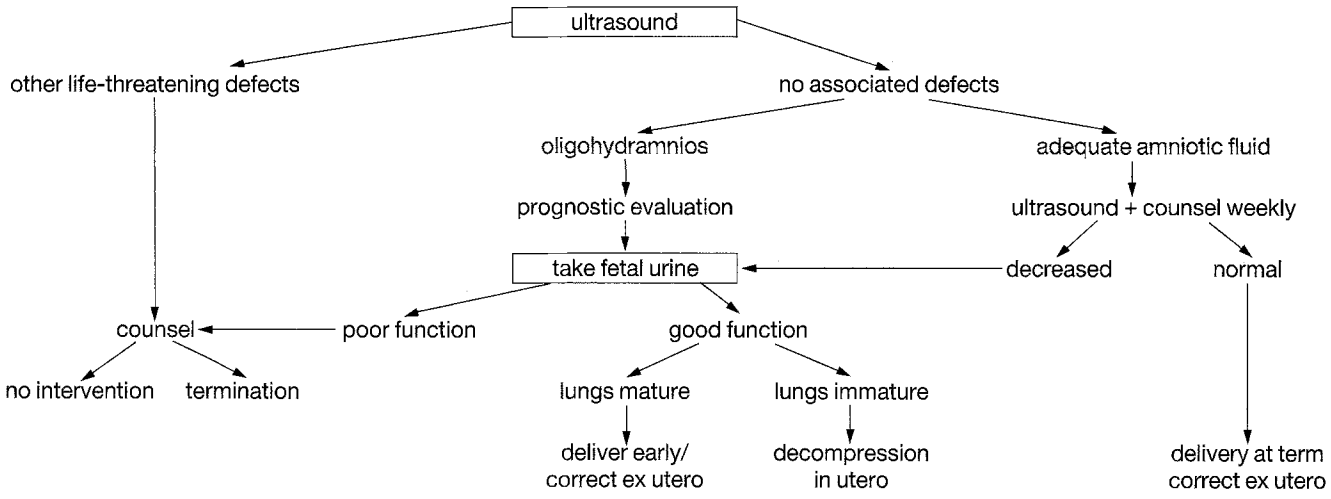

Fig. 1. Algorithm for prenatal bilateral hydronephrosis

The 1st group consisted of 9 fetuses with presumed cystic malformation. In 2 of these, the findings could not be confirmed on postnatal ultrasonography. In a 2nd group of 10 cases, antenatal ultrasonography demonstrated hydronephrosis. Two of these 10 cases were found to be normal after birth and 2 others displayed normal anatomical variations, namely partial extrarenal pelvis.

In a 3rd group, 2 cases of hydronephrosis with oligohydramnios and suspected bladder dilation were observed. In the 4th group, 1 case of bladder dilatation was observed; this was confirmed on several occasions, but not after birth. Group 5 consisted of 1 case with an absent kidney.

Five out of 23 suspected anomalies could not be confirmed postnatally; this represents 22% of the total patient population. On postnatal follow-up, 2 supplementary cases presented as partial extrarenal pelvis, a normal anatomical variation. All malformations were confirmed by radiography, isotopic or anatomopathological investigations.

One fetus presented at 30 weeks of gestation with a renal cyst compressing the other abdominal organs. It was transcutaneously aspired. Only a small dysplastic kidney with a glomerular filtration rate of less than 10 ml/min remained after birth.

Labour was induced at 38 weeks in 2 cases due to complications, namely obstruction of the pelviureteric junction. The first case was observed as a worsening hydronephrosis which proved to be bilateral after birth. The other presented with extreme intra-abdominal compression due to a unilateral multicystic kidney. However, drainage of the major cysts did not relieve intra-abdominal compression. An explorative laparatomy was performed in the neonatal period because of further complications (pneumothorax, intestinal obstruction) and revealed a multicystic dysplastic kidney, which was removed. The anatomopathological findings confirmed the existence of a unilateral pelviureteric obstruction. Post-operative recovery was excellent.

Discussion

These studies confirm that antenatal ultrasonography provides important information for the rapid diagnosis of urogenital malformations [2, 13, 16]. Its reliability is not absolute because of difficulties in differentiating between certain disorders, such as multicystic kidney versus pelviureteric junction obstruction and hypoplastic kidneys versus bilateral renal agenesis [2]. Moreover, the exact number of false-negative examinations is unknown. Therefore, theoretically, the urogenital system of all newborns should be screened.

Striking are the five cases presumed to be transient dilatations of the urinary tract. This has also been found by other authors [2, 9, 10], but the mechanism of this phenomenon is still controversial. The hydronephrosis could be related to the maximal sodium concentration and the increased urinary output of the 27-week-old fetus [2, 5, 7]. Moreover, dilatation could also be caused by immaturity and incomplete emptying of the bladder or even transient vesicoureteral reflux [2, 3, 10]. This implies that even with normal postnatal ultrasonography, a (voiding) cystourethrography is necessary to complete the diagnostic evaluation.

Since antenatal ultrasonography provides a reliable diagnostic tool, an accurate antenatal and postnatal approach to the information obtained by this technique is essential. We consider that at least a control ultrasonogram must be performed during the early neonatal period. If this is normal, then a transient process can be considered, and cystourethrography is indicated to exclude vesicoureteral reflux [13, 16].

A negative examination should be followed by ultrasonography at 3 months of age. Conversely, if the antenatal pathological findings are confirmed by the early postnatal examination, then cystourethrography remains the first choice examination to exclude vesicoureteral reflux, posterior urethral valves or urethral stenosis.

If cystourethrography is unable to establish an aetiology for hydronephrosis or multicystic kidney, then urography can exclude pelviureteric junction obstruction or distal ureterovesical stenosis [13, 16, 17].

In cases of doubt, a percutaneous puncture with contrast dye injection can confirm pelviureteric junction obstruction. If necessary this can be followed by the positioning of a percutaneous nephrostomy tube to relieve obstruction and enable evaluation of renal function [16]. In those cases where immediate drainage seems unnecessary (i.e. moderate hydronephrosis, multicystic kidneys with satisfactory renal function), renal function must be assessed by urography with