Ultrasound Screening for Early Detection of Congenital Kidney and Urinary Tract Abnormalities in Neonates

Thesis
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Contents

List of Abbreviations

ADPKD	Autosomal dominant polycystic kidney disease
APD	Anteroposterior diameter
ARPKD	Autosomal recessive polycystic kidney disease
BRA	Bilateral renal agenesis
BW	Birth weight
CBD	Congenital bladder diverticula
CFU	Colony-forming units
CT	Computed tomography
DIC	Direct isotope cystogram
DM	Diabetes mellitus
DMSA	Dimercaptosuccinic acid
DRNC	Direct radionuclide cystography
DTPA	99mTc-diethylenetriaminepentaacetate
GA	Gestational age
HPF	High-power field
IRC	Indirect radioisotope cystogram
IVP	Intravenous pyelogram
IVU	Intravenous urogram
IVUS	Indirect voiding urosonography
MAG-3	99mTc-mercaptoacetyltriglycine
MCDK	Multicystic dysplastic kidney
MOD	Mode of delivery
PKHD1	Polycystic Kidney and Hepatic Disease 1
PUV	Posterior urethral valve
RE	Renal ectopia
RPD	Renal pelvis dilatation
SD	Standard deviation
SFU	The Society of fetal urology
TMP-SMZ	Trimethoprim sulfamethoxazole
UPJO	Ureteropelvic junction obstruction
URA	Unilateral renal agenesis
US	Ultrasound
UTIs	Urinary tract infections
VCUG	Voiding cystourethrogram
VUR	Vesicoureteral reflux
VUS	Voiding urosonography
WBCs	White blood cells

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Introduction

Congenital urinary tract anomalies are relatively frequent and may be found in about 3% to 4% of the population ***(Kim et al., 2009)***. Also they account for 20 to 30 percent of all anomalies identified in the prenatal period ***(Dugoff, 2002)***.

Many cases of renal insufficiency in childhood are attributed to congenital anomalies of the kidneys and urinary tract ***(Kim et al., 2009)***. Nearly 30% of childhood cases of chronic renal failure in Japan are attributed to congenital anomalies of the kidney and urinary tract ***(Tsuchiya et al., 2003)***.

Congenital anomalies of the urinary tract are well known causes of urinary tract infections (UTIs) in children, as about 40% of infants and children with symptomatic UTI are reported to have vesicoureteric reflux (VUR) and 20% have other associated abnormalities in urinary tract ***(Ahmadzadeh and Askarpour, 2007)***.

UTIs have been considered an important risk factor for the development of renal insufficiency or end-stage renal disease in children ***(Elder, 2007a)***. About 10%–30% of children with febrile UTIs develop renal scarring, which is thought to be a risk factor for hypertension and renal insufficiency in the longer term ***(Smellie, et al., 2001)***.

Therefore, early diagnosis of congenital anomalies of the urinary tract is crucial, as potential targeted therapy (either surgical or conservative) might prevent irreversible damage of the renal parenchyma ***(Halek et al., 2010)***.

Ultrasound study has a fundamental role in the investigation for detecting renal anomalies, since it is an accessible method of real-time diagnosis without the use of ionizing radiation,

which is an important factor, especially in this pediatric age bracket ***(Kim et al., 2009)***.

Prenatal ultrasound for detecting urinary abnormalities has been used, but the sensitivity of the prenatal ultrasonography in detecting urinary abnormalities is low (36%) ***(Stolz et al., 2002)***. So the postnatal ultrasound examination completes early diagnosis of renal defects by uncovering the malformations which have been missed prenatally ***(Stolz et al., 2002).***

The postnatal ultrasound screening of the urinary system is a reliable, cheap and non-invasive method. It can be performed in many local hospitals as a primary screening tool for the newborn. Through its help, many subclinical renal abnormalities will be diagnosed early ***(Chein et al., 1999)***.

Aim of the Work

(1) Determination of the incidence of congenital abnormalities of the kidney and urinary tract in apparently healthy newborn infants detected by postnatal renal ultrasound screening.
(2) Detection of the accuracy of prenatal ultrasound screening in excluding abnormalities of the kidney and urinary tract in the studied group.
(3) Detection of the presence of UTI in those with congenital kidney and urinary tract anomalies detected by our postnatal ultrasound screening.

Aim of the Work