

Short Communication

Phimosis: A cause of chronic kidney disease

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Chronic urinary tract infection is a familiar cause of chronic kidney disease. Phimosis, with high incidence in boys may cause recurrent urinary tract infection, which will do harm to the kidney. We presented a case of a patient with phimosis-associated chronic pyelonephritis, who finally developed end stage renal disease followed by a review of literature. It was concluded that phimosis might be a cause of chronic kidney disease, proper treatment on which may be necessary to reduce the damage to kidney.

Key words: phimosis, chronic kidney disease

INTRODUCTION

Currently, chronic kidney disease (CKD) is a common syndrome in clinical practice, which will gradually develop to end stage renal disease (ESRD) without proper treatment. These days, with the increasingly high proportion of the secondary kidney disease, over 50% cases with CKD are due to diabetes and hypertension in developed countries (Reutens et al., 2011; Wang et al., 2011), except for a lot of cases of CKD which are caused by recurrent urinary tract infection (UTI). Phimosis, with high incidence in young male patients, without proper treatment, may lead to recurrent UTI, adherent foreskin, and even urethral stricture (Sandler et al., 2008). Therefore, it can be inferred that through inducing chronic UTI phimosis disease may indirectly cause chronic renal failure. However, according to the present medical literature, phimosis is rarely mentioned as the cause of ESRD. We here present a case in which a patient with phimosis-induced chronic pyelonephritis finally developed ESRD, after which a literature review was presented.

MATERIALS AND METHODS

Clinical data

A 30-year-old, unmarried male patient was hospitalized because of

nausea, abdominal distention and fatigue. The patient first complained dysuria, urinary frequency and urgency with fever at the age of 1 year old. At that time, he was diagnosed as "adherent foreskin with urinary tract infection" and was treated with antibiotics. But such symptoms were never cured completely. He was admitted to the hospital many times because of high fever and low-back pain, diagnosed as chronic pyelonephritis. A circumcision was performed at the age of 4 years old for uncontrollable and recurrent UTI. However, after the surgery, he still appeared to have recurrent pyelonephritis. The clean catch midstream urine samples were properly cultured for several times, which indicated the growth of *Escherichia coli*, *Proteus* and *Enterococcus Faecium*. He had standard treatment with antibiotics such as penicillin, cephalosporin and quinolone. The patient manifested changes of urinary stream at the age of 11 years and developed dysuria at the age of 13 years. He underwent the operation of left nephrotomy and calculus extraction at the age of 20 years because of nephrolith and perinephric abscesses. The diagnosis at that time was "chronic pyelonephritis and urethral stricture". Meanwhile, there was no evidence of obvious hydronephrosis and nephrotuberculosis. In the following years, he had several operations of urethral dilatation and continuous treatment of UTI. However, the patient still suffered from recurrent acute pyelonephrosis and once accompanied with serious epididymitis.

He was found elevation of the serum creatinine of 120 µmol/L about 5 years ago and it increase gradually to 300 µmol/L 3 years ago. Last year, his serum creatinine level surged to 1100 µmol/L with right nephrolith and hydronephrosis. After the right nephrectomy and calculus extraction, serum creatinine level returned to around 400 µmol/L. But it crept up again a month later.

His body temperature was 37.3°C, pulse rate 85 beats per minute (bpm), blood pressure 165/95 mmHg taken with mercurial sphygmomanometer. At that moment, his body signal indicated a clear consciousness, meanwhile, his face anemic, pharynx

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congestive, and tonsils and thyroid normal. There were no swollen superficial lymph nodes were found and no vascular murmur was heard. Besides, the respiratory examination showed normal with a heart rate at 85 bpm with regular rhythm and with a II to III grade's blowing apex murmur. Abdomen was flat and soft and liver and spleen remained untouched. The percussion tenderness over kidney region was positive on both sides. A scar of circumcision can be seen around the glans penis. On the lower limbs, there was edema. The result of nervous system examination showed normal.

Through a series of routine tests, we got the following results: firstly, based on a complete blood cell count, we got that a white cell count of $5.1 \times 10^9/L$ with 89.1% neutrophils and 2.3% monocytes. Hemoglobin was 96 g/L. Secondly, urinary routine test showed white blood cell (++) , protein (+) , red blood cell (+) , Thirdly, the result of stool test showed normal. Besides, the information we got from his blood chemistry was as follows: 142 mmol/L sodium, 5.0 mmol/L potassium, 107 mmol/L chloride, 22.6 mmol/L bicarbonate, 19.3 mmol/L blood urea nitrogen, 847 $\mu\text{mol/L}$ creatinine, 5.0 mmol/L glucose, 21 U/L aspartate aminotransferase, 15 U/L alanine aminotransferase, 1.69 mmol/L calcium and 105 ng/L PTH. Fourthly, the test result for antinuclear antibody was negative and the serum HBsAg was also negative. A midstream "clean-catch" urine bacteria culture indicated a growth of *Pseudomonas Aeruginosa* $>10^5$ cfl/ml, which was resistant to penicillin, cephalosporin and quinolone, and was sensitive to carbapenems. Renal ultrasonography revealed asymmetrical kidneys with both atrophy and scarring. No hydronephrosis and calculi were found. Then, Electroconvulsive Therapy (ECT) showed the Glomerular filtration rate (GFR) of left kidney was 7.7 ml/min and the right 8.5 ml/min. Electrocardiogram (ECG) tested normal. Chest radiograph was normal. But Ultrasonic Cardiogram demonstrated an obvious enlargement of the left ventricle. Intravenous pyelography showed abnormalities of both of the renal pelvis, but there was no evidence of obstruction.

The patient was diagnosed chronic pyelonephritis, chronic kidney disease, CKD 5 stage, renal hypertension and nephrogenic anemia. Then he was treated with antibiotics and supportive therapy, anti-hypertension, anti-anemia and hemodialysis. Now the patient is treated with maintenance hemodialysis.

RESULTS AND DISCUSSION

The patient with recurrent UTI developed ESRD finally, which resulted partly from phimosis. Thus, it can be concluded that phimosis can lead to recurrent UTI and may function as a cause of chronic renal failure.

With the rapid development of modern medical science, the secondary kidney diseases have already caught more attentions nowadays (Wang et al., 2012; Wang et al., 2011). Among them, UTI is one of the most common bacterial infections in children, while the chronic pyelonephritis is a relatively complex and serious type of renal infection, and one of the most important causes of chronic renal failure as well. Its prevalence is high among young male patients, and it can be considered as a cause of the chronic pyelonephritis. The incidence of UTI in uncircumcised boys is not low (Parvex et al., 2008), but the case reports of ESRD in children resulted from UTI are comparatively scarce. The diagnosis of UTI in children should be differentiated from those of neurogenic bladder and abnormalities of the urinary tract. However, the acute pyelonephritis in infants is seldom

accompanied with urinary track obstruction. Renal scarring is significantly associated with pyelonephritis in children under the age of 3 (Parvex et al., 2008; Rushton et al., 1992). Therefore, more attention should be paid to the UTI in children.

There are several theories regarding the pathogenesis of renal scarring after UTI in children. Renal scarring is associated with high grade vesicoureteral reflux (Rushton et al., 1992; Gusmano et al., 1993), which can eventually lead to the reflux nephropathy and renal impairment (Bailey et al., 1994). Reflux nephropathy, both congenital and acquired in association with UTI, has been shown to be the cause of renal insufficiency and hypertension in large numbers of children, adolescents, and young adults (Arar et al., 1994; De Santo et al., 1989). Redundant prepuce and phimosis are the most common causes of UTI in children and infants. The incidence of UTI in uncircumcised boys is comparable with that in girls, whereas the rate in circumcised boys is much lower (Wiswell, 1992; Rushton et al., 1992; Roberts et al., 1999; Zorc et al., 2005). Bacterial adherence is an initiating factor in UTI. Present research showed that bacterial adherence to the foreskin is necessary for pyelonephritis to occur (Fussell et al., 1988). The significant morbidity of acute pyelonephritis in infants is one reason for encouraging neonatal circumcision, but a more important reason is that acute pyelonephritis in the first years of life often leads to significant renal damage that may progress to ESRD during adolescence. Since circumcision can now be done under local anesthesia, the newborn infant can have a painless prophylactic operation that will prevent urinary tract infections, pyelonephritis, and ESRD (Schoen et al., 2000; Concepción et al., 2008; Roberts, 1996). The children of pyelonephritis companied with redundant prepuce are advised to have circumcision in the age under 3 (Schoen et al., 1990; Schoen, 2006).

In this case, circumcision was carried out at the age of 4 years old, even though the patient had the history of recurrent UTI and acute pyelonephritis from the age of 1 year old, because of the chronic UTI and pyelonephritis, even though several times of surgical intervention were taken, the patient eventually developed ESRD and relied on the maintenance hemodialysis. Based on the history and the imaging records of renal scarring, it is not difficult to obtain the diagnosis of "chronic pyelonephritis and chronic renal failure". Though the patient is on renal replacement therapy now, it is still difficult to cure the bacterial infection of the urinary tract because of the chronic renal scarring. There are several reports on chronic pyelonephritis and chronic renal failure which are resulted from the acute pyelonephritis in children, while few of them with intact clinical data (Schoen, 2005).

The incidence of redundant prepuce and phimosis is high in Asia (Ko MC et al., 2007) as well as in western countries (Schoen, 2006). But the early diagnosis of UTI and complete cure are not so easy (Zorc et al., 2005).

Lots of the patients already have renal scarring at the first time when they visited the urologist or nephrologist. Thus, it is valuable for the children with urinary tract infection to have early surgical management of redundant prepuce at the early age, so as to prevent the chronic urinary tract infection and even chronic renal failure (Singh-Grewal et al., 2005; Wiswell, 2000).

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