Postnatal evaluation of intrauterine hydronephrosis due to ureteropelvic junction obstruction[1]

Avaliação pós-natal de hidronefrose intra-uterina por estenose da junção ureteropiélica

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ABSTRACT

PURPOSE: Fetal hydronephrosis is a frequent finding due to advances in prenatal ultrasonography. The definition of fetal and neonatal urinary tract obstruction is a very difficult task requiring confirmation of reduced renal function and hydronephrosis. In this study we followed a series of consecutive patients with intrauterine hydronephrosis that persisted during post-natal life.

METHODS: 116 newborns with antenatal hydronephrosis diagnosed by ultrasound and submitted to a specific post-natal evaluative protocol with a follow-up period of 6 years.

RESULTS: In 45 (38.8%) of 116 patients, ureteropelvic junction (UPJ) obstruction was confirmed and surgical correction of the UPJ obstruction was done in 19 patients. From 26 children who were initially submitted to non-surgical treatment, only 6 (23%) needed a surgical approach during follow up. Overall analysis showed that surgery was performed in 25 patients with UPJ obstruction, and the others 20 patients were kept under clinical observation, since normal renal function was confirmed by scintigraphy scans.

CONCLUSION: Fetal hydronephrosis due to UPJ obstruction deserves careful postnatal evaluation. UPJ obstruction is the most frequent anomaly and its surgical treatment has very precise indications. The evaluative protocol was useful in identify patients that could be followed-up with a non-surgical approach.

Key words: Hydronephrosis. Prenatal Diagnosis. Radionuclide Imaging.

RESUMO

OBJETIVO: Com a ampla utilização dos exames ultrassonográficos na avaliação pré-natal, é frequente o diagnóstico da hidronefrose fetal. A definição de obstrução do trato urinário no periodo pós-natal necessita da confirmação de redução da função renal além da hidronefrose. Neste estudo, acompanhamos uma série de pacientes consecutivos com hidronefrose intra-útero que persistiu no periodo pós-natal.

MÉTODOS: 116 recém-nascidos com hidronefrose pré-natal diagnosticada pela ultrassonografia foram submetidos a protocolo específico de avaliação e companhados pelo periodo de 06 anos.

RESULTADOS: Em 46 (38,8%) dos 116 pacientes foi confirmado o diagnóstico de estenose da junção ureteropiélica (JUP). Conforme os resultados do protocolo aplicado a correção cirúrgica da estenose da JUP foi realizada em 19 pacientes. Das 26 crianças encaminhadas

inicialmente para observação clínica, apenas 6 (23%) necessitaram cirurgia durante o seguimento ambulatorial. Na análise geral, o procedimento cirúrgico para correção da estenose da JUP foi indicado em 25 pacientes. Nas outras 20 crianças não houve necessidade da realização da cirurgia.

CONCLUSÃO: a hidronefrose fetal requer cuidadosa avaliação pós-natal. A estenose da junção pielo-ureteral é a anomalia mais frequente como causa da hidronefrose, e sua correção cirúrgica tem indicações precisas. O protocolo aplicado foi útil em diferenciar pacientes que não necessitaram cirurgia para tratamento da estenose da JUP.

Descritores: Hidronefrose. Diagnóstico Pré-natal. Cintilografia.

Introduction

Hydronephrosis detected during fetal life represents a major challenge to the attending physician. Until the mid-80's, and based on the concept that hydronephrosis was synonymous of obstruction, the surgical treatment was routine[1]. From this decade several studies had shown that the dilation of the urinary tract was not necessarily indicative of obstruction, registering cases of spontaneous regression of hydronephrosis[2,3]. Currently, the diagnose of urinary tract obstruction in children is made by demonstration of hydronephrosis associated with progressive reduction of renal function assessed by radioisotopes[4,5]. The analysis of sequential images obtained by ultrasound associated with scintigraphic assessment of renal function provides objective tools that helps in the decision make to opt for clinical observation or surgery in those children whose hydronephrosis persists in the post-natal life[6].

Among the anomalies of the urinary tract detected by ultrasound during fetal life and coursing with hydronephrosis, ureteropelvic junction obstruction (UPJ) stands out by its frequency. The surgical benefits and successful outcome are well defined, providing high cure rates.

The aim of this study was to evaluate a series of consecutive patients with intrauterine hydronephrosis secondary to UPJ stenosis, which persisted during post-natal period, and submitted to a specific evaluative protocol.

Methods

This prospective study was approved by local Ethics Committee and was conducted by analysis of medical records of 116 consecutive children with congenital hydronephrosis diagnosed by prenatal ultrasound and submitted to an investigative protocol. Only patients with hydronephrosis secondary to UPJ obstruction, presenting normal serum levels of urea and creatinine, were included in this study.

Clinical follow-up was performed with ultrasound examination during the first week of life to confirm hydronephrosis. Prophylactic antibiotic was introduced until VCUG, performed after the first month of life, confirmed absence of vesico-urethral reflux. At the end of the first month of life the patients were re-evaluated with a new renal ultrasound and the renal function assessed by a diuretic renogram (DTPA) and renal scintigraphy (DMSA). The presence or absence of urinary tract obstruction was defined by values of $T1/2 \geq 20$ minutes or $T1/2 \leq 10$ minutes, respectively. The indication of surgical treatment of UPJ obstruction was based on the presence of hydronephrosis, obstructive pattern at renogram values and relative renal function inferior than 40%, as defined by scintigraphy.

During the clinical follow up of those patients, the surgical approach to correct UPJ stenosis was indicated only when the scintigraphy showed a reduction of the relative renal function (equal or greater than 10%), or in those patients with increasing hydronephrosis documented by ultrasound (reduced thickness of renal parenchyma and an increased anteroposterior diameter of the renal pelvis, associated with obstructive renogram pattern).

Patients returned to the hospital every three months during the first year, and every six months during the second year and thereafter annually.

Dismembered pyeloplasty technique as described by Anderson and Hynes[7] was performed in all patients who underwent a surgical treatment.

Results

The diagnosis of UPJ stenosis was performed in 45 (38.8%) of 116 patients with intrauterine hydronephrosis. Of these patients, 33 (73%) were male and 12 (27%) female. The involvement was unilateral in 33 and bilateral in 12 (Figure 1). In the remaining 71 children (61.2%) the etiological factors of hydronephrosis were vesicoureteral reflux, primary megaureter, multicystic renal dysplasia, ureterocele and anterior or posterior urethral valves. These patients were not included in the current presentation.

Characteristics		Pyeloplasty (n=25)	Follow up (n=20)
Ante-natal diagnosis	2º trimester	5	1
	3º trimester	16	14
	Unknown	4	5
Side	Unilateral	17	16
	Bilateral	8	4
Oligoamnio	No	2	0
	Yes	23	20
Gender	Male	19	14
	Female	6	6

FIGURE 1 – Clinical and anatomic characteristics of 45 new-born with neonatal hydronephrosis due to uretopelvic junction obstruction.

Open pyeloplasty was indicated as an initial therapy in nineteen children due to a relative renal function smaller than 40% (DMSA). Fifteen of these had an obstructive pattern as assessed by renogram with DTPA and four had severe bilateral hydronephrosis.

In 26 patients, as renogram showed absence of obstructive pattern and renal function was equal to or greater than 40%, we opted for conservative management and follow up. During follow up, four (15.3%) of these children were submitted to pyeloplasty due to a decrease in renal function greater than 10% compared to initial scintigraphy, and other 2 (7.7%) due to increase in hydronephrosis, but without association with an obstructive renogram. Thus, from 26 patients initially under conservative management only six (23%) required surgery during a follow up period that ranged from 2 to 6 years. A surgery was not necessary in the remaining 20 patients and they were discharged after 6 years of follow-up.

Discussion

Fetal hydronephrosis (FH) is a common anomaly, affecting 1-5% of pregnancies[8]. With the increasing use of ultrasound in the prenatal evaluation from the mid 80's, hydronephrosis began to be diagnosed in intrauterine life[9-11]. Hydronephrosis secondary to ureteropelvic junction stenosis is the more often renal anomaly diagnosed, and occurs in about half of the cases of antenatal hydronephrosis without ureteral dilatation[12]. Today, postnatal ultrasound findings as hydronephrosis grade, parenchymal thickness, ureteral dilation and duplex system may suggest hydronephrosis etiology and may help in predicting outcome[13].

In most cases neonatal hydronephrosis is a benign condition that may even present spontaneous resolution, but it is known that children with antenatal hydronephrosis are at greater risk of postnatal pathology[14]. Therefore, a follow-up protocol that can differentiate patients that will require a surgical approach is an useful tool[15].

Up to 80's a classic solution to hydronephrosis was the surgical approach[16] and some authors advocated that hydronephrosis would compromise the renal function in the absence of treatment[17]. Many discussions started to clarify which intrauterine ureteropelvic dilation would be considered physiological or pathological. A study of Grignon *et al*[18] defined that all fetal renal pelvis with an anteroposterior diameter bigger than 10 mm on ultrasound deserves investigation on postnatal period. However, additional studies had shown that in many infants with severe hydronephrosis the kidneys were not obstructed, with no evidence of contralateral compensatory renal hypertrophy[19].

In the 70s and 80s, the diuretic renogram was described and recognized for the clinical evaluation of hydronephrosis, as simple, safe and minimally invasive, providing information related to the differential renal function, and presence or absence of urinary obstruction[20,21]. Today, diuretic renogram and scintigraphy are currently used to confirm an obstructive pattern and assess differential renal function[22].

Urinary tract obstruction is now defined by the presence of hydronephrosis plus a decrease of renal function[2,4,5,23]. Thus, in the last years, the indication of a pyeloplasty was made through evaluation of renal function: decrease more than 10% from initial renal function or initial renal function less than 40% on scintigraphy[24,25]. Another important factor to be considered is the rise of hydronephrosis showed by sequential ultrasound, always analyzed with functional data[26].

Pyeloplasty in children is a procedure that has proven efficacy and safety[27] but not without risks. Recurrence of ureteropelvic junction obstruction, urinary fistula, urinoma and surgical infection are some of the complications of surgery, and relevant complications due to anesthesia should not be forgotten[28,29]. So, pyeloplasty should be indicated as precise as possible.

A prospective study with a large numbers of patients followed with conservative treatment showed the need for conversion to surgical treatment in 22% of patients during a follow-up period of 10 years[6]. By adopting similar approach, our study showed that in only 6 from 26 patients (23%) it was necessary the conversion from clinical observation to surgery procedure during a follow-up period of 6 years.

Considering the high success rate of clinical management in this group of patients, we believe that children with unilateral hydronephrosis due to UPJ obstruction presenting a scintigraphic differential renal function of 40% or higher, and with a diuretic renogram with a non-obstructive T1/2 value, can be safely followed-up.

Conclusions

Intrauterine and neonatal hydronephrosis can display spontaneous regression in its evolution. The neonatal evaluation used was useful in identifying patients who might benefit from the adoption of conservative treatment for UPJ obstruction. The evaluative protocol was useful in identify patients that could be followed-up with a non-surgical approach.

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