ROLE OF MICTURATING CYSTO-URETHROGRAM IN RENAL PARENCHYMAL DISEASE

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SUMMARY

Children developing renal parenchymal disease (RPD) secondary to urinary tract infection have vesico-ureteric reflux. Micturating cysto-urethrogram (MCUG) is advised in routine to rule out this pathology. This study was conducted to assess the diagnostic and predictive value of MCUG in cases that suffer from recurrent urinary tract infections and are going to develop RPD. 32 children between the age of 3-8 years and having the history of repeated episodes of Urinary Tract Infection (UTI) underwent micturating cysto-urethrogram (MCUG). 11 had vesico-ureteric reflux. 6 had signs of renal parenchymal disease (RPD). 2 developed RPD but demonstrated no reflux. As such the predictive value of this investigation in children suffering from UTI with reflux to develop RPD was almost 50% i.e. children with UTI and reflux had very high risk of developing RPD.

INTRODUCTION

Recurrent urinary tract infection is a common cause of prolonged ill health, failure to thrive and fever in children of all ages, especially between 2 months and 8 years. There is marked decline in the incidence of UTI followed by a sharp rise with the onset of sexual activity. 1-2% males and 3-5% females[1] develop symptoms of UTI. A significant number of these children suffer from repeated episodes and develop vesico-ureteric reflux with subsequent damage to renal parenchyma.

Aim of study was to assess the diagnostic value and accuracy of MCUG in predicting the development of RPD in children with recurrent UTI. Thus identifying the children at high risk for further management. Attempts have also been made to assess renal damage in UTI with ultrasonography and Radio-Isotope Scans.[2,3,4]

These examinations can prove renal damage but cannot predict RPD in UTI in unestablished cases.

Role of vesico-ureteric reflux causing RPD secondary to UTI is well established.[5,6] The severity of RPD also varies with the severity and degree of reflux. Hence all the cases of UTI being investigated must undergo MCUG.[3] This study does not suggest that patient of UTI without reflux will certainly not develop RPD.

MATERIAL AND METHODS

These children were referred to the Radiology (Diagnostic) department of Khyber Teaching Hospital, as part of investigation for recurrent UTI by Pediatric physicians and surgeons. A small segment of patients were also referred by Nephrologist. Majority of the children selected were out-door patients. Study was conducted in three stages over a period of two years.

Age limit was set between 3 to 8 years. Children below the age of three years were not included as they were unable to respond to vocal commands during examination and a voiding exposure could not be properly taken. Criteria for enrollment in study were age group as mentioned above, symptoms of fever with or without dysuria. A positive urine culture suggesting bactiuria.

Children with congenital anomalies and normal anatomical variances like partial or complete duplication of collecting systems were also not included. Patients with symptoms of systems in addition to urinary tract were also dropped from study. Sex was no bar.

Following the above criteria, almost 63 patients were included in study. 31 dropped out during different stages. 20 did not turn up for follow up after 6 months and the rest failed to turn up after second stage of investigation. Only 32 children, who completed all the three stages of examination were finally included in analyzing the results.

Mean age of these children was 4 years 6 months. 21 were females and 11 were males.

MCUG was performed according to the established standard procedure, as recommended by International Reflux Study[8] group. Examination was conducted under fluoroscope. Spot films were recorded before, during early and late phases of micturation.

Vesico-ureteric reflux was noted and graded, although, the aim of study does not include the RPD stage comparison with the grade of reflux.

Renal Parenchymal Disease was diagnosed by ultrasonography. Criteria of RPD was:

- Reduction in the parenchymal thickness.
- Increase in parenchymal echodensity.

With or without the following

- Calyceal distortion
- Reduction in over-all size of kidney
- Loss of regularity of renal margins

Study was performed in three stages.

1) At the onset of attack of UTI to a child with history of repeated episodes, with the last two attacks in last three months.
2) Approximately 6-8 months after the first examination.
3) After 10-12 months from second examination.

In all the three sessions child underwent MCUG and an ultrasonography (USG)

examination. MCUG to assess the reflux and USG to record the renal changes.

RESULTS

In first stage of study out of 32 children with symptomatic UTI, 11 had vesico-ureteric reflux. Out of these 11 children, 6 showed sonographic evidence of Renal Parenchymal Disease.

In second stage of study the number of children with reflux was again 11 but one child had developed reflux while one child with reflux in previous study showed improvement and became without reflux. There was no change in the number of children developing renal parenchymal disease.

In the third stage of study one more child was added to the group showing reflux. Three more children developed RPD, one belonged to the group of children having reflux in first and second stages but two children had no reflux in any of the three sessions of MCUG.

In short out of 32 children with repeated episodes of UTI, 12 had reflux at any stage of study. In all 8 children developed RPD. 6 had reflux and 2 had no reflux. i.e. out of the total children in study 37.5% had reflux on MCUG examination and 50% of these had or developed RPD. As such 25% cases with symptomatic UTI developed RPD out of which 18.75% had a reflux positive on MCUG and only 6.25% had no reflux.

Thus a significant proportion of children with symptomatic UTI who had vesico-ureteric reflux developed RPD.

DISCUSSION

37.5% cases had a vesico-ureteric reflux positive MCUG in patients suffering from repeated episodes of symptomatic UTI. This is almost the same as seen in other studies.[9] The percentage of children having or developing RPD was 25%. Relatively identical results have been obtained in different studies.[10,11] Two children who had no reflux in first stage and became reflux positive in second and third stages, developed RPD, although they were receiving treatment for UTI. 6 children who had reflux and received treatment during study did not develop RPD. Rest of the 20 children who had symptomatic UTI and received treatment for that did not develop reflux at any stage did not show signs of RPD. However two children without reflux at any stage did develop RPD, inspite of treatment.

Children with UTI and without reflux were less likely to develop RPD but those with reflux had high incidence of complications like RPD.

In another study by Segura et al,[10] 20 % of children with UTI who developed RPD had no reflux and in another similar study by Smellie et al[9] the figure was in range of 15%.

Literature[2] suggests that minimal and moderate degree reflux is not an important cause for developing RPD.

Literature[13] also confirms that E.Coli bacteria binds to specific receptors on the uroepithelial cells in mucosa. These bacteria ascend in ureter due to turbulent flow. By attaching to receptors on cells they prevent washout with urine flow. Hence local presence of bacteria results in ureteritis followed by functional disturbance of ureters. Thus facilitating bacterial invasion of kidneys. Another rout of renal infection is through blood stream. This was unlikely in this study because there were no clinical signs and symptoms of septicemia.

Changes of renal parenchymal disease were also confirmed by repeated USG. The

change in parenchymal thickness, echodensity, cortico-medullary sharpness, calyceal distortion and irregularity of renal margins were documented and also compared with changes of excretory urograms.

In initial stages in which 6 cases were found to be having changes of RPD on USG, one case had doubtful sonographic changes but it was reconfirmed by radioisotope studies.

Thus a normal MCUG, USG and excretory urogram does no imply that child will not develop RPD at all, on the contrary a reflux positive child inspite of early normal USG had high risk of developing RPD.

CONCLUSION

MCUG is an important investigation and should be carried out in all cases of recurrent symptomatic UTI to identify the children who are at high risk to develop RPD for further management and close observation.

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