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Diagnostic Imaging in Children

In this issue of the journal, two articles highlight the important roles of diagnostic imaging in the management of a common (urinary tract infection) and a rare (hyperinsulinaemic hypoglycaemia) paediatric condition. Persistent hyperinsulinaemic hypoglycaemia of infancy (PHHI) reported in this issue of our journal is a devastating disease requiring aggressive management in order to avoid brain damage as the patients are deprived of both glucose and ketones required for brain cell metabolism. Although the focal and diffuse forms of PHHI share an indistinguishable clinical presentation, they have different genetic basis and the surgical approach and outcome of the two conditions are different. Selective surgical removal of an identified focal lesion will result in a cure while in the diffuse form of PHHI, near total pancreatectomy is recommended. Magnetic resonance or computerised tomography imaging of the pancreas, intra-operative ultrasonography and palpation are not reliable to differentiate the two forms. Pre-operative differentiation of the two conditions requires pancreatic venous sampling which is a technically demanding invasive procedure requiring general anaesthesia and the patients are subjected to the risk of hypoglycaemia as drug treatment with diazoxide, octreotide and nifedipine need to be stopped for 5 days before the test and blood sugar maintained by intravenous glucose infusion. Positron emission tomography (PET) performed with ¹⁸F-fluoro-L-dihydroxyphenylalanine (¹⁸F-fluoro-L-DOPA) has been used to detect neuroendocrine tumours and it has been found to be useful to differentiate the focal from the diffuse form of PHHI.¹⁻⁴ ¹⁸F-DOPA-PET of the pancreas is now available in Hong Kong and this procedure will greatly facilitate the diagnosis and management of such patients. However, surgery for both the focal and diffuse form of the disease remains technically demanding.

Up till recently, most centres still recommend that further investigations (renal ultrasound and voiding cystourethrogram) should be performed in all infants and young children, after the first documentation of an urinary tract infection (UTI)⁵ but the benefit of this practice is not really evidence based.^{6,7} Vesicoureteric reflux (VUR) and renal scarring had been found in 39% and 23% of Chinese children after the first documented UTI respectively.⁸ Voiding cystourethrogram (VCUG) has been the standard test for detecting vesicoureteric reflux but it remains to be demonstrated that this test performed routinely after UTI will improve outcome like recurrence of UTI, renal scarring or renal function.⁷ The recent guideline published by the National Institute for Health and Clinical

Excellence proposed that wholesale imaging of the urinary tract may not be indicated following the first urinary tract infection.⁹ It is recommended that VCUG only be performed following UTI in infants younger than 6 months if the infection is atypical or recurrent.⁹ In infants older than 6 months and children younger than 3 years, VCUG could be considered if the UTI is atypical or recurrent and there is in addition the presence of dilatation of the renal tract on ultrasound, poor urine flow, family history of VUR and non-*E. coli* infection.⁹ This recommendation although controversial, will undoubtedly drastically reduce the number of VCUG to be performed in infants and children following the first UTI. VCUG is an invasive and distressing procedure to both the patients and their parents.¹⁰ Nearly 25% of children experience difficulty with micturation and haematuria. Disturbance of toilet training and disturbance of behaviour can also follow the procedure. Distress can be minimised by properly informing and preparing the children before the distressing procedure. Contrast-enhanced ultrasound techniques have a high positive likelihood ratio and low negative likelihood ratio in the detection of VUR based on an analysis of 16 studies but the performance of indirect radionuclide voiding cystography has not been satisfactory so far.⁷ The less invasive contrast enhanced ultrasound techniques could be considered as an accurate alternative but VCUG is still the investigation of choice in detecting VUR children at present. The article by Chan et al will help paediatricians to better understand the procedure so that they can inform, prepare and counsel the children and the parents before the procedure to minimise the distress caused by this invasive procedure.

The development of less invasive and yet accurate techniques is important in the diagnosis and management of different paediatric diseases. We hope to publish more review articles on advances in diagnostic imaging in future issues of our journal.

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Louis Low
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