379

EFFECT OF HOSPITALISATION ON AMBULATORY BLOOD PRESSURE MONITORING VALUES IN CHILDREN 10 TO 16 YEARS OF AGE

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Aim Ambulatory blood pressure monitoring (ABPM) is a standard procedure in diagnosing arterial hypertension in children and adolescents. ABPM is usually used as an outpatient method enabling recordings of blood pressure (BP) during regular daily activities. However, sometimes it is necessary to have an insight into 24-hour BP values during hospitalisation which can result in clinical doubt of validity of those measurements since hospitalisation restricts physical activity in children providing falsely lower results. On the other hand, hospitalisation can be stressful to children, resulting in values higher than those measured outside of the hospital environment. The aim of this study was to analyze the effect of hospitalization on ambulatory blood pressure (ABP) values in children.

Methods The research was conducted at the Department of Pediatrics, University Hospital Centre Sestre milosrdnice. The study included 72 children of both sexes, aged 10 and 16 years. In our study group 40 (55.6%) of children had arterial hypertension, 9 (12.5%) had type 1 diabetes while the diagnosis in 23 (31.9%) of subjects was headache, precordial pain, overweight or obesity, asthma or proteinuria. ABPM was performed on all subjects. The first group included children to whom ABPM was performed in the hospital, while in the second group ABPM was done as an outpatient procedure. Height, weight and body mass index were obtained for all subjects. Office BP, standard ABPM parameters and blood pressure variability (BPV) were analysed.

Results There was no statistically significant difference between hospitalised and outpatient ABP results for 24-hour systolic (SBP) and diastolic blood pressure (DBP) ($p=0.173$ and $p=0.93$, respectively), daytime SBP and DBP ($p=0.268$ and $p=0.968$, respectively) and nighttime SBP and DBP ($p=0.116$ and $p=0.653$, respectively). Also, there was no difference neither for systolic ($p=0.921$) and diastolic ($p=0.238$) BP load nor for the nighttime dipping ($p=0.181$ for systolic dip and $p=0.479$ for diastolic dip). 24-hour and daytime diastolic BPV was, however, higher in an outpatient subjects ($p=0.034$ and $p=0.001$, respectively). Most of the subjects had non-dipping pattern (52.78% in hospitalised subjects and in 66.67% in outpatient subjects).

Conclusion Hospitalization did not affect the standard ABPM parameters. Higher diastolic BPV in outpatient children could indicate somewhat higher physical activity in this group, but without affecting the average BP values. These results indicate a low level of physical activity in our subjects.

380

WHAT INFLUENCES BLOOD PRESSURE VARIABILITY IN CHILDREN WITH ESSENTIAL HYPERTENSION?

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Blood pressure variability (BPV) is a complex physiological phenomenon and it is known that increased BPV exacerbates the progression of hypertension and correlates with adverse cardiovascular outcomes. However, there is paucity of data regarding factors influencing BPV in pediatric population. This study aimed to analyze blood pressure (BP) pattern and assess blood pressure variability and its possible determinants in untreated children with essential hypertension.

The study group included 132 children, average age 15 y (7- 18 y), 84 boys and 48 girls with essential hypertension and no use of antihypertensive therapy. Anthropometric parameters, serum glucose level (sG), serum uric acid (sUA), serum creatinine (sCr), total cholesterol (TCh), HDL cholesterol (HDL), LDL cholesterol (LDL) and triglycerides (TG) were measured in all participants. Office blood pressure (BP) and ambulatory blood pressure (AMBP) was measured according to recent European Society of Hypertension (ESH) guidelines. BPV was defined as value of the standard deviation of blood pressure for day and night time periods. In addition to the classical statistical analysis, an unsupervised machine learning approach using the expected maximization algorithm was implemented to find groups of patients with similar characteristics.

The average age was 14.98 ± 2.1 years. Comparing sex-specific BP parameters, boys had higher daytime and nighttime systolic BP, although the difference was not statistically significant ($p = 0.067$ and $p = 0.583$). Girls had significantly higher daytime and nighttime diastolic BP values ($p=0.017$; $p=0.027$). There was no difference in BPV according to gender while boys have higher values of sCr, sG, and sUA despite similar body mass index (BMI) [27.18 ± 5.27 kg/m² (males) vs 27.94 ± 5.27 kg/m² (females), $p = 0.427$]. A statistically significant positive correlation was found between the Z-score for BMI and daytime systolic BPV, nighttime systolic BP and total cholesterol, nighttime diastolic BPV and sUA ($r = 0.19$, $r = 0.28$ and $r = 0.26$, respectively). Within the male population two clusters were found. The subjects in cluster 2 had higher daytime and nighttime systolic and diastolic BP values, higher total cholesterol and triglycerides and significantly higher night time systolic and diastolic BPV.

Understanding potential determinants of BPV in hypertensive children could help identify patients with increased cardiovascular risk earlier. Our results suggest that clustering of metabolic factors influence BPV in untreated children with essential hypertension which could also be gender specific for male subjects.

381

CONTRAST-ENHANCED UROSONOGRAPHY IN DIAGNOSTICS OF INTRARENAL REFLUX

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Many studies have shown that intrarenal reflux (IRR) is one of the most important risk factors for febrile urinary tract infections (UTI) and renal scarring and consequently the development of hypertension and renal failure. The incidence of IRR diagnosed by fluoroscopic voiding cystourethrography (VCUG) ranges from below 1% to 10%. Although numerous

studies have indicated high diagnostic accuracy of ceVUS compared to VCUG in the detection of VUR, a limited ability for detecting IRR in children compared to VCUG has been suggested as a potential drawback of ceVUS. The aim of our study is to evaluate the prevalence of IRR diagnosed by ceVUS and its association with age, gender and grade of VUR.

We used LOGIQ S8 ultrasound machine equipped with dedicated software for contrast-enhanced studies and harmonic imaging (HI). Standard ultrasound of the urinary tract was followed by bladder catheterisation and instillation of physiological normal saline and the US contrast medium (SonoVue®, Bracco). The diagnostic criterion for IRR is the appearance of contrast microbubbles outside the contours of the duct system or renal calyx and the entry of contrast into the renal parenchyma.

Since March 2006 until January 2020 we performed 8130 ceVUS examinations and found VUR in 2972 children (36,6%). Until December 2012 we did not use contrast specific software and we found VUR in 1013 out of 2977 children (34%) of whom IRR was found in 23 children (2,3%). Since January 2013 we used contrast specific software and HI and found VUR in 1959 out of 5153 children (38%) and IRR in 233 children (11,9%). We detected IRR in 124 male (53,2%) and 109 female patients (46,8%) with age range from 15 days to 82 months. Most common indications for ceVUS were: febrile urinary tract infection (82%), prenatally diagnosed hydronephrosis (14,6%) and neurogenic bladder (2,6%). Unilateral IRR was found in 180 patients (77,3%) and bilateral in 53 patients (22,7%). From all uretero-renal units with IRR (286), VUR was II grade in 8 children (2,8%), III grade in 41 (14,3%), IV grade in 174 (60,8%) and V grade in 63 children (22%).

Our results in the largest so far published series of patients with ceVUS show that using contrast specific software and harmonic imaging intrarenal reflux was found in about 12% of patients with VUR. IRR is found even in children with low grade reflux. Our results emphasize the importance of considering IRR in the future classification of VUR as well as in assessment of prognosis and therapy in each child with VUR.

382 TRANSCUTANEOUS TIBIAL NERVE STIMULATION IN CHILDREN AND ADOLESCENTS WITH NEUROGENIC BLADDER AND BOWEL DYSFUNCTION

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Transcutaneous tibial nerve stimulation (TTNS) is a non-invasive neuromodulatory method which is used mostly in children and adults with overactive bladder, nonobstructive urinary retention, functional constipation, fecal incontinence and in chronic pelvic pain syndrome. Experience in treatment of children and adolescents with neurogenic dysfunction is very limited. Aim of this study is to evaluate the success of 3 months home TTNS therapy in patients with neurogenic bladder/bowel dysfunction.

In our institution in 2015 we started the program of non-invasive neuromodulation in treatment of children with different forms of lower urinary tract and bowel dysfunctions. In 75 of children with neurogenic bladder/bowel some form of neuromodulation was performed. In 36 of children some other treatments that could influence bladder/bowel function were performed together with TTNS so they were excluded from this study. We followed 39 patients in whom home treatment with TTNS was performed for 30 minutes every day during 12 weeks. Self-adhesive surface electrode was placed 4-5 cm cranial from medial malleolus. We evaluate treatment success by bladder/bowel symptom questionnaire before and after 12 weeks of therapy.

Out of 39 patients 23 had myelomeningocele, 9 had operation of spinal cord or pelvic tumor, 5 had tethered cord syndrome, 1 patient had spinal cord injury and 1 had transverse myelitis. There were 19 male and 20 female patients with age range from 4 to 21 years, average age 13,03+/- 5,04 years. Eight patients (20%) did not feel any urinary/bowel symptom improvement. Twenty (51,3%) patients had better sensation of bowel fullness, 2 (30,8%) achieved stool continence, 12 (30,8%) had better sensation of bladder fullness, 6 (15,4%) achieved urinary continence and 4 (10,2%) reported voiding with less straining. None of our patients had side effects of TTNS.

Neuromodulation is a new method in patients with bladder/bowel dysfunction. TTNS is least invasive and might be valuable option for patients with neurogenic diseases. Although the method is not as effective as in children with non-neurogenic dysfunctions, most of our patients (80%) had some symptom improvement, mostly related to bowel function. Our data in small group of patients suggest that transcutaneous electrical nerve stimulation might be effective and safe for treating patients with neurogenic disorders with positive effects especially on bowel function. Further larger well-designed randomised controlled trials are needed to make definitive conclusions and evaluate long-term effects.

383 ULTRASOUND ASSESSMENT OF KIDNEY LENGTH WITH DUPLEX COLLECTING SYSTEM IN INFANTS

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Objective To determine the ratio of the sizes of kidneys with duplex collecting system (DCS) and healthy kidneys with one collecting system as well as kidneys with single collecting system located on the contralateral side of the kidney with DCS.

Methods The study was conducted on healthy infants, born on time, who were from 30 to 210 days of age. Ultrasonic measurements of kidney lengths were taken on the group of 33 infants with DCS (14 males, 19 females) with 66 kidneys (DCS group) and 948 infants with 1896 healthy kidneys with single collecting system who were the control group (CG). Five of the 33 infants with DCS had bilateral DCS, which is total of 38 kidneys with DCS. The other 28 infants from the DCS group had one kidney with single collecting system, so this group is called the CDCS group.

Results We determined the normal values of kidney lengths of infants CG in relation to age, gender and body side and presented on four different nomograms of kidney length.