It is important to find and manage the cause of short stature in children. Growth hormone (GH) stimulation test is considered as a 'gold standard' for the diagnosis of GH deficiency (GHD), and several pharmacologic agents including insulin, glucagon, L-dopa, or clonidine are used for GH stimulation test (GHST). However, diagnostic value, sensitivity or specificity of each GHST is not clear. This study was designed to evaluate the diagnostic value of GHST by insulin, glucagon, L-dopa, or clonidine for GHD during childhood.

Subjects and Methods

Subjects who visited the pediatric endocrine clinic of Dankook University Hospital and underwent GHST using 2 or 3 combinations out of insulin, glucagon, L-dopa, or clonidine for the evaluation of short stature between 2001 and 2016 were enrolled in the study. GH deficiency was defined when serum peak GH concentration was less than 10 ng/ml during at least two provocation tests. Medical records were reviewed about clinical and laboratory characteristics. For statistics, Chi square test, Student t-test, Fisher’s exact test, and McNemar test were done. Sensitivity, specificity, positive predictive value, negative predictive value, and ROC curve were calculated. It was considered significant if P value was less than 0.05.

Results

Initially 89 subjects with short stature were enrolled, but subjects who had underlying structural brain lesions or chromosomal anomaly were excluded. A total of 62 children were analyzed, and 43 subjects (69.4%) were diagnosed with idiopathic short stature. Average height z score was -2.53 in GHD. Mean IGF-1 and IGFBP3 z scores were -0.64 and -0.88 in GHD, respectively. There was no significant difference in height, IGF-1, and IGFBP3 Z scores between GHD and non GHD groups. Insulin test, glucagon test, L-dopa test, and clonidine test were done in 62, 51, and 10 subjects, respectively. In each test, sensitivity for GHD was 95.4%, 65.6%, 74.2%, and 90%, respectively. Specificity of insulin, glucagon, and L-dopa was 52.6%, 89.5%, 93.3%, respectively. Positive predictive value for GHD was highest in L-dopa test (96.2%), and negative predictive value was highest in insulin test (83.3%). There was no serious adverse event during GHST, except for mild hypoglycemic symptoms or transient vomiting.