UMOA calculations for $^{16}\text{O}$, $^{40}\text{Ca}$, and $^{56}\text{Ni}$ RYOJI OKAMOTO, Kyushu Institute of Technology, SHINICHIRO FUJII, Kyushu University, KENJI SUZUKI, Kyushu Institute of Technology — One of the most fundamental problems in nuclear theory is to describe nuclear structure from the underlying nuclear interactions. The unitary-model-operator approach (UMOA) is an \textit{ab initio} method which can describe the structure of nuclei beyond the $p$ shell using realistic nuclear forces. In the UMOA, the original Hamiltonian is unitarily transformed, and thus three-or-more-body cluster terms are generated even if we employ only the two-body force as the original interaction. In this work, the UMOA is applied to nuclei around $^{16}\text{O}$, $^{40}\text{Ca}$, and $^{56}\text{Ni}$. The ground-state and single-particle energies for hole states of those nuclei including three-body-cluster effects are calculated with realistic nucleon-nucleon interactions. We show that the calculated results are fairly close to the experimental values. The dependence of the results on the two-body interactions and effects of the genuine three-body force are also discussed.