In this thesis we are concerned with the numerical simulation of the interaction of compressible viscous flow and an elastic structure in 2D. For the elastic deformation we use a 2D linear model and nonlinear St. Venant-Kirchhoff and neo-Hookean models. The flow is described by the compressible Navier-Stokes equations written in the arbitrary Lagrangian-Eulerian (ALE) form in order to take into account the time-dependence of the flow domain. The discretization of both the flow problem and the elasticity problem is realized by the discontinuous Galerkin finite element method (DGM). We focus on testing the DGM applied to the solution of the flow and elasticity problems. Furthermore, we discuss the coupling algorithm and the technique, how to deal with the deformation of the computational domain for the fluid flow problem. Our work is motivated by the biomedical applications. Numerical experiments include numerical simulation of vibrations of human vocal folds induced by the compressible viscous flow.