We consider a spherical magma chamber filled with a low-viscosity magma. The chamber is included in a homogeneous and isotropic elastic half-space. We assume that, as a result of the inflow of fresh magma or a phase transition, the pressure in the chamber increases slowly during a finite time interval. Assuming that the pressure increase is linear in time, we calculate the stress field generated in the surrounding medium considering the chamber as a center of dilation. We assume that a vertical tensile fracture originates at the top of the magma chamber after the rock strength is exceeded. The fracture is assumed to propagate quasi-statically along a vertical plane, driven by the stress distribution: both the cases of positive and negative buoyancy force are considered. The problem is solved in two dimensions by considering the fracture as a tensile Somigliana dislocation and expanding the associated stress release into Chebyshev polynomials. The fracture may reach the Earth’s surface or not, depending on the depth and radius of the magma chamber, the rate and duration of pressure increase, the rock and magma densities and the rock strength. When the fracture reaches the Earth’s surface, we assume that it becomes a vertical conduit. Magma pours out from the vent, driven by the pressure gradient in the conduit. Under the assumption of laminar flow of a Newtonian fluid, we evaluate the initial effusion rate as a function of the relevant model parameters. The flow rate is found to be a nonlinear function of the density contrast. We also establish a relationship between the flow rate in the conduit and the initial thickness of the ensuing lava flow, in the case of effusion on a steep slope.