Application of seismic techniques to an explosion event at Tungurahua volcano, Ecuador, provided clear images to elucidate its source process. We used waveform inversion and a source location method to analyze the event observed by five broadband seismic stations on the volcano. The source location method assumes isotropic radiation of S waves, which has been shown to be valid in a high frequency band because of the path effect caused by the scattering of seismic waves. The source location method using seismic amplitudes in a frequency band of 5-10 Hz indicates that the event was triggered at a depth of 6 km below the summit, and the source ascended toward the summit at a speed of about 1600 m/s. Waveform inversion of low-frequency signals in a period band of 2-10 s at the event onset points to an isotropic mechanism with initial deflation and subsequent inflation at a similar depth of 6 km. This source-time history can be explained by a sudden pressure drop and subsequent bubble growth in magma. The ascending source suggests that a pressure wave generated by the growth of bubbles traveled up the magma conduit, which triggered fragmentation of magma at shallow depths. Rapid decompression of magma in a shock tube has been considered to be an important mechanism for explosive eruptions triggered by ruptures at the magma surface. However, our study suggests that a pressure disturbance in magma at depth and its upward propagation are fundamental processes that triggered an explosive eruption.