Radiofrequency ablation (RFA) is a minimally invasive clinical technique used to treat liver cancer tumors. In this procedure, needles are guided into the tumor and a radiofrequency current is used to produce frictional heat that kills cells. An ablation device burns an almost spherical ellipsoid of fixed size. The largest region that can currently be treated with a single ablation is about 5 cm in diameter. The clinical need to also treat a 1 cm margin surrounding the tumor region means that tumors exceeding 3 cm in diameter require multiple ablations. RFA treatment of large or irregularly shaped tumors would benefit from automated methods that determine the placement of multiple burn regions so the tumor can be completely destroyed with a minimally invasive sequence of burns. This work concerns the development of optimization models and algorithms to determine the number and location of radiofrequency ablations, and its integration into a computer assisted image-guided surgery system.