The cornerstone of atrial fibrillation (AF) is electrical isolation of the pulmonary veins (PV). In patients with non-paroxysmal AF, PV isolation alone is insufficient and one needs to modify the atrial arrhythmogenic substrate. AF ablation is mostly performed using a transvenous, endocardial approach with catheters. This technique enables one to characterize the underlying substrate in order to tailor the ablation procedure but these ablation lesions are not always transmural nor long lasting. Thoracoscopic surgical AF ablation techniques, on the other hand, create more reliable linear lesions but the lesion set is based on empirical assumptions rather than specific patient characteristics. Performed in combination (hybrid AF ablation), both approaches are complementary as they overcome their mutual shortcomings. In this thesis, we demonstrated that the hybrid AF ablation procedure is safe and feasible. Medium and long-term results are encouraging, especially in currently challenging settings such as non-paroxysmal AF and failed endocardial catheter ablation procedures.