

TABLE 4: Results for RFA for HCC.

Author	Year	Number of patients	Inclusion criteria if any	3-year survival (%)	5-year survival (%)
Chen et al. [58]	2006	71	Solitary <5 cm	71	68 ^a
Livraghi et al. [59]	2008	218	Solitary <2 cm	76	55 ^b
N'Kontchou et al. [60]	2009	222	Up to 3 HCC <5 cm		40 ^c
Peng et al. [62]	2010	224	Solitary <5 cm		60
Huang et al. [63]	2010	115	Milan	70	55

^a4-year survival.^bSurvival increased to 69% for "operable" patients.^cSurvival increased to 76% for "operable" patients.

resectable and where there is satisfactory liver function reserve. LT should preferably be used for HCCs within Milan criteria in patients with more advanced liver disease (Child Pugh B or C) if medically fit [9]. The NCCN guidelines are similar but more ambiguous about the optimal size of HCC best suited for resection. LT is reserved for patients within Milan criteria and more advanced liver disease and potentially for those that are "unresectable" due to unfavourable tumour location or inadequate liver reserve [10]. This reflects the increasing use of resection as the first line of management for early HCC and may, in part, be also due to the fact that UNOS criteria specify that patients eligible for LT should not be considered for resection. Thus, although there are certain differences in all these guidelines, it is clear that use of surgical resection as the first treatment for small HCCs in a well-preserved liver is increasingly prevalent. This is clearly helped by the fact that although long-term results after LT have remained relatively static over the last 10 years, those with resection have significantly improved.

3.3. Ablative Techniques for HCC. Ablative techniques have an established role in the management of HCC. Radiofrequency ablation (RFA) is the most commonly used ablative technique for HCC. Other modalities include percutaneous ethanol injection (PEI) and microwave ablation (MWA). RFA is a minimally invasive procedure that can be performed percutaneously or operatively using both an open and a laparoscopic approach, with relatively low major complication rates. It can also be performed in patients who would be unsuitable for surgery (either LT or resection) due to associated comorbidity. It, however, is the only potentially curative technique that does not permit histological analysis of the tumour, and hence tumour-based prognostic criteria for best outcomes cannot be readily determined. In terms of safety and efficacy, a large meta-analysis in 2001 demonstrated an overall mortality of 0.5% and a complication rate of 8.9% [54]. More recent studies have demonstrated further lowering of mortality (0.1%) and complication rates [55]. The commonest complications are liver abscesses, biliomas, haemorrhage, and so forth. Although both RFA and PEI are effective techniques, studies have demonstrated that necrotic effect of RFA is more predictable for larger tumour sizes and that RFA is superior in terms of local tumour progression and disease-free survival [56].

3.3.1. Results of RFA for HCC. RFA is best used for tumours less than 3 cm after which the incidence of local recurrence increases. Vascular proximity leads to a heat-sink effect minimising the efficacy of the burn and thereby promoting higher recurrence rates. Significantly better results seem to be obtained when the procedure is performed operatively rather than percutaneously [57]. A randomised trial reported comparable outcomes between RFA and surgical resection for solitary small HCCs <5 cm with 4-year survival rates between 64 and 68% [58]. Another more recent study demonstrated sustained complete response rate for RFA for very small HCCs to be over 97% with a 5-year survival of 69% in tumours that would be considered operable [59]. This was improved upon in another series reporting a 5-year survival rate of 76% for patients considered operable disease by BCLC criteria [60]. A large retrospective study demonstrated that in Child Pugh A cirrhotics, RFA and resection offered equivalent benefits for tumours less than 3 cm while resection provided better survival when the HCC was larger than 3 cm but still within Milan criteria [61]. A Chinese study demonstrated 5- and 7-year survival of 60% and 55% with RFA as the primary treatment for HCCs within Milan criteria [62]. The latest randomised controlled trial comparing RFA and resection for HCCs within Milan criteria demonstrated that overall survival and recurrence-free survival were significantly better with curative resection rather than RFA [63]. In this study, the overall 5-year survival rates were 55% with RFA and 76% with resection, both comparing favourably with LT. Most of these series enrolled patients with Child Pugh score A and tumours either within Milan criteria or small solitary tumours <5 cm. Table 4 summarises results of RFA for HCCs.

These data would suggest that RFA is probably as effective as both resection and LT for small HCCs in early cirrhotic patients with preserved liver function. However, more prospective randomised trials with much larger number of patients would be necessary to demonstrate the superior treatment modality. Recent trials have demonstrated slight inferiority of RFA over resection for small HCCs. The BCLC algorithm recommends RFA as the primary treatment for single small HCCs in patients that are high risk for operative management due to associated comorbidity [8]. Similar approach is advocated by both APASL and the NCCN which recommend RFA as an equivalent alternative for