Assessment of Health-related Quality of Life after Radiofrequency Ablation or Laparoscopic Surgery for Small Renal Cell Carcinoma: a Prospective Study with Medical Outcomes Study 36-Item Health Survey (SF-36)

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Objective: The purpose of this study was to assess the changes in health-related quality of life (HRQoL) during follow-up period in patients treated with percutaneous radiofrequency ablation (RFA) or laparoscopic surgery for small renal cell carcinoma.

Methods: From December 2004 through September 2006, for 37 consecutive patients, who were diagnosed with renal cell carcinoma and underwent percutaneous RFA (n = 20) or laparoscopic radical nephrectomy (n = 17) at our institution, HRQoL was evaluated prospectively using SF-36 Health survey pre- and post-operatively (1, 4, 12 and 24 weeks after surgery).

Results: Four of the eight scale scores of SF-36 were significantly lower pre-operatively in the RFA group than in the laparoscopic surgery group. The QoL scores in physical functioning, role-physical functioning and role-emotional functioning were significantly reduced one week after laparoscopic surgery. However, there was no reduction of the SF-36 QoL scores one week after operation in the RFA group. Furthermore, HRQoL scores in the RFA group showed a tendency to improve during follow-up periods.

Conclusions: This is the first study to evaluate HRQoL changes (up to 24 weeks) in patients who have undergone RFA or laparoscopic radical nephrectomy for small renal cell carcinoma. No reduction, but rather an improvement, in HRQoL was seen in the RFA group during follow-up periods. From the point of view of QoL, RFA could be a viable alternative treatment for selected patients with small renal cell carcinoma.

Key words: quality of life – renal cell carcinoma – radiofrequency ablation – laparoscopic surgery

INTRODUCTION

Radical nephrectomy with open or laparoscopic surgery to date has been the standard treatment for renal cell carcinoma (RCC). It has been reported that renal tumors below 3 cm in diameter are generally not associated with metastasis and the effect of nephron-sparing surgery is comparable to radical nephrectomy in the 10-year survival rate for those lesions (1). Recent advances in surgical techniques have led to the use of nephron-sparing, such as open or laparoscopic partial nephrectomy in selected patients with small renal tumors, even in the patients with a solitary kidney (2,3). However, more minimally invasive treatment is required for patients who are not suitable for surgery, such as those with significant risk for invasive surgery under general anesthesia.

Percutaneous radiofrequency ablation (RFA) has recently been applied as an effective and safe minimally invasive treatment option for the selected cases with RCC who have reasons to avoid invasive surgery under general anesthesia, although its long-term oncological efficacy remains to be
determined (4). However, there is no data examining long-term health-related quality of life (HRQoL) in the patients treated by RFA.

The aim of this study was to objectively evaluate the HRQoL after RFA using the validated Short Form-36 (SF-36) health survey. We also investigated the HRQoL after laparoscopic radical nephrectomy to compare with RFA.

PATIENTS AND METHODS

Between December 2004 and September 2006, 37 consecutive patients were diagnosed with T1a renal cell carcinoma and underwent percutaneous RFA (n = 20), or laparoscopic radical nephrectomy (n = 17) at our institution. RFA was performed percutaneously with local or epidural anesthesia. Pathological diagnosis was confirmed by biopsy of the tumor just after RFA. Eligibility criteria for RFA were single kidney (seven cases), renal dysfunction (three cases), risk of general anesthesia (cardiac and/or respiratory disfunction, high age; five cases), double cancer (two cases) and refusal of open or laparoscopic surgery (three cases). All patients who agreed to participate in this study received a questionnaire for self-administration from the author with an informed consent.

HRQoL was assessed with the Medical Outcomes Study 36-Item Short Form (SF-36) (5). The Japanese version of SF-36 was translated, adapted and validated by Fukuhara et al. (6). The SF-36 is an internationally validated generic HRQoL questionnaire, consisting of 36 items organized into eight scales: physical functioning (PF), role-physical functioning (RP), bodily pain (BP), general health (GH), vitality (VT), social functioning (SF), role-emotional functioning (RE) and mental health (MH). The eight scales are scored separately from 0 to 100 with higher score representing a better level of QoL (7,8). Data were collected pre-operatively (baseline) and during follow-up period at 1, 4, 12 and 24 weeks after surgery. Pre-operative SF-36 scores in Fig. 1 were calculated based on norm-based scoring (9). The means of differences of value from the baseline in SF-36 scores (Δ values) were used to assess the longitudinal changes in both groups (Fig. 2).

STATISTICAL ANALYSIS

All data in both Figs 1 and 2 were expressed as a mean scores (standard divisions are not shown). Differences between patients’ data and nation-norm data were tested with Student’s t-test. The statistical analysis of comparing each postoperative HRQoL scores with pre-operative scores in Fig. 2 was performed using the Mann–Whitney U-test. A two-tailed  P-value of less than 0.05 was considered statistically significant.

RESULTS

PARTICIPANT CHARACTERISTICS AT BASELINE

Thirty-seven consecutive patients were diagnosed with renal cell carcinoma and underwent RFA (n = 20) or laparoscopic radical nephrectomy (n = 17) at our institution. The mean age in the RFA group (62.3 years) was significantly higher than that in the laparoscopic surgery group (53.0 years; P = 0.008). The male/female ratio was 3.0 in the RFA group and 2.4 in the laparoscopic surgery group. There was no significant difference in the tumor size in both RFA and laparoscopic surgery group (2.4 ± 0.6 vs 2.7 ± 0.7 cm, P = 0.269). Body mass index is similar in both groups (P = 0.324; Table 1). No major surgical and post-operative complications, such as organ injury, ileus and severe infection, were seen in all patients.

Table 1. Patient demographics

<table>
<thead>
<tr>
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<th>RFA(n = 20)</th>
<th>Lap(n = 17)</th>
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<tbody>
<tr>
<td>Mean age (range) (years)</td>
<td>65.9 (43–85)</td>
<td>53.0* (35–75)</td>
</tr>
<tr>
<td>Female/male</td>
<td>5/15</td>
<td>5/12</td>
</tr>
<tr>
<td>Body mass index (kg/m²)</td>
<td>23.2 ± 3.1</td>
<td>21.5 ± 2.8</td>
</tr>
<tr>
<td>Tumor size (cm)</td>
<td>2.4 ± 0.6</td>
<td>2.7 ± 0.7</td>
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*P < 0.01 vs RFA
RFA, radiofrequency ablation; Lap, Laparoscopic.
Figure 2. Longitudinal changes in the mean SF-36 scores over time for patients treated with RFA or laparoscopic radical nephrectomy. Each score shows the means of differences of values from the baseline (Δ values) at each time point after surgery. *P < 0.01; **P < 0.05 vs baseline.
EVALUATION OF SF-36 HRQoL Scores

The pre-operative (baseline) SF-36 QoL scores in both RFA and laparoscopic radical nephrectomy were compared with the age-adjusted nation-norm. As shown in Fig. 1, baseline SF-36 scores on the PF (\(P = 0.008\)), RP (\(P = 0.005\)), GH (\(P = 0.032\)), SF (\(P = 0.020\)), RE (\(P = 0.009\)) and MH (\(P = 0.008\)) scales in the RFA group were significantly lower than the nation-norm. On the contrary, only the SF scale was significantly lower than the nation-norm in the Lap group (\(P = 0.034\)). When evaluating the SF-36 between the two treatment groups, the baseline of PF, RP, VT and MH were significantly lower in the RFA group (\(P = 0.008, P = 0.035, P = 0.003, P = 0.009, \) respectively). These differences between the RFA and the Lap groups could be due to the fact that the mean age in the RFA group was higher than the Lap group, and the indications of RFA included coexisting morbidities and surgical or anesthetic risk. Comparing with the baseline mean values, the scores of PF, RP and RE in the laparoscopic surgery group were significantly lower at one week after surgery (\(P = 0.006, P = 0.028 \) and \(P = 0.036\) respectively; Fig. 2). Recovery of the QoL scores in PF, RP and RE in the laparoscopic surgery group was observed at 4–12 weeks after surgery. However, no reduction of each SF-36 score was seen at one week after surgery in the RFA group. On the contrary, gradual improvement was seen in the SF-36 scores, especially in RP, MH and VT, during post-operative periods in the RFA group, although no significant difference was observed (Fig. 2). There was no significant difference in any of the categories of SF-36 between two groups during follow-up periods after surgery.

DISCUSSION

Surgery remains the standard treatment for nonmetastatic renal cell carcinoma. Laparoscopic nephrectomy can provide the patients with benefits associated with minimally invasive surgery. Several benefits of laparoscopic over open nephrectomy have also been reported, namely, reduced postoperative pain and shortened hospital stay, both of which allow the patient to return to normal activities much sooner (10).

A more minimally invasive treatment option would be required for patients with incidental small tumor, and open or laparoscopic partial nephrectomy has successfully been performed as nephron-sparing surgery (1–3).

Percutaneous RFA under local or epidural anesthesia is one of the minimally invasive treatment options, especially for the patients who are unsuitable for surgery under general anesthesia, although RFA still remains experimental because of the lack of the evidence of long-term oncological efficacy, as well as possibility of incomplete tumor cell death (11,12). Recently it has been reported that RFA is a promising technique and most successful for the treatment of small exophytic renal tumors (13). A key limitation of RFA is the size of the tumor. Successful ablation of tumors greater than 4 cm in diameter has been challenging (14–16). However, RFA can be repeated for suspicious residual tumors, resulting in successful local control over a mean follow-up period of 17 months with neither significant complications nor distant metastasis (17). It is clear that RFA is less invasive than open or laparoscopic surgery under general anesthesia, but no data has been reported about objective evaluation of post-operative HRQoL in patients after RFA. To our knowledge, this is the first study to look at the HRQoL outcomes for RFA.

The SF-36 questionnaire provides a practical method for documenting the health status of various patients (18). It contains standardized questions that are reduced to eight health status scores, offering a validated mechanism to compare the relative HRQoL for both sets of patients. Despite the limitations as a result of the small sample size and the type of survey (our study is not randomized, and the sample population is heterogeneous), our results indicated that no significant reduction of HRQoL was seen during post-operative periods, and further, HRQoL showed a tendency to improve in comparison to baseline in the RFA group. It has recently been reported that overall QoL was maintained at a relatively higher level in patients with hepatocellular carcinoma who had undergone transcatheter arterial chemoembolization followed by RFA (19). Their results supported the earlier study by Flechtner et al., who found that, when symptoms, such as pain or fatigue, occurred, their impact on the QoL of oncological patients was substantial (20). Thus fewer symptoms and complications as well as psychological relief in undergoing RFA may result in higher QoL scores. Hence we conclude that RFA improves the HRQoL of the patients with renal cell carcinoma who are unsuitable for surgical treatment, without the reduction of HRQoL during post-operative periods.

Open or laparoscopic radical nephrectomy is the standard method for renal cell carcinoma at present in terms of oncological efficacy. RFA could be recommended from the viewpoint of HRQoL, especially for the selected patients with small renal tumors, since QoL, as well as cancer control, is currently considered as the standard endpoint (21,22). Furthermore, RFA might be one of the best methods for the patients who are unsuitable for surgery under general anesthesia in preserving QoL during the treatment period. We believe that the assessment of post-operative HRQoL in the present study is useful for the decision-making process in patients with incidental small renal tumors.

CONCLUSION

This is the first study to evaluate and compare HRQoL changes in patients who have undergone RFA or laparoscopic radical nephrectomy for T1a renal cell carcinoma. Comparing the baseline scores, no reduction of HRQoL was seen, and additionally, improvement of HRQoL was observed in the RFA group during follow-up periods. From the viewpoint of QoL, our data suggest that RFA is an alternative to be considered for selected patients with small
renal tumors, although further long-term follow-up is required to determine its oncological efficacy.

**Conflict of interest statement**  
None declared.

**References**


