Survival Difference between Surgery Versus Non-Surgery for the Treatment of Hepatocellular Carcinoma Patients at Liver Centre, Malaysia

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Abstract

Hepatic resection, the only treatment that offers long term survival for patients with Hepatocellular carcinoma (HCC), have shown significant improvement in results over the past decades. The aim of the study was to compare the survival between patients receiving and not receiving surgery. A retrospective cohort study measured the survival of newly diagnosed cases of HCC patients who underwent treatment in Selayang Hospital from 1 January 2003 till 31 December 2006. Survival time was measured from the date of diagnosis until the subjects died or until the end of study period (31 December 2007). Overall survival was significantly longer in surgery group in comparison with non-surgery group with a median survival of 43 and 20 months, respectively (p<0.001). The following factors were noted to have improved survival duration with surgical resection; Child Pugh Class B patients, tumor size less or more than 4cm and number of nodules less than 3. Subgroup analysis showed improved survival duration with surgical resection among patients with Child Pugh Class B with tumor size less than 4cm or with nodule less than 3 and patients who had less than 3 nodules, even with tumor size of less or more than 4cm. Multivariate Cox Regression showed surgical intervention significantly improved survival time for overall patients (Adjusted HR: 1.5) while non-surgery improved survival in patients with tumor size less than 4cm (Adjusted HR: 0.4). Surgical resection significantly improved the survival duration in overall patients while non-surgical procedure improved survival if the tumor size was less than 4cm.

Keywords: HCC, surgery, survival, Selayang Hospital, tumor size.

Introduction

Most researchers have found out that Hepatocellular Carcinoma (HCC) was increasing in trend as well as the mortality. HCC accounts for 6% of all cancers worldwide and the fifth commonest cancer in the world. The estimated number of people who develop HCC is 564,000 cases per year worldwide (1). In Malaysia, HCC is one of the commonest malignancies with an age-standardised annual incidence of 2.8 cases per 100,000 populations (2). It accounts for 5.6% of all cancers and 8.1% of all cancer related death in this country. It is the twelfth commonest cancer in men and ranked eighteenth amongst women in Malaysia as reported by National Cancer Registries, 2002 (2).

Hepatic resection, the only treatment that offers long-term survival for patients with HCC, has shown significant improvement in results within past decade (3-6). Although few would contest this well-
established fact, the paradox is that no randomized study has clearly demonstrated the benefit of surgery especially in liver centre of Malaysia, Selayang Hospital. HCC is often associated with cirrhosis and the remnant hepatic functional reserve is not always preserved well and candidates for hepatic resection are limited (7-9). Recently, HCC have been often treated by nonsurgical therapeutic options such as transcatheter arterial chemoembolization (TACE), percutaneous ethanol injection treatment (PEI) (10), microwave coagulation therapy (MCT) (11) and percutaneous radiofrequency thermal ablation (RFA) (12).

The reported 5-year overall survival for surgery ranges from 35% to 60%, whereas the 3-year overall survival for non-surgery ranges from 13% to 26% (13-14). In view of that, we opine that surgery gives better survival for HCC patients compared to non-surgery. This study aims to give evidence based benefit of surgery in HCC patients at the liver centre of Malaysia with regard to survival. It is hypothesized that surgery gives a better survival compared to non-surgery procedures.

METHODS

Study Design

Selayang Hospital is known as liver centre of Malaysia in which start operated on 2000. Most of hepatobiliary disease was referred here for further management as well as HCC. This study was a retrospective cohort to all newly diagnosed HCC patients by CT Scan in liver centre, Malaysia (Selayang Hospital) from 1 January 2003 till 31 December 2006. All patients were followed up until achieving the primary endpoint (death) or until the end of the study as on 31 December 2007. It was universal sampling with inclusion and exclusion criteria being constructed. Inclusion criteria were based on all newly diagnosed HCC patients with CT Scan from 1 January 2003 till 31 December 2006 and exclusion criteria included multiple cancer.

Sample size of 210 was based on study by Verhoef et al (15) with power of 90%. Demographic information (age, gender, ethnic, alcohol intake, hepatitis status) and clinical variables (tumor size, number of nodules, Child Pugh Class, types of treatment) were obtained from medical records. The surgeon decided on the type of treatment that depended on findings of CT Scan in which this study only focussed on tumor size, number of nodules and Child Pugh Class. Small tumor, less nodules involved with Child Pugh class A or early B were considered as candidate for surgical resection.

Data was collected between February to April 2009 by review all the variables in medical record. The CT Scan finding was noted in view of tumor size and number of nodules involved. All the patients were followed up for their survival status by registering death and via telephone.

Statistical Analysis

All data were collected and analyzed with statistical computer software (SPSS 13.0). Categorical variables were compared using the chi-square test and overall survival analyses were carried out using the Kaplan-Meier methods. Comparisons between different groups were carried out using log rank test. Multivariate analyses for survival were carried out using Cox’s Regression model. Tests were deemed to be significant at the 0.05 levels. The survival status coded as death (1) and censored (0).

RESULTS

Demographic

A total of 210 HCC patients were evaluated from 1 January 2003 till 31 December 2006 with 123 patients dead and 87 being censored case. Most of HCC patients were aged between 40-60 years, males, Chinese ethnic, with no alcohol intake and positive hepatitis status as shown in Table 1. Out of 210 HCC patients, 114 patients underwent surgical resection and 96 patients received non-surgical procedure. The choice of surgery significantly depended on age group and alcohol status.

Majority of HCC patients were Child Pugh Class A in which 65.6% underwent surgical resection while Child Pugh Class B and Child Pugh Class C were mostly received non-surgery procedures. The difference was significant as well as in number of nodules involved. As shown in Table 2, most of HCC patients who underwent surgical resection involved nodules less than 3 (59%) compared to only 36.4% patients with nodules more than 3. Out of 210 patients, 128 patients presented with tumor size more than 4cm with 59.4% were having surgical resection. However, only 46.3% of tumor size less than 3cm underwent surgical resection.

Survival

Overall median survival time for patients having surgical resection was 43 months (95%CI: 31.7-54.3) with a 3-year and 5-year survival rate of 55% and 26%, respectively. It showed that surgery had a better survival compared to non-surgical procedures in which overall median survival time was only 20 months (95%CI: 15.5-24.4) with a 3-year and 5-year survival rate of only 23% and 13%, respectively (Table 3, Figure 1).
Table 1: Demographic of HCC patients

<table>
<thead>
<tr>
<th>Variables</th>
<th>Total (n=210)</th>
<th>Had Surgery</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Yes (n=114)</td>
<td>No (n=96)</td>
</tr>
<tr>
<td>Age</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;40 years old</td>
<td>14 (6.7%)</td>
<td>12 (85.7%)</td>
<td>2 (14.3)</td>
</tr>
<tr>
<td>40-60 years</td>
<td>112 (53.3%)</td>
<td>54 (48.2%)</td>
<td>58 (51.8%)</td>
</tr>
<tr>
<td>&gt;60 years old</td>
<td>84 (40.0%)</td>
<td>48 (57.1%)</td>
<td>36 (42.9%)</td>
</tr>
<tr>
<td>Gender</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>166 (79%)</td>
<td>86 (51.8%)</td>
<td>80 (48.2%)</td>
</tr>
<tr>
<td>Female</td>
<td>44 (21%)</td>
<td>28 (63.6%)</td>
<td>16 (36.4%)</td>
</tr>
<tr>
<td>Ethnic</td>
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<tr>
<td>Chinese</td>
<td>159 (75.7%)</td>
<td>87 (54.7%)</td>
<td>72 (45.3%)</td>
</tr>
<tr>
<td>Malay</td>
<td>42 (20%)</td>
<td>23 (54.8%)</td>
<td>19 (45.2%)</td>
</tr>
<tr>
<td>Indian</td>
<td>9 (4.3%)</td>
<td>4 (44.4%)</td>
<td>5 (55.6%)</td>
</tr>
<tr>
<td>Alcohol</td>
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</tr>
<tr>
<td>No</td>
<td>124 (59%)</td>
<td>75 (60.5%)</td>
<td>49 (39.5%)</td>
</tr>
<tr>
<td>Yes</td>
<td>86 (41%)</td>
<td>39 (45.3%)</td>
<td>47 (54.7%)</td>
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<tr>
<td>Hepatitis Status</td>
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<tr>
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<td>49 (19%)</td>
<td>25 (62.5%)</td>
<td>15 (37.5%)</td>
</tr>
<tr>
<td>Yes</td>
<td>170 (81%)</td>
<td>89 (52.4%)</td>
<td>81 (47.6%)</td>
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</table>

Table 2: Clinical variables of HCC patients

<table>
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<th>p value</th>
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</thead>
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<td></td>
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<td>No (n=96)</td>
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<tr>
<td>Child Pugh</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Class A</td>
<td>125 (59.5%)</td>
<td>82 (65.6%)</td>
<td>43 (34.4%)</td>
</tr>
<tr>
<td>Class B</td>
<td>80 (38.1%)</td>
<td>32 (40%)</td>
<td>48 (60%)</td>
</tr>
<tr>
<td>Class C</td>
<td>5 (2.4%)</td>
<td>0</td>
<td>5 (100%)</td>
</tr>
<tr>
<td>Tumor Size</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>&lt;4cm</td>
<td>82 (39%)</td>
<td>38 (46.3%)</td>
<td>44 (53.7%)</td>
</tr>
<tr>
<td>&gt;4cm</td>
<td>128 (61%)</td>
<td>76 (59.4%)</td>
<td>52 (40.6%)</td>
</tr>
<tr>
<td>Number of nodules</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;3</td>
<td>166 (79%)</td>
<td>98 (59%)</td>
<td>68 (41%)</td>
</tr>
<tr>
<td>&gt;3</td>
<td>44 (21%)</td>
<td>16 (36.4%)</td>
<td>28 (63.6%)</td>
</tr>
</tbody>
</table>

Table 3 summarized the differences between HCC patients who underwent surgical resection or not with clinical variables which played an important factor especially before deciding the types of treatment. For the surgery group, the median survival time was better with Child Pugh Class B (25 months, 95% CI: 5.8-44.2), tumor size less than 4cm (57 months, 95% CI: 44.4-69.6), tumor size more than 4cm (21 months,
Table 3: Univariate Analysis of Survival

<table>
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<tr>
<th>Variables</th>
<th>n</th>
<th>Died</th>
<th>Median(months)</th>
<th>95% CI</th>
<th>1 year</th>
<th>3 year</th>
<th>5 year</th>
<th>p value</th>
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<td><strong>Overall</strong></td>
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<td>Surgery</td>
<td>114</td>
<td>54</td>
<td>43</td>
<td>31.7-54.3</td>
<td>74</td>
<td>55</td>
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<td>&lt;0.0001</td>
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<tr>
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<td>96</td>
<td>69</td>
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<td>61</td>
<td>23</td>
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<td><strong>Child Pugh Class A</strong></td>
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<td></td>
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<td></td>
</tr>
<tr>
<td>Surgery</td>
<td>82</td>
<td>34</td>
<td>57</td>
<td>39.2-74.7</td>
<td>75</td>
<td>61</td>
<td>35</td>
<td>0.22</td>
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<tr>
<td>No Surgery</td>
<td>43</td>
<td>22</td>
<td>26</td>
<td>19.9-32.0</td>
<td>86</td>
<td>37</td>
<td>37</td>
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<td><strong>Child Pugh Class B</strong></td>
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<tr>
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<td>25</td>
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<td>65</td>
<td>47</td>
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<td><strong>HCC &lt;4cm</strong></td>
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<tr>
<td>Surgery</td>
<td>37</td>
<td>11</td>
<td>57</td>
<td>44.4-69.6</td>
<td>88</td>
<td>84</td>
<td>30</td>
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<tr>
<td>No Surgery</td>
<td>41</td>
<td>24</td>
<td>25</td>
<td>17.7-32.3</td>
<td>73</td>
<td>38</td>
<td>25</td>
<td></td>
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<tr>
<td><strong>HCC &gt;4cm</strong></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Surgery</td>
<td>77</td>
<td>43</td>
<td>21</td>
<td>11.4-30.6</td>
<td>66</td>
<td>39</td>
<td>24</td>
<td>0.005</td>
</tr>
<tr>
<td>No Surgery</td>
<td>55</td>
<td>45</td>
<td>15</td>
<td>9.6-18.3</td>
<td>48</td>
<td>0.7</td>
<td>0.7</td>
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<tr>
<td><strong>Nodule &lt;3</strong></td>
<td></td>
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<td></td>
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<tr>
<td>Surgery</td>
<td>98</td>
<td>40</td>
<td>57</td>
<td>38.9-75.1</td>
<td>76</td>
<td>62</td>
<td>34</td>
<td>&lt;0.005</td>
</tr>
<tr>
<td>No Surgery</td>
<td>68</td>
<td>46</td>
<td>21</td>
<td>15.1-26.8</td>
<td>69</td>
<td>27</td>
<td>13</td>
<td></td>
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<tr>
<td><strong>Nodule &gt;3</strong></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Surgery</td>
<td>16</td>
<td>14</td>
<td>12</td>
<td>2.5-21.5</td>
<td>56</td>
<td>19</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No Surgery</td>
<td>28</td>
<td>23</td>
<td>12</td>
<td>9.5-14.5</td>
<td>60</td>
<td>15</td>
<td>13</td>
<td>0.632</td>
</tr>
</tbody>
</table>

Figure 1: Kaplan-Meier survival estimates by treatment
Survival difference between surgery and non-surgery of HCC  

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95% CI: 11.4-30.6) and number of nodules involved less than 3 (57 months, 95% CI: 38.9-75.1)

Subgroup analysis of survival showed that HCC patients of Child Pugh Class B with tumor size less than 4cm or nodule less than 3, the surgical approach gave benefit of survival as well as in group of nodule less than 3 with tumor size less or more than 4cm (Table 4).

Table 4 summarized the prediction model in survival of HCC patients according to overall patients and tumor size. Negative prognostic factors for overall HCC patients were non surgery (aHR: 1.5), Child Pugh Class B(aHR:2.0), Child Pugh Class C(aHR: 3.0) and tumor size more or same than 4cm(aHR:2.3). In view of HCC patients with tumor size less than 4cm, the non surgery procedure gave benefit of HCC patients survival (aHR: 0.4) while for tumor size more or same with 4cm, both of procedure did not benefit off HCC patients survival.

Discussion

Nowadays, the management of HCC offers many treatment options in relation to the tumor stage (16). Among these, liver transplantation has the best results in terms of overall survival (17). However, this procedure was not performed in Malaysia because of organ shortage. Liver surgery for HCC has improved its results in patients during the last decades with mortality lower than 5% in most series (18). The availability of non-surgery approach makes treatment options wider and some will benefit on survival of HCC patients.

Surgical resection was considered the treatment of choice for patients with absent of alcohol intake, Child Pugh Class A and number of nodules less than 3. The surgeon may have their own reason before deciding the types of treatment in which majority study agreed that Child Pugh Class A and less nodules involved should be offered for surgical resection. The absence of alcohol intake in HCC patients will clarifies the liver status, should it be good with no cirrhosis. Therefore surgical may not be offer to this patients and non-surgery treatment will be the choice.

As agreed upon by many researchers (19, 20), surgery gives a better survival compared to non-surgery procedure with median 43 months and 20 months, respectively. Few studies did not opine (21, 22) in which the sample size was too small, compared to this study which agreed with surgery give a better survival. Surgical resection will remove the entire cancer cell while non-surgery procedure needs a repetition of procedure. The time taken longer in non-surgery procedure explained the survival duration become shorter besides of other factors such as cirrhosis or late stage of cancer.

There was no difference of survival in Child Pugh Class A in view of treatment. However, for Child Pugh Class B, surgery gave a prolonged survival with median 20 months. Tumor size and number of nodules involved, plays an important deciding factor of types of treatment. As we observed in this study, it was shown that patients who had tumor size of less or more than 4cm and nodules involved less than 3, had a good survival with surgery procedure (23). It explained that multiple nodules involved will make surgery difficult and non-surgery approach will benefit the survival. However, the difference was not significant.

Subgroup analysis showed that HCC patients of Child Pugh Class B with tumor size less than 4cm or nodules less than 3 gave a better survival with surgical resection. Good clinical stage contributed to a better survival with surgery as shown by Ari et al (2000) (13). The size does not matter in survival of HCC patients but with fewer nodules involvement, there was a longer duration of survival (24).

The prediction model after controlling other factors proved that for overall HCC patients, surgery gave longer duration of survival by 1.5 times compared to non-surgery procedure (25). If patients had tumor size less than 4cm, non-surgery procedure produced benefit of survival by 0.4 times compared to surgery in univariate and multivariate analysis. However, for patients who had tumor size more or same than 4cm, the comparison of treatment did not reach statistical significance in multivariate analysis.

Besides surgery, the prediction model for overall patients also showed that good clinical stage of HCC (Child Pugh Class A, small tumor, less nodules involved) gives a better prognostic factor as majority of studies reported the same findings. There is no argument about this prediction model as most studies in the past decades and current study agreed on this aspect (20, 21, 25). Therefore, in Malaysian people with HCC, we also may apply this prediction towards a better survival. If the patients comes with tumor size less than 4cm, the non-surgery procedure and Child Pugh Class A will give improvement in duration of survival as we observe in Table 5. However, if tumor size is more or equal to 4cm, the choice of surgery or non-surgery will not make difference in survival outcome but Child Pugh Class A and involvement of less nodules will give a better survival.
Table 4: Subgroup analysis of HCC patient’s survival

<table>
<thead>
<tr>
<th>Variables</th>
<th>n</th>
<th>Median(months)</th>
<th>95% CI</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Child Pugh Class A &amp; HCC &lt;4cm</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Surgery</td>
<td>26</td>
<td>57</td>
<td>35.16-78.84</td>
<td>0.506</td>
</tr>
<tr>
<td>No Surgery</td>
<td>21</td>
<td>44* means</td>
<td>34.80-53.95</td>
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</tr>
<tr>
<td>Child Pugh Class A &amp; HCC ≥4cm</td>
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<td></td>
<td></td>
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</tr>
<tr>
<td>Surgery</td>
<td>56</td>
<td>27</td>
<td>0.09-53.90</td>
<td>0.074</td>
</tr>
<tr>
<td>No Surgery</td>
<td>22</td>
<td>20</td>
<td>13.52-26.48</td>
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<tr>
<td>Child Pugh Class B &amp; HCC &lt;4cm</td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Surgery</td>
<td>11</td>
<td>57</td>
<td></td>
<td>0.005</td>
</tr>
<tr>
<td>No Surgery</td>
<td>18</td>
<td>14</td>
<td>10.16-17.83</td>
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<tr>
<td>Child Pugh Class B &amp; HCC ≥4cm</td>
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<td>Surgery</td>
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<td>4.27-23.73</td>
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<td>7.71-16.30</td>
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<td>Surgery</td>
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<td>58</td>
<td>31.08-84.91</td>
<td>0.261</td>
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<td>Surgery</td>
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<td>12</td>
<td>0.0-39.85</td>
<td>0.509</td>
</tr>
<tr>
<td>No Surgery</td>
<td>17</td>
<td>12</td>
<td>10.11-13.89</td>
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<tr>
<td>HCC &lt;4cm &amp; Nodule &lt;3</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Surgery</td>
<td>34</td>
<td>57</td>
<td>35.31-78.70</td>
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</tr>
<tr>
<td>No Surgery</td>
<td>32</td>
<td>29</td>
<td>22.08-35.91</td>
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</tr>
<tr>
<td>HCC &lt;4cm &amp; Nodule ≥3</td>
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<td></td>
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<tr>
<td>Surgery</td>
<td>3</td>
<td>57</td>
<td>6.76-17.24</td>
<td>0.298</td>
</tr>
<tr>
<td>No Surgery</td>
<td>9</td>
<td>12</td>
<td>8.36-23.64</td>
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<tr>
<td>HCC ≥4cm &amp; Nodule &lt;3</td>
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<td></td>
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<tr>
<td>Surgery</td>
<td>64</td>
<td>27</td>
<td>0.0-55.72</td>
<td>0.002</td>
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<tr>
<td>No Surgery</td>
<td>36</td>
<td>16</td>
<td>8.36-23.64</td>
<td></td>
</tr>
<tr>
<td>HCC ≥4cm &amp; Nodule ≥3</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Surgery</td>
<td>13</td>
<td>5</td>
<td>3.33-6.67</td>
<td>0.369</td>
</tr>
<tr>
<td>No Surgery</td>
<td>19</td>
<td>12</td>
<td>7.7-16.27</td>
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</tr>
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</table>
Table 5: Predictor model for HCC patient’s survival

<table>
<thead>
<tr>
<th>Variables</th>
<th>Simple Cox Regression</th>
<th>Multiple Cox Regression*</th>
</tr>
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<tbody>
<tr>
<td></td>
<td>β 95%CI Crude HR</td>
<td>β 95%CI Adjusted HR</td>
</tr>
<tr>
<td>Overall</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Non-Surgery vs Surgery(96 vs 114)</td>
<td>-0.65 0.36-0.75 0.52</td>
<td>0.4 1.03-2.25 1.52</td>
</tr>
<tr>
<td>Child B vs A(80 vs 125)</td>
<td>0.84 1.61-3.33 2.31</td>
<td>0.7 1.30-2.82 1.91</td>
</tr>
<tr>
<td>Child C vs A(5 vs 125)</td>
<td>1.46 1.73-10.85 4.33</td>
<td>1.1 1.19-7.94 3.08</td>
</tr>
<tr>
<td>HCC &lt;4cm vs HCC ≥4cm(128 vs 82)</td>
<td>0.81 1.52-3.33 2.25</td>
<td>0.8 1.52-3.36 2.26</td>
</tr>
<tr>
<td>Nodule &lt; 3 vs Nodule ≥ 3(44 vs 166)</td>
<td>0.84 1.57-3.40 2.31</td>
<td>0.4 0.97-2.27 1.49</td>
</tr>
<tr>
<td>HCC &lt; 4cm(n=78)</td>
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<td></td>
</tr>
<tr>
<td>Non-Surgery vs Surgery(37 vs 41)</td>
<td>-1.06 0.16-0.73 0.35</td>
<td>-0.9 0.18-0.83 0.39</td>
</tr>
<tr>
<td>Child B vs A(29 vs 47)</td>
<td>-2.19 0.02-0.51 0.11</td>
<td>1.1 1.48-6.33 3.06</td>
</tr>
<tr>
<td>Child C vs A(2 vs 47)</td>
<td>-0.02 0.08-1.57 0.36</td>
<td>1.8 1.27-27.79 5.96</td>
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<tr>
<td>Nodule &lt; 3 vs Nodule ≥ 3(66 vs 16)</td>
<td>-0.92 0.18-0.89 0.4</td>
<td>0.6 0.75-4.64 1.87</td>
</tr>
<tr>
<td>HCC ≥ 4cm(n=132)</td>
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<td></td>
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<tr>
<td>Non-Surgery vs Surgery(77 vs 55)</td>
<td>0.57 1.17-2.69 1.78</td>
<td>0.3 0.81-2.07 1.3</td>
</tr>
<tr>
<td>Child B vs A(51 vs 78)</td>
<td>0.68 1.29-3.02 1.97</td>
<td>0.5 1.09-2.68 1.71</td>
</tr>
<tr>
<td>Child C vs A(3 vs 78)</td>
<td>1.12 0.94-9.95 3.06</td>
<td>1.2 1.01-10.74 3.3</td>
</tr>
<tr>
<td>Nodule &lt; 3 vs Nodule ≥ 3(100 vs 32)</td>
<td>-0.65 1.23-2.97 1.92</td>
<td>0.5 1.02-2.63 1.64</td>
</tr>
</tbody>
</table>

*Backward stepwise Cox proportional hazards regression applied. Log-minus-log plot and hazard function plot were applied to check the model assumption.

The choice of treatment depends on the surgeon expectation of the variety. Therefore, it is our limitation in looking into the different type of treatment and the survival of HCC patients. The choice of treatment sometimes not only depends on the tumor size, nodules involved or Child Pugh Class only but other factors such as co-morbidity, cirrhosis, fibrosis, vascular invasion which contributes to poor survival or when the surgical procedure cannot be performed. However, this study findings will give a view of Malaysian prognostic factor of HCC patients and as a pilot study for future research in survival of HCC patients as not much study done on survival.

As in conclusion, surgery will remain a best option in HCC patients for a better survival but for small HCC, non-surgery approach also will benefit on the survival. Therefore, an expert opinion from the Surgeon whether to perform surgery or not, should consider the prediction model for a longer survival in HCC patients. Keeping in mind, the public health view, the 3-step prevention should be more emphasized in view of education, promotion, early diagnosis, early treatment as early stage of HCC will improve the survival. These findings will help the Surgeon to choose the type of treatment depending on Child Pugh Class, tumor size and number of nodules involved. The effort should be made to ensure that every patient receives an appropriate treatment.

References


3. The Liver Cancer Study Group of Japan. Predictive factors for long term prognosis after partial hepatectomy for patients with


23. Jerome HL, Pauline WC, Steven MA, Ronald WB, & Clifford YK Surgery for Hepatocellular
