The effect of cytoreductive partial nephrectomy in elderly patients with metastatic renal cell carcinoma: a systematic review

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Abstract

Background To explore the survival value of cytoreductive partial nephrectomy (cPN) in elderly metastatic renal cell carcinoma (EmRCC). Methods RCC patients aged ≥65 years from 2010 to 2015 in The Surveillance, Epidemiology and End Result database (SEER) were analyzed using Kaplan-Meier (K-M) method and multivariate COX analysis. Propensity score matching (PSM) was performed to balance effects of confounding factors such as general features and pathological features. We were committed to study the long-term survival advantages of cPN patients, explore the appropriate population of cPN, and try to establish a Nomogram model to predict individual survival. Results In EmRCC patients, especially in male patients with tumors size ≤7cm, N0 stage, or isolated metastases, cPN brought a better survival than cytoreductive radical nephrectomy (cRN). Tumor size and N stage were independent risk factors affecting the survival of cPN patients, cPN in patients with tumor size >7cm or N1 stage may present a higher risk of death. Conclusions The implementation of cPN in EmRCC patients who meet specific clinical characteristics like tumors size ≤7cm, N0 stage, or isolated metastases seems to help improve the tumor outcomes.

Background

With the aggravation of global aging, the proportion of the elderly in renal cell carcinoma (RCC) patients is increasing [1]. Authoritative guide provides a lot of guidelines for the management of RCC patients, but the treatment recommendations for elderly patients are often the same as for young people, ignoring the elderly with low glomerular filtration rate baseline, high proportion of cardiovascular disease and low drug toxicity tolerance. It needs to strengthen the individualized guidance for the management of cancer in this part of the population.
The release of CARMENA trial results challenged the role of cytoreductive nephrectomy (CN) in metastatic RCC (mRCC) [2]. But it is undeniable that the trial has been criticized for some selection bias with slow and incomplete recruitment and incorporating too many high-transfer cases and patients with poor prognosis [3,4]. Therefore, the trial could not reduce the value of CN in mRCC patients with intermediate-risk disease [5,6].

Cytoreductive radical nephrectomy (cRN) and cytoreductive partial nephrectomy (cPN) are two major surgical methods of CN, and the application of cPN in mRCC has been increasing year by year [7]. It is generally believed that compared with cRN, cPN can not only reduce tumor burden equally [8], but also better protect renal function, reduce the occurrence of long-term cardiovascular diseases, and increase patients' tolerance to systemic therapy drugs, which is conducive to long-term survival [9,10]. However, the risk of increased perioperative complications and prolonged operative time is equally worrying. As a result, elderly metastatic renal cancer (EmRCC) is often considered to have worse long-term survival and lower resistance to surgical risks, so it is directly abandoned for surgery or rarely considered for cPN treatment [11].

Up to now, there is a lack of systematic prospective studies on the treatment of EmRCC population, and the retrospective analysis of a single center often has the defect of a small number of cases [12]. Based on the extensive representation of SEER database, this study attempts to explore the value of cPN in EmRCC from the perspective of population epidemiology beyond clinical trials.

Methods

Patients aged ≥65 was defined as the elderly [1,12], and EmRCC population was searched from the Surveillance, Epidemiology and End Result database (SEER) between 2010-2015, eliminating patients diagnosed of “autopsy” or “death certificate”, “source information unknown” and “incomplete follow-up information”.

3
Cell classification was performed according to Fuhrman grade and TNM staging was conducted according to AJCC 2007th edition. Histologic type was divided into two categories: “clear cell renal cell carcinoma (ccRCC)” and “other”. According to the metastasis of liver, lung, bone and brain, metastasis sites were divided into two parts: “isolated site group” and “multiple sides group”.

With the help of IBM SPSS Statistics 24.0 software, the Kaplan-Meier (K-M) method was applied to perform single-factor survival analysis of variables, and screened variables with the $P<0.05$ into Cox regression model to evaluate independent risk factors for overall survival (OS). Propensity score matching (PSM) was used to balance effects of confounding factors such as general features and pathological features, and to compare the difference of OS between cPN and cRN [13]. The Nomogram model was constructed using the R language (version 3.5.1; R Foundation; Foreign package, survival package and rms package) to estimate the survival rate and internal verification was conducted [14]. $P<0.05$ was considered statistically significant.

Results

In total, 6105 elderly patients with mRCC who met the inclusion criteria in SEER database were analyzed from 2010 to 2015. Only 1542 (25.3 %) patients received surgical treatment. Of them, 278 patients with “bilateral tumor, tumor biopsy or focal lesion only, and unclear CN mode” were excluded, and 1264 patients who underwent CN (78 cases of cPN and 1186 cases of cRN) were included in the study. The baselines of cPN and cRN were significantly different in tumor size and T stage. After propensity score matching analysis (PSM, matching tolerance 0.02), the remaining 59 cases of cPN and 149 cases of cRN matched well with clinicopathological features. The demographics characteristics of the study were shown in Table 1.

Among EmRCC cohort, the media survival time (MST) of patients undergoing CN was 19.00
months (95%CI, 16.83-21.17), which was significantly better than that of patients who were not treated with surgery (MST, 3.00 months; 95%CI, 2.81-3.19) (P<0.001). Patients received cRN was associated with worse survival than those having cPN (cPN: MST, 32.00months; 95%CI, 8.11-55.89 vs cRN: MST, 19.00months; 95%CI, 16.66-21.34; P=0.011). After PSM, the survival advantage of patients having cPN was still obvious (cPN: MST, 32.00months; 95%CI, 12.58-51.42 vs cRN: MST, 19.00months; 95%CI, 13.05-24.95; P=0.042). (Figure 1)

Analysis of each subgroup showed that OS and CSS of cPN were superior to cRN in male patients with tumor size ≤7cm, N0 stage or isolated metastasis, and the difference was statistically significant. (Table 2) The effect of cPN in N1 stage patients was worse than that of cRN (cPN: MST, 7.17 months; 95%CI, 3.80-10.53 vs cRN: MST, 16.32 months; 95%CI, 13.90-18.75; P=0.026). (Figure 2)

Variables with P<0.05 in K-M analysis were selected into COX multivariate analysis (Follow LR method), and we found that tumor size and N stage were independent risk factors affecting the survival of EmRCC patients undergoing cPN. (Table 3) The risk of death in patients with tumor >7 cm was 2.54 times that of patients with tumor ≤7 cm (95%CI, 1.25-5.13; P=0.010). The risk of death in N1 patients was 5.48 times that of N0 patients (95%CI, 2.46-12.22; P<0.001). (Figure 3)

On Cox regression model, gender, T stage, N stage, CN and distant metastasis were independent predictors of OS affecting EmRCC patients. The Nomogram model was established based on statistical results and clinical experience to predict the 1-year, 2-year and 3-year estimated survival rate of EmRCC patients. The c-index of the model was 0.647 (95%CI, 0.637-0.657; P<0.001). (Figure 4)

Discussion

With the progress of global aging, the number of elderly patients in metastatic renal
cancer is increasing. Older patients have many characteristics of their own, such as visceral reserve dysfunction, more toxic side effects and poorer tolerance on drug treatment, as well as shorter natural lifespan, seemingly unable to enjoy the benefits of long-term survival of cPN [1]. Although the authoritative guidelines have various norms for the treatment of RCC, they often confuse the elderly with the young patients and lack more personalized guidance for the elderly. It is urgent to increase the research on this part of patients.

The release of the CARMENA trial has weakened the value of CN in the age of vascular targeted therapy [2]. However, due to the limitations of patient selection bias in this trial, and considering that some patients lack a good economic basis to bear the high cost of vase-targeted drugs, CN still has a unique position in the treatment of metastatic renal cancer [3-5]. In recent years, cPN has replaced cRN in the treatment of RCC with tumor size ≤4cm, becoming the gold standard for surgical treatment. Even in tumor size >7cm of RCC, some scholars have tried PN to achieve clinical efficacy comparable to RN [15]. Due to poorer baseline kidney function in elderly patients, PN can lead to better long-term renal function protection [9,16], which not only reduce the risk of chronic kidney disease progression and the incidence of cardiovascular events [8,17], but also enable patients to better tolerate the toxic side effects of systemic drug therapy such as vascular targeted therapy, immunotherapy, and thus may have better prospects in metastatic RCC [18].

Our study found that the long-term survival of surgical patients in EmRCC was better than that of non-surgical patients, which was consistent with other research results [19-21]. Moreover, all the subjects were EmRCC patients who underwent CN in the database, which greatly reduced the selection bias of retrospective data and increased the accuracy of conclusions. Whether before or after PSM pairing, the OS of patients undergoing cPN has certain advantages over those undergoing cRN, suggesting that we should pay attention
to the selection of surgical methods when EmRCC patients are treated with CN. Disputes over cPN procedures often lie in complications and duration of surgery, which may be one of reasons for the lower proportion of cPN in EmRCC patients. However, with improvements of anesthesia, surgical techniques and equipment, the gap between the age and surgical methods of complications has become smaller [22]. CPN treatment does not increase the incidence and mortality of perioperative complications in elderly RCC patients [16,23,24].

Further subgroup analysis showed that in male patients with EmRCC, tumor size \( \leq 7 \) cm, N0 stage and isolated distant metastasis, cPN would brought a more significant survival advantage than cRN. For EmRCC patients with the above clinical characteristics, more attention should be paid to cPN rather than just considering cRN for the purpose of reducing tumor burden, improving clinical symptoms and prolonging long-term survival. This is the most recent conclusion to our knowledge about the therapeutic value of cPN in EmRCC.

COX multivariate analysis of patients undergoing cPN indicated that the risk of death in patients with tumor >7 cm was 2.54 times that of patients with tumor \( \leq 7 \) cm and the risk of death in N1 patients was 5.48 times that of N0 patients. This suggests that cPN is more desirable in EmRCC patients with a small primary tumor volume or N0 stage.

The constructed Nomogram model has a certain predictive value for the survival rate of EmRCC patients. Although the internal validation C-index was not perfect, the model also showed that cPN treatment in specific EmRCC patients (male, T1, N0, isolated metastases) may have superior 1-, 2-, and 3-year survival rate. In the EmRCC population that conforms the above clinical feature, cPN therapy should be fully considered in patient with a good physical function.

Admittedly, retrospective analysis based on SEER database has certain limitations. For
example, there is a lack of physical function scores such as Karnofsky score or ECOG score, as well as information related to simultaneous or subsequent targeted vascular therapy and immunotherapy, which makes our conclusion biased to some extent. However, due to the lack of large-scale prospective studies for CN treatment in EmRCC population, and our research is based on a large epidemiological database, the conclusions are still of special value, which can assist in the development of clinical practice, research trials and guidelines for this special population.

Conclusions

In our study, we found that: 1. In EmRCC, the MST of cPN seems to be superior to cRN, especially in males, tumor size ≤7cm, N0 stage or isolated metastasis. 2. Tumor size and N stage were independent risk factors affecting the survival of patients who underwent cPN, while cPN in patients with tumor size >7cm or N1 stage may bring a higher risk.

Abbreviations

CKD: Chronic Kidney Disease
CN: Cytoreductive Nephrectomy
cPN: cytoreductive Partial Nephrectomy
cRN: cytoreductive Radical Nephrectomy
ccRCC: clear cell Renal Cell Carcinoma
CSS: Cancer-Specific Survival
EmRCC: Elderly metastatic Renal Cell Carcinoma
HR: Hazard Ratios
K-M: Kaplan-Meier
mRCC: metastatic Renal Cell Carcinoma
MST: Media Survival Time
OS: Overall Survival

PSM: Propensity Score Matching

SEER: The Surveillance, Epidemiology and End Results

95% CI: 95% Confidence Interval

Declarations

I Ethics approval and consent to participate: All procedures performed in studies involving human participants conform to the standards of the institutional and national ethics committees, as well as to the 1964 Helsinki Declaration and subsequent relevant ethics. We obtained the authorization to access the SEER database, with the number 14260-Nov2016. The SEER database does not reveal patient privacy, so patient informed consent is not required.

I Consent for publication: Not applicable.

I Availability of data and materials: The datasets generated and analysed during the current study are available in the [SEER] repository, [http://seer.cancer.gov/]

I Competing interests: The authors declare that they have no competing interests.

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I Authors’ contributions:

WZ: Formal analysis, project administration, writing-original draft, and writing-review and editing.

JC: Designed the epidemiological investigation, formal analysis.

YL: Conceptualization, supervision, data curation and validation.

XS: Data curation, methodology, software, project administration, and writing-review and editing.

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Tables

Table 1. The portion and distribution of clinical features of elderly metastatic renal cell carcinoma patients before and after propensity matching

| Variable          | Before PSM a n=1264 | After PSM n=208 |
|-------------------|---------------------|-----------------|
|                   | PN b (n=78, %)      | RN c (n=1186, %)| p-value | PN (n=59, %) | RN (n=149, %) | p-value |
| Age at diagnosis, years | 71.59 ± 5.22 | 72.11 ± 5.57 | 0.425 | 71.39 ± 5.04 | 72.34 ± 5.93 | 0.278 |
| Race              | 79%                 | 635%            | 0.264 | 610%         | 42.7%        | 0.067 |
| White             | 6887.2%             | 104387.9%       | 0.325 | 5186.4%      | 13288.6%     | 0.411 |
| Other d           | 33.8%               | 806.7%          |        | 23.4%        | 138.7%       |        |
| Gender            | Male                | 5671.8%         | 78466.1% | 4372.9%     | 9865.8%      |        |
|                   | Female              | 2228.2%         | 40233.9% | 1627.1%     | 5134.2%      |        |
| Marital status    | 0.786               | 0.354           |        |            |              |        |
|               | Single   | Married | Unknown | Insurance status | Insured | Uninsured | Unknown | Site | Right | Left | Unknown | Histologic Type | Tumor Size, cm | Fuhrman Grade | T Stage |
|---------------|----------|---------|---------|-----------------|---------|-----------|---------|------|-------|------|---------|----------------|----------------|--------------|--------|
| Single        | 2025.6%  | 34629.2%| 1423.7% | 4932.9%         | 1.000   |           |        |      |       |      |         |                |                |              |        |
| Married       | 5671.8%  | 79967.4%| 4372.9% | 9765.1%         | 1.000   |           |        |      |       |      |         |                |                |              |        |
| Unknown       | 22.6%    | 413.5%  | 23.4%   | 32.0%           | 1.000   |           |        |      |       |      |         |                |                |              |        |
| Insurance     |          |         |         |                 |         |           |        |      |       |      |         |                |                |              |        |
| status        |          |         |         |                 |         |           |        |      |       |      |         |                |                |              |        |
| Insured       | 78100.0% | 116698.3%| 59100.0% | 14798.7%        |         |           |        |      |       |      |         |                |                |              |        |
| Uninsured     | 0.0%     | 80.7%   | 0.0%    | 10.7%           |         |           |        |      |       |      |         |                |                |              |        |
| Unknown       | 0.0%     | 121.0%  | 0.0%    | 10.7%           |         |           |        |      |       |      |         |                |                |              |        |
| Site          |          |         |         |                 |         |           |        |      |       |      |         |                | 1.000          | 0.645        |        |
| Right         | 3646.2%  | 55146.5%| 2745.8% | 7546.2%         |         |           |        |      |       |      |         |                |                |              |        |
| Left          | 4253.8%  | 63453.5%| 3254.2% | 7449.7%         |         |           |        |      |       |      |         |                |                |              |        |
| Unknown       | 0.0%     | 10.1%   | 0.0%    | 0.0%            |         |           |        |      |       |      |         |                |                |              |        |
| Histologic    |          |         |         |                 | 0.055   |           |        |      |       |      |         |                |                |              |        |
| Type          |          |         |         |                 | 0.417   |           |        |      |       |      |         |                |                |              |        |
| ccRCC         | 6178.2%  | 89475.4%| 4779.7% | 11275.2%        |         |           |        |      |       |      |         |                |                |              |        |
| pRCC          | 1114.1%  | 726.1%  | 711.9%  | 128.1%          |         |           |        |      |       |      |         |                |                |              |        |
| chRCC         | 0.0%     | 141.2%  | 0.0%    | 0.0%            |         |           |        |      |       |      |         |                |                |              |        |
| CDC           | 0.0%     | 100.8%  | 0.0%    | 10.7%           |         |           |        |      |       |      |         |                |                |              |        |
| SRCC          | 33.8%    | 726.1%  | 35.1%   | 85.4%           |         |           |        |      |       |      |         |                |                |              |        |
| Other         | 33.8%    | 12410.5%| 23.4%   | 1610.7%         |         |           |        |      |       |      |         |                |                |              |        |
| Tumor Size,cm |          |         |         | < 0.001         | 0.431   |           |        |      |       |      |         |                |                |              |        |
| ≤4            | 2937.2%  | 746.2%  | 1322.0% | 2013.4%         |         |           |        |      |       |      |         |                |                |              |        |
| 4-7           | 2329.5%  | 31926.9%| 2033.9% | 6140.9%         |         |           |        |      |       |      |         |                |                |              |        |
| > 7           | 2532.1%  | 78165.9%| 2542.4% | 6543.6%         |         |           |        |      |       |      |         |                |                |              |        |
| Unknown       | 11.3%    | 121.0%  | 11.7%   | 32.0%           |         |           |        |      |       |      |         |                |                |              |        |
| Fuhrman Grade |          |         |         | 0.607           | 0.925   |           |        |      |       |      |         |                |                |              |        |
| Grade 1       | 11.3%    | 131.1%  | 11.7%   | 32.0%           |         |           |        |      |       |      |         |                |                |              |        |
| Grade 2       | 1823.1%  | 20717.5%| 1322.0% | 3020.1%         |         |           |        |      |       |      |         |                |                |              |        |
| Grade 3       | 2532.1%  | 41735.2%| 1932.2% | 5637.6%         |         |           |        |      |       |      |         |                |                |              |        |
| Grade 4       | 2228.2%  | 38732.6%| 1932.2% | 4026.8%         |         |           |        |      |       |      |         |                |                |              |        |
| Unknown       | 1215.4%  | 16213.7%| 711.9%  | 2013.4%         |         |           |        |      |       |      |         |                |                |              |        |
| T Stage       |          |         |         | < 0.001         | 0.090   |           |        |      |       |      |         |                |                |              |        |
| T1            | 4152.6%  | 14712.4%| 2237.3% | 4630.9%         |         |           |        |      |       |      |         |                |                |              |        |
| T2            | 911.5%   | 13411.3%| 915.3%  | 149.4%          |         |           |        |      |       |      |         |                |                |              |        |
| T3            | 2025.6%  | 77265.1%| 2033.9% | 7751.7%         |         |           |        |      |       |      |         |                |                |              |        |
| T4            | 810.3%   | 12510.5%| 813.6%  | 106.7%          |         |           |        |      |       |      |         |                |                |              |        |
Unknown 00.0%  80.7%  00.0%  21.3% 
N Stage 0.115  1.000 
N0 6380.8%  84070.8%  4779.7%  11677.9% 
N1 1215.4%  30225.5%  1016.9%  2718.1% 
Unknown 33.8%  443.7%  23.4%  64.0% 
Metastasis Sites 0.516  0.406 
One Site 6583.3%  96781.5%  4983.1%  11879.2% 
Two Sites 1012.8%  19116.1%  711.9%  2718.1% 
≥Three Sites 33.8%  282.4%  35.1%  42.7% 

Table 2. Survival comparison of PN and RN among different subgroups of elderly metastatic renal cell carcinoma.

\(^{a}\) PSM: Propensity Score Matching; \(^{b}\) PN: Partial Nephrectomy; \(^{c}\) RN: Radical Nephrectomy; \(^{d}\) Other: American Indian/AK Native, Asian/Pacific Islander and other races; \(^{e}\) Single: Never married, Domestic Partner, Widowed, Separated or Divorced; \(^{f}\) ccRCC: Clear Cell Renal Cell Carcinoma; \(^{g}\) pRCC: Papillary Renal Cell Carcinoma; \(^{h}\) chRCC: Chromophobe Renal Cell Carcinoma; \(^{i}\) CDC: Collecting Duct Carcinoma; \(^{j}\) sRCC: Sarcomotoid Renal Cell Carcinoma.
| Variable                    | Mean Survival Time of OS<sup>a</sup>, months (95%CI)<sup>c</sup> | P-value | Mean Survival Time of CSS<sup>b</sup>, months (95%CI)<sup>c</sup> | P-value |
|-----------------------------|---------------------------------------------------------------|---------|---------------------------------------------------------------|---------|
|                             | PN<sup>d</sup> (n=78)                                         |         | RN<sup>e</sup> (n=1186)                                       |         |
|                             |                                                               |         |                                                               |         |
| Gender                      |                                                               |         |                                                               |         |
| Male                        | 35.3027-60-42.98                                             | 0.03    | 42.2934-51-50.07                                              | 0.036   |
| Female                      | 30.1319-70-40.55                                             | 0.26    | 33.7823-18-44.38                                              | 0.351   |
| Histologic Type             |                                                               |         |                                                               |         |
| ccRCC<sup>f</sup>           | 36.7729-30-44.25                                             | 0.05    | 41.3733-37-48.97                                              | 0.129   |
| Other                       | 27.3113-53-41.09                                             | 0.06    | 39.5424-41-54.67                                              | 0.038   |
| Tumor Size, cm              |                                                               |         |                                                               |         |
| ≤7                          | 43.3935-37-51.42                                             | 0.00    | 48.3440-57-56.12                                              | 0.006   |
| > 7                         | 18.9510-87-27.02                                             | 0.41    | 26.0035-90-56.87                                              | 0.606   |
| Grade                       |                                                               |         |                                                               |         |
| G1-2                        | 42.0430-43-53.66                                             | 0.22    | 52.9843-80-62.16                                              | 0.067   |
| G3-4                        | 31.9323-19-40.68                                             | 0.06    | 37.6628-45-46.87                                              | 0.085   |
| T Stage                     |                                                               |         |                                                               |         |
| T1                          | 41.8333-48-50.18                                             | 0.08    | 48.1640-49-55.83                                              | 0.050   |
| T2                          | 32.3018-22-46.39                                             | 0.47    | 36.4722-42-50.51                                              | 0.659   |
| T3                          | 24.1313-93-34.32                                             | 0.81    | 28.7517-46-40.03                                              | 0.852   |
| T4                          | 18.880-7337.02                                              | 0.92    | 25.625-01-46.24                                              | 0.722   |
| N Stage                     |                                                               |         |                                                               |         |
| N0                          | 42.1134-83-49.40                                             | 0.00    | 47.8640-81-54.90                                              | 0.003   |
| N1                          | 7.173-80-10.53                                              | 0.02    | 9.644-43-14.85                                                | 0.048   |
| Number of Metastasis Sites  |                                                               |         |                                                               |         |
| One                         | 37.8030-50-45.11                                             | 0.01    | 44.6137-26-51.96                                              | 0.009   |
| ≥Two                        | 20.397-96-32.81                                              | 0.66    | 23.5010-12-36.88                                              | 0.993   |

<sup>a</sup> OS: Overall Survival; <sup>b</sup> CSS: Cancer-Specific Survival; <sup>c</sup> 95%CI: 95% Confidence Interval; <sup>d</sup> PN: Partial Nephrectomy; <sup>e</sup> RN: Radical Nephrectomy; ccRCC<sup>f</sup>: Clear cell Renal cell carcinoma.
Table 3. Multivariate cox regression analysis of prognostic factors influencing the overall survival of elderly patients underwent partial nephrectomy with metastatic renal cell carcinoma. (Step 2, Follow LR)

| Variable               | Univariate analyses |                      | Multivariate analyses |                      |
|------------------------|---------------------|-----------------------|-----------------------|-----------------------|
|                        | Log-Rankc² | p-Value | HRa (95% CI)b | p-Value |                      |
| Age at diagnosis       | 0.70      | 0.402    | NAc             | NA                   |
| Race                   | 4.66      | 0.097    | NA              | NA                   |
| Gender                 | 0.04      | 0.849    | NA              | NA                   |
| Marital status         | 4.02      | 0.134    | NA              | NA                   |
| Site                   | 0.03      | 0.871    | NA              | NA                   |
| Histologic Type        | 1.12      | 0.290    | NA              | NA                   |
| Tumor Size             | 12.18     | <0.001   | NA              | NA                   |
| ≤7 cm                  | NA        | NA       | Reference       | 1.000                |
| >7 cm                  | NA        | NA       | 2.54(1.25-5.13) | 0.010                |
| Fuhrman Grade          | 9.44      | 0.024    | NA              | NA                   |
| T Stage                | 10.02     | 0.018    | NA              | NA                   |
| N Stage                | 30.78     | <0.001   | NA              | <0.001               |
| N0                     | NA        | NA       | Reference       | 1.000                |
| N1                     | NA        | NA       | 5.48(2.46-12.22) | <0.001               |
| Unknown                | NA        | NA       | 2.51(0.58-10.94) | 0.219                |
| Metastasis Sites       | 5.00      | 0.025    |                 |                      |

aHR: Hazard Ratio; b95%CI: 95% Confidence Interval; cNA: Not applicable

Figures
Figure 1

K-M survival curve of cytoreductive nephrectomy (a), partial nephrectomy and radical nephrectomy (b, c) in elderly metastatic renal cell carcinoma.
Figure 2

Comparison survival of cytoreductive nephrectomy methods in tumor size ≤7cm (a), isolated metastasis (b) and N0 stage (c) and N1 stage (d) in elderly patients with metastatic renal cell carcinoma.
Figure 3

Risk analysis of cytoreductive partial nephrectomy in elderly patients with metastatic renal cell carcinoma with tumor diameter >7cm (a) and N1 stage (b).
Figure 4

Prognosis prediction model of elderly metastatic renal cell carcinoma -- Nomogram model (a) and 1-year (b), 2-years (c), 3-years (d) calibration curve of survival probability prediction.