Hong Kong J Radiol. 2026;29:Epub. Published 9 March 2026 | https://doi.org/10.12809/hkjr2518007

ORIGINAL ARTICLE

Treatment Outcomes of Nasopharyngeal Carcinoma in Patients Aged 80 Years or Above

PW Kwok, I Yeung, WWY Tin, SY Tung

Department of Clinical Oncology, Tuen Mun Hospital, Hong Kong SAR, China

ABSTRACT

Introduction: *Optimal treatment for nasopharyngeal carcinoma (NPC) in patients aged 80 years or above remains controversial due to concerns about the tolerability of radical radiotherapy (RT). This study evaluated treatment outcomes and toxicities in octogenarians with NPC in Hong Kong.*

Methods: *This retrospective analysis included patients aged 80 years or above with NPC treated at a single institution in Hong Kong between January 2009 and December 2023. Patients with distant metastases at diagnosis were excluded. Patient characteristics, treatment outcomes, and toxicities were analysed.*

Results: *A total of 42 patients (median age, 83 years; range, 80-94) were included. The median follow-up duration was 20.3 months. In the entire cohort, the median overall survival (OS) was 22.8 months (95% confidence interval [95% CI] = 14.6-30.9) and the 5-year OS rate was 23.8%. Twenty-seven patients (64.3%) received radical RT using intensity-modulated radiotherapy (IMRT); none received chemotherapy. Among these patients (Cohort A), the median OS was 41.3 months (95% CI = 27.7-55.0), while the 5-year OS and cancer-specific survival rates were 38.1% and 74.2%, respectively. Grade ≥3 acute toxicities occurred in 22.2% of patients; one patient (3.7%) died due to treatment-related toxicity. Treatment failure occurred in five patients (18.5%), all due to distant metastases. Among patients who received non-radical RT (Cohort B), the median OS was 12.8 months (95% CI = 10.9-14.7), and none survived beyond 5 years. Most deaths in Cohort A (57.9%) were unrelated to NPC, whereas the majority in Cohort B (66.7%) were NPC-related.*

Conclusion: *In appropriately selected patients aged 80 years or above with NPC, radical RT using modern IMRT techniques is a viable treatment option, offering reasonable survival outcomes and an acceptable toxicity profile. Chronological age alone should not be regarded as a barrier to radical treatment in NPC.*

Key Words: *Nasopharyngeal carcinoma; Octogenarians; Radiotherapy*

Correspondence: *Dr PW Kwok, Department of Clinical Oncology, Tuen Mun Hospital, Hong Kong SAR, China*
Email: kwokpw@ha.org.hk

Submitted: 1 July 2025; Accepted: 18 December 2025. This version may differ from the final version when published in an issue.

Contributors: All authors designed the study. PWK and IY acquired and analysed the data. PWK drafted the manuscript. PWK, WWYT and SYT critically revised the manuscript for important intellectual content. All authors had full access to the data, contributed to the study, approved the final version for publication, and take responsibility for its accuracy and integrity.

Conflicts of Interest: All authors have disclosed no conflicts of interest.

Funding/Support: This research received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors.

Data Availability: All data generated or analysed during the present study are available from the corresponding author on reasonable request.

Ethics Approval: This study was approved by the Central Institutional Review Board of Hospital Authority, Hong Kong (Ref No.: CIRB-2024-421-1). The requirement for informed consent was waived by the Board due to the retrospective nature of the study.

Supplementary Material: The supplementary material was provided by the authors and some information may not have been peer reviewed. Any opinions or recommendations discussed are solely those of the author(s) and are not endorsed by the Hong Kong College of Radiologists. The Hong Kong College of Radiologists disclaims all liability and responsibility arising from any reliance placed on the content. To view the file, please visit the journal online (https://doi.org/10.12809/hkjr2518007).

中文摘要

80歲或以上鼻咽癌患者的治療結果

郭伯維、楊溢、佃穎恩、董煜

引言：對於年滿80歲或以上的鼻咽癌患者，其最佳治療方案仍具爭議，主要源於對根治性放射治療耐受性的顧慮。本研究旨在評估本港80歲或以上鼻咽癌患者的治療成效及相關毒性。

方法：本回顧性研究分析一所醫院於2009年1月至2023年12月期間治療的80歲或以上鼻咽癌患者資料。診斷時已出現遠處轉移者予以排除。研究分析內容包括患者特徵、治療成效及毒性情況。

結果：本研究共納入42名患者（年齡中位數83歲，介乎80至94歲），中位隨訪時間為20.3個月。整體患者的中位總生存期為22.8個月（95%置信區間：14.6-30.9個月），5年總生存率為23.8%。其中27名患者（64.3%）接受以調強放射治療進行的根治性放療，無人接受化療。在該組患者（A組）中，中位總生存期為41.3個月（95%置信區間：27.7-55.0個月），5年總生存率及癌症特異性生存率分別為38.1%及74.2%。3級或以上急性毒性發生率為22.2%；1名患者（3.7%）因治療相關毒性死亡。共有5名患者（18.5%）出現治療失敗，均為遠處轉移所致。接受非根治性放療的患者（B組）其中位總生存期為12.8個月（95%置信區間：10.9-14.7個月），且無人存活超過5年。A組多數死亡個案（57.9%）與鼻咽癌無關，而B組大多數死亡個案（66.7%）則與鼻咽癌相關。

結論：對於經審慎篩選的80歲或以上鼻咽癌患者，採用現代調強放射治療技術進行根治性放療屬可行治療選項，可帶來合理的生存成效及可接受的毒性水平。年齡本身不應被視為接受根治性治療的障礙。

INTRODUCTION

Nasopharyngeal carcinoma (NPC) is an epithelial carcinoma originating from the nasopharyngeal mucosa. This malignancy is most prevalent in Asia, accounting for over 80% of global incident cases in 2022.[1] In endemic regions, NPC incidence peaks in the 45-59 years age-group and declines thereafter.[2] Data from the Hong Kong Cancer Registry indicate that in 2023, approximately 4.9% of new NPC cases occurred in patients aged 80 years or above.[3]

Standard treatment for NPC involves high-dose radical radiotherapy (RT) of 66 to 70 Gy, often combined with concurrent, induction, and/or adjuvant chemotherapy for locally advanced disease.[4,5] However, these treatment guidelines are largely based on clinical studies that have underrepresented or excluded older adult populations. For instance, in a meta-analysis of chemotherapy in NPC, only 13% of the cohort was aged 60 years or above.[6]

Older adults with NPC have worse survival outcomes compared to their younger counterparts.[5] Previous studies have reported 5-year overall survival (OS) rates ranging from 44% to 60% among patients aged 70 years or above with NPC,[7-9] whereas those aged 80 years or above exhibit a considerably lower survival rate of approximately 30%.[10] Treating older adults with NPC presents particular challenges due to increased co-morbidities, nutritional issues, organ dysfunction, and greater susceptibility to treatment-related toxicities.[11] Despite these clinical challenges, studies specifically addressing treatment outcomes and strategies in older adults with NPC remain limited. Furthermore, inconsistencies exist regarding the definition of 'older adults' or 'elderly' across published studies, with age thresholds typically ranging from 65 to 70 years.[7-10,12,13] Notably, outcomes for the oldest patients with NPC, specifically those aged 80 years or above, are rarely reported. These much older patients may represent a distinct subgroup, even within the broader geriatric population. Huang et al[10] reported that patients aged 80 years or above with NPC had significantly worse survival than those aged 65 to 69 years. This study aimed to investigate treatment patterns and survival outcomes in older adults aged 80 years or above with NPC in Hong Kong.

METHODS

Patient Characteristics

We conducted a retrospective review of the medical records of patients with NPC who received care at Tuen Mun Hospital between 1 January 2009 and 31 December 2023. Patients aged 80 years or above at diagnosis with histologically confirmed NPC were included. Those with distant metastasis at initial diagnosis were excluded. Data on demographics, disease status, co-morbidities, and treatment outcomes were retrieved from electronic patient records and analysed. Patients were categorised into those who received radical RT to the nasopharynx (Cohort A) and those who did not (Cohort B).

Staging and Evaluation

Patients underwent clinical evaluation, including history taking and physical examination. Local and regional staging was performed using magnetic resonance imaging of the nasopharynx and neck and/or computed tomography. Between 2009 and 2017, positron emission tomography–computed tomography (PET-CT) was selectively performed in patients with symptoms, laboratory abnormalities, or chest radiograph findings suggestive of distant metastasis. From 2018 onwards, PET-CT has been routinely performed for all patients with tumour (T) stage T4, nodal (N) stage N3, or T3N2 disease, as well as those with clinical suspicion of metastatic disease, in accordance with Hospital Authority (HA) standard indications.

NPC staging was performed according to the 8th edition of the American Joint Committee on Cancer (AJCC) staging manual.[14] Patients diagnosed prior to the introduction of the AJCC 8th edition were retrospectively re-staged. Patient performance status was assessed using the Karnofsky Performance Status (KPS) Scale.[15] Co-morbidities and overall health status were retrospectively evaluated using the Adult Comorbidity Evaluation–27 (ACE-27),[16] the Charlson Comorbidity Index (CCI),[17] and the modified Frailty Index-11 (mFI-11).[18]

Radiotherapy

All patients who received radical RT underwent intensity-modulated radiotherapy (IMRT). Patients were immobilised in the supine position using a thermoplastic cast applied to the head and shoulders. A non-contrast simulation computed tomography scan was acquired and fused with the diagnostic magnetic resonance imaging scan. Target volumes were contoured according to international guidelines.[19,20] The gross tumour volume encompassed the primary tumour and enlarged lymph nodes. Clinical target volumes (CTVs) were defined as high-risk, intermediate-risk, and low-risk CTVs. The high-risk CTV included the gross tumour volume plus a 5-mm margin and the whole nasopharynx. The intermediate-risk CTV included the high-risk CTV plus a 5-mm margin and was expanded to cover sites at risk of microscopic extension, as well as the involved nodal levels. The low-risk CTV included uninvolved but potentially at-risk nodal levels. Prescribed doses to the high-, intermediate-, and low-risk CTVs were 70 Gy, 60 Gy, and 54 Gy, respectively, delivered in 33 daily fractions using the simultaneous integrated boost technique. A 3-mm margin from CTV to planning target volume was added to account for setup uncertainty. The planning target volume was subsequently cropped 3 mm from the external body contour, and midline avoidance structures were created to minimise skin and mucosal toxicities.

Treatment Evaluation and Follow-up

Patients undergoing radical RT were monitored weekly during treatment. RT-related toxicities were prospectively recorded and graded according to the National Cancer Institute Common Terminology Criteria for Adverse Events, version 5.0.[21] Treatment response evaluations were conducted 8 to 12 weeks after completion of RT and included physical examination and nasopharyngoscopy. For patients treated after 2021, routine magnetic resonance imaging of the nasopharynx and neck was also performed in addition to physical examination and nasopharyngoscopy. Patients were subsequently followed up at regular 3- to 6-month intervals by oncologists and otolaryngologists. Each visit included a clinical examination and nasopharyngoscopy. Further investigations (e.g., imaging and blood tests) were performed when recurrence was suspected.

Cause-of-Death Analysis

Causes of death were determined from electronic medical records and classified into four categories: (1) NPC-related death, defined as death resulting from the primary NPC or its metastases; (2) treatment-related death, defined as death due to complications arising from NPC treatment; (3) non-NPC death, defined as death from causes unrelated to the cancer or its treatment; and (4) unknown, defined as death for which a definitive cause could not be established based on the available clinical information. Classification as NPC-related death required the terminal event to be attributable to metastatic disease or to a documented complication of symptomatic or progressive local disease. When

competing causes were present, the primary cause was determined based on clinical documentation, imaging findings, and its temporal relationship to treatment. For example, aspiration pneumonia occurring with documented dysphagia secondary to progressive local NPC was classified as an NPC-related death, whereas aspiration pneumonia in the absence of documented treatment-related dysphagia or residual tumour was classified as a non-NPC death.

Statistical Analyses

OS was defined as the interval from the date of histological diagnosis to the date of death. Progression-free survival was defined as the interval from histological diagnosis to the date of disease progression (including local, regional, or distant progression) or death. Cancer-specific survival (CSS) was defined as the interval from histological diagnosis to the date of NPC-related death. Survival rates were estimated using the Kaplan–Meier method. Univariable and multivariable Cox proportional hazards regression models were used to identify factors associated with survival. Variables with $p < 0.05$ in univariable analysis and those deemed clinically relevant were considered for multivariable modelling. To reduce multicollinearity, closely related clinical variables were not included simultaneously in the multivariable model, such as individual TNM components and overall stage or measures of performance status and frailty. Hazard ratios (HRs) with 95% confidence intervals (95% CIs) were reported. The Mann–Whitney *U* test was used to compare distributions of ordinal variables between patient cohorts. For categorical variables, the Chi squared test or Fisher's exact test was applied, as appropriate. All statistical tests were two-sided, with a significance threshold of $p < 0.05$. Statistical analyses were performed using SPSS (Windows version 26.0; IBM Corp, Armonk [NY], United States).

RESULTS

Patient Characteristics and Treatment

In total, 42 patients were included. Patient characteristics are summarised in Table 1. The median age was 83 years (range, 80-94) and 29 patients (69.0%) were men. Most patients presented with stage III disease (33.3%), followed by stage II (26.2%), stage IVa (19.0%), and stage I (11.9%). A higher proportion of patients in Cohort A underwent PET-CT for distant metastasis screening compared with Cohort B (29.6% vs. 6.7%). Staging information was unavailable for four patients (9.5%), all of whom were in Cohort B.

Overall, 27 patients (64.3%) received radical RT to the nasopharynx (Cohort A), while 15 patients (35.7%) did not (Cohort B) [Table 1]. Reasons for not undergoing radical RT included patient refusal (n = 9), concomitant malignancy (n = 1), and medical unfitness for radical treatment (n = 5). Of the 15 patients in Cohort B, two (13.3%) received palliative RT. Chemotherapy was not administered to any patients in either cohort.

Cohort A had significantly more patients with a KPS score ≥70% compared with Cohort B. No significant differences were observed in ACE-27 scores or CCI scores. Although a higher proportion of patients in Cohort B had a mFI-11 score ≥0.27 (categorised as frail) compared with Cohort A, this difference was not statistically significant (Table 1).

Survival Outcome and Prognostic Factors

At the time of analysis, eight patients (19.0%) were alive. The median follow-up duration was 20.3 months (range, 1.5-138) for the entire cohort, and 28.2 months for those who were alive. The median OS was 22.8 months (95% CI = 14.6-30.9).

Among patients who received radical RT (Cohort A), the median OS was 41.3 months (95% CI = 27.7-55.0). The median CSS was not reached. The median progression-free survival was 39.6 months (95% CI = 22.4-56.7). The 5-year OS and CSS rates were 38.1% and 74.2%, respectively (Figure 1).

Among patients who did not receive radical RT (Cohort B), the median OS was 12.8 months (95% CI = 10.9-14.7) and the median CSS was 14.4 months (95% CI = 10.9-17.9). No patient in Cohort B survived to 5 years (Figure 2).

Univariable analysis identified several factors significantly associated with worse OS, including absence of radical RT (no vs. yes; HR = 5.03, $p < 0.001$), male sex (male vs. female; HR = 2.55, $p = 0.031$), advanced nodal stage (N2-3 vs. N0-N1; HR = 2.70, $p = 0.017$), advanced overall AJCC stage (stage III-IV vs. stage I-II; HR = 2.99, $p = 0.005$), poor KPS score (<70% vs. ≥70%; HR = 3.29, $p = 0.003$), and frailty based on the mFI-11 (mFI-11 ≥0.27 vs. <0.27; HR = 4.22, $p = 0.010$). On multivariable analysis, no receipt of radical RT (HR = 13.33, $p = 0.006$) and male sex (HR = 3.22, $p = 0.033$) were independently associated with worse OS (Table 2).

Table 1. Baseline patient and disease characteristics.*

	Overall (n = 42)	Cohort A (Radical RT, n = 27)	Cohort B (No radical RT, n = 15)	p Value
Age, y	83 (80-94)	83 (80-92)	84 (80-94)	0.439
Sex				0.089
Male	29 (69.0%)	16 (59.3%)	13 (86.7%)	
Female	13 (31.0%)	11 (40.7%)	2 (13.3%)	
Tumour (T) stage				0.546
T1	11 (26.2%)	6 (22.2%)	5 (33.3%)	
T2	9 (21.4%)	8 (29.6%)	1 (6.7%)	
T3	15 (35.7%)	11 (40.7%)	4 (26.7%)	
T4	3 (7.1%)	2 (7.4%)	1 (6.7%)	
Missing	4 (9.5%)	0	4 (26.7%)	
Nodal (N) stage				0.485
N0	12 (28.6%)	8 (29.6%)	4 (26.7%)	
N1	16 (38.1%)	14 (51.9%)	2 (13.3%)	
N2	5 (11.9%)	3 (11.1%)	2 (13.3%)	
N3	5 (11.9%)	2 (7.4%)	3 (20.0%)	
Missing	4 (9.5%)	0	4 (26.7%)	
Overall stage				0.132
I	5 (11.9%)	3 (11.1%)	2 (13.3%)	
II	11 (26.2%)	11 (40.7%)	0	
III	14 (33.3%)	9 (33.3%)	5 (33.3%)	
IVa	8 (19.0%)	4 (14.8%)	4 (26.7%)	
Missing	4 (9.5%)	0	4 (26.7%)	
Distant metastasis screening†				
PET-CT	9 (21.4%)	8 (29.6%)	1 (6.7%)	
CT of the thorax and abdomen	2 (4.8%)	1 (3.7%)	1 (6.7%)	
Abdominal ultrasound	1 (2.4%)	0	1 (6.7%)	
Bone scan	1 (2.4%)	0	1 (6.7%)	
Chest radiograph only	25 (59.5%)	18 (66.7%)	7 (46.7%)	
None	4 (9.5%)	0	4 (26.7%)	
KPS score				< 0.001
≥70	32 (76.2%)	26 (96.3%)	6 (40.0%)	
<70	10 (23.8%)	1 (3.7%)	9 (60.0%)	
ACE-27 score				0.654
0	6 (14.3%)	4 (14.8%)	2 (13.3%)	
1	23 (54.8%)	15 (55.6%)	8 (53.3%)	
2	8 (19.0%)	6 (22.2%)	2 (13.3%)	
3	5 (11.9%)	2 (7.4%)	3 (20.0%)	
CCI score				0.796
0	22 (52.4%)	14 (51.9%)	8 (53.3%)	
1	12 (28.6%)	7 (25.9%)	5 (33.3%)	
2	5 (11.9%)	4 (14.8%)	1 (6.7%)	
≥3	3 (7.1%)	2 (7.4%)	1 (6.7%)	
mFI-11 score				0.233
<0.27 (non-frail)	38 (90.5%)	26 (96.3%)	12 (80.0%)	
≥0.27 (frail)	4 (9.5%)	1 (3.7%)	3 (20.0%)	

Abbreviations: ACE-27 = Adult Comorbidity Evaluation–27; CCI = Charlson Comorbidity Index; KPS = Karnofsky Performance Status; mFI-11 = modified Frailty Index-11; PET-CT = positron emission tomography–computed tomography; RT = radiotherapy.

* Data are shown as No. (%) or median (range).

† Statistical comparison of imaging modalities was not performed due to small cell counts.

Cause-of-Death Analysis

Among the 34 patients who died, the most common cause of death was NPC-related death (n = 15, 44.1%), followed by non-NPC death (n = 13, 38.2%). Treatment-related mortality occurred in one patient (2.9% of deaths), and the cause of death was unknown in five patients (14.7%). The causes of death among patients who underwent radical RT (Cohort A) and those who did not (Cohort B) are summarised in Table 3. The two cohorts demonstrated distinct cause-of-death profiles. In Cohort A, the most common cause of death was non-NPC death (n = 11, 57.9%), followed by NPC-related death (n = 5,

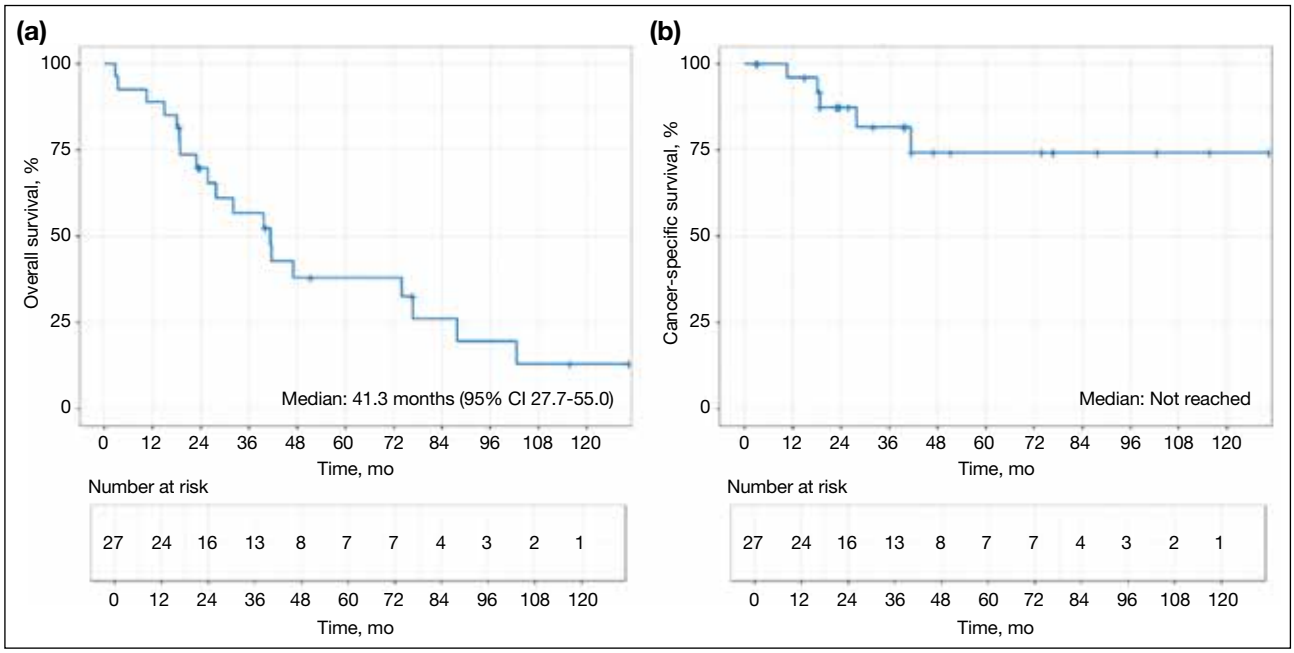

Figure 1. (a) Overall survival and (b) cancer-specific survival in Cohort A.
Abbreviation: 95% CI = 95% confidence interval.

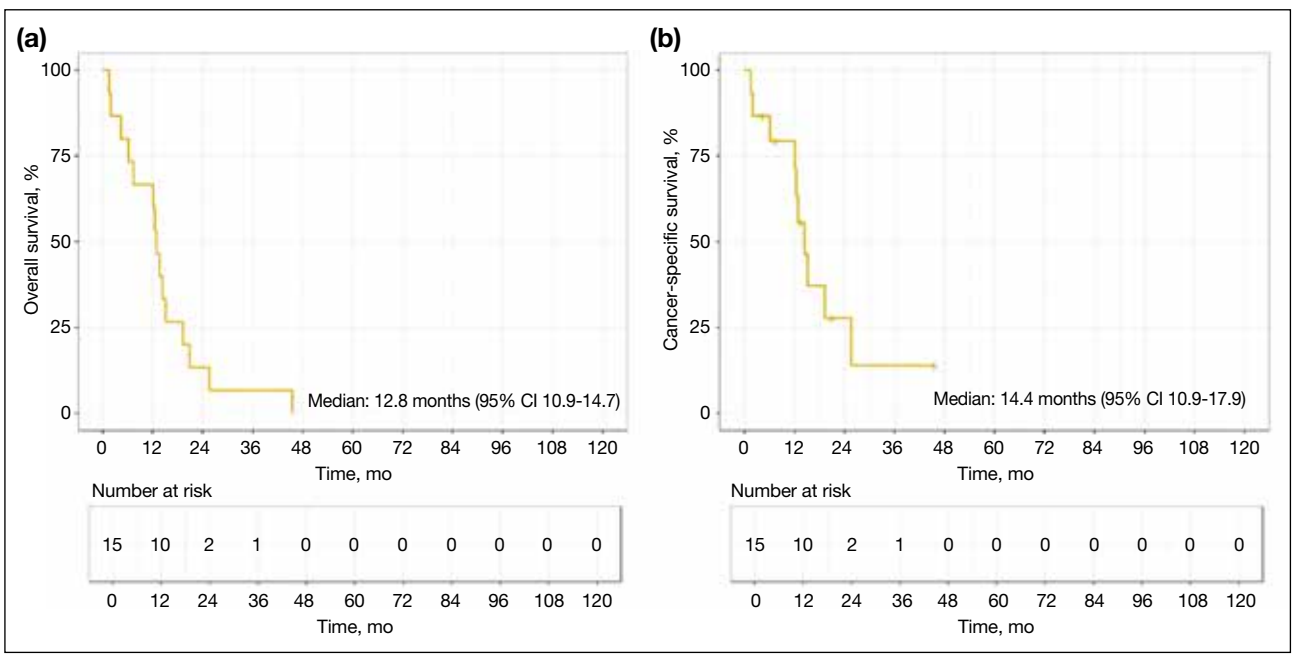

Figure 2. (a) Overall survival and (b) cancer-specific survival in Cohort B.
Abbreviation: 95% CI = 95% confidence interval.

26.3%), unknown causes (n = 2, 10.5%), and treatment-related death (n = 1, 5.3%). Among patients in Cohort A who died of non-NPC causes, the median interval from the last day of RT to death was 36.9 months (interquartile range, 16.1-71.0). In Cohort B, the majority of patients died of NPC-related causes (n = 10, 66.7%); two patients (13.3%) died of non-NPC causes and three patients (20%) died of unknown causes. Detailed descriptions of the circumstances of death for individual cases are provided in the online supplementary Table.

Table 2. Univariable and multivariable analyses of prognostic factors for overall survival.

	Univariable analysis		Multivariable analysis	
	HR (95% CI)	p Value	HR (95% CI)	p Value
Radical radiotherapy				
Yes	1.00 (reference)	N/A	1.00 (reference)	N/A
No	5.03 (2.33-10.87)	< 0.001	13.33 (2.08-83.33)	0.006
Sex				
Female	1.00 (reference)	N/A	1.00 (reference)	N/A
Male	2.55 (1.09-5.99)	0.031	3.22 (1.10-9.43)	0.033
Age, y				
80-84	1.00 (reference)	N/A	N/A	N/A
≥85	0.83 (0.41-1.69)	0.612	N/A	N/A
Tumour (T) stage				
T1-T2	1.00 (reference)	N/A	N/A	N/A
T3-T4	1.85 (0.90-3.83)	0.095	N/A	N/A
Nodal (N) stage				
N0-N1	1.00 (reference)	N/A	N/A	N/A
N2-N3	2.70 (1.19-6.10)	0.017	N/A	N/A
Overall stage				
I-II	1.00 (reference)	N/A	N/A	N/A
III-IV	2.99 (1.38-6.49)	0.005	N/A	N/A
Karnofsky Performance Status score				
≥70	1.00 (reference)	N/A	N/A	N/A
<70	3.29 (1.51-7.19)	0.003	N/A	N/A
ACE-27 comorbidity score				
<2	1.00 (reference)	N/A	N/A	N/A
≥2	1.67 (0.80-3.48)	0.173	N/A	N/A
Charlson Comorbidity Index score				
<2	1.00 (reference)	N/A	N/A	N/A
≥2	1.36 (0.54-3.40)	0.513	N/A	N/A
Modified Frailty Index-11 score				
<0.27	1.00 (reference)	N/A	N/A	N/A
≥0.27	4.22 (1.40-12.66)	0.010	N/A	N/A

Abbreviations: 95% CI = 95% confidence interval; ACE-27 = Adult Comorbidity Evaluation–27; HR = hazard ratio; N/A = not applicable.

Radical Radiotherapy

Treatment Outcomes

Among the 27 patients in Cohort A who underwent radical RT, the majority (96.3%) completed the planned course of treatment. Local treatment response to RT was documented in 22 patients; of these, 95.5% achieved a complete response. One patient had persistent disease in the nasopharynx and achieved successful salvage with brachytherapy. No local or regional relapse was observed. Five patients (18.5%) developed distant recurrence, with a median time to onset of distant metastasis of 17.6 months (range, 8.3-34.0). None of these patients received further systemic anticancer therapy for metastatic disease.

Table 3. Causes of death by treatment cohort.*

	Cohort A (Radical RT, 19 deaths)	Cohort B (No radical RT, 15 deaths)	Total (34 deaths)
NPC-related death	5 (26.3%)	10 (66.7%)	15 (44.1%)
Non-NPC death	11 (57.9%)	2 (13.3%)	13 (38.2%)
Myocardial infarction	1 (5.3%)	0	1 (2.9%)
Stroke	2 (10.5%)	0	2 (5.9%)
Chest infection	6 (31.6%)	2 (13.3%)	8 (23.5%)
Second cancer	2 (10.5%)	0	2 (5.9%)
Treatment-related death	1 (5.3%)	0	1 (2.9%)
Unknown	2 (10.5%)	3 (20.0%)	5 (14.7%)

Abbreviations: NPC = nasopharyngeal carcinoma; RT = radiotherapy.
* Data are shown as No. (%).

Acute and Late Treatment Toxicities

Table 4 summarises the acute toxicities observed in Cohort A. Grade ≥3 acute RT toxicities, defined as those occurring during RT or within 3 months after RT, were observed in six of 27 patients (22.2%). The most frequently reported acute toxicities were mucositis (all grades, 96.3%; grade ≥3, 14.8%) and radiation dermatitis (all grades, 77.8%; grade ≥3, 3.7%). Seven patients (25.9%) required unplanned hospital admission

Table 4. Acute treatment-related toxicities in Cohort A (n = 27).*

	Any grade	Grade ≥3
Mucositis	26 (96.3%)	4 (14.8%)
Dermatitis	21 (77.8%)	1 (3.7%)
Dysphagia	13 (48.1%)	1 (3.7%)
Xerostomia	12 (44.4%)	0
Dysgeusia	11 (40.7%)	0
Infection†	1 (3.7%)	1 (3.7%)

* Data are shown as No. (%). One patient experienced both grade 3 mucositis and grade 3 dysphagia.

† Grade 5 chest infection occurred in one patient during week 2 of radiotherapy (after the sixth fraction).

during treatment: four for grade 3 mucositis, one for grade 3 dermatitis, one for feeding tube insertion to support nutrition in the absence of clinically significant mucositis, and one for a chest infection during the sixth RT fraction (this patient subsequently died). The fatal chest infection resulted in a treatment-related mortality rate of 3.7%. Two patients (7.4%) died within 90 days of completing RT.

Grade ≥3 late RT toxicities (defined as those occurring more than 3 months after RT) were observed in 14.8% of patients, the majority of which involved severe hearing loss. One patient (3.7%) required long-term feeding tube support due to dysphagia.

DISCUSSION

In this retrospective study of patients aged 80 years or above with NPC, radical RT using IMRT resulted in a median OS of 41.3 months and a 5-year OS rate of 38.1%, with manageable toxicity. To our knowledge, this is the first study to specifically evaluate treatment outcomes and toxicities in this group of patients, thereby addressing a critical knowledge gap.

The treatment of NPC in older adults is challenging and frequently overlooked, as this population is often excluded from or underrepresented in clinical trials. Older adults represent a heterogeneous group characterised by a wide range of co-morbidities and varying degrees of frailty. Management of NPC in this group is often complex, and survival outcomes are generally worse compared with those of their younger counterparts.

Yang et al[8] reported outcomes in patients aged 70 years or above with NPC, most of whom received RT combined with chemotherapy, achieving a 5-year OS rate of 59.5%. Notably, only 65.3% of patients in that cohort received IMRT, and most were younger than 75 years.[8] Jin et al[7] examined a similar cohort of patients aged 70 years or above with NPC who were treated exclusively with IMRT and reported a 5-year OS rate of 54%; however, chemotherapy was administered to 42.8% of patients, and the maximum age in that cohort was 73 years. Patients aged 80 years or above represent an especially challenging subgroup, even within the broader geriatric population. In a National Cancer Database analysis by Huang et al,[10] patients aged 80 years or above with NPC who received radical RT had a 5-year OS rate of 31.3%. Toxicity outcomes were not reported in that study.

Due to prevalent co-morbidities and reduced bone marrow reserve, older patients with NPC often have limited tolerance for chemotherapy, whether administered as induction therapy or concurrently with RT. The benefit of chemotherapy in this population remains a subject of debate. While some retrospective studies have reported improved outcomes with the addition of chemotherapy to RT in older adults,[12,22,23] others have shown no clear survival advantage.[7,24,25] In clinical practice, chemotherapy is seldom administered to patients aged 80 years or above.[8] Indeed, in our cohort, no patient in this age-group received chemotherapy.

High-dose RT to the head and neck region can be potentially morbid, and treatment tolerance is a significant concern, particularly among older adults. A study by Sze et al[9] reported significantly higher rates of acute grade 3 toxicities, RT incompletion, and 90-day mortality in patients aged 70 years or above with NPC compared with younger patients. As a result, clinicians may be hesitant to offer radical RT to patients aged 80 years or above.

Our findings demonstrated that radical RT is associated with meaningful survival outcomes in patients aged 80 years or above. Among those who received radical RT, a median OS exceeding 3 years and a 5-year OS rate of 38.1% are encouraging, suggesting that radical RT can provide reasonable survival even for octogenarians.

Our study also showed that patients who did not receive radical RT had poorer outcomes, with a median OS of only 12.8 months. However, direct survival comparisons between these two cohorts should be interpreted with caution due to important baseline differences. Patients in Cohort B had significantly worse performance status,

with a greater proportion exhibiting a KPS score below 70 compared with Cohort A. Although no significant differences were observed between cohorts in terms of co-morbidity indices, inherent disparities undoubtedly existed. These differences may introduce confounding bias, whereby the observed survival advantage of radical RT may be partially attributable to baseline patient characteristics. Despite these limitations, the considerable difference in outcomes suggests a potential benefit of radical RT in appropriately selected older adults.

Perhaps more importantly, the cause-of-death analysis offers additional insight into the potential benefit of radical RT. Among patients who received radical RT, most deaths were due to medical conditions unrelated to NPC or its treatment, whereas in the non-radical RT group, the majority of deaths were attributable to NPC progression.

These findings may assist clinicians in discussions with patients and caregivers, facilitating personalised management strategies. It is important for clinicians to recognise the potential benefits of radical RT in appropriately selected patients, ensuring that advanced age alone does not preclude access to potentially curative treatment.

IMRT has become the standard of care for NPC, providing optimal tumour coverage while sparing critical organs at risk.[26] It is associated with improved tumour control and a reduction in both acute and late toxicities.[27,28] In our study, however, grade ≥3 acute toxicities remained common (22.2%) among patients undergoing radical RT with IMRT. It is important to recognise that older adults are at increased risk of developing severe treatment-related toxicities; all toxicities should be identified promptly and managed proactively. In particular, RT-induced mucositis and dysphagia can lead to life-threatening infectious complications, as demonstrated by the single grade 5 toxicity observed in our cohort. Intensive clinical monitoring throughout treatment—combined with appropriate supportive medications and multidisciplinary collaboration involving nurses, dietitians, and speech therapists—is essential. Vigilance in nutritional management is particularly important, as older adults may already be at high risk of sarcopenia and have limited physiological reserves.[29] Clinicians should maintain a low threshold for feeding tube insertion during RT, and a prophylactic approach to nutritional support may be considered.

Although the incidence of grade ≥3 acute toxicities was relatively high, it was not prohibitive. In our study, the rates of grade ≥3 dermatitis and mucositis were 3.7% and 14.8%, respectively, both of which appear lower than previously reported figures of 21.6% to 22.3% for grade ≥3 dermatitis and 18.9% to 68% for grade ≥3 mucositis.[9,25] This difference is likely attributable to our institutional protocol, which routinely includes a 3-mm skin clip and the creation of midline structure avoidance volumes. In the present study, the treatment-related mortality rate was 3.7% and the 90-day mortality rate was 7.4%, a figure comparable to the 7.8% reported by Sze et al[9] in patients aged above 70 years.

Late grade ≥3 RT toxicities were also infrequent in our study; only one patient remained dependent on a feeding tube. This observation may be partly explained by the relatively short follow-up period and limited survival duration, which may have precluded the full manifestation of late toxicities. Another contributing factor is that all patients received IMRT, which delivers a more conformal dose distribution to the target volume while better sparing adjacent normal tissues.[30]

Although this study focuses on patients aged 80 years or above, it is essential for clinicians to recognise that chronological age alone should not serve as the sole criterion for risk stratification. Co-morbidity and frailty assessments provide critical information to guide the management of older patients with NPC. Comprehensive geriatric assessment, considered the gold standard for evaluating older adults, is recommended by both the International Society of Geriatric Oncology[31] and the American Society of Clinical Oncology[32] to support treatment decision making. However, comprehensive geriatric assessment is not widely implemented due to its time-consuming nature. Several tools are available for co-morbidity assessment, including the CCI,[17] the ACE-27,[16] and the mFI-11.[18] Notably, both ACE-27 and CCI have been associated with survival outcomes. For example, Huang et al[10] identified CCI score ≥2 was an independent prognostic factor for mortality, while higher ACE-27 scores have been associated with poorer survival outcomes.[7,9,33] In our study, there was a trend towards worse survival outcomes in patients with higher CCI, ACE-27, and mFI-11 scores; however, none of these associations reached statistical significance in multivariable analysis, likely due to the small sample size.

Several questions remain unanswered. Although radical

RT of 70 Gy remains the current standard of care,[4] it is unclear whether this 'one-size-fits-all' approach is appropriate for older adults with NPC. A logical consideration is RT dose de-escalation, aiming to balance optimal tumour control with minimised toxicity. Wang et al[34] demonstrated comparable outcomes between standard-dose RT (70 Gy) and reduced-dose RT (53-67 Gy) in patients with T1 to T3 NPC. However, there is currently no robust evidence supporting RT dose de-escalation specifically in older adults with NPC. Future studies are warranted to explore the optimal dose and fractionation schedules for this population.

Strengths and Limitations

This study has several strengths. To our knowledge, it is the first to specifically report treatment outcomes and toxicities in patients aged 80 years or above with NPC. All treatments were delivered using modern IMRT techniques, and acute and late treatment-related adverse events were prospective documented.

This study has several important limitations. First, inherent selection bias exists in this retrospective cohort comparison, as patients who received radical RT were likely to have been healthier overall, despite similar co-morbidity scores, and treatment decisions were influenced by unmeasured factors, including clinician judgement and patient preference. Second, comprehensive screening for distant metastases was not performed in some patients, particularly those who did not receive radical RT. It is therefore possible that a higher proportion of patients in Cohort B had undiagnosed stage IVb disease at presentation, which may have contributed to poorer outcomes. Third, the relatively small sample size limits the statistical power of the analysis and precludes the application of more sophisticated statistical methods, such as causal inference approaches (e.g., propensity score matching). Fourth, the follow-up duration was relatively short and some late toxicities may not yet have emerged. Fifth, formal geriatric assessments (such as comprehensive geriatric assessment) and quality-of-life evaluations were not conducted. Prospective multicentre studies with larger sample sizes, standardised geriatric assessments, and quality-of-life measurements are warranted to validate these findings and better inform clinical practice.

CONCLUSION

In appropriately selected patients aged 80 years or above with NPC, radical RT using modern IMRT techniques represents a viable treatment option, offering reasonable survival outcomes with an acceptable toxicity profile. Chronological age alone should not be regarded as a barrier to radical treatment in NPC.

REFERENCES

1. International Agency for Research on Cancer, World Health Organization. Ferlay J, Ervik M, Lam F, Laversanne M, Colombet M, Mery L, et al. Nasopharyngeal cancer statistics. Global Cancer Observatory: Cancer Today. 2024. Available from: https://gco.iarc.who.int/media/globocan/factsheets/cancers/4-nasopharynx-fact-sheet.pdf. Accessed 9 Feb 2026.
2. Chang ET, Ye W, Zeng YX, Adami HO. The evolving epidemiology of nasopharyngeal carcinoma. Cancer Epidemiol Biomarkers Prev. 2021;30:1035-47.
3. Hospital Authority. Hong Kong Cancer Registry. Cancer statistics query system (All ages). Available from: https://www3.ha.org.hk/cancereg/allages.asp. Accessed 9 Feb 2025.
4. Lee VH, Lam KO, Lee AW. Chapter 10—Standard of Care for Nasopharyngeal Carcinoma (2018-2020). In: Lee AW, Lung ML, Ng WT, editors. Nasopharyngeal Carcinoma: From Etiology to Clinical Practice. London: Academic Press; 2019: 205-38.
5. Bossi P, Chan AT, Licitra L, Trama A, Orlandi E, Hui EP, et al. Nasopharyngeal carcinoma: ESMO-EURACAN Clinical Practice Guidelines for diagnosis, treatment and follow-up. Ann Oncol. 2021;32:452-65.
6. Blanchard P, Lee A, Marguet S, Leclercq J, Ng WT, Ma J, et al. Chemotherapy and radiotherapy in nasopharyngeal carcinoma: an update of the MAC-NPC meta-analysis. Lancet Oncol. 2015;16:645-55.
7. Jin YN, Zhang WJ, Cai XY, Li MS, Lawrence WR, Wang SY, et al. The characteristics and survival outcomes in patients aged 70 years and older with nasopharyngeal carcinoma in the intensity-modulated radiotherapy era. Cancer Res Treat. 2019;51:34-42.
8. Yang G, Huang J, Sun J, Wang L. Elderly nasopharyngeal carcinoma patients (aged ≥70 years): survival and treatment strategies. Cancer Med. 2023;12:19523-9.
9. Sze HC, Ng WT, Chan OS, Shum TC, Chan LL, Lee AW. Radical radiotherapy for nasopharyngeal carcinoma in elderly patients: the importance of co-morbidity assessment. Oral Oncol. 2012;48:162-7.
10. Huang Y, Chen W, Haque W, Verma V, Xing Y, Teh BS, et al. The impact of comorbidity on overall survival in elderly nasopharyngeal carcinoma patients: a National Cancer Data Base analysis. Cancer Med. 2018;7:1093-101.
11. Mascarella MA, Vendra V, Sultanem K, Tsien C, Shenouda G, Sridharan S, et al. Predicting short-term treatment toxicity in head and neck cancer through a systematic review and meta-analysis. J Geriatr Oncol. 2024;15:102064.
12. Liu H, Chen QY, Guo L, Tang LQ, Mo HY, Zhong ZL, et al. Feasibility and efficacy of chemoradiotherapy for elderly patients with locoregionally advanced nasopharyngeal carcinoma: results from a matched cohort analysis. Radiat Oncol. 2013;8:70.
13. Wen YF, Sun XS, Yuan L, Zeng LS, Guo SS, Liu LT, et al. The impact of Adult Comorbidity Evaluation–27 on the clinical outcome of elderly nasopharyngeal carcinoma patients treated with chemoradiotherapy or radiotherapy: a matched cohort analysis. J Cancer. 2019;10:5614-21.
14. Amin MB, Edge S, Greene F, Byrd DR, Brookland RK, Washington MK, et al (eds). AJCC Cancer Staging Manual. 8th ed. New York: Springer; 2017.
15. MDCalc. Karnofsky Performance Status Scale. Available from: https://www.mdcalc.com/calc/3168/karnofsky-performance-status-scale. Accessed 6 Feb 2026.

16. British Geriatrics Society. Adult Comorbidity Evaluation–27. Available from: https://www.bgs.org.uk/sites/default/files/content/attachment/2018-07-05/adult_comorbidity_evaluation.pdf. Accessed 6 Feb 2026.
17. MDCalc. Charlson Comorbidity Index (CCI). Available from: https://www.mdcalc.com/calc/3917/charlson-comorbidity-index-cci. Accessed 6 Feb 2026.
18. Evidencio. Modified Frailty Index. Available from: https://www.evidencio.com/models/show/1777. Accessed 6 Feb 2026.
19. Lee AW, Ng WT, Pan JJ, Poh SS, Ahn YC, AlHussain H, et al. International guideline for the delineation of the clinical target volumes (CTV) for nasopharyngeal carcinoma. Radiother Oncol. 2018;126:25-36.
20. Grégoire V, Ang K, Budach W, Grau C, Hamoir M, Langendijk JA, et al. Delineation of the neck node levels for head and neck tumors: a 2013 update. DAHANCA, EORTC, HKNPCSG, NCIC CTG, NCRI, RTOG, TROG consensus guidelines. Radiother Oncol. 2014;110:172-81.
21. United States Department of Health and Human Services. Common Terminology Criteria for Adverse Events (CTCAE) Version 5.0. 2017 Nov 27. Available from: https://dctd.cancer.gov/research/ctep-trials/for-sites/adverse-events/ctcae-v5-5x7.pdf. Accessed 6 Feb 2026.
22. Zeng Q, Xiang YQ, Wu PH, Lv X, Qian CN, Guo X. A matched cohort study of standard chemo-radiotherapy versus radiotherapy alone in elderly nasopharyngeal carcinoma patients. PLoS One. 2015;10:e0119593.
23. Lu Y, Hua J, Yan F, Jiang C, Piao Y, Ye Z, et al. Combined radiotherapy and chemotherapy versus radiotherapy alone in elderly patients with nasopharyngeal carcinoma: a SEER population-based study. Medicine (Baltimore). 2021;100:e26629.
24. Lyu Y, Ni M, Zhai R, Kong F, Du C, Hu C, et al. Clinical characteristics and prognosis of elderly nasopharyngeal carcinoma patients receiving intensity-modulated radiotherapy. Eur Arch Otorhinolaryngol. 2021;278:2549-57.
25. Sommat K, Yit NL, Wang F, Lim JH. Impact of comorbidity on tolerability and survival following curative intent intensity modulated radiotherapy in older patients with nasopharyngeal cancer. J Geriatr Oncol. 2018;9:352-8.
26. Lee AW, Ng WT, Chan LL, Hung WM, Chan CC, Sze HC, et al. Evolution of treatment for nasopharyngeal cancer—success and setback in the intensity-modulated radiotherapy era. Radiother Oncol. 2014;110:377-84.
27. Fatima K, Andleeb A, Sofi MA, Rasool MT, Fir A, Nasreen S, et al. Clinical outcome of intensity-modulated radiotherapy versus two-dimensional conventional radiotherapy in locally advanced nasopharyngeal carcinoma: comparative study at SKIMS Tertiary Care Institute. J Cancer Res Ther. 2022;18:133-9.
28. Peng G, Wang T, Yang KY, Zhang S, Zhang T, Li Q, et al. A prospective, randomized study comparing outcomes and toxicities of intensity-modulated radiotherapy vs. conventional two-dimensional radiotherapy for the treatment of nasopharyngeal carcinoma. Radiother Oncol. 2012;104:286-93.
29. Morse RT, Ganju RG, Gan GN, Cao Y, Neupane P, Kakarala K, et al. Sarcopenia and treatment toxicity in older adults undergoing chemoradiation for head and neck cancer: identifying factors to predict frailty. Cancers (Basel). 2022;14:2094.
30. Lai SZ, Li WF, Chen L, Luo W, Chen YY, Liu LZ, et al. How does intensity-modulated radiotherapy versus conventional two-dimensional radiotherapy influence the treatment results in nasopharyngeal carcinoma patients? Int J Radiat Oncol Biol Phys. 2011;80:661-8.
31. Wildiers H, Heeren P, Puts M, Topinkova E, Janssen-Heijnen ML, Extermann M, et al. International Society of Geriatric Oncology consensus on geriatric assessment in older patients with cancer. J Clin Oncol. 2014;32:2595-603.
32. Mohile SG, Dale W, Somerfield MR, Hurria A. Practical assessment and management of vulnerabilities in older patients receiving chemotherapy: ASCO Guideline for Geriatric Oncology Summary. J Oncol Pract. 2018;14:442-6.
33. Guo R, Chen XZ, Chen L, Jiang F, Tang LL, Mao YP, et al. Comorbidity predicts poor prognosis in nasopharyngeal carcinoma: development and validation of a predictive score model. Radiother Oncol. 2015;114:249-56.
34. Wang X, Wang Y, Jiang S, Zhao J, Wang P, Zhang X, et al. Safety and effectiveness of de-escalated radiation dose in T1-3 nasopharyngeal carcinoma: a propensity matched analysis. J Cancer. 2019;10:5057-64.

