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Second primary cancer after intensity-modulated radiotherapy for nasopharyngeal carcinoma in Hong Kong (2001-2010): A territory-wide study by HKNPCSG

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Background

Nasopharyngeal carcinoma (NPC) survivors have an increased risk of second primary cancer (SPC) after definitive radiotherapy. It has been speculated that the routine use of intensity-modulated radiotherapy (IMRT) further increases the risk of radiation-associated SPC, but long-term clinical data with reference to population cancer incidences are lacking.

Methods

This is a territory-wide multicentered study. Consecutive NPC patients (n=3166) who underwent definitive IMRT in all six public oncology centers in Hong Kong between 2001 and 2010 were included. SPC risks were quantified by standardized incidence ratios (SIR) and absolute excess risks (AER), estimated from age-, sex- and calendar year-specific population cancer incidence data from the Hong Kong Cancer Registry. Predictive factors for SPC occurrence were analyzed by Cox regression. SPC-specific mortality was estimated using competing risk model.

Results

With a median follow-up of 10.8 years, 290 SPCs were observed with a crude incidence of 9.2%. Cancer risk in NPC survivors was 90% higher than that in general population (SIR, 1.9; 95% CI, 1.7–2.2), with an AER of 52.1 (95% CI, 36.8–67.3) per 10,000 person-years at risk. Significant excess cancer risks were observed for oral cavity (SIR, 26.3; 95% CI, 19.1–33.6), soft tissue or bone sarcoma (SIR, 15.2; 95% CI, 9.3–21.2), oropharynx (SIR, 11.4; 95% CI, 4.0–18.9), paranasal sinus (SIR, 8.6; 95% CI, 1.7-25.1), salivary gland (SIR, 6.8; 95% CI, 1.4-20.0), non-melanoma skin (SIR, 3.6; 95% CI, 1.5–5.7), thyroid (SIR, 3.4; 95% CI, 1.2–5.6) and lung (SIR, 1.8; 95% CI, 1.3–2.3). Advanced age, smoking, hepatitis B status and re-irradiation were independent predictive factors for SPC occurrence. SPC constituted 9.4% of all deaths during study period, the 5-year and 10-year SPC-specific mortality were 0.9% and 3.4% respectively. Median overall survival after SPC occurrence was 2.4 years.

Conclusions

Second cancer risk after IMRT for NPC was substantial within the irradiated head and neck regions. Relative risk of SPC after IMRT was comparable with historical reports in the conventional 2-dimensional radiotherapy era. SPC impairs long-term survival of NPC patients, close surveillance is warranted as part of survivorship care.

Legal entity responsible for the study

The authors.

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Disclosure

All authors have declared no conflicts of interest.