**Table S1. The characteristics of the included studies.**

| Study | Design | Number | Age, median (range) or mean(SD), y | Sex (Male/Female) | Nation | Laryngeal tumor stage | Extracted outcomes |
|---|---|---|---|---|---|---|---|
| Nichols 2012 | Cohort | 75 | NA | 66/9 | UK | T1/T2 | Age, gender, T stage, smoking, alcohol |
| Dziegielewski 2012 | Cohort | 258 | 64.2 (36-92) | 205/53 | Canada | T3/T4a | Treatment modality |
| Dionysopoulos 2013 | Cohort | 289 | 63 (36-82) | 277/12 | Greece | T1/T2/T3/T4 | Nodal involvment, tumor subsite |
| Zhang 2013 | Cohort | 205 | 61.8±10.6 | 197/8 | China | T1/T2/T3/T4 | Age, TMN stage, T stage, node involvement, tumor subsite, smoking, alcohol, Charlson score, patholic differentiation |
| Timmermans 2015 | Cohort | 166 | 61.9 (11.3) | 124/42 | Netherlands | T3/T4 | Treatment modality, Age, sex, T stage, node involvement |
| Wong 2015 | Cohort | 140 | 66 (36-92) | 121/19 | UK | T1/T2/T3/T4 | Sex, age, smoking, node involvement, TMN stage |
| Grover 2015 | Cohort | 969 | 59.2 (10.4) | 774/195 | USA | T4a | Age, TMN stage, node involvement, Charlson score, tumor subsite |
| Wang 2016 | Cohort | 120 | 60.6±8.6 | 118/2 | China | T1/T2/T3/T4 | Age, smoking, alcohol, tumor subsite, T stage, node involvement, TMN stage, pathologic differentiation |
| Tu 2015 | Cohort | 141 | 59 (36-87) | 137/4 | China | T1/T2/T3/T4 | T stage, node involvement |
| Fu 2016 | Cohort | 420 | 60±9.1 (33-84) | 413/7 | China | T3/T4 | Age, sex, smoking, alcohol, tumor subsite, T stage, node involvement, TMN stage, pathologic differentiation |
| Graboyes 2017 | Cohort | 1460 | NA | 531/143 | USA | T3 | Age, sex, Charlson score, tumor subsite, pathologic differentiation |
| Dyckhoff 2017 | Cohort | 769 | 61.9 (9.7) | 626/58 | Germany | T4 | Treatment modality, age, node involvement, tumor subsite, Charlson score |

| Birkeland 2017 | Cohort | 244 | NA | 208/36 | USA | T1/T2/T3/T4 | T stage |
|---|---|---|---|---|---|---|---|
| Cheraghlo 2018 | Cohort | 726 | NA | 528/198 | USA | T1/T2 | Age, sex, Charlson score, tumor subsite, T stage, node involvement |
| Chen 2018 | Cohort | 361 | 60 (35-87) | 353/8 | China | T1/T2/T3/T4 | Age, sex, tumor subsite, T stage, node involvement, TMN stage, pathologic differentiation |
| Oh 2019 | Cohort | 329 | 62 (57-66) | 30/6 | Canada | T4a | Treatment modality, age, alcohol, sex, node involvement |
| Patel 2019 | Cohort | 8703 | NA | 6601/2102 | USA | T2/T3/T4 | Age, sex, Charlson score, pathologic differentiation, T stage, node involvement, treatment modality |
| Zhou 2019 | Cohort | 232 | 63 (39-81) | 192/40 | China | T1/T2/T3/T4 | Age sex, smoking, alcohol, tumor subsite, T stage, node involvement, TMN stage, pathologic differentiation |
| Song 2019 | Cohort | 137 | NA | 133/4 | China | T1/T2/T3/T4 | Tumor subsite, age, pathologic differentiation |
| Bates 2019 | Cohort | 11,237 | NA | 8472/3538 | USA | T3/T4 | Age, sex, Charlson score, T stage, node involvement, treatment modality |
| Boukovalas 2020 | Cohort | 362 | 64 | 294/68 | USA | T1/T2/T3/T4 | Age, sex, T stage, node involvement ,smoking, alcohol |
| Zhang 2020 | Cohort | 207 | NA | 198/9 | China | T1/T2/T3/T4 | Age, sex, alcohol, smoking, pathologic differentiation, TMN stage , T stage, node involvement |
| Lin 2021 | Cohort | 2094 | NA | 1712/382 | China | T1/T2/T3/T4 | Age, sex, pathologic differentiation, node involvement |

CRT; chemoradiation therapy, TL; total laryngectomy, RT; radiation therapy, HR; Hazard ratio.