

Comparison of New AJCC Staging System with Old AJCC Staging System in Nasopharyngeal Carcinoma

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Purpose : This study was designed to examine the reliability of the new version of the AJCC staging system (1997) of nasopharyngeal carcinoma in comparison with the AJCC staging system of 1992.

Materials and Methods : Between 1983 and 1996, 185 patients with histologically proven nasopharyngeal carcinoma were treated with radiation therapy at the Department of Therapeutic Radiology Seoul National University Hospital. For these patients, AJCC staging system of 1992 was compared with the 1997 version, by reviewing hospital records, computed tomography (CT) and/or magnetic resonance imaging (MRI).

Results : 5-year overall survival rates according to the 1992 and 1997 AJCC staging systems were 100%, and 100% at stage I; 100%, and 68.8% at stage II; 61.4%, and 63.8% at stage III; 61.1%, and 63.2% at stage IV. 5-year overall survival rates of each classification showed significant differences between stages ($p=0.0049$ for the old version, $p=0.01$ for the new), but no significant difference was found between the staging systems except at stage II.

Conclusion : The new AJCC staging system allows staging as reliably as the 1992 version, but the adequacy of the newly modified staging classification should be confirmed by further clinical examination.

Key Words : Nasopharyngeal carcinoma, Stage

INTRODUCTION

The accurate classification and staging of cancer allows physicians to make better decisions on treatment, to evaluate the results of management more reliably, and to confidently compare the worldwide statistics reported from various institutions on a local, regional, and national basis.

Staging of cancer is not a fixed concept. As new information becomes available about the etiology and various diagnostic and treatment methods, the classification and staging of cancer must necessarily change.

Many staging systems have been applied to carcinoma of the nasopharynx. The multiplicity of staging systems can make result comparisons from different institutions extremely difficult. The latest, and the most widely used staging system is that proposed by the American Joint Committee on

Cancer (AJCC). The AJCC revised staging system of nasopharyngeal cancer was published in 1997 and incorporated revisions to both T and N stages.^{1, 2)}

In this study, we compared the new version of 1997 with the previous version of 1992, with respect to nasopharyngeal cancer investigating the staging revisions and survival rates.

METHODS AND MATERIALS

Between 1983 and 1996, 235 patients with histologically proven nasopharyngeal carcinoma were referred to the Department of Therapeutic Radiology at Seoul National University Hospital for radical radiation therapy. Work-ups for tumor extent determination included general physical examination and head and neck examinations, combined with nasopharyngoscopy, computed tomography (CT), and/or magnetic resonance imaging (MRI), and complete blood cell count and liver function test. Among these patients, 50 patients were excluded from the analysis 25 patients did not complete radiation therapy schedule, two patients had distant metastasis at initial examination, and 23 patients had a histology of other than squamous cell carcinoma or undifferentiated car-

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cinoma. All cases were rated retrospectively according to the 1992 AJCC and 1997 AJCC staging systems by reviewing medical records and CT/MRI findings.

All patients were treated with a Co-60 teletherapy unit or a 4 MV photon beam produced by a Clinac 4/100 linear accelerator (Varian, USA). The nasopharynx, the base of skull and the upper part of the neck were irradiated by two lateral, shaped, parallel opposing portals. The lower neck was irradiated using an anterior single portal with midline shielding. The dose to the primary site was 63.8-75.4 Gy (median 70.2 Gy) which was delivered in daily doses of 1.75 to 2 Gy, five days per week. The posterior and inferior limits of the lateral ports were reduced when 45 Gy was reached, in order to limit the dose to the spinal cord. The dose to the lower neck was 45 Gy. Palpable nodes were boosted with an additional 9-12 MeV electron beam.

All patients were monitored by nasopharyngoscopy and by physical examination every 2 months during the first 2 years and at 4-6 months intervals thereafter. Survival period was calculated from the day of treatment start either until death, or until the most recent follow-up date. The median follow-up time was 48 months (range 3-216 months) and the minimum follow-up of a surviving patient was 24 months. Statistical analysis was performed using a PC-SAS system (version 6.12). Survival curves were derived by the Kaplan-Meier method and comparisons were performed using the log-rank test.³⁾

RESULTS

1. Staging migration & correlation between the two staging systems

According to the 1992 AJCC staging system, there were

Table 1. Staging Migration - Stage

	New Stage [†]							
	I	IIA	IIB	III	IVA	IVB	Total	
Old Stage [*]	I	1					1	
	II	10					10	
	III		4	19	3		26	
	IV		21	12	81	34	148	
Total		11	4	40	15	81	34	185

Spearman's correlation coefficient between old and new stage : 0.664 (p<0.01)

^{*}1992 AJCC Staging System, [†] 1997 AJCC Staging System

one case of stage I disease, 10 of stage II, 26 of stage III, and 148 of stage IV. Restaging using the 1997 AJCC staging system resulted in, 11 cases of stage I disease, 44 of stage II; four of IIA, 40 of stage IIB, 15 of stage III, 81 of stage IVA, 34 of stage IVB (Table 1) Both T and N staging migrations were also observed (Table 2, 3).

To evaluate the correlation between the two groups on the distribution of stages, Spearman's correlation coefficient was calculated. Spearman's correlation coefficient between the 1992 AJCC T and N stages was -0.089 (p=0.23). According to the 1997 AJCC system the T and N stage correlation was -0.03 (p=0.68). Both old and new staging systems showed no correlation between the T and N stages. Spearman's correlation coefficient between the old and new stagings was 0.664 (p<0.01), 1992 versus 1997 staged T was 0.929 (p<0.01), and the corresponding correlation for N staging was 0.940 (p<0.01).

2. Survival

5-year overall survival rates according to both the old and

Table 2. Staging Migration - T Stage

	New T [†]						
	I	2a	2b	3	4	Total	
Old T [*]	1	10				10	
	2	30	7	1		38	
	3	1	16	28	6	51	
	4			2	21	63	
Total		41	23	31	27	63	185

Spearman's correlation coefficient between old and new T stage : 0.929 (p<0.01)

^{*}1992 AJCC Staging System, [†] 1997 AJCC Staging System

Table 3. Staging Migration - N Stage

	New T [†]						
	0	1	2	3a	3b	Total	
Old N [*]	0	47				47	
	1		24			24	
	2a		18		2	18	
	2b		23	2		27	
	2c		2	21	30	23	
	3		1	13	13	2	46
Total		47	68	36	36	2	185

Spearman's correlation coefficient between old and new N stage: 0.940 (p<0.01)

^{*}1992 AJCC Staging System, [†] 1997 AJCC Staging System

the new staging systems were as follows :for the 1992 system, 100% for stages I & II, 61.4% for stage III, 61.1% for stage IV ($p=0.01$); and for the 1997 system, 100% for stage I, 75% for stage IIA, 63.4% for stage IIB, 63.8% for stage III, 64.1% for stage IVA, and 63% for stage IVB ($p=0.01$). There was no significant difference between the systems except for stage II ($p=0.04$, Fig. 1, 4).

For T staging, 5-year overall survival rates were as follows : for the 1992 T staging system, 61% for T1, 64% for T2, 68% for T3, and 60% for T4, ($p=0.34$); and for the 1997 T staging system, 63% for T1, 55% for T2a, 74% for T2b, 66% for T3, and 61% for T4 ($p=0.82$). No statistically significant differences were found between the old and new T staging systems. For N staging, 5-year overall survival rates were as follows :for the 1992 system, 71% for N0, 60% for N1, 67% for N2a, 71% for N2b, 79% for N2c, and 42% for N3 ($p=0.03$); and for the new N staging

system, 71% for N0, 66% for N1, 56% for N2, 63% for N3a, 0% for N3b ($p=0.04$). Only the 1992 N2 (N2a, N2b, N2c) and new 1997 stagings showed marginally significant difference in overall survival rates ($p=0.06$).

DISCUSSION AND CONCLUSION

A variety of nasopharyngeal carcinoma staging systems have been designed. The most widely used systems in the English literature are the AJCC and Ho systems.^{1, 2, 4} Each of these systems has its limitations. In the AJCC system the designation of T1 or T2, which is based on the extent of tumor involvement inside the nasopharynx, had no predictive value in terms of the primary tumor control.⁵ In the 1997 revision of the AJCC staging system, disease confined to the nasopharynx was graded as T1. The 1997 staging system included the parapharyngeal space extension in T2. In this

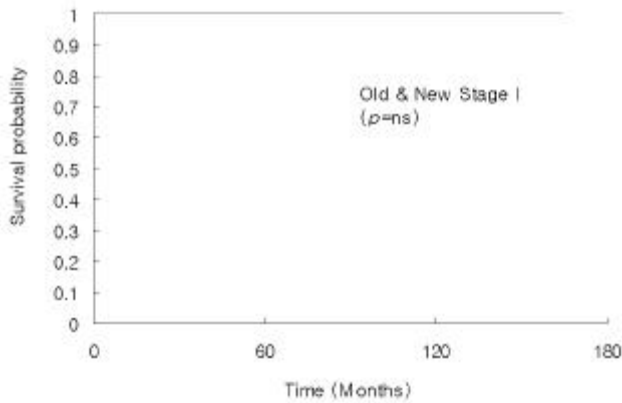


Fig. 1. Overall survival curve of stage I according to 1992 and 1997 AJCC staging system using Kaplan-Meier Method

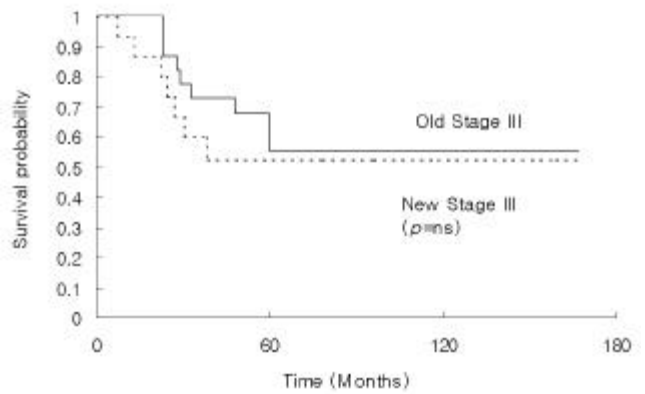


Fig. 3. Overall survival curve of stage III according to 1992 and 1997 AJCC staging system using Kaplan-Meier Method

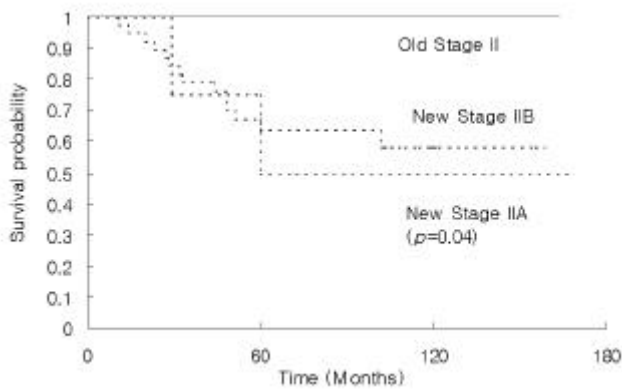


Fig. 2. Overall survival curve of stage II according to 1992 and 1997 AJCC staging system using Kaplan-Meier Method.

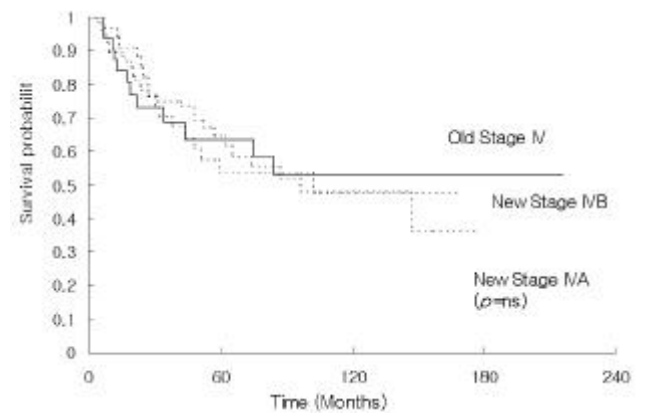


Fig. 4. Overall survival curve of stage IV according to 1992 and 1997 AJCC staging system using Kaplan-Meier Method

study, because of the small number of patients in T2, the effect of parapharyngeal extension on survival may not be accurately reflected.

Cranial nerve involvement has been shown to carry a worse prognosis than the skull base involvement.^{6, 7)} However, both are included in the T4 classification in the 1992 staging system. In the 1997 AJCC staging system, skull base involvement is classified as T3 and cranial nerve involvement as T4. In our results, old and new T staging showed no significant difference in survival rates.

The nasopharynx has a rich submucosal lymphatic network, and cervical lymph node involvement occurs early in the disease course. Approximately 90% of patients develop lymphadenopathy, at the time of initial diagnosis it is present in 60% to 85%, and 40% to 50% of patients have bilateral lymph node involvement.^{8, 9)} With respect to the N stage classification, the 1997 AJCC staging system classifies neck disease whether unilateral or bilateral if it is less than 6 cm in diameter, instead of the previous classification in number and size. Supraclavicular lymph node metastasis is classified as N3b in 1997 system.

According to our results, both the 1992 and the 1997 systems were significant in terms of overall survival. A marginally significant difference ($p=0.06$) was found between the old N2 (N2a, N2b, N2c) and the new N2 staging, but there were no differences in the N1 and N3 stagings. Supraclavicular lymph node metastasis found to be associated with poor outcome, but we found no statistically significant differences, which might have been due to the relatively small number of patients with 1997 staged N3b disease ($n=2$).

In our study, both old and new staging systems carried statistical significance in terms of overall survival rates, but there was no significant difference between the survival rates of the two staging systems, except old stage II and new stage IIA, IIB. This was due to a staging migration, as many of the patients previously staged as III were restaged to stage IIA or IIB.

Recently, Ozyar and colleagues published the results of a comparison between the 1988 and 1997 classifications of nasopharyngeal carcinoma.¹⁰⁾ In their report, the 1997 staging

system showed greater statistical differences between stages in terms of overall and distant metastasis free survival, however, we found that the new staging system did not have improved discrimination, moreover, they did not observe any significant difference in survival for the T stages.

We believe that, had the number of patients in our study been larger, more information upon new staging system in terms of survival would have been available. A prospective study upon the efficacies of the staging systems in terms of predicting outcome is recommended.

REFERENCES

1. **American Joint Committee on Cancer.** Pharynx. In Fleming ID, Cooper JS, Henson DE, et al. eds. AJCC Cancer Staging Manual, 5th ed. Philadelphia: Lippincott-Raven 1997:31-9
2. **American Joint Committee on Cancer.** Pharynx. In Beahrs OH, Henson DE, Hutter RVP, Kennedy BJ eds. Manual for Staging of Cancer, 4th ed. Philadelphia: JB Lippincott; 1992: 31-9
3. **Kaplan EL, Meier PL.** A nonparametric estimation from incomplete observations. J Am Statist Assoc 1958;53:457-81
4. **Ho JHC.** An epidemiologic and clinical study of nasopharyngeal carcinoma. Int J Radiat Oncol Biol Phys 1978;4:183-98
5. **Sham JST, Wei WL, Nichols J, et al.** Extent of nasopharyngeal carcinoma involvement inside the nasopharynx. Cancer 1992;69:854-859
6. **Huang SC, Lui LT, Lynn TC.** Nasopharyngeal cancer: study III. A review of 1206 patients treated with combined modalities. Int J Radiat Oncol Biol Phys 1985;11:1789-93
7. **Perez CA, Venkata RD, Marcial-Vega V, et al.** Carcinoma of the nasopharynx: factors affecting prognosis. Int J Radiat Oncol Biol Phys 1992;23:217-80
8. **Lindberg RD.** Distribution of cervical lymph node metastases from squamous cell carcinoma of the upper respiratory and digestive tracts. Cancer 1972;29:1446-49
9. **Mesic JB, Fletcher GH, Goepfert H.** Megavoltage irradiation of epithelial tumors of the nasopharynx. Int J Radiat Oncol Biol Phys 1981;7:447-53
10. **Ozyar E, Yildiz F, Akyol FH, Atahan IL.** Comparison of AJCC 1988 and 1997 classification for nasopharyngeal carcinoma. Int J Radiat Oncol Biol Phys 1999;44:1079-1087

AJCC

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<p>_____ : 1997 가</p> <p>_____ : 1983 1996 가</p> <p>_____ : 1992 1997 III 61.4% 63.8%; IV 61.1% 63.2%</p> <p>_____ : AJCC 가</p>	<p style="text-align: center;">AJCC</p> <p style="text-align: center;">1992</p> <p style="text-align: center;">185</p> <p style="text-align: center;">1992 1997</p> <p style="text-align: center;">5 I 100%; II 100% 68.8%; II</p> <p style="text-align: center;">1992</p>	<p style="text-align: center;">1992</p> <p style="text-align: center;">1997</p> <p style="text-align: center;">5</p> <p style="text-align: center;">II</p>	<p style="text-align: center;">100%;</p> <p style="text-align: center;">II 100% 68.8%;</p> <p style="text-align: center;">5</p>	<p style="text-align: center;">185</p>
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