J Korean Med Sci 2003; 18: 80-7
ISSN 1011-8934

Epidemiologic Survey of Head and Neck Cancers in Korea

Head and neck cancers have never been systematically studied for clinical purposes yet in Korea. This epidemiological survey on head and neck cancer patients was undertaken from January to December 2001 in 79 otorhinolaryngology resident-training hospitals nationwide. The number of head and neck cancer patients was 1,063 cases in the year. The largest proportion of cases arose in the larynx, as many as 488 cases, which accounted for 45.9%. It was followed by, in order of frequency, oral cavity (16.5%), oropharynx (10.0%), and hypopharynx (9.5%). The male:female ratio was 5:1, and the mean age was 60.3 yr. Surgery was the predominant treatment modality in head and neck cancers: 204 (21.5%) cases were treated with only surgery, 198 (20.8%) cases were treated with surgery and radiotherapy, 207 cases (21.8%) were treated with combined therapy of surgery, radiotherapy, and chemotherapy. Larynx and hypopharynx cancers had a stronger relationship with smoking and alcohol drinking than other primary site cancers. Of them, 21 cases were found to be metastasized at the time of diagnosis into the lung, gastrointestinal tract, bone, or brain. Coexisting second primary malignancies were found in 23 cases. At the time of diagnosis, a total of 354 cases had cervical lymph node metastasis accounting for 42.0%.

Key Words : *Head and Neck Neoplasms; Epidemiology; Incidence; Mouth Cavity; Nasopharynx; Oropharynx; Hypopharynx; Larynx; Nasal Cavity; Paranasal Sinuses*

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Received : 24 September 2002
Accepted : 29 November 2002

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*This study was supported by a 2001-Grant from the Korean Academy of Medical Sciences.

INTRODUCTION

As the age distribution in Korean society has gotten gradually older, the morbidity of cancer in Korea has increased accordingly. This also derives from the increase of smoking, drinking, and air pollution. Since the 1980s, in spite of the substantial expansion of surgical aspect and radiotherapy, significant number of people has still been suffering from cancer, which often ends up with death. The data of cancer registry reports the current status of nationwide cancers under the guidance of central committee of the Korean Cancer Registry in the Ministry of Health and Welfare. However, this implies several limitations because it is focused too much on the diagnosis itself. Thus, in our epidemiologic survey, we intend to develop various items to add, such as classification of anatomical primary site, staging of head and neck cancers, correlation between smoking or drinking and head and neck cancer, double primary cancers, and treatment modality by site and stage. We further expect to accomplish the accuracy and the completion of the survey data by allowing otolaryngologists let input the data, who are in charge of head and neck cancers. We truly hope that we could understand head and neck cancers of Korea systematically and precisely through this data. This understanding could hopefully make analysis of survival rate, and treatment result possible. Finally, we expect that this data could serve as an important sour-

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ce for efficient research, new treatments, early diagnosis, and prophylactic projects on head and neck cancers.

MATERIALS AND METHODS

A registry center was set up, and a computerized program for the head and neck cancer registry was made and distributed to 79 resident-training hospitals nationwide. Patients diagnosed as head and neck cancer were periodically entered to the database of the program by otolaryngologists in each hospital. This collected data was then finally organized and entered to the registration center through the Internet or in disket. This registration program consists of thirty-two items including not only age, sex, address, occupation of patients, but also their past history of drinking and smoking, current cancer stage, concrete primary site, treatment method, and histopathologic type. The entirely reviewed database is finally analysed by following contents;

1. morbidity and cancer stage according to primary site
2. analysis according to age
3. analysis according to sex
4. analysis according to residence
5. analysis according to patterns of smoking and alcohol drinking
6. analysis according to occupation
7. analysis of distant metastasis
8. analysis of double primary cancers
9. analysis according to histopathologic type
10. treatment modality according to primary site

Table 1. Distribution of patients by sex and primary sites

Primary site	Male	Female	Total
Larynx	459 (51.6%)	29 (16.8%)	488 (45.9%)
Oral cavity	112 (12.6%)	63 (36.4%)	175 (16.5%)
Oropharynx	87 (9.8%)	19 (11.0%)	106 (10.0%)
Hypopharynx	99 (11.1%)	2 (1.2%)	101 (9.5%)
Nasopharynx	53 (6.0%)	21 (12.1%)	74 (7.0%)
Paranasal sinuses	33 (3.7%)	13 (7.5%)	46 (4.3%)
Nasal cavity	18 (2.0%)	10 (5.8%)	28 (2.6%)
Unknown primary	18 (2.0%)	4 (2.3%)	22 (2.1%)
Lymphoma	8 (0.9%)	12 (6.9%)	20 (1.9%)
Trachea	2 (0.2%)	0 (0%)	2 (0.2%)
Esophagus	1 (0.1%)	0 (0%)	1 (0.1%)
Total	890 (83.7%)	173 (16.3%)	1,063 (100%)

RESULTS

Analysis of the whole head and neck cancer patients

The head and neck cancer patients were 1,063 in total. The largest proportion of cases arose in the larynx, and it accounted for 45.9% with 488 cases. It was followed by the order of oral cavity with 175 cases (16.5%), oropharynx with 106 cases (10.0%), hypopharynx with 101 cases (9.5%), nasopharynx with 74 cases (7.0%), and paranasal sinuses with 46 cases (4.3%) respectively (Table 1).

Classification by sex

Male patients accounted for 83.7% with 890 cases, and female patients accounted for 17.3% with 163 cases. The distribution by the primary site is shown in Table 1. Larynx cancer in a male patient group and oral cavity cancer in a female patient group occupied the highest distribution respectively.

Classification by age

The age distribution of all patients ranged from 8 to 91 yr with the average of 60.3 yr, and the seventh decade occupied the highest frequency of 36.2% (Table 2). More in detail, the age distribution of male patients ranged from 15 to 91 yr (mean=61.3 yr) with the highest frequency in the seventh decade. That of female patients ranged from 8 to 90 yr with the average of 55.8 yr, and the seventh decade occupied the highest frequency. The distribution of patients by the primary site according to each decade is shown in Table 3.

Classification by place of residence

The distribution of patients by place of residence revealed the highest frequency of 19.4% in Kyong-gi Province. On the other hand, Jeju Province comprised with the lowest frequency of 0.9%.

Analysis by occupation

With regard to the distribution by occupation, patients with no occupation accounted for the highest frequency of 38.6%, followed by farmers of 22.3%, housewives of 7.4%, and businessmen of 7.3%.

Classification by smoking history

Of all the patients, smokers accounted for 37.5% with 399 cases. The distribution by the primary site is shown in Table 4.

Classification by drinking history

When drinking history of all patients was divided into

Table 2. Distribution of patients by each decade of age

sex \ decade	0-9	10-19	20-29	30-39	40-49	50-59	60-69	70-79	80-89	90-99	Total
Male	0 (0%)	0 (0%)	10 (1.1%)	17 (1.9%)	94 (10.6%)	240 (27.0%)	341 (38.3%)	160 (18.0%)	26 (2.9%)	2 (0.2%)	890 (100%)
Female	1 (0.6%)	2 (1.2%)	1 (0.6%)	25 (14.5%)	33 (19.1%)	26 (15.0%)	44 (25.4%)	33 (19.1%)	7 (4.0%)	1 (0.6%)	173 (100%)
Total	1 (0.1%)	2 (0.2%)	11 (1.0%)	42 (4.0%)	127 (11.9%)	266 (25.0%)	385 (36.2%)	193 (18.2%)	33 (3.1%)	3 (0.3%)	1,063 (100%)

Table 3. Distribution of patient by each decade according to primary

sex \ decade	0-9	10-19	20-29	30-39	40-49	50-59	60-69	70-79	80-89	90-99	Total
OC	0 (0%)	1 (0.6%)	2 (1.1%)	16 (9.1%)	37 (21.1%)	41 (23.4%)	45 (25.7%)	26 (14.9%)	6 (3.4%)	1 (0.6%)	175 (100%)
Npx	0 (0%)	1 (1.4%)	3 (4.1%)	8 (10.8%)	15 (20.3%)	12 (16.2%)	22 (29.7%)	12 (16.2%)	1 (1.4%)	0 (0%)	74 (100%)
Opx	0 (0%)	0 (0%)	0 (0%)	5 (4.7%)	13 (12.3%)	36 (34.0%)	32 (30.2%)	15 (14.2%)	4 (3.8%)	1 (0.9%)	106 (100%)
Hpx	0 (0%)	0 (0%)	0 (0%)	0 (0%)	5 (5.0%)	24 (23.8%)	50 (49.5%)	19 (18.8%)	3 (3.0%)	0 (0%)	101 (100%)
Lx	0 (0%)	0 (0%)	0 (0%)	3 (0.6%)	39 (8.0%)	130 (26.6%)	204 (41.8%)	97 (19.9%)	14 (2.9%)	1 (0.2%)	488 (100%)
PNS	0 (0%)	0 (0%)	3 (6.5%)	3 (6.5%)	10 (21.7%)	6 (13.0%)	13 (28.3%)	9 (19.6%)	2 (4.3%)	0 (0%)	46 (100%)
NC	0 (0%)	0 (0%)	1 (3.6%)	2 (7.1%)	4 (14.3%)	9 (32.1%)	6 (21.4%)	4 (14.3%)	2 (7.1%)	0 (0%)	28 (100%)
Lym	1 (5.0%)	0 (0%)	2 (10.0%)	2 (10.0%)	2 (10.0%)	3 (15.0%)	4 (20.0%)	5 (25.0%)	1 (5.0%)	0 (0%)	20 (100%)
UP	0 (0%)	0 (0%)	0 (0%)	2 (9.1%)	1 (4.5%)	5 (22.7%)	8 (36.4%)	6 (27.3%)	0 (0%)	0 (0%)	22 (100%)
T&E	0 (0%)	0 (0%)	0 (0%)	1 (33.3%)	1 (33.3%)	0 (0%)	1 (33.3%)	0 (0%)	0 (0%)	0 (0%)	3 (100%)
Total	1 (0.1%)	2 (0.2%)	11 (1.0%)	42 (4.0%)	127 (11.9%)	266 (25.0%)	385 (36.2%)	193 (18.2%)	33 (3.1%)	3 (0.3%)	1,063 (100%)

P.S., primary site; OC, oral cavity; Npx, nasopharynx; Opx, oropharynx; Hpx, hypopharynx; Lx, larynx; PNS, paranasal sinus; NC, nasal cavity; Lym, lymphoma; UP, unknown primary; T&E, trachea and esophagus.

Table 4. Distribution of patients by primary site according to smoking & drinking

S.&A \ P.S.	OC	Npx	Opx	Hpx	Lx	NC	PNS	Lym	Up	Total
Smoker	47/175	18/74	41/106	62/101	244/488	8/28	8/46	3/20	8/22	439/1,063
	26.9%	24.3%	38.3%	61.4%	50.0%	28.6%	17.4%	15.0%	36.4%	41.3%
Alcoholics	24/175	17/74	22/106	43/101	129/488	4/28	6/46	1/20	3/22	248/1,063
	13.7%	23.0%	20.6%	42.6%	26.4%	14.3%	13.0%	5.0%	13.6%	23.3%

(Pearson chi-sqaure, $p<0.01$). P.S., primary site; S.&A., smoker & alcoholics; OC, oral cavity; Npx, nasopharynx; Opx, oropharynx; Hpx, hypopharynx; Lx, larynx; PNS, paranasal sinus; NC, nasal cavity; Lym, lymphoma; UP, unknown primary.

Table 5. Distribution of patients by treatment modality according to primary site

T.M. \ P.S.	OC	Npx	Opx	Hpx	Lx	PNS	NC	UP	T&E	Lym	Total
S	61 (40.7%)	2 (2.9%)	12 (12.6%)	2 (2.5%)	119 (28.2%)	2 (4.3%)	5 (18.5%)	1 (5.0%)	0 (0%)	0 (0%)	204 (21.5%)
RT	3 (2.0%)	13 (19.1%)	9 (9.5%)	5 (6.2%)	93 (22.0%)	14 (30.4%)	3 (11.1%)	1 (5.0%)	0 (0%)	1 (6.7%)	142 (14.9%)
C	26 (17.3%)	3 (4.4%)	5 (5.3%)	4 (4.9%)	3 (0.7%)	1 (2.2%)	5 (18.5%)	2 (10.0%)	0 (0%)	2 (13.3%)	51 (5.4%)
S+RT	38 (25.3%)	7 (10.3%)	24 (25.3%)	12 (14.8%)	91 (21.6%)	17 (37.0%)	3 (11.1%)	4 (20.0%)	2 (66.7%)	0 (0%)	198 (20.8%)
S+C	2 (1.3%)	0 (0%)	0 (0%)	3 (3.7%)	1 (0.2%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)	1 (6.7%)	7 (0.7%)
S+RT+C	26 (17.3%)	20 (29.4%)	36 (37.9%)	35 (43.2%)	70 (16.6%)	5 (10.9%)	2 (7.4%)	8 (40.4%)	0 (0%)	5 (33.3%)	207 (21.8%)
C+RT	2 (1.3%)	14 (20.6%)	2 (2.1%)	10 (12.3%)	12 (2.8%)	6 (13.0%)	4 (14.8%)	0 (0%)	1 (33.3%)	3 (20.0%)	54 (5.7%)
Bx	16 (10.7%)	9 (13.2%)	7 (7.4%)	10 (12.3%)	33 (7.8%)	1 (2.2%)	5 (18.5%)	4 (20.0%)	0 (0%)	3 (20.0%)	88 (9.3%)
Total	174	68	95	81	422	46	27	20	3	15	951

P.S., primary site; T.M., treatment modality; OC, oral cavity; Npx, nasopharynx; Opx, oropharynx; Hpx, hypopharynx; Lx, larynx; PNS, paranasal sinus; NC, nasal cavity; Lym, lymphoma; UP, unknown primary; T&E, trachea and esophagus; S, surgery; RT, radiotherapy; C, chometherapy; Bx, biopsy.

four levels-never, occasional, moderate, and heavy: the ones who had more than moderate level of drinking history accounted for 23.3% with 248 cases. The distribution by the primary site is shown in Table 4.

Classification by treatment modality

As for the treatment modality, the cases that treated with surgery, radiotherapy, and chemotherapy accounted for the highest frequency of 21.8% with 207 cases. Next, only surgery cases of 21.5%, and surgery with radiotherapy cases of 20.8% were followed in order (Table 5).

Distant metastasis

The cases that had distant metastasis accounted for 2.0% with 21 cases, and the metastasized organ were lung, gastrointestinal tract, bone, and brain in order. Primary sites are shown in Table 6.

Double primary cancer

The cases diagnosed as double primary cancer were numbered at 23 cases, as shown in Table 7, and the unknown primary cancer was with the highest incidence of double primary cancer.

Classification by histopathology

The histological classification were investigated, as shown in Table 10. Squamous cell carcinoma was the major type with 822 cases (89.7%) (Table 8).

Laryngeal cancers

Cancers of the larynx were numbered at 488 cases, which

Table 6. Distribution of patients by distant metastasis according to primary site

OC (175)	Npx (74)	Opx (106)	Hpx (101)	Lx (488)	NC (28)	PNS (46)	UP (22)	Lym (20)	Total (1,063)
1	5	1	3	8	0	1	1	1	21
0.6%	6.8%	0.9%	3.0%	1.6%	0%	2.2%	4.5%	5.0%	2.0%

OC, oral cavity; Npx, nasopharynx; Opx, oropharynx; Hpx, hypopharynx; Lx, larynx; PNS, paranasal sinus; NC, nasal cavity; Lym, lymphoma; UP, unknown primary.

Table 7. Distribution of patients by double primary cancers according to primary site

OC (175)	Npx (74)	Opx (106)	Hpx (101)	Lx (488)	PNS (46)	NC (28)	UP (22)	Lym (20)	Total (1,063)
2	3	2	3	10	1	0	2	0	23
1.1%	4.1%	1.9%	3.0%	2.0%	2.2%	0%	9.1%	0%	2.2%

OC, oral cavity; Npx, nasopharynx; Opx, oropharynx; Hpx, hypopharynx; Lx, larynx; PNS, paranasal sinus; NC, nasal cavity; Lym, lymphoma; UP, unknown primary.

Table 8. Distribution & histologic types of epithelial malignancies

pathology \ P.S.	Lx	Hpx	Opx	OC	Npx	NC	PNS	Total
SCCs	464	86	74	126	21	15	36	822 (89.7%)
Variant	3		2	1	5			11 (1.2%)
Undiff. ca.		2			31	1	1	35 (3.8%)
Adenocarcinoma	1		4	3	1		1	10 (1.1%)
Adenocarcinoma NOS	1		1					2 (0.2%)
Adenoid cystic ca.	1		4	9	3	1	3	21 (2.3%)
Mucoepidermoid ca.			2	5	1			8 (0.9%)
Others			2	1	1	1	2	7 (0.8%)
Total	470	88	89	145	63	18	43	916 (100%)

P.S., primary site; OC, oral cavity; Npx, nasopharynx; Opx, oropharynx; Hpx, hypopharynx; Lx, larynx; PNS, paranasal sinus; NC, nasal cavity; Lym, lymphoma.

Table 9. Distribution of subsite

P.S	Subsites						
Larynx	Glottis 207 (42.4%)	Supraglottis 144 (29.5%)	Transglottic 129 (26.4%)	Subglottis 8 (1.6%)			
Oral cavity	O.T. 87 (49.7%)	F.O.M. 35 (20%)	B.M. 14 (8%)	H.P. 8 (4.6%)	R.T. 6 (3.4%)	A.R 1 (0.5%)	Etc 26 (13.8%)
Nasopharynx	Posterolateral wall 49 (66.2%)	Lateral wall 13 (17.6%)	Inferior wall 12 (16.2%)				
Oropharynx	Tonsil 46 (43.4%)	Tongue base 23 (21.7%)	Soft palate 21 (19.8%)	Etc 16 (15.1%)			
Hypopharynx	Pyriform sinus 77 (76.2%)	Post. pharyngeal wall 9 (8.9%)	Postcricoid 15 (14.9%)				
Paranasal sinus	Maxillary sinus 37 (80.4%)	Sphenoid sinus 5 (10.9%)	Ethmoid sinus 4 (8.7%)	Frontal sinus 0 (0%)			

P.S., primary site; O.T., oral tongue; F.O.M., floor of mouth; B.M., buccal mucosa; H.P., hard palate; R.T., retromolar trigon; A.R., alveolar ridge.

Table 10. Nodal metastasis of each primary site

N.M. \ P.S.	OC	Npx	Opx	Hpx	Lx	PNS	NC	UP	Total
N+	56 (38.9%)	51 (73.9%)	53 (60.2%)	65 (70.7%)	98 (26.7%)	8 (20.5%)	1 (4.5%)	22 (100%)	354 (42.0%)
N-	88	18	35	27	269	31	21	0	489 (58.0%)
Total	144	69	88	92	367	39	22	22	843 (100%)

P.S., primary site; N.M., nodal metastasis; OC, oral cavity; Npx, nasopharynx; Opx, oropharynx; Hpx, hypopharynx; Lx, larynx; PNS, paranasal sinus; NC, nasal cavity; UP, unknown primary.

accounted for 45.9% of total cases. Of all larynx cancer patients, male patients accounted for 94.1% with 459 cases; female patients accounted of 5.9% with 29 cases. Larynx cancer accounted for 51.6% of all male patients, and 16.8% of all female patients (Table 1).

The age distribution of all the larynx cancer patients ranged from 30 to 90 yr with the average of 62.8 yr, and the seventh decade occupied with the highest frequency (Table 3). More in concrete, the age distribution of the male patients ranged from 30 to 90 yr with the average of 62.7 yr, and the seventh decade occupied with 42.5%, which turned out to be the highest frequency. Unlike male patients, age of female patients ranged from 38 to 89 yr with the average of 63.3 yr. Also, the highest frequency resulted in 34.5% in the seventh decade as well.

The smokers accounted for 50.0% with 244 cases of all 488 larynx cancer cases, which was equivalent to 61.2% of the head and neck cancer patients who had smoking history (Table 6). With the reference to those four levels of drinking history mentioned above, the patients who had more than moderate level of drinking were numbered at 129 cases, and this was equivalent to 26.4% of all 488 larynx cancer cases.

The distribution by each subsite of larynx was investigated, as shown in Table 9. Glottic cancer occupied the highest frequency of 42.4% with 207 cases, followed by supraglottic, transglottic, and subglottic cancers were in order.

As for the treatment modality, the cases that were treated with only surgery occupied with the highest frequency of 28.2 % with 119 cases. Next was only radiotherapy cases that accounted for 22.0% with 93 cases (Table 5).

The cases accompanied by distant metastasis occupied with 1.6% (8 cases), and the metastasized site were the lung (4 cases), gastrointestinal tract (2 cases), and bone (2 cases) (Table 6). The cases proved as double primary cancer numbered 10 cases (2.0%), and other primary sites were thyroid gland, lung, gastrointestinal tract and prostate (Table 7).

Oral cavity cancers

Oral cavity cancers were 175 cases and accounted for 16.5% of total cases. Of the oral cavity cancer patients, 64% was male with 112 cases, and female patients accounted for 36.0% with 63 cases. Oral cavity cancer accounted for 12.6% of male patients, and 36.4% of female patients respectively (Table 1).

The age distribution of the oral cavity cancer patients ranged from 15 to 90 yr, with the average of 56.7 yr of age. The seventh decade had the highest frequency by occupying 25.7% of all (Table 3). More in detail, the age distribution of the male patients ranged from 23 to 87 yr with the average of 57.3 yr, and the seventh decade occupied with the highest frequency of 27.2%. In female patients, age ranged from 15 to 90 yr with the average of 55.8 yr, and also had the highest frequency of 23.8% in the seventh decade .

The patients with smoking history numbered 47 cases, and was equivalent to 26.9% of the oral cavity cancer patients and 11.8% of the head and neck cancer patients with smoking history, respectively. The patients who had more than moderate level of drinking history were numbered at 24 cases, which was equivalent to 13.7% of the oral cavity cancer patients, and 9.7% of the head and neck cancer patients whit drinking history, respectively.

The distribution by each subsite of oral cavity is shown in Table 9. Tongue cancers occupied with the highest frequency of 49.7% with 87 cases, followed by floor of mouth, and buccal mucosa.

As for the classification by the treatment modality, as shown in Table 7, the cases that were treated with only surgery occupied with the largest portion of 40.7% with 61 cases. It was followed by surgery with radiotherapy occupying 25.3% with 38 cases.

One case was accompanied by distant metastasis into the lung (Table 6), and the cases diagnosed as double primary cancer numbered 2 cases, with larynx and gastrointestinal tract (Table 7).

Nasopharyngeal cancers

Nasopharyngeal cancers were 74 cases and accounted for 7.0% of total cases. Of the nasopharynx cancer patients, 71.6% was male with 53 cases, and the female occupied 28.4% with 21 cases. Nasopharynx cancer patients accounted for 6.0% of male patients, and 12.1% of female patients, respectively (Table 1).

The age distribution of all nasopharynx cancer patients ranged from 12 to 81 yr with the average of 54.1 yr of age, and the seventh decade occupied with the highest frequency of 29.7% (Table 3). More in detail, the age distribution of the male patients ranged from 24 to 81 yr with the average of 54.9 yr, and the seventh decade occupied with the highest frequency of 28.3%. That of female patients ranged from 12 to 74 yr with the average of 52.0 yr.

The patients with smoking history were numbered at 18 cases, which was equivalent to 24.3% of nasopharynx cancer patients, and 4.5% of head and neck cancer patients with smoking history, respectively (Table 4). The patients with more than moderate level of drinking history were numbered at 17 cases, which was equivalent to 23.0% of the nasopharynx cancer patients, and 6.9% of the head and neck cancer patients with drinking history, respectively (Table 4).

The subsites of nasopharynx were divided into following three categories: posterosuperior wall, lateral wall, and inferior wall. The distribution by each subsite of nasopharynx is shown in Table 9. Posterosuperior wall occupied wih the highest frequency of 49 cases, followed by lateral wall, and inferior wall in order.

As for the classification by the treatment modality, as shown in Table 5, the cases that treated with surgery with radiotherapy and chemotherapy occupied the highest of 29.4% with 20 cases, followed by radiotherapy and chemotherapy 20.6% with 14 cases, radiotherapy 19.1% with 13 cases.

The cases accompanied by distant metastasis accounted for 6.8% with 5 cases, and the metastasized organ were the lung, gastrointestinal tract and bone (Table 6). And, the cases diagnosed as double primary cancer were numbered at 3 cases, with the lung (2 cases) and stomach (Table 7).

With regard to the distribution by the histological classification of nasopharynx cancers undifferentiated carcinoma occupied with the highest frequency of 31 cases, followed by squamous cell carcinoma of 21 cases.

Oropharyngeal cancers

Oropharyngeal cancers were 106 cases and accounted for 10.0% of total cases. 82.1% of the oropharynx cancer patients was male with 87 cases, and the female occupied with 17.9% with 19 cases. Oropharynx cancer patients accounted for 9.8 % of male patients, and 11.0% of female patients, respectively (Table 1).

The age distribution of all the oropharynx cancer patients

ranged from 31 to 91 yr with the average of 59.7 yr, and occupied with the highest frequency of 34.0% in the sixth decade (Table 3). More in detail, the age distribution of the male patients ranged from 38 to 91 yr with the average of 60 yr, and the sixth decade occupied with the highest frequency of 33.0%. That of female patients aged from 31 to 87 yr had the average of 58 yr, and the sixth decade also occupied the highest frequency of 36.8%.

The patients with smoking history were numbered at 41 cases, which was equivalent to 38.3% of the oropharynx cancer patients and 10.3% of the head and neck cancer patients with smoking history, respectively. The patients with drinking history were numbered at 22 cases, which was equivalent to 20.6% of the oropharynx cancer patients, and 8.9% of the head and neck cancer patient with drinking history, respectively (Table 4).

With regard to the distribution by each subsite of oropharynx, as shown in Table 9, tonsil occupied with the highest frequency of 43.4% with 46 cases, followed by tongue base, and soft palate in order.

As for the classification by the treatment modality, as shown in Table 5, the cases that treated with surgery with radiotherapy and chemotherapy occupied with 37.9% with 36 cases, followed by surgery and radiotherapy occupying 25.3% with 24 cases.

One case accompanied by distant metastasis into the lung (Table 6). And, the cases diagnosed as double primary cancer were numbered at 2 cases, with colon cancer and renal cell cancer of kidney (Table 7).

Hypopharyngeal cancers

Hypopharyngeal cancers were 101 cases and accounted for 9.5% of total cases. As much as 98.0% of the hypopharynx cancer patients was male with 99 cases, and the female occupied only 2.0% with 2 cases. Hypopharynx cancer patients accounted for 11.1% in the male patients, and 1.2% of the female patients, respectively (Table 1).

The age distribution of all the hypopharynx cancer patients ranged from 40 to 83 yr with the average of 64.0 yr of age, and the seventh decade occupied with the highest frequency of 49.5% (Table 3). More in detail, the age distribution of the male patients ranged from 41 to 83 yr with the average of 64.2 yr of age, and the seventh decade occupied with the highest frequency of 50.5%.

The patients with smoking history were numbered at 62 cases, which was equivalent to 61.4% of the hypopharynx cancer patients, and 15.5% of the head and neck cancer patients with smoking history, respectively. The patients with alcohol abuse history were numbered at 43 cases, which was equivalent to 42.6% of the hypopharynx cancer patients, and 17.3% of the head and neck cancer patient with drinking history, respectively (Table 4).

Piriform sinus occupied the highest frequency of 76.2% with 77 cases, followed by postcricoid, and posterior pharyngeal wall in order (Table 9).

As for the classification by the treatment modality, the cases that treated with surgery with radiotherapy and chemotherapy occupied with the largest portion of 43.2% with 35 cases. It was followed by surgery with radiotherapy occupying 14.8% with 12 cases (Table 5).

The cases accompanied by distant metastasis occupied with 3.0% with 3 cases. The metastasized organ were lung, brain and gastrointestinal tract (Table 6). The cases diagnosed as double primary cancer were numbered at 3 cases with soft palate and stomach (2 cases) (Table 7).

Paranasal sinuses cancers

Paranasal sinuses cancers were 46 cases and accounted for 4.3% of total cases. Of the paranasal sinus cancer patients 71.7% was male with 33 cases, and the female occupied with 28.3% with 13 cases (Table 1).

The age distribution of all the paranasal sinus cancer patients ranged from 27 to 87 yr with the average of 61.7 yr of age, and occupied with the highest frequency of 28.3% in the seventh decade (Table 3). More in detail, the age distribution of the male patients ranged from 27 to 87 yr with the average of 63.2 yr, and the seventh decade occupied with the highest frequency of 33.3%. That of female patients aged from 35 to 80 yr had the average of 59.3 yr of age, and the fifth decade occupied with the highest frequency of 27.0%.

The patients with smoking history were numbered at 8 cases, which was equivalent to 17.4% of the paranasal sinus cancer patients. The patients with drinking history numbered 6 cases, which was equivalent to 13.0% of the paranasal sinus cancer patients (Table 4).

With regard to the distribution by each subsite of paranasal sinuses, as shown in Table 9, maxillary sinus occupied with the highest frequency of 80.4% with 37 cases, followed by the order of sphenoid and ethmoid sinus.

As for the classification by the treatment modality, the cases that treated with surgery and radiotherapy occupied with the largest portion of 37.0% with 17 cases. It was followed by radiotherapy occupying 30.4% with 14 cases (Table 5).

One case accompanied by distant metastasis into the gastrointestinal tract (Table 6). The cases diagnosed as double primary cancer numbered 1 case with the stomach (Table 7).

Nasal cavity cancers

Nasal cavity cancers were 28 cases and accounted for 2.6% of total cases. Of the nasal cavity cancer patients 64.3% was male with 18 cases, and the female occupying 35.7% (10 cases) (Table 1).

The age distribution of all the nasal cavity cancer patients ranged from 26 to 87 yr with the average of 58.8 yr of age, and occupied with the highest frequency of 32.1% in the sixth

decade (Table 3). More in detail, the age distribution of the male patients ranged from 26 to 87 yr with the average of 59.6 yr, and the sixth decade occupied with the highest frequency of 38.9%. That of female patients aged from 35 to 83 yr had the average of 57.0 yr of age.

The patients with smoking history were numbered at 8 cases, which was equivalent to 28.6% of the nasal cavity cancer patients. And, the patients with drinking history were numbered at 4 cases, which was equivalent with 14.3% of the paranasal sinus cancer patients (Table 4).

As for the classification by the treatment modality, the cases that were treated with surgery and the cases that were treated with chemotherapy occupied with the largest portion of 18.5% with 5 cases (Table 5).

DISCUSSION

By sex, head and neck cancer patients composed of 83.7% in male and of 16.7% in female. male:female sex ratio, 5:1. It was observed that the male patients had markedly high frequency especially in hypopharynx (98.0%), larynx (94.1%), and oropharynx (82.1%) cancers. Muir et al. (1) had reported that the ratio of male to female was 2:1 in the research on the cases of upper aerodigestive tract cancers. The male:female sex ratio of our study turned out to be 5:1. This can verify that head and neck cancers are much more common among males in Korea than in western countries.

Age distribution of the all patients ranged from 8 to 91 yr with the average of 58.8 yr of age, and the seventh decade accounted for the highest incidence of 36.2%, followed by 25.0% in the sixth decade, and 18.2% in the eighth decade. With regard to the age distribution by each primary site, the seventh decade occupied with the largest proportion in all primary sites except oropharynx and nasal cavity cancers (sixth decade) (Table 2). The male patients accounted for the highest frequency of 38.3% in the seventh decade. Also, in the female patients, the seventh decade was in the lead with 25.4%.

As for the distribution by a residential area, Kyonggi Province and Seoul accounted for 19.4%, and 18.3%, respectively. Jeju Province, in contrast, showed the lowest distribution (0.9%) in this respect. At the time of diagnosis, the patients who had no job accounted for 38.6%, which turned out to be the highest frequency in the survey of the distribution by occupation. This result could account for the fact that there were large number of the elderly patient included in the survey, who were likely to be retired already. Next, farmers of 22.3%, housewives of 7.4%, and businessmen of 7.3% followed in order.

With regard to the distribution by primary site, larynx comprised the highest frequency of 45.9% with 488 cases, followed by the order of oral cavity of 175 cases (16.5%), oropharynx of 106 cases (10.0%), hypopharynx of 101 cases (9.5%), nasopharynx of 74 cases (7.0%), and paranasal sinuses of 46 cases (3.1%). This result is not so much different as the research of Cho et al. (2) on upper aerodigestive tract cancers in Korea. In a group with male patients, larynx cancer had the largest proportion of 51.6% with 459 cases as in the whole patients group, followed by the order of oral cavity (12.6%), hypopharynx (11.1%), and oropharynx (9.8%). On the other hand, oral cavity cancer had the largest proportion of 36.4% in a female patient group, and larynx (16.8%), nasopharynx (12.1%), oropharynx (11.0%) followed in order.

Tobacco and alcohol abuse have been considered as risk factors for many of the epithelial malignancies of the upper aerodigestive tract (3-5). In our survey, the patients who had smoking history accounted for 41.3% of total with 439 cases. Among head and neck cancers, especially hypopharynx and larynx cancers, patients showed the high percentage of 61.4% and 50.0% in smoking history. These two primary site cancers had statistically significant relationships with smoking than other primary sites had (Pearson chi-square, $p<0.01$). The patients who had more than moderate level of drinking history were numbered at 248 cases, which was equivalent to 23.3% of all. Hypopharynx and larynx cancers also had the high percentage of 42.6% and 26.4% in drinking history, which also could explain statistically significant relationships between those two cancers and alcohol abuse (Pearson chi-square, $p<0.01$), just as with smoking history.

As for the treatment modality to all patients, the following turned out to be facts: the cases treated with only surgery of 204 cases (21.5%), only radiotherapy of 142 cases (14.9%), only chemotherapy of 51 cases (5.4%), surgery with radiotherapy of 198 cases (20.8%), surgery with chemotherapy of 7 cases (0.7%), and surgery, radiotherapy, and chemotherapy of 207 cases (21.8%). Accordingly, the cases including surgery for the treatment turned out as much as 64.8%. In conclusion, we were able to ascertain that the surgery-related treatments were predominant in the field of the current treatment for head and neck cancers, even if there should be a little difference of the treatment modality according to primary sites. As for each primary site, the cases treated with only surgery occupied with the highest frequency in oral cavity, larynx. On the other hand, in nasopharynx, oropharynx, and hypopharynx, the cases treated with surgery, radiotherapy and chemotherapy occupied the highest frequency.

Either only surgery or radiotherapy was the main treatment modality in the case of stage I, II larynx cancers, but combined therapy of either surgery with radiotherapy or surgery, radiotherapy, and chemotherapy was dominant treatment modality in advanced stage; stage III, IV. On the other hand, the combined therapy was the main treatment modality in hypopharynx cancer regardless of stage.

Squamous cell carcinoma accounted for 89.7% of all. Moreover, cancers larynx (98.1%), hypopharynx (97.7%), oral cavity (81.8%) were mostly due to squamous cell carcinoma.

Of all patients, 21 cases were found to be metastasized at the time of diagnosis into the lung, gastrointestinal tract, bone,

or brain, and the T-stage of primary tumor that had distant metastasis turned out to be as follows; stage I of 1 case, stage II of 6 cases, stage III of 7 cases, and stage IV of 7 cases.

Coexisting second primary malignancies were found in 4-8% of the patients who had one head and neck primary malignancy (6). Additionally, 20-25% of the patients with head-and-neck primary malignancies developed a second cancer within 5 yr (6). In our research, 23 cases were diagnosed as double primary cancers, and the number was equivalent to 2.0% of all the patients (Table 7). Other involved primary sites were gastrointestinal tract (8 cases), lung (4 cases), head and neck area (3 cases), kidney (2 cases), and skin (1 case).

At the time of diagonosis 354 cases had cervical lymph node metastasis comprising 42.0% of all the patients. Nasopharynx occupied with the highest frequency of 73.9% of all, and hypopharynx of 70.7%, and oropharynx 60.2% followed next in order (Table 10).

With regard to the distribution and frequency of the subsite by each primary site, glottis comprised the highest frequency of 42.4%, followed by supraglottis of 29.5%, and transglottic cancer of 26.4% in order. Concerning oral cavity, tongue accounted for 49.7% with 87 cases, followed by floor of mouth of 20%, and buccal mucosa of 8% in order. As for oropharynx, tonsil accounted for the highest frequency of 43.4% with 46 cases, and this was followed by tongue base of 21.7%, and soft palate of 19.8% in order. Piriform sinus had the largest proportion of 76.2% with 77 cases in hypopharynx, and the following postcricoid of 14.9%, and posterior pharyngeal wall of 8.9% were observed in order.

The cancer registry is a very meaningful project, considering that it could serve as the prophylaxis and treatment of cancers, and that it could play a basic role for people's welfare. However, the epidemological survey on head and neck cancers by otorhinolaryngologists only took a first step as of now. So, there were a few trials and tribulations while we were taking this survey: for instance, the cases recorded incompletely, the problem failed to fill up the treatment modality including neck dissection, and so forth. However, we expect this survey to be played as a key role for basic data, if the content of data is more and more developed and qualified toward completion. Additionally, if we pay a careful attention to follow-up of these patients, we could expect to acquire more useful data such as the treatment result and survival rate of head and neck cancers, and separated, more detailed analysis of each specific anatomical site is required to identify the distinctive pattern of each primary head and neck cancer.

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