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Malignancies in Korean Patients with Inflammatory Myopathy

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The aim of this study was to assess the prevalence and the common type of malignancies in Korean patients with polymyositis (PM) and dermatomyositis (DM) and to evaluate the differences of clinical and laboratory findings between patients with malignancy and those without malignancy. Forty-one Korean patients, who were diagnosed as PM or DM, were enrolled in this study. They fulfilled the Bohan and Peter's criteria for a definite diagnosis of PM and DM. Patients with PM were 25 and those with DM were 16. Eleven out of 41 patients (26.8%) had malignancies. The malignancy was diagnosed simultaneously or later in 81.8% of patients with inflammatory myopathy (IM). The breast cancer was the most common malignancy. In this study, forty three years old as a screening age for malignancy had 88.9% sensitivity and 50.2% specificity. The serum levels of creatine kinase (CK) were significantly lower in patients with malignancy than those without malignancy.

Key Words: Dermatomyositis, polymyositis, malignancy

INTRODUCTION

It has been reported that the malignancy in the inflammatory myopathy (IM) could be caused by a part of the clinical course of IM itself, and another part of paraneoplastic syndrome.[1] However, the accurate mechanisms for their relations have not been proved yet.[2] A number of cases have been reported since the report on gastric cancer as the first malignancy related with polymyositis (PM) by Stertz in 1916.[3] The previous studies have reported that the prevalence of malignancies in IM ranged from 4 to 42%, and were exhibited more highly in the patients with dermatomyositis (DM) than those with PM.[4]

However, few data have been reported in Asian ethnic groups.[5-7] Several cases of malignancies in patients with IM were also reported in Korea,[8,9] but they were insufficient to evaluate the prevalence or types of the malignancies in Korean patients. Therefore, we sought to investigate the prevalence and the common types of the malignancies in the Korean patients who were diagnosed as IM and to evaluate the differences of clinical and laboratory findings between patients with malignancy and those without malignancy.

MATERIALS AND METHODS

The subjects of this study were 41 patients who were diagnosed as PM or DM at Yonsei University Medical Center, Seoul, Korea from January 1995 to January 2003. All patients fulfilled the Bohan and Peter's criteria for a definite diagnosis of PM and DM.[10] There were 25 patients with PM and 16 patients with DM. The diagnosis of malignancy with PM or DM was limited to the cases that were definitely proved on the pathology.

All patients were retrospectively investigated into age, sex, types of IM, clinical manifestations and laboratory findings through the medical records. The patients with malignancies were analyzed into the primary organs of the malignancy, the period between the diagnosis of IM and that of malignancy, and the causes of death.

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Laboratory findings included creatine kinase (CK), lactate dehydrogenase, aspartate transaminase, alanine transaminase, erythrocyte sedimentation rate (ERS, Westergren method), and C-reactive protein (CRP). All laboratory data were represented as levels at the time of diagnosis of PM or DM.

Statistical analysis

All statistical analyses were conducted using SPSS package for Windows (version 10.0). The data were represented as mean ± SD, and the comparison between the patients with malignancy and those without malignancy was examined using Mann-Whitney U test and chi-square test. The age requiring the screening test for the malignancy in the patients with IM was presumed using the receiver operation characteristic curve.

RESULTS

Patient's characteristics

Of 41 patients diagnosed as IM, patients with PM were 25 (9 men and 16 women) and those with DM were 16 (4 men and 12 women). The mean age at the diagnosis of IM was 43.7 ± 16.3 years (38.3 ± 16.0 for men and 46.1 ± 16.1 for women) (Table 1).

Malignancy and inflammatory myopathy

Eleven of 41 patients were diagnosed as malignancies (5 men and 6 women) including 6 patients with PM and 5 patients with DM. The prevalence of malignancy in total patients with IM was 26.8% (24% in patients with PM and 31.3% in those with DM). The mean age at the diagnosis of malignancy was 50.1 ± 12.6 years old (range, 31 to 76) (Table 1).

Table 1. Characteristics of 41 Patients with Polymyositis and Dermatomyositis

	Polymyositis		Dermatomyositis		Total
	With malignancy	Without malignancy	With malignancy	Without malignancy	
Patients (n)	6	19	5	11	41
Men	3	6	2	2	13
Women	3	13	3	9	28
Age*					
Male	9.0 ± 7.0	31.8 ± 12.2	63.5 ± 17.7	32.0 ± 29.7	38.3 ± 16.0
Female	53.3 ± 10.5	44.1 ± 13.9	47.7 ± 4.7	46.2 ± 23.0	46.1 ± 16.1
Laboratory findings					
CK†	2289.5 ± 2245.5	4235.0 ± 3.0	360.0 ± 222.8	1422.3 ± 2197.3	2723.2 ± 2998.4
ESR	27.2 ± 16.5	41.7 ± 33.2	20.4 ± 15.5	17.4 ± 10.8	30.5 ± 26.6
CRP	3.3 ± 6.0	1.2 ± 3.2	2.0 ± 2.1	0.2 ± 0.4	1.4 ± 3.3
LDH	631.7 ± 561.1	1031.9 ± 889.3	302.4 ± 260.0	772.9 ± 427.5	814.9 ± 713.0
AST	85.7 ± 81.6	150.4 ± 103.3	40.4 ± 16.1	80.1 ± 62.3	108.6 ± 91.4
ALT	71.0 ± 105.8	148.3 ± 121.6	17.6 ± 6.1	49.4 ± 22.6	94.5 ± 104.6
Incidence of malignancy	24.0%		31.3%		26.8%
Death (n)	3		1		4

CK, creatine kinase (IU/L); ESR, erythrocyte sedimentation rate (mm/hour); CRP, C-reactive protein (mg/dL); LDH, lactate dehydrogenase (IU/L); AST, aspartate transaminase (IU/L); ALT, alanine transaminase (IU/L).

*Mean age at diagnosis of inflammatory myopathy (years).

† CK in inflammatory myopathy with malignancy = 1412.5 ± 568.6 and CK in inflammatory myopathy without malignancy = 3203.8 ± 585.5, $p < 0.05$.

Table 2. Clinical and Laboratory Data of 11 Patients with Polymyositis and Dermatomyositis at Diagnosis of Malignancy

Case	Sex*	Age†	CK	ESR	CRP	LDH	AST	ALT	Myositis	Organ	Duration‡	Survival	Cause of death
1	M	44	3996	43	15	1141	87	45	PM	Thyroid	0	S	-
2	M	31	17	23	4.1	234	18	14	PM	Thymus	11	S	-
3	M	41	3950	13	0	243	74	23	PM	Liver	-4	S	-
4	M	51	229	13	1	452	48	24	DM	Nasopharynx	4	S	-
5	M	76	478	42	3.5	151	40	12	DM	Stomach	0	S	-
6	F	46	35	14	0	125	16	12	DM	Breast	0	S	-
7	F	43	578	30	0.6	690	60	24	DM	Breast	-12	S	-
8	F	53	480	3	5	94	38	16	DM	Breast	0	D	Bone and liver metastasis
9	F	43	4966	20	0.6	1521	244	285	PM	Pleura	0	D	Aspiration pneumonia
10	F	53	177	12	0	209	33	14	PM	Lung	0	D	Pneumonia
11	F	68	631	52	0.1	442	58	45	PM	Bladder	51	D	Sepsis

CK, creatine kinase (IU/L); ESR, erythrocyte sedimentation rate (mm/hour); CRP, C-reactive protein (mg/dL); LDH, lactate dehydrogenase (IU/L); AST, aspartate transaminase (IU/L); ALT, alanine transaminase (IU/L); PM, polymyositis; DM, dermatomyositis; S, survival; D, deceased.

*M, male; F, female.

† Age at diagnosis of malignancy (years).

‡ Duration from the diagnosis of myositis to that of malignancy (months).

The mean period from the diagnosis of IM to the diagnosis of malignancy was 4.5 ± 16.3 months (range, -12 to 51). Of these patients, 2 patients were previously diagnosed as malignancy before the diagnosis of IM, 6 patients were simultaneously diagnosed as malignancy and IM, and 3 patients were diagnosed as IM and then as malignancy.

The PM-patients group included each 1 case of thyroid cancer, thymoma, hepatoma, pleural cancer, lung cancer and bladder cancer, and the DM-patients group had 3 cases of breast cancer and each 1 case of gastric cancer and nasopharynx cancer. Women showed the breast cancer most frequently as shown in 3 cases, and then each 1 case of lung cancer, bladder cancer, and pleural cancer. Men exhibited each 1 case of gastric cancer, nasopharynx cancer, hepatoma, thyroid cancer, and thymoma (Table 2).

Four out of 11 IM patients with malignancies were died, and the causes of death were due to aspiration pneumonia, sepsis due to pneumonia, sepsis of unknown etiology, and bony and hepatic metastasis of primary tumor.

Clinical and laboratory findings between malignancy and inflammatory myopathy

At the diagnosis of IM, the mean level of serum CK was significantly lower as 1412.5 ± 568.6 IU/L in the malignancy group than 3203.8 ± 585.5 IU/L in the non-malignancy group ($p < 0.05$). The mean levels of other enzymes originated from muscle in the malignancy group were also lower than those in the non-malignancy group, but there was no statistical significance (p values of LDH, AST and ALT were 0.12, 0.23, and 0.28, respectively). Moreover, comparison between malignancy and non-malignancy groups in each myositis type showed no significant difference except CK level.

Assessment of age for screening of malignancy

When the cut-off value for screening of malignancy in the patients with IM was set up as 43 years old, the sensitivity of the detection for malignancy was 88.9% and the specificity was 50.2%. When the cut-off value was set up as 50 and 60 years old, the sensitivity was shown to be 55.6% and 22.2% each and the specificity was 75.4% and 89.6%, respectively (area = 0.785, 95% confidence interval = 0.599~0.971 and significance, $p = 0.01$).

DISCUSSION

The prevalence of malignancy in the patients

with IM has been diversely reported in the range of 4 - 42%, and more frequently reported in the patients with DM than in those with PM.[4] According to the Cohort study conducted in Sweden, Denmark and Finland by Hill et al., the malignancies were found in 198 out of total 618 patients with DM as showing 32% of malignancy prevalence.[11] In this study, malignancies were accompanied in 26.8% of the patients with IM, in the concrete, in 24% of patients with PM and 31.3% of patients with DM. The patients with DM generated higher prevalence of malignancies. This result was similar to 32% shown in the study of Hill et al.,[11] but was higher than 15.3% of Mebazaa et al. conducted in Tunisia.[12] Wakata et al. reported 18.8% of the prevalence of malignancies in the Japanese patients with IM,[5] and Chen et al. found 18% of the prevalence of malignancy in 91 patients with DM in Taiwan,[6] which showed lower prevalence than that of our study.

According to Buchbinder et al., the malignancy was simultaneously or later diagnosed in 74% of the patients with IM, and was previously found before the diagnosis of IM in 26% of them.[2] Of the patients in this study, the malignancy was simultaneously or later diagnosed in 81.8% of patients with IM, and was diagnosed before diagnosis of IM in 18.2% of them.

The mean age of patients with IM at the diagnosis of malignancy was 50.1 ± 12.6 years. This was not significantly different from 49.6 years reported by Mebazaa et al.,[12] but was younger than 62.1 years by Wakata et al.[5]

Since the patients with IM have the tendency to accompany malignancy, the screening test for malignancy should be emphasized. However, performing the screening test for all patients with IM is inefficient and uneconomical, and therefore, it is necessary to set up the age requiring the screening test. According to our study with Korean patients with IM, when the cut-off value of age for the screening test of malignancy was set up as 43 years, the sensitivity of the detection for malignancy was 88.9% and the specificity was 50.2%. The screening test for the malignancy might be necessary for the Korean patients with IM aged over 43 years. In addition, the risk for malignancy in patients with IM has been reported to be highest within first year after diagnosis of IM, decrease with time, and disappeared beyond 5 years.[2,11] Our study showed the diagnosis of malignancies in 8 of 11 patients with IM simultaneously or within first year as well. Thus, screening work up for malignancy in patients over 43 years old should be performed as early as possible after the diagnosis of IM.

The types of malignancies occurring in IM have been variously reported according to locations and races. Europe shows high prevalence of cancers in the ovary, lung, and gastrointestinal tract, in patients with IM.[11,13] According to Hill et al., the most frequent malignancy in patients with DM was ovarian cancer, and the next frequent malignancies were lung cancer, pancreas cancer, non-Hodgkin's lymphoma, gastric cancer and colon cancer in order.[11] In addition, patients with PM exhibited non-Hodgkin's lymphoma most frequently, and then, lung cancer and bladder cancer. Chow et al. reported that the most frequent malignancy was ovarian cancer in patients with DM and malignancies in the lymph nodes or hematopoietic organs in the patients with PM.[13] In contrast, Asia showed a high correlation between nasopharynx cancer and DM. Chen et al. reported that the most frequent malignancy related to DM in Taiwan was nasopharynx cancer, and then the next one was lung cancer.[6] A study in Singapore also reported that the nasopharynx cancer was the most frequent malignancy.[7] However, in the present study with the Korean patients, breast cancer was most frequently accompanying malignancy. According to Korean Central Cancer Registry program in 2000,[14] the frequent malignancies in Korea were gastric cancer, hepatic cancer, lung cancer, colon cancer, and bladder cancer in men, and gastric cancer, breast cancer, cervix cancer, colon cancer, and thyroid cancer in women in order. Although, in this study, the frequency of malignancy in IM was not corresponding to the order of the frequency of malignancy in Koreans, since the frequency and type of leading malignancies has ethnic diversity, we suggest that the protocol of screening work up should aim at those developing frequently in each race. Indeed, considering those leading malignancies in Korea, we have performed chest CT, abdomen-pelvis CT, upper and lower gastrointestinal endoscopies, mammography, gynecologic evaluations, and

neck ultrasonography for early detection of hidden malignancy in Korean patients with inflammatory myositis.

The clinical manifestations and laboratory findings except CK between the patients with malignancy and those without malignancy were not significantly different in this study. The serum levels of CK were significantly lower in the malignancy group. Lakhanpal et al. have also reported that the mean of the maximal levels of CK in patients with polymyositis-dermatomyositis and an associated malignant disease was lower than those without cancer, however, its mechanism has not been proven yet.[15]

In summary, the prevalence of malignancy in Korean patients with IM was 26.8%. The breast cancer was the most common malignancy. The clinical manifestations and laboratory findings were not significantly different except CK between the patients with malignancy and those without malignancy.

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