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Spontaneous pain in patients with maxillary sinus carcinoma in relation to T-classification and direction of tumour spread

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Abstract

Spontaneous pain was one of many complaints on initial examination of 845 patients with maxillary sinus carcinoma. The pain was analysed; cheek, teeth, head and eye pain were compared with the T-classification and the anterior-posterior direction of invasion. The incidence of the cheek, teeth, head and eye pain was 48, 39, 29 and 23 per cent respectively. The incidence of both the cheek and teeth pain was increased according to the advancement of T-classification and invasion towards the posterior. Head and eye pain was often referred. In the localized posterior group which tend to be diagnosed late, spontaneous pain occurred in 15 to 48 per cent of the patients. Maxillary sinus carcinoma should always be a differential diagnosis in patients with unclear cheek, teeth, head and eye pain. A careful investigation should be performed in order to diagnose malignant diseases as early as possible.

Introduction

Innervation of the maxillary sinus is derived from the maxillary nerve via its infraorbital and posterior, middle and anterior superior alveolar branches (Berkovitz and Moxham, 1988). The maxillary nerve is the second division of the trigeminal nerve and gives off the middle meningeal nerve directly after its origin from the trigeminal ganglion. The ophthalmic nerve (first division of the trigeminal nerve) innervates the bulb of the eye, and gives off a recurrent filament to the dura mater (Clemente, 1985). Therefore maxillary sinus carcinoma causes spontaneous pain which can be located in the cheek, teeth, head and eye, as a result of direct involvement or as radiated or referred pain. In the present study, we have made it clear that there is a relation between spontaneous pain and T-classification or direction of invasion in patients with maxillary sinus carcinoma. This helps to diagnose maxillary sinus carcinoma as early as possible.

Materials and methods

The subjects included in this study total 845 patients with untreated maxillary sinus carcinoma whose treatment began between 1957 and 1982 at two institutions (Osaka University Hospital and Osaka Kaisei Hospital). The diagnosis was confirmed histologically in all cases. The clinical diagnosis was made on the basis of physical findings, X-ray tomograms and computed tomography (CT) scans. TNM-classification was performed according to UICC (1987) and the anterior-posterior direction of invasion was divided into four groups which included a localized tumour in the maxillary sinus group, an anterior group, a posterior group, and a both anterior and posterior group according to tomography, CT and surgical findings. Of the many complaints presented on initial consultation, spontaneous pain was analysed. Cheek, teeth, head and eye pain were compared with the T-classification and the anterior-posterior direction of invasion using the chi-square test.

Results

The relation between spontaneous pain and the T-classification is listed in Table I and the relation between the spontaneous pain and the anterior-posterior direction of invasion is listed in Table II.

Cheek pain

Cheek pain occurred in 404/845 (48 per cent) of the patients and increased from 31 to 53 per cent according to the advancement of the T-classification. There was a significant difference in pain incidence between T_2 and T_3 ($p < 0.02$) and between T_2 and T_4 ($p < 0.01$).

The incidence of cheek pain also increased from 31 to 56 per cent according to the localized, the anterior, the posterior, and both anterior and posterior groups, respectively. It tended to be higher in the posterior than in the anterior group. However, the difference was not significant.

Teeth pain

Teeth pain occurred in 325/845 (39 per cent) of the patients and increased from 23 to 44 per cent according to the advancement of the T-classification. The difference in pain incidence between T_2 and T_4 was significant ($p < 0.01$).

The incidence of teeth pain also increased from 23 to 52 per cent according to the localized, the anterior, the posterior, and both anterior and posterior groups respectively.

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TABLE I

RELATION BETWEEN SPONTANEOUS PAIN AND T-CLASSIFICATION IN PATIENTS WITH MAXILLARY SINUS CARCINOMA

	Cases	Cheek pain			Teeth pain		Head pain	Eye pain		
T1	13	4 (30.8)*			3 (23.1)		2 (15.4)	2 (15.4)		
T2	205	79 (38.5)	c	b	64 (31.2)	b	57 (27.8)	28 (13.7)	c	a
T3	324	161 (49.7)			124 (38.3)		87 (26.9)	73 (22.5)		
T4	303	160 (52.8)			134 (44.2)		96 (31.7)	88 (29.0)		
Total	845	404 (47.8)			325 (38.5)		242 (28.6)	191 (22.6)		

*Numbers in parenthesis are percentages.
Statistically significant, a: $p < 0.001$; b: < 0.01; c: $p < 0.02$.

It tended to be higher in the posterior than in the anterior group. The difference in pain incidence between the localized and the both anterior and posterior groups was significant ($p < 0.05$).

Head pain

Head pain occurred in 242/845 (29 per cent) of the patients. The incidence of head pain was almost the same in T_2 as in T_3 group. Head pain was somewhat more common in T_4 than in T_1 group, but the difference was not significant.

The incidence of head pain was twice as high in the both anterior and posterior group than in the localized group and a little higher than in either the anterior or posterior group. These differences, however, were not significant.

Eye pain

Eye pain occurred in 191/845 (23 per cent) of the patients. The incidence of eye pain in T_1 group was almost the same as in T_2. However, it gradually increased according to the advancement from T_2 to T_4. There were significant differences in the incidences between T_2 and T_3 ($p < 0.02$) and between T_2 and T_4 ($p < 0.001$) group.

The incidence of eye pain was almost the same in the localized group as in the anterior group. It tended to become higher according to the posterior and the both anterior and posterior group, respectively. However, the difference was not significant.

On the other hand, 431 (51 per cent) patients had been treated in different ways before their initial examination; 160 (19 per cent) patients had been treated medically, 180 (21 per cent) patients had been treated by aspirations, incisions or teeth extractions, and 91 (11 per cent) patients had been operated for suspicious inflammations or other benign diseases.

Discussion

The treatment policy for maxillary sinus carcinoma has been successively improved and treatment details of a combination therapy with irradiation (50 Gy), continuous intra-arterial infusions of 5-FU (2000 mg), and the reduction of tumour mass have been reported by Sakai *et al.* (1976, 1983). In 845 patients with maxillary sinus carcinoma, the five year cumulative survival rate of stages I, II, III and IV was 69, 43, 33 and 14 per cent respectively and the ten year cumulative survival rate of stages I, II, III and IV was 46, 38, 29 and 12 per cent respectively. Thus, it is very important to find maxillary sinus carcinoma as early as possible in order to improve the survival rate. More than half (51 per cent) of the patients, however, had been misdiagnosed and treated in various ways before being referred with a diagnosis of carcinoma. If the recent technical developments of CT scanning, magnetic resonance imaging (MRI) and sinoscopy are used together with an increase in knowledge of maxillary sinus carcinoma, an earlier diagnosis with a consequent improvement of the survival rate can be achieved.

The differential diagnosis of patients with orofacial pain is wide. The commonest cause is probably dental disease, but even lung cancer may cause facial pain (Des Press and Freeman, 1983; Jones and Lawson, 1987; Bindoff and Heseltine, 1988). Bullitt *et al.* (1986) evaluated 2,000 patients with facial pain. Sixteen of these patients were found to have tumours which involved two maxillary sinus carcinomas, one breast carcinoma with metastasis in the skull base, and 13 intracranial tumours. Trigeminal nerve symptoms in intracranial tumours were also documented by Vassilakis *et al.* (1988) and Schnetler and Hopper (1989).

As a general rule the diffusion of pain over the branches of the trigeminal nerve is confined to one of the main divisions, although in severe cases it may radiate over the other main divisions (Clemente *et al.*, 1985). Therefore, maxillary sinus carcinoma causes spontaneous pain in the area of distribution of the trigeminal nerve which includes the cheek, teeth, head and eye.

In our series, cheek pain was most common and

TABLE II

RELATION BETWEEN SPONTANEOUS PAIN AND THE ANTERIOR-POSTERIOR DIRECTION OF TUMOUR INVASION IN PATIENTS WITH MAXILLARY SINUS CARCINOMA

Cases		Cheek pain	Teeth pain		Head pain	Eye pain
Localized	13	4 (30.8)*	3 (23.1)	d	2 (15.4)	2 (15.4)
Anterior	216	87 (40.3)	61 (28.2)		60 (27.8)	34 (15.7)
Posterior	385	84 (47.8)	141 (36.6)		104 (27.0)	81 (21.0)
Both anterior and posterior	231	129 (55.8)	120 (51.9)		76 (32.9)	74 (32.0)
Total	845	404 (47.8)	325 (38.5)		242 (28.6)	191 (22.6)

*Numbers in parenthesis are percentages.
Statistically significant, d: $p < 0.05$.

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occurred in one third of patients in the localized T_1 group and in about half of the patients in the T_3 group. The anterior group is diagnosed relatively early, because it is usually accompanied by swelling of the cheek and tenderness. However, in the posterior group the diagnosis tends to be late if other symptoms are absent or careful investigations are not done, although about half the patients complained of cheek pain which is more frequent than in the anterior group. Teeth pain was the second commonest type of pain. In the localized and posterior group which tend to be diagnosed late, about one fourth and one third, respectively, complained of teeth pain. The otorhinolaryngologist should not only refer to a dentist, but also perform careful investigations if there are other symptoms or bad teeth which cause teeth pain.

As the trigeminal nerve gives off the tentorial and dural branches (Clemente *et al.*, 1985), head pain may often be referred. In the localized group, 15 per cent of the patients complained of pain in the head. Although the incidence of head pain differed a little between the anterior and posterior group, it doubled in those cases where bone destruction had occurred (T_2, T_3 and T_4) compared with those without bone destruction (T_1).

Eye pain is perhaps explained as either referred pain or direct stimulation of the peripheral receptors of the orbital periosteum or contents. In the localized group, 15 per cent of the patients complained of eye pain, which may be referred. The incidence of eye pain showed little difference between the localized and anterior group, but increased in the posterior group. It may depend on tumour invasion into the pterygopalatine fossa and involvement of the pterygopalatine ganglion or some branches of the trigeminal nerve.

In conclusion, the incidence of cheek, teeth, head and eye pain was 48, 39, 29 and 23 per cent respectively. The incidence of both cheek and teeth pain increased according to the advancement of T-classification and the posterior invasion. We should always think of maxillary sinus carcinoma in patients with unclear cheek, teeth, head and eye pain and perform careful investigations using the improved methods to diagnose malignant disease as early as possible.

Key words: Maxillary sinus neoplasms; Pain, facial

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