

Multiple Bowen's Disease in a Patient with a History of Possible Arsenic Exposure: A Case Report

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A 81-year-old man with a patch of scaly erythema on his scrotum visited Hiratsuka Kyosai Hospital in June 2006. Reddish, scaly plaques, which were untreated, were present on his back and lower legs since 1999. Pathological examination of the lesions on the scrotum revealed Bowen's disease; therefore he was referred to our clinic for further treatment. During his visit Tokai University Hospital, irregularly bordered scaly erythematous patches were observed on his back, left arm, right knee, and right foot, sizing from 2 to 4cm in diameter. He was treated with phenol and liquid nitrogen cryotherapy; however, he dropped out of clinic after receiving treatment for a year. At this point, most lesions were cured and only scars remained. In June 2009, he revisited Tokai University Hospital, and this time, multiple scaly erythematous patches were noted on his back and both the arms and legs. The results of the biopsies of 4 lesions obtained from the back, right arm, right knee, and the right foot led to the diagnosis of multiple Bowens' disease. During the inquiry, we learned that since birth, he has resided in Hiratsuka City and had often used water from wells. We researched the possibilities of water and soil contaminations in the Hiratsuka area.

Key words: multiple Bowens' disease, arsenic, well

INTRODUCTION

John T. Bowen first defined Bowen's disease as precancerous dermatosis in 1912, when he encountered 2 cases of chronic atypical epithelial proliferation, that were reported to exhibit syphilis like symptoms [1]. However, this disease is now considered to be a type of squamous cell carcinoma *in situ* rather than precancerous dermatosis. Bowen's disease often manifests as a solitary lesion, but multiple lesions can often be noted in the case of individuals exposed to environmental or occupational risk factors, such as those engaged in mining, smelting, and agriculture [2]. Arsenic is also used medicinally, for example, to treat syphilis before penicillin was introduced, and also as a treatment for psoriasis, as Fowler's solution. Here, we describe a case of a patient with multiple Bowen's disease. The patient might have been exposed to environmental arsenic, which might have led to the development of multiple Bowen's disease.

CASE REPORT

A 81-year-old man with a patch of scaly erythematous plaque on the scrotum visited Hiratsuka-Kyosai Hospital in June 2006. Reddish, scaly plaques were present on his back and the lower legs since 1999, and these were left untreated. He did not have any relevant family history. Since birth, he has been a resident of Hiratsuka City; further, he did not have a history of traveling abroad. He underwent total resection of the

plaque on the scrotum. Pathological examination of the resected specimen revealed Bowen's disease. He was referred to Tokai University Hospital, in July 2006, for further treatment of the erythematous plaques on the back and lower legs.

Physical examinations revealed irregularly bordered scaly erythematous patches on the back, left arm, right knee and right foot, sizing from 2 to 4cm (Fig. 1). Apparent hypopigmentation or hyperpigmentation or hyperkeratosis of the palms and soles was not noted. On the basis of the biopsy results obtained from Hiratsuka Kyosai Hospital, we diagnosed him with multiple Bowen's disease.

He had experienced colon cancer and gastric cancer at the age of 64 and 74, respectively. This patient relied on water from wells for daily use. He did not have any relevant history of occupational hazard. With regard to his family history, 4 out of 6 family members had internal malignancies. His father died from gastric cancer at the age of 55, whereas one of his brothers died from lung cancer; in addition, and 2 of his brothers died from gastric cancer.

Considering his age and the number of lesions, phenol and liquid nitrogen cryotherapy treatments, were administered, instead of excision of the plaques. However, he dropped out of the clinic after receiving treatment for a year. At this point, most lesions were cured and only scars remained.

In June 2009, after an interval of 2 years, he revisited Tokai University Hospital with a recur-



Fig. 1 Clinical appearance: July, 2006 (Right: back, upper left: right foot, lower left: right knee)

rence plaques, however this time with multiple scaly erythematous and brownish keratotic patches on the back and both the arms and legs (Fig. 2). In some of these patches scaling, crusting, and ulcerations were noted. We performed biopsies of the lesions obtained from the 4 locations (back, right arm, right knee, and the right foot). The results of the biopsies indicated hyperkeratosis, parakeratosis, and diffuse cellular derangement with atypical cells in the epidermis. These atypical cells consisted of considerably enlarged nuclei and some degrees of mitosis and clumping cells were also seen. In addition, mild infiltration of inflammatory cells in the upper dermis was noted (Fig. 3). On the basis of these findings, we diagnosed the patient with multiple Bowen's disease. From the arm, back, right knee, and right foot, 2, 2, 1, and 1 plaque, respectively, were excised because of their large size. As per the patient's request, we have monitored him after the surgery without further treatment of the remaining lesions. We have not detected any abnormalities until March 2010.

DISCUSSION

Multiple Bowen's disease often develops in individuals who are exposed to arsenic. Chronic arsenicism leads to the development of hyperpigmented patches and small hypopigmented patches on the skin of the trunk. Diffuse hyperkeratic patches, which may at times be as thick as 1 cm, are observed on the palms and soles. In heavy arsenic poisoning, verruca-like

or corn-like keratotic lesions are also observed on the back of the hands and feet [3]. In our patient, none of these symptoms of chronic arsenic poisoning were evident, however, there are reports of cases where the keratotic lesions, hyperpigmentation, and hypopigmentations have improved in a period of 18 months, leaving with only diffuse pigmentation [10]. There is a possibility that he may have shown these symptoms, yet that they have improved with time. In the medical interviews conducted, he could not remember himself or his family members presenting severe symptoms.

Furthermore, he had a past history of using the water from wells, and he and his family had experienced malignant diseases. Through research, we learned that the city of Hiratsuka had recently announced that the soil and water around the site of old Sagami navy chemical test site were poisoned with low levels of arsenic [4]. (Fig. 4) Our patient had lived around the old chemical test site, and had used water from wells around this area. Laboratory examinations conducted in November 2006, according to the Ministry of the Environment, led to the detection of diphenylarsinic acid (DPAA) and phenylarsonic acid (PAA) in the water from multiple wells, which may have been used in the case of our patient, and phenylarsine oxide (PAO) in the soil. Usually, organic arsenics are structurally highly stable chemicals, but in the environment, these could be oxidized and dissolved in water. Although deadly poisoning levels of arsenic were not present in the water, Ministry of Environment advised against



Fig. 2 Clinical appearance: June, 2009 (Right: back, upper left: right foot, lower left: right knee)

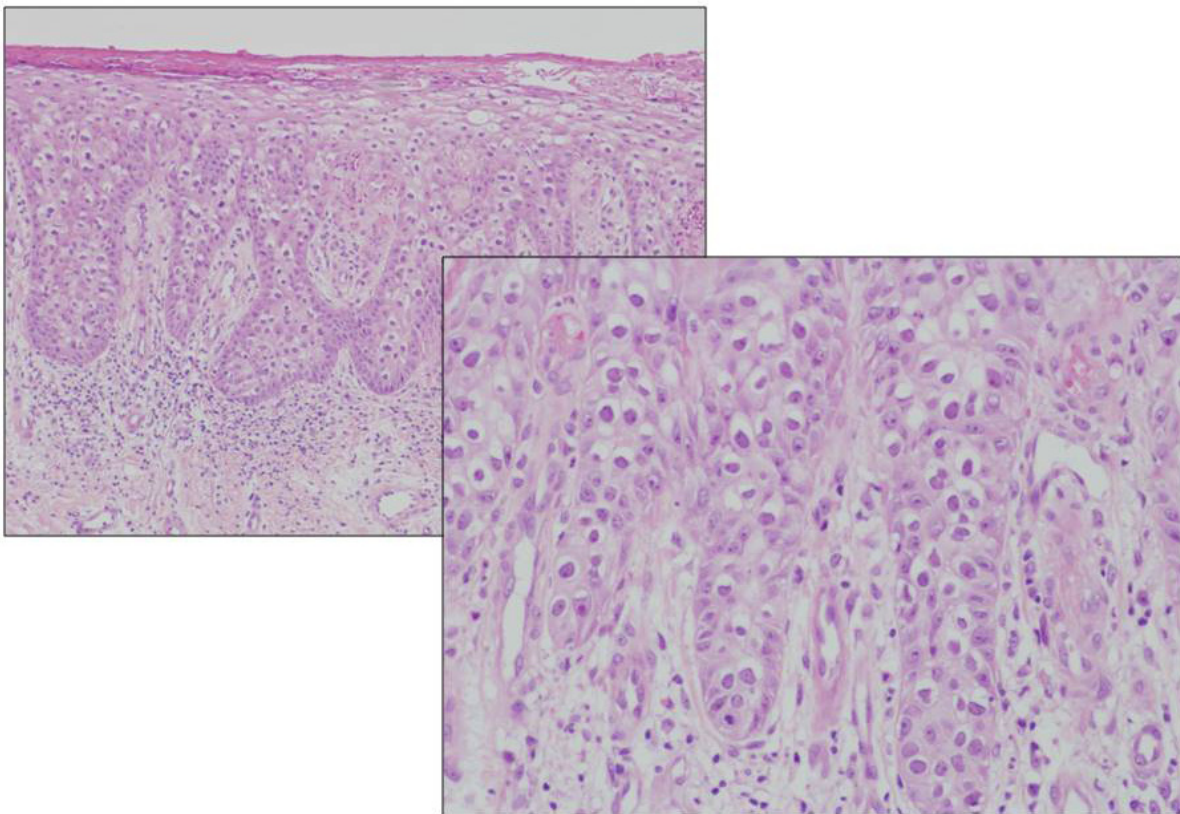


Fig. 3 Histopathological findings (H-E stain. Left: x10, right: x20)

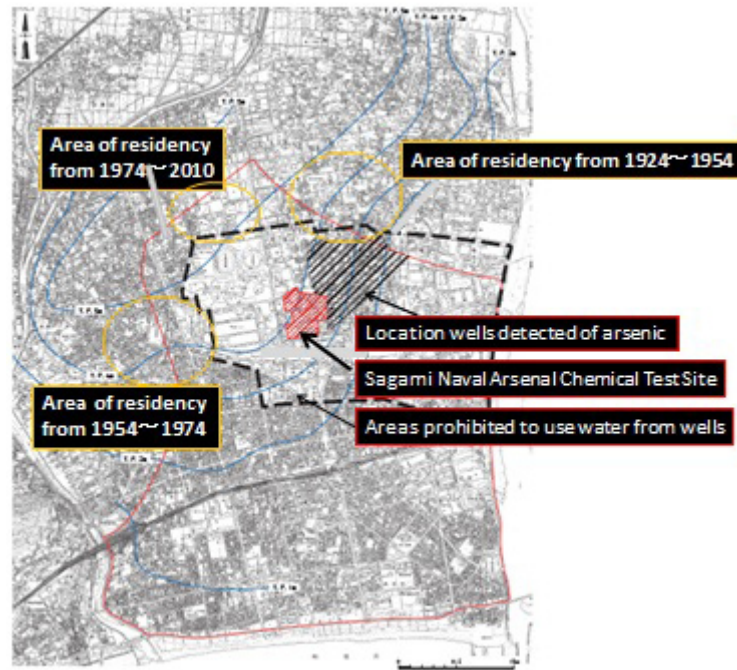


Fig. 4 Map of Hiratsuka City where arsenic poisoning was detected.

the use of waters from the wells, and announced to continue investigating these wells.

There are many ways to measure the poisoning levels of arsenic in an individual's body that could lead to poisoning, such as examination of the blood, urine, hair, and nails. However, results of these examinations tend to normalize after a period of no arsenic exposure. One report stated that the results of these examinations normalized 6 months after no arsenic exposure [10]. Our patient had discontinued the use of water from the wells since many years, and therefore, we could not measure the level of arsenic that could have led to poisoning.

We also reviewed the medical records of all the patients that were diagnosed as multiple Bowen's disease at Tokai University Hospital in the past 20 years. Table 1 shows the residency, distribution of lesions, possible past exposures to arsenic, types of internal malignancies, and the treatment received.

Regarding the distribution of the lesions, our data, compiled from these past 20 years, were consistent with the previous reports. There were 15 patients with multiple Bowen's disease, and total of 48 lesions. The distribution of the lesions was as follows: 20 lesions (42%) were present on the trunk; 15 (31%) on the back, 1 (2%) on the chest and 4 (8%) on the buttocks. Further, 16 lesions (33%) were present on the lower extremities; 7 (15%) on the upper extremities; and 5 (10%) in the head and neck regions. Moreover, 73% were present on the skin that was not exposed to the sun, whereas 27% were present on the skin that was exposed to the sun. All of these data were consistent with those of previous studies [5, 6]. However, we could not find others who had lived in Hiratsuka City and had presented same types of symptoms. This maybe due to the fact that most of the time, Bowen's disease

present itself as erythematous plaque without subjective complaints such as pain or itch. Some patients visit clinics for cosmetic reasons, however there could be a possibility that most patients don't notice the existence of the disease.

Bowen's disease has also been recognized as a cutaneous sign of internal malignancy [7]. In Tokai University Hospital, the number of patients with internal malignancies were 6 (40%), and this number is also consistent with that reported by previous studies [7-9]. Furthermore, the comparison of the types of malignancies accompanied showed consistent numbers as well. The statistics gathered by Eguchi A, in 2001, showed that during the years from 1965 to 2001 in Japan, there had been 201 cases of Multiple Bowens' Disease reported. Within these figures, 44 cases (22.0%) out of the 201 cases were accompanied by internal malignancies, including 10 cases (22.0%) of lung cancer, 9 cases (20%) of gastric cancer, 7 cases (15.9%) of colon cancer, 4 cases (9.1%) of uterine cancer, and 3 cases (6.8%) of breast cancer [7]. In comparison to our data, although we experienced no case accompanied by lung cancer, we had experienced 3 cases (20%) of gastric cancer, 1 case (6.7%) of colon cancer, and 1 case (6.7%) of breast cancer. We also experienced 1 case (6.7%) of renal pelvic cancer, and urinary tract cancer is also commonly mentioned as one of the highly accompanied malignancy for Bowens' Disease [2, 9].

In most cases, Bowen's disease that is attributable to arsenic poisoning develops as a result of environmental, occupational, or medical exposure to arsenic. Internal malignancies are also often seen to be accompanied by Bowens' disease, therefore systematic examinations should be conducted to patients presenting these symptoms. In the case of our patient, although

Table 1 Patients diagnosed with Multiple Bowen's Disease in the past 20 years

Year	Case	Residency	Distribution	Arsenic History	Internal Malignancies	Treatment
1992	66y/o man	Gotemba	chest (2), back (3), buttock, right arm, right thigh, left lower ext, foot (3)	use of wells, agriculture, medicine	renal pelvic ca	excision, cryotherapy
1993	70y/o man	unknown	left thigh, left foot	unknown	unknown	excision
2001	79y/o woman	Sagamihara	right lower ext, left thigh	none	gastric ca	excision
2002	65y/o woman	Hadano	left thigh, left lower ext	unknown	unknown	excision
2005	89y/o man	Isehara	left ear, left hand	unknown	gastric ca	excision
2006	72y/o woman	Ashigara	buttock, left lower ext	none	none	excision
	64y/o man	Kawasaki	right lower ext (2)	unknown	none	excision
	81y/o man	Hiratsuka	back (8), left arm (5), right knee, foot	use of wells	gastric ca, colon ca	excision, cryotherapy
	96y/o woman	Ashigara	face (2)	unknown	none	excision
2007	73y/o man	Hadano	back, ear	none	none	excision
	83y/o woman	Hadano	left lower ext (2), right foot	none	none	excision
	57y/o woman	Hiratsuka	back (2), buttock	none	none	excision
	85y/o man	Isehara	neck, right ear	none	none	excision
	68y/o man	Hiratsuka	face, back, buttock	none	prostate ca	cryotherapy
2009	69y/o man	Chigasaki	right lower ext, left lower ext	none	breast ca	excision

he did not present symptoms of the palms and soles at the time of examination, it is possible that Bowen's disease developed as a result of exposure to arsenic through use of water from wells. Dermatologists need to bear in mind that arsenic exposures are not uncommon, and that symptoms such as hyperkeratosis, hyperpigmentation, and hypopigmentation may disappear with time, to conceal the possible exposure to arsenic. Routine systemic examinations are necessary along with follow-up examination of the skin.

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