A Case with Intractable Pain Suffering from Pancoast Syndrome

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There has been increasing concern about the management of pain in terminal care of cancer patients. The WHO (World Health Organization) guidelines for pain relief[1] can be used by physicians of any specialty in any area, and are considered to have broad support. It is not always possible, however, to relieve cancer pain by means of the drug therapy proposed by WHO[2].

In this paper we report a patient with Pancoast syndrome involving the brachial plexus, whose pain was not controlled by oral morphine sulfate and nerve block therapy.

Case report

Patient was a 45-year-old man. He had no previous history of disease. In August 1988, an abnormal shadow was pointed out in the right upper lung field of the chest X-P performed on a routine health check-up in his workplace. In January 1989, he was diagnosed as having squamous cell carcinoma of the lung by a biopsy performed in another hospital. On May 9 of the same year, he was referred to the Pain Clinic, Kanto Teishin Hospital, for pain relief because the severe pain in his right upper extremity had not been alleviated by radiotherapy beginning in February. Clinical findings on admission: The patient had severe pain (rt-Th2 area), decreased muscle force and imperception of the right upper extremity together with ipsilateral Horner's syndrome, exhibiting brachial plexus neuralgia associated with typical Pancoast syndrome.

Laboratory findings on admission: WBC 10,900 mm^3; RBC 279 × $10^4/mm^3$; Hb 8.6 $g \cdot dl^{-1}$; Ht 27.0%; CRP 5+; and erythrocyte sedimentation rate (ESR) 99 mm for 30 min, 111 mm for 1 hr and 140 mm for 2 hr.

Figure 1 shows radioisotope (RI) distribution in the skeletal system as demonstrated by bone scintigraphy. Abnormal RI accumulation was observed in the area ranging from the left orbital region to the temporal bone, Th2 and 8, L3/4, right 1st, 2nd and 7th ribs, and left sacroiliac joint. Brain CT revealed destruction of the greater wing of the sphenoid bone and a tu-

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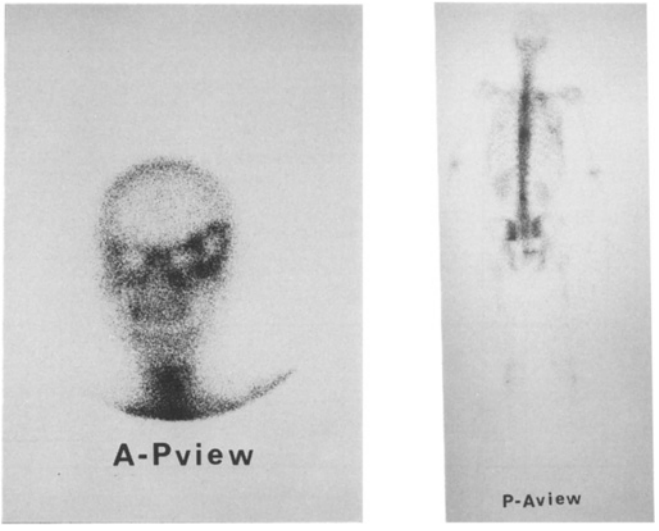

Fig. 1. Bone scintigraphy showing RI distribution. There is abnormal accumulation ranging from the left orbital region to the temporal bone, Th2 and 8, L3/4, right 1st, 2nd and 7th ribs, and left sacroiliac joint.

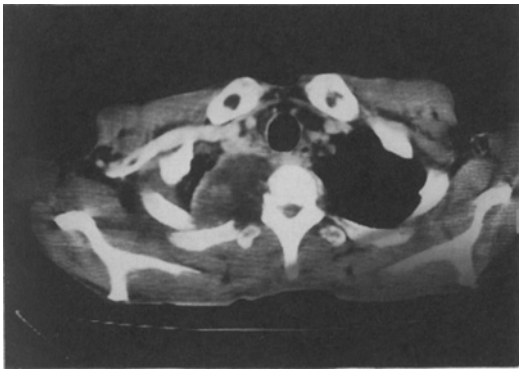

Fig. 2. Chest CT showing a mass in the paravertebral area of Th1–3 and destruction of Th2 vertebral body and costal head.

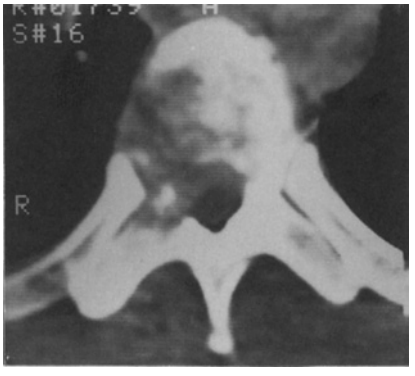

Fig. 3. Metastatic tumor invades the spinal canal of Th8 vertebral body.

mor in the orbit. Chest CT disclosed a mass in the paravertebral region at Th1–3and destruction of the Th2 vertebral body and costal head (fig. 2). Lung metastasis was also detected. In addition, the patient had bone metastasis in the right 2nd and 3rd ribs, and Th2 and 8. The metastatic lesion of the vertebral body of Th8 invaded the spinal canal (fig. 3).

Figure 4 shows the course of treatment after admission. The patient first received treatment consisting of clomipramine at a dose of 25 mg × 3/day, alprazolam 0.4 mg × 3/day and Brompton cocktail 10 ml × 6/day. On hospital day 2, Th2 spinal rhizotomy with radiofrequency thermocoagulation was performed in 2 sessions of coagulation for 90 sec at 80°C, but failed to produce satisfactory alleviation of pain. Spinal rhizotomy conducted on hospital days 7 and 15 also failed to relieve his pain, suggesting invasion to a more central portion than the spinal nerve root. On day 12, Brompton cocktail was replaced with oral morphine sulfate at an initial dose of 90 mg·day^{-1}. On day 14, radiotherapy was initiated to treat temporal bone

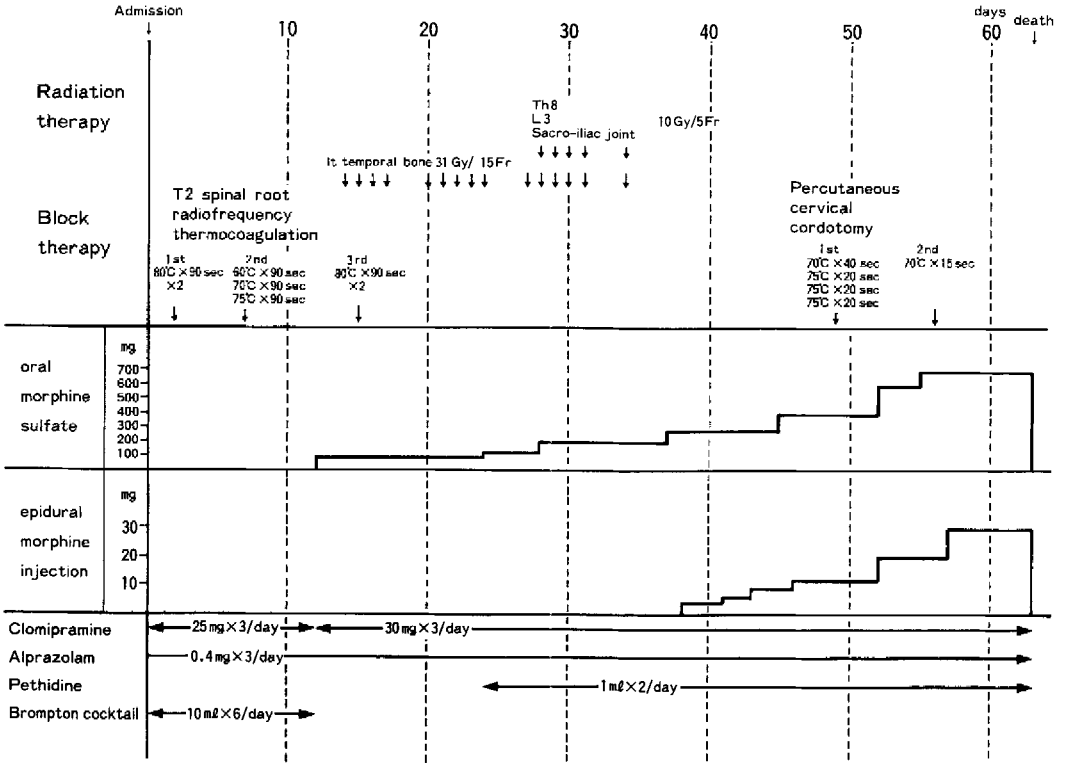

Fig. 4. Course of treatment after admission. Treatment consisted of Th2 spinal rhizotomy with radiofrequency thermocoagulation in 3 sessions, percutaneous cervical cordotomy in 2 sessions, oral morphine sulfate (700 mg·day^{-1} in the terminal stage), epidural morphine injection (30 mg·day^{-1} in the terminal stage), i.v. pethidine, tricyclic antidepressant and radiotherapy.

metastasis. On day 24, oral morphine sulfate was increased to 120 mg·day^{-1} in combination with i.v. pethidine (35 mg × 2/day) because of his severe pain and sense of fatigue. On day 38, intravenous hyperalimentation was started together with increased doses of oral morphine sulfate to 400 mg·day^{-1} and epidural morphine (L2/3) to 3 mg × 4/day. Because the above regimen failed to control his pain, percutaneous cordotomy was performed on day 49 by an approach between left C1 and 2 (70°C × 40 sec, 75°C × 20 sec, 75°C × 20 sec and 75°C × 20 sec). Although the pain of the right upper extremity was completely alleviated by this treatment, the patient developed mirror image pain in the opposite upper extremity. Although his condition remained favorable for several postoperative days, the mirror image pain in the left upper extremity gradually became intolerable, necessitating increased doses of morphine for epidural injection and oral administration. On day 56, percutaneous cordotomy was performed to treat the mirror image pain by an aproach between the right C1 and 2 (70°C × 15 sec). The mirror image pain disappeared immediately after surgery. On the following day, however, pain recurred, possibly because of the limited coagulation time, which was only 15 sec on the right side. On day 58, the patient developed paralysis of the left upper extremity and bilateral lower extremities in addition to that of the right upper extremity. On day 63, the patient experienced

exacerbated dyspnea and died.

At autopsy, squamous cell carcinoma of 3 × 2 × 4 cm in size originating from B[1]a periphery of the upper lobe of the right lung directly invaded the area ranging from the superior thoracic aperture to the right cervical region, forming a tumor of 9 × 8 × 5 cm involving the brachial plexus. In addition, the tumor destroyed the 2nd and 3rd thoracic vertebrae and the base of the right 2nd and 3rd ribs. Microscopically, tumor invasion extended from the epidural to slightly intradural and intraspinal region at the levels of the 1st to 4th and 8th to 9th thoracic spinal cord. Histologically, squamous cell carcinoma infiltrated through the perineurium to reach the intraneural portion of the spinal nerve root.

Discussion

Pancoast syndrome refers to the pathological condition in which a tumorous lesion of the pulmonary apex causes symptoms including pain of the shoulder and upper extremities, decreased muscle force and muscular atrophy of the hands, and Horner's sign. It is caused for the most part by malignant tumors including primary lung cancer. Thus, early diagnosis is critical. When Horner's sign is manifest, the patient is likely to have a tumor of considerable size, and consequently, a poor prognosis. The syndrome is characterized by a chronic, progressive course, proceeding from nerve root symptoms to sympatholytic symptoms, and finally to spinal cord symptoms.

Therefore, patients with clinical symptoms suggestive of Pancoast syndrome should be immediately subjected to diagnostic imaging including chest plain radiography, CT scanning, tomography and bone scintigraphy.

Although Pancoast syndrome is rare, and is found in only 3 to 4% of patients with lung cancer[3], the pain associated with this syndrome may be among the most difficult cancer pain to control[4].

Paulson reported that surgery is not indicated in patients with distant metastasis or tumor extending to the brachial plexus, subclavian artery, vertebra or mediastinum[5]. When surgery is not indicated, as in our patient, treatment consists mainly of radiotherapy. The reasons for this choice are that Pancoast syndrome is frequently associated with squamous cell carcinoma, and location of the lesion around the lung facilitates the application of high-dose radiotherapy[6]. Radiotherapy administered in the early stage is expected to improve not only vital prognosis but also prognosis in terms of pain.

Radiotherapy is effective in relieving pain in about 90% of the patients[4]. In patients with pain that is refractory to radiotherapy and not alleviated by systemic analgesic therapy, other therapeutic means are necessary. Batzdorf et al.[7] recommended percutaneous cordotomy, open cordotomy with rhizotomy, laminectomy, subarachnoid phenol block, stellate phenol block, partial brachial plexus excision and transdermal stimulation.

Therapy for our patient consisted of rhizotomy with radiofrequency thermocoagulation (Th2) in 3 sessions, percutaneous cordotomy in 2 sessions, oral morphine sulfate (700 mg·day^{-1} in the terminal stage), epidural morphine injection (30 mg·day^{-1} in the terminal stage), i.v. pethidine, tricyclic antidepressant and radiotherapy.

Radiotherapy, thermocoagulation and morphine administration were not effective in controlling pain; complete pain relief of several days was obtained by cordotomy.

In percutaneous cervical cordotomy, an electrode needle is percutaneously inserted into the lateral spinothalamic tract of the cervical spinal cord, and a thermocoagulation focus is formed

at the end of the needle to block the conduction of pain, thus eliminating it[8]. Open cordotomy, which is an invasive method requiring partial excision of the spinal cord[9], has recently been made less invasive by using a fine electrocoagulative electrode needle set in a trocar (spinal needle) for insertion into the cervical spinal cord[10,11]. Amano[12] and Takakura et al.[13] reported this method, which has been used widely to treat terminally ill patients with cancer pain. Percutaneous cervical cordotomy has many advantages, including less surgical stress, technically comparative ease of application, and strong effects, namely, complete, selective blocking of pain when performed properly.

The rate of successful pain relief by percutaneous cervical cordotomy is reported to be about 85% by White et al.[14] and 78% by Nagaro et al[15]. Considering that the subjects of these studies were patients whose pain had not been relieved by other methods, these rates are high.

However, one problem with this method is that contralateral pain develops postoperatively in about 40% of patients[16]. Our patient also suffered from this mirror image pain. Many aspects of mirror image pain following percutaneous cervical cordotomy remain to be clarified, including the pathway by which neural excitation in the spinal cord reaches the contralateral site, the mechanism involved in symmetrical development of pain, and factors responsible for the difference between patients with and without such pain.

When radiotherapy is not effective in patients with severe, intractable pain resulting from tumor invasion extending through the perineurium, as in our patient, an aggressive approach should be undertaken in the early stage using intensive nerve block therapy, including cordotomy and subarachnoid phenol block, from the viewpoint of quality of life.

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