Keywords
yawning; acupuncture; autonomic nervous system; brain tumour

Abstract
Persistent and excessive yawning (greater than 1 to 4 yawns/minute) is a pathological process associated with a variety of conditions including central nervous system disorders, opiate withdrawal and drug side effects. This report describes a patient with a brain tumour who presented with persistent excessive yawning. She was successfully treated with medical acupuncture. A possible mechanism involving the autonomic nervous system is discussed.

Presentation
A 51 year-old lady presented with a one and half year history of headache, with no abnormal neurological signs on physical examination. An MRI scan of the brain showed an aggressive tumour in the right parietal lobe, but without significant surrounding cerebral oedema or midline shift. The paraventricular area and the brain stem were not involved. Subsequently, she underwent gross total resection of the tumour. The pathology result was an anaplastic oligodendroglioma. She was offered thirty-three radiation treatments for adjuvant therapy to the brain to improve the probability of local tumour control. The radiation volume included the postoperative tumour bed and adjacent areas. The right hypothalamus, midbrain and upper pons were included in the high dose volume (> 95% of the total dose of 5940 cGy), while correspondent areas on the left side were included in a lower dose volume (<60% of total dose). She tolerated the treatment quite well without significant side effects, except that her blood pressure was elevated during treatment to 180/110 mm Hg. On the day of her 24th treatment she presented with persistent yawning. The yawning had continued for more than six hours, with a frequency of 15 - 20 yawns per minute, before she was seen for her condition. A tingling sensation around her mouth was also noted. She denied any snoring or previous history of apnoea. Her past history was not significant apart from a hysterectomy. Her medication included dexamethasone 2 mg o.d., ranitidine 150 mg b.i.d., paracetamol 650 mg p.r.n. q. 6 h., and dilantin 200 mg o.d. (she was on a dose reducing schedule for dilantin). Physical examination showed an obese lady weighing 140kg with no abnormal neurological signs. She was mentally alert and orientated in time and space. A Traditional Chinese Medical examination revealed weak proximal (both superficial and deep) pulses bilaterally, but normal middle and distal pulses. Her tongue was slightly swollen but pink with no coating. The latter was brushed off in the morning.

Treatment and Result
As there is no clear guidance in either Western Medicine or Traditional Chinese Medicine in the treatment of non-drug induced pathological yawning, the patient was offered empirical treatment with medical acupuncture. PC6 acupoint (2 cun [body inch] above the transverse crease of the wrist, between the tendons of musculus palmaris longus and musculus flexor radialis) in her left forearm was punctured with a 0.25mm thick stainless steel needle, to a depth of approximately one centimeter. At this point a ‘grasping’ sensation of the needle was felt, without any manipulation or “de qi” sensation. Within one minute, the patient described a sensation of tingling involving her face and forehead on both sides but not affecting the pinnas. Then her yawning stopped instantly. The needle was left in place for 10 minutes. No other acupoint was used in the treatment. She has suffered no relapse since. Her radiation treatment was completed uneventfully. At two-months following completion of her radiation treatment, she had no further persistent yawning.

Discussion
Yawning involves a wide opening of the mouth with concurrent deep inhalation followed by a slow expiration. This complex coordinated motor output process resembles a classical reflex since once initiated, it goes to completion without significant influence from sensory feedback. The exact neuronal mechanism through which yawning occurs is still unknown. It appears that the complex neuronal network involved in yawning may be situated in the reticular brain stem area. It may be closely associated with motor nuclei of the trigeminal nerve in the pons, the facial nuclei, the dorsal and ventral group nucleus of the ‘respiratory center’ in the medulla oblongata, and other nuclei constituting the autonomic nervous system in the brain stem and...
hypothalamus. This is supported by the interesting observation that yawning also occurs in anencephalic newborns, and that involvement of the autonomic nervous system in yawning has been demonstrated by microneurographic examination of the sympathetic nervous system. A close link of this complex yawning neural network to a large associative cortical area has also been proposed.

The physiological triggers of yawning are not clearly known. Involuntary programmed cortical activities in response to a relatively non-stimulating environment have been suggested. This is supported by the observation that yawning occurs more often at bed or waking times and in boring situations. It can also be triggered by just reading or thinking about it or seeing somebody yawn. Yawning can also be observed in patients suffering from brain hypoxemia, epilepsy, brain tumours or lesions, intracranial hemorrhage, infections, multiple sclerosis, and progressive supranuclear palsy. Morphine withdrawal and the consumption of a variety of drugs that affect neurotransmitters, such as dopamine, are also found to be associated with excessive yawning. Other neurotransmitters and neuropeptides are thought to be involved in the yawning process including adrenocorticotropic, alpha melanocyte stimulating hormone, acetylcholine, serotonin, excitatory amino acids, nitric oxide, oxytocin and opioid peptides.

In the patient presenting in this report, the trigger of her pathological yawning was not clear, but could be due to the presence of the brain tumour, and the effect of radiation treatment involving the relevant brain stem areas. As there is still no clear clinical guideline regarding the urgent management of non-drug induced pathological yawning, in either Traditional Chinese Medicine or Western Medicine, the choice of treating this lady with medical acupuncture was largely empirical. The choice of using the acupoint PC6 was based on the clinical evidence of its usefulness in controlling nausea and vomiting. The ‘emesis center’ is located in the brain stem between the obex and the retrofacial nucleus, including the region extending from the nucleus of the solitary tract through the lateral tegmental field of the reticular formation to the ventrolateral medulla. These areas are closely related to the areas involved in the yawning process and the autonomic nervous system. The exact mechanism of the negative modulation of nausea and vomiting with PC6 stimulation is not clear. Inhibition of serotonin receptors at a central level has been postulated, since it is recognized that serotonin receptor antagonists reduce nausea and vomiting in clinical studies. Serotonin has also been shown to exert a positive modulating effect on yawning. It is possible that the therapeutic effect of PC6 acupoint stimulation on yawning, as demonstrated in this patient, may work through a similar mechanism of serotonin receptor inhibition within the central nervous system. The observation in this patient, that a tingling sensation expanded from around the mouth to the face, suggests a trigeminal nerve sensory distribution. This suggests that PC6 stimulation may have exerted an effect on corresponding areas of the pons where the trigeminal nuclei are situated. This again relates closely to the areas controlling yawning and emesis.

The finding that an increase in parasympathetic activity seems to precede the expression of nausea and the observation that an increase in parasympathetic activity occurs in response to yawning, suggests that the autonomic nervous system is probably involved in both processes. PC6 acupoint stimulation may be viewed as a regulator, possibly modulating the parasympathetic component, of the autonomic nervous system. In fact the Yin and Yang patterns, as described in Traditional Chinese Medicine, may correlate with relative changes in parasympathetic and sympathetic activities in disease. Further studies in this context will be necessary to clarify the physiological basis of Traditional Chinese Medicine.

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References


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**Embedded needles**

**Arthur JA Wightman**

The chest radiograph (see figure) illustrates the result of a form of acupuncture practised principally in Japan called okibari or maibotsushin. This differs from conventional acupuncture in that the needles are left permanently in position. They are inserted to the desired depth and then broken off at the skin surface. Several dozen needles of gold, silver or stainless steel may be inserted at one session. One hundred and thirty-five needles were counted on this radiograph.

The very rare serious complications of conventional acupuncture have been fully documented.1-3 Patients undergoing okibari are subject to additional risk from migration of needles with time. In a recently reported case, a 92 year old woman was admitted to hospital with a pneumothorax, a needle having punctured her lung 50 years after she had undergone such treatment.4 Computed tomography (CT) also showed needles in her liver and spleen. A second patient developed new neurological signs 13 years after she had had needles embedded in her nuchal and occipital areas. CT revealed needles that had strayed into the medulla oblongata, cerebellum and upper cervical subarachnoid space.5 A further case of migration into the medulla oblongata has been reported.6 Embedded needles in the trunk may migrate locally to the peritoneal cavity and bladder,7,8 the kidney,9 and the ureter.10 

Because of the additional complications associated with needle migration in this form of acupuncture, the major acupuncture organisations in Japan recommended, in 1976, that its practice should be discontinued (personal communication White AR, 2000). It is not illegal, however, and is probably still undertaken in Japan, Korea and amongst South East Asian communities in North America and elsewhere. Whilst it will always be an uncommon finding, such appearances may be seen in radiographs of any part of the body, almost anywhere in the world. They are more commonly incidental findings than causative of any current symptomatology.

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**Reference List**


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