Commentary: octreotide and hypertrophic pulmonary osteoarthropathy

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Hypertrophic pulmonary osteoarthropathy (HPOA) typically presents with painful and swollen wrists or ankles. It is frequently associated with clubbing and occasionally with gynaecomastia. Still more unusually, myxoid changes may occur in the face and ears. The osteoarthropathy is due to periostitis which leads to loosely woven subperiosteal new bone formation. This is seen radiographically as linear calcification outside the cortex of the distal diaphysis of the tibia, ulna and radius, sometimes with appearances described as “onion skin” or “candle wax”.

HPOA has been reported to occur in up to 12% of bronchial carcinomas, which are responsible for 90% of the cases, and occurs particularly in squamous cell carcinomas. However, HPOA has been described with virtually every cause of clubbing. The chief differential diagnosis is thyroid acropachy which is typically painless and involves more distal long bones. Very rarely, vinyl chloride may cause acroosteolysis and mimic the condition.

The condition has been successfully treated by vagotomy and by interruption of intercostal nerves, suggesting a neurogenic origin. In the past it was common practice to sever the branches of the vagus around the hilum when cancers were found to be unresectable. Surgery and radiotherapy to the primary tumour may relieve the symptoms and, if relief occurs, it is usually rapid. Radiotherapy to the painful areas may also be effective. Persistent symptoms may often be relieved by non-steroidal anti-inflammatory agents. Steroids and low dose colchicine have also been advocated. In the presence of gynaecomastia associated with non-small cell carcinomas secreting human chorionic gonadotrophin or human placental lactogen the anti-oestrogen agent tamoxifen or local radiotherapy may be effective in relieving the discomfort.

The pathogenesis of HPOA remains uncertain. Although a common factor appears to be local hyperaemia, no specific endocrine, peptide or cytokine mediator has been consistently linked with the condition. Raised levels of hormones such as oestrogen have been blamed but clubbing was not seen as a common sequence of treatment with stilboestrol for prostate cancer. Reduction of the metabolism of an unidentified vasoactive substance by pulmonary shunting seems unlikely to be the sole explanation despite a dog model demonstrating that HPOA can be induced by artificial creation of a shunt.

Acromegaly may occur with bronchial carcinoid associated with increased production of tumour growth hormone. HPOA has obvious similarities to acromegaly and has also been described in association with bronchial carcinoid. A similar syndrome has been described with adenocarcinoma, large cell carcinoma, and squamous cell carcinoma. In the latter case intense symmetrical uptake with $^{99mTc}$-hydroxymethane diphosphonate was demonstrated in the distal portions of the long bones accompanied by markedly raised levels of growth hormone in the serum. After treatment with chemotherapy and radiotherapy for the cancer, the arthralgia disappeared and scintigraphic findings and serum growth hormone levels improved, suggesting that ectopic production of growth hormone in the pulmonary tumour may have been the cause of the osteoarthropathy.

In this issue of Thorax Johnson et al report an interesting phenomenon – namely, the response of painful HPOA to octreotide, a synthetic analogue of somatostatin, the hormone inhibitor or “endocrine arsenic”. Although we are not told of the response of the primary tumour to radiotherapy, the response of the pain to octreotide and to its reinstitution provides compelling evidence for an effect of the drug. It is interesting that there was no change in the gynaecomastia, perhaps supporting the hypothesis of an effect through growth hormone.

The role of octreotide is well established in controlling the growth and secretions from pituitary adenomas, particularly in acromegaly, and the neuroendocrine tumours. It is commonly used in palliative care to control the vomiting associated with intra-abdominal malignancies by reducing the volume of secretions. It is used in bowel obstruction although this is not, as yet, supported by controlled trials. The non-opioid analgesic effect of octreotide by intrathecal infusion has been reported in an uncontrolled series of six patients, reproducing earlier work using intrathecal somatostatin, and this use is supported by growing evidence for the inhibitory effects of octreotide on nociceptive neurones. However, in a randomised, single blind, crossover study 200 µg octreotide by subcutaneous bolus was found to be no better than placebo in nine out of 10 patients in the relief of advanced cancer pain.

Disparate hypotheses abound regarding the aetiology of HPOA. As yet there is little information about the value, if any, of bis-
Treatment of resistant pain in hypertrophic pulmonary osteoarthropathy with subcutaneous octreotide

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Abstract

Pain in hypertrophic pulmonary osteoarthropathy (HPOA) due to periostitis and arthropathy can be a particularly disabling symptom, and resistant to a wide variety of treatments. The effectiveness of subcutaneous octreotide in relieving this pain in a patient with HPOA is reported.

Keywords: hypertrophic pulmonary osteoarthropathy, octreotide.

The syndrome of secondary hypertrophic pulmonary osteoarthropathy (HPOA) is most commonly associated with a peripheral bronchogenic carcinoma, but also occasionally with pleural mesotheliomas. It consists of a symmetrical periostitis affecting the long bones of the extremities, an arthropathy of the wrists, ankles and knees, and gross finger clubbing. Gynaecomastia is seen in approximately 10% of cases.

The pathogenesis remains uncertain. The variety of clinical features and efficacy of different therapeutic procedures account for the various proposed theories. These include reflex vagal stimulation causing the release of vasoactive intestinal polypeptides resulting in increased blood flow to the extremities, peripheral impaction of megakaryocytes and platelet clumps in the fingers and toes resulting in the release of platelet-derived growth factor, a hormonal mechanism suggested by high plasma levels of growth hormone, and increased excretion of oestrogen found in some patients with HPOA.

The predominant symptom is pain due to the periostitis. First line management is aimed at treating the primary tumour but, in resistant cases when the pain can be persistent and very disabling, other therapies have been found to be effective – for example, vagotomy and non-steroidal anti-inflammatory drugs (NSAIDs).

Octreotide, a synthetic analogue of somatostatin, is well recognised as an inhibitor of growth hormone and gastroenteropancreatic peptide secretion. It has recently been used successfully in the management of chronic cancer pain. Here we report its success in providing relief for a patient with uncontrolled pain due to HPOA.

Case report

Five months after bronchoscopic diagnosis of a poorly differentiated squamous cell carcinoma of the bronchus a 54 year old man developed painful lower legs and knees, which resulted in severe difficulty in walking, and painful gynaecomastia. Radiographs of his lower limbs confirmed the typical radiological appearances of the subperiosteal new bone formation of HPOA.

Symptoms persisted despite radiotherapy to the primary tumour, opiates, and various NSAIDs. Treatment with dexamethasone (4 mg/day), amitriptyline, sodium valproate, and a trial lumbar sympathectomy with 0.5% bupivacaine all produced no benefit.

In view of the painful gynaecomastia and therefore possible hormonal aetiology of the HPOA, a trial of subcutaneous octreotide was administered at a dose of 100 μg twice daily. This resulted in complete relief of his pain over the following few days and, with physiotherapy,

marked improvement in his walking. There
was, however, no improvement in the pain or
size of his gynaecomastia.

After one week he became reluctant to con-
tinue with twice daily injections and requested
that the octreotide was stopped. Within 24
hours his symptoms had returned, prompting
reintroduction of octreotide, this time 200 µg
by a 24 hour subcutaneous infusion to avoid
the discomfort of repeated injections. He again
became pain-free and mobile, sufficient to en-
dable discharge home after only three days.

Discussion
Octreotide is known to have a wide clinical
application in the management of many endo-
crine disorders. Its effect on nociceptive pain
pathways is as yet unclear, and limited clinical
experience means its role as an analgesic agent
is unsure. It has been suggested, however, that
it may become important as an adjunct or in
particular pain syndromes.³

In the case reported it provided complete
pain relief in a difficult pain problem. The
presence of the HPOA-associated gynaecomas-
tia raised the possibility of a hormonal
aetiology for the clinical picture and perhaps
suggests that the symptomatic response to
octreotide was because of a direct effect on the
underlying disease mechanisms rather than a
primary analgesic effect.

Octreotide may be a useful analgesic for
treating the pain of HPOA when more con-
tentional treatment has failed. It needs further
evaluation, however, to determine its mecha-
nism of action and thus enable identification
of patients who are most likely to benefit.

1 Yacoub M. Cervical vagotomy for pulmonary osteo-
2 Dickinson CJ. The aetiology of clubbing and hypertrophic
3 Gosney MA, Gosney JR, Lye M. Plasma growth hormone
pathways is as yet unclear, and limited clinical and
digital clubbing in carcinoma of the bronchus. Thorax
1990;45:545±7.
4 Grobner J, Brown JB. Increased oestrogen excretion in
HPOA. Lancet 1961;i:1274.
5 De Conno F, Saita L, Ripamonti C, Ventafridda V. Sub-
cutaneous octreotide in the treatment of pain in advanced
6 Aneurysms of the thoracic aorta may cause
obstructive hypertranslucency due to extrinsic
compression of the tracheobronchial tree.

Unilateral
hypertranslucency
of the left hemithorax
due to aneurysm of
the thoracic aorta

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Abstract
A 19 year old man presented with a six
months history of dyspnoea on exertion.
Chest radiographs, isotopic lung scans,
and computed tomographic scans of the
chest showed unilateral translucency of
the left lung, absence of ventilation and
perfusion in the same lung, and a 3.5 cm
aneurysm of the descending thoracic aorta
which compressed the left mainstem bron-
chus.

(K Thorax 1997;52:299±300)

Keywords: dyspnoea, aortic aneurysm, unilateral hyper-
translucency.

There have been several recent reports of a
nosological entity described as “unilateral pul-
monary emphysema” or abnormal trans-
radiancy of one lung, first reported by Swyer
and James in 1953¹ and McLeod in 1954.²
Apart from these syndromes, increased radio-
lucency of one hemithorax occurs in many
other conditions such as compensatory em-
physema, obstructive emphysema, bullae and
cyst and pulmonary vascular obstruction. The
most common causes are foreign body inhala-
tion and congenital lobar emphysema in chil-
dren and bronchial tumours in adults.³

Case report
A 19 year old man presented with a six months
history of dyspnoea on exertion. Two years
prior to his admission he had a traffic accident
which caused him a chest trauma without com-
pl ications at that time. The patient had never
smoked. Physical examination showed a small
reduction of breath sounds in the left hemi-
thorax. The results of laboratory blood tests
were normal.

A posteroanterior chest radiograph (fig 1)
revealed unilateral transluency of the left lung,
and air trapping was found on inspiration-
expiration chest radiographs. Lung function

Figure 1 Posteroanterior chest radiograph showing
unilateral transluency of the left lung.

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Figure 2  Computed tomographic scan of the chest showing (A) striking hypertranslucency of the left lung associated with an increase in volume and decrease in the diameter of the pulmonary vessels and (B) compression of the left mainstem bronchus by a 3.5 cm aneurysm of the descending aorta.

studies showed an obstructive pattern with forced expiratory volume in one second (FEV₁) 1.36 l (32% predicted), forced ventilatory capacity (FVC) 1.91 l (38% predicted), forced mid expiratory flow (PEF₁₂₅₋₇₅) 0.47 l (23% predicted), residual volume (RV) 258 l (161% predicted), and total lung capacity (TLC) 6.32 l (99% predicted). There was no response to an inhaled bronchodilator. The carbon monoxide lung transfer factor (TLCO) was 50% predicted, arterial oxygen tension (PaO₂) was 8.5 kPa, arterial carbon dioxide tension (PaCO₂) 4.7 kPa, and pH 7.47.

Ventilation-perfusion isotopic lung scans showed absence of ventilation and perfusion of the left lung. Fibreoptic bronchoscopic examination revealed an extrinsic compression of the left main bronchus. The rest of the bronchial tree was normal. A computed tomographic (CT) scan of the chest (fig 2) showed that there was striking hypertranslucency of the left lung associated with an increase in volume and decrease in the diameter of the pulmonary vessels, possibly related to compensatory vasoconstriction (fig 2A). The left mainstem bronchus was smoothly compressed by a 3.5 cm aneurysm of the descending aorta (fig 2B).

The patient was operated on successfully. An aneurysmatic dilation (3.5 cm × 3 cm) was found 2 cm beyond the origin of the left subclavian artery. At thoracotomy a complete tear of the intima and media of the aorta was found, the continuity of the vessel being maintained by adventitial coats only. After removal of the aneurysm the continuity of the aorta was established by a prosthetic graft. His clinical condition improved and lung function tests, blood gas tensions and chest radiograph became normal.

Discussion

We have described a case of unilateral hypertranslucency of the left lung caused by an aneurysm of the thoracic aorta. Aortic aneurysms may be classified as arteriosclerotic, syphilitic, traumatic, dissecting, post-stenotic, and mycotic. The cause of our patient’s aneurysm was probably post-traumatic as he had had a chest trauma two years prior to his admission. Serological tests for syphilis were negative.

Aneurysms of the thoracic aorta may be found by chance on chest radiographs in an otherwise asymptomatic patient, or may present as pain from aortitis, erosion of the sternum or vertebral column and compression of the spinal nerves, or as symptoms arising from compression of adjacent structures. Respiratory symptoms result from compression of the tracheobronchial tree. In some cases compression may cause severe respiratory failure and indicate the need for emergency surgery. In most patients, as in our case, dyspnoea alone without chest pain is the presenting respiratory symptom and its severity varies according to the size and location of the dilatation of the aneurysm. CT scanning and bronchoscopy clearly show the level of the compression. Surgery is indicated when the patient is symptomatic as a result of the aneurysm. Aneurysms of the descending aorta should be included in the differential diagnosis in patients with unilateral hypertranslucency and an appropriate history. In patients with such a finding a bronchial biopsy should not be attempted before CT scans are obtained.

1 Sweeney PR, James GCW. A case of unilateral pulmonary emphysema. Thorax 1953;8:133-5.