

## An intravenous drug addict presenting with 'shortness of breath': case report

### 個案報告：一名氣促的靜脈注射藥物的癮君子

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A 49-year-old male intravenous drug addict attended the emergency department complaining of 'shortness of breath' for one day. He was discharged after evaluation and referred to the methadone clinic. He re-attended the next day complaining of neck stiffness and twitching of limbs for one day. The final diagnosis was tetanus. Although tetanus is rare in Hong Kong, high vigilance should still be maintained for its atypical presentations, especially in high-risk groups. (*Hong Kong j.emerg.med.* 2004;11:60-64)

一名四十九歲的男性靜脈注射藥物的癮君子因申訴氣促一天而到急症室求診，經診斷後出院並轉介美沙酮診所。翌日，他因頸部僵硬及肢體顫搐了一天再度求診，最後診斷為感染破傷風。雖然在香港破傷風是很罕見，但仍需注意一些非典型的徵狀，尤其是對那些高危群組，更應提高警覺。

**Keywords:** Diagnosis, dyspnoea, emergencies, intravenous drug abuse, tetanus

**關鍵詞：**診斷、氣促、緊急情況、靜脈注射藥物的濫用、破傷風

## Introduction

Although rare in Hong Kong, tetanus is a highly lethal disease.<sup>1,2</sup> Statistics from the Department of Health confirms that it continues to occur sporadically in Hong Kong (Figure 1).<sup>3</sup> The main problem facing emergency physicians is the difficulty in early diagnosis of this uncommon disease.<sup>4,5</sup> This is the report of a case of tetanus with subtle initial presentation.

## Case report

A 49-year-old male intravenous drug addict attended the emergency department in January 2003

complaining of 'shortness of breath' for one day. He had an injection of heroin six hours prior to the attendance. There was no cough or wheezing. He requested methadone prescription. His blood pressure was 135/77 mmHg, pulse rate 97 beats per minute, respiratory rate 20 breaths per minute, tympanic temperature 37.6°C and SpO<sub>2</sub> 96% on room air. General and chest examinations were essentially normal, apart from multiple injection marks on the limbs and an aphthous ulcer on the tongue. There was no trismus or skin wound. His chest X-ray was normal. The electrocardiogram showed normal sinus rhythm. Basing on these unremarkable findings, he was discharged and referred to the methadone clinic. He re-attended the next day complaining of neck stiffness and twitching of limbs for one day. There was persistent 'shortness of breath'. Once again, he had an injection of heroin six hours prior to this re-attendance. He was fully conscious, with a Glasgow coma score of 15/15. He could open his mouth and speak in full sentence. His blood pressure was 142/84 mmHg,

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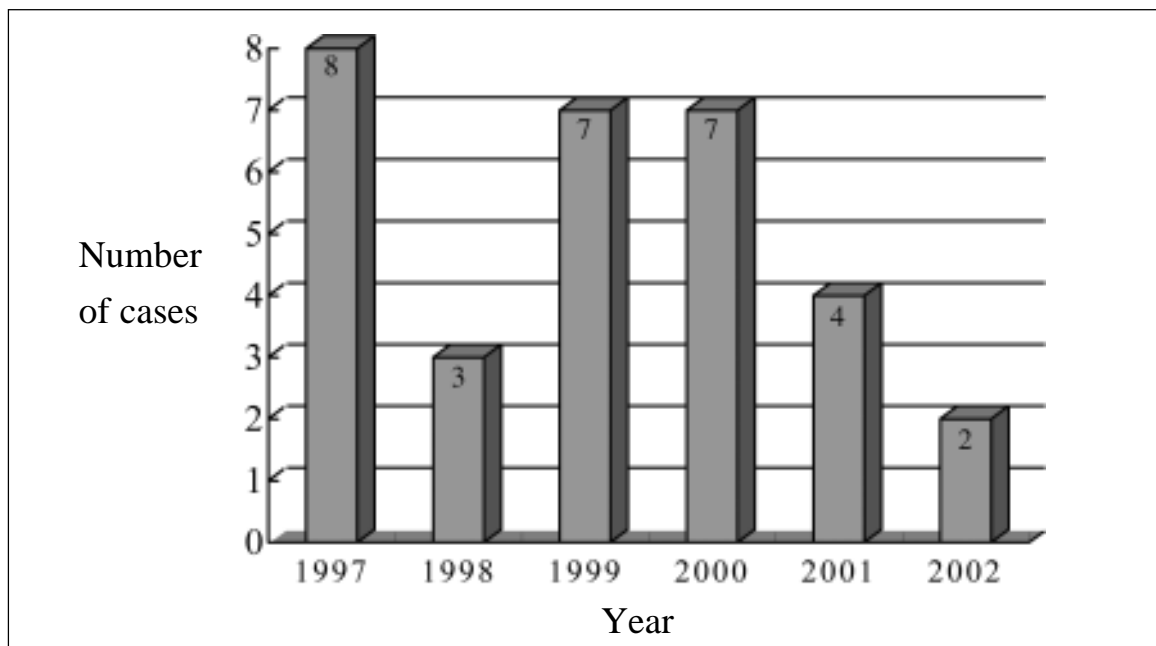


Figure 1. Statistics of tetanus in Hong Kong.

pulse rate 87 beats per minute, respiratory rate 18 breaths per minute, tympanic temperature 39°C, and SpO<sub>2</sub> 89% on 24% oxygen. Examination revealed marked neck stiffness and muscle spasms of all limbs. His upper limbs were flexed and the lower limbs extended, but his abdomen was soft. There was no opisthotonus. His muscle power was grade 4 in all limbs, with depressed limb jerks and flexor plantar reflexes. On chest examination, the breath sounds were clear and air entry was equal on both sides. However, his chest X-ray showed suspicious lower zone haziness bilaterally. His spot blood sugar was 6.1 mmol/L. The clinical diagnosis was tetanus. He was given oxygen at a rate of 6 L/min, human tetanus immune globulin 500 IU intramuscularly, antitetanus toxoid 0.5 ml intramuscularly, and penicillin 2 megaunits intravenously. He was then admitted to the intensive care unit.

Immediately and shortly after admission, a series of investigations was performed. The white cell count was  $18.5 \times 10^9/L$  (normal 3.9-10.7) with 85.8% neutrophil (normal 38-76). The platelet count was  $693 \times 10^9/L$  (normal 152-358). His liver and renal function tests were essentially normal. The serum calcium and magnesium levels were within normal limits. His

plasma creatine kinase (CK) was 1271 U/L (normal 42-218), creatine kinase-MB 10.7 µg/L (normal <4.94) and CK-MB/CK index 8.4 ng/U (An index <20 makes myocardial injury unlikely except when total CK levels are very high due to concomitant skeletal muscle injury). The blood gas results were as follows: pH 7.36, pCO<sub>2</sub> 6.47 kPa, pO<sub>2</sub> 9.89 kPa, base excess 0.4 mmol/L, bicarbonate 26.6 mmol/L, and calculated oxygen saturation 94%. There was no myoglobin in the urine but haemoglobin was detected. Urine drug screen revealed morphine, codeine, methadone and their metabolites. Computed tomogram of brain showed normal findings. Lumbar puncture confirmed normal pressure, colour, protein, sugar and cytology, with no *Cryptococcus* detected. Blood and urine cultures were negative. Cerebrospinal fluid cultures for bacteria, fungi, viruses and acid-fast bacilli were all negative. Antibodies to Human Immunodeficiency Virus 1 & 2 were negative. However, tracheal aspirate yielded moderate growth of *Moraxella catarrhalis*.

He was intubated and mechanically ventilated shortly after admission. Midazolam, morphine, rocuronium and cisatracurium were used in different stages for sedation and muscle paralysis. As prolonged ventilatory support was considered necessary,

tracheostomy was performed. Rigidity and spasm subsided after four weeks and mechanical ventilation was subsequently withdrawn. After more than ten weeks of hospitalisation and rehabilitation, he was finally discharged. At the follow-up visit two months later, he could walk unaided with totally independent activities of daily living.

## Discussion

Tetanus was first described in Egypt over 3,000 years ago.<sup>6</sup> Despite the availability of antitoxin since 1893 and effective vaccine since 1923, tetanus is still prevalent in under-developed and developing countries worldwide, especially in Africa and Southeast Asia.<sup>6</sup> It is estimated that the global incidence of tetanus is one million cases annually with a mortality rate of 20-50%, at least half of them being neonatal deaths.<sup>7,8</sup> It is rare in developed countries nowadays, having less than one case per million per year, probably because of the widespread immunisation of populations at risk.<sup>1,8-10</sup>

Tetanus is the oldest of the 'classic diseases of addiction', dating back to Victorian times and being an infectious complication of intravenous narcotic drug users.<sup>1,2,3,11</sup> In addition to puncture wounds as portals of bacterial entry, additives such as quinine which lower the redox potential at the site of injection may be contributory to the higher incidence and mortality in this group of patients.<sup>2,12</sup>

The exotoxin tetanospasmin produced by the vegetative form of *Clostridium tetani* is responsible for the clinical manifestations of muscular rigidity, muscular spasms and autonomic instability.<sup>1,2,5</sup> Previously, the major risk to life is related to involvement of the muscles of respiration, leading to respiratory failure and death.<sup>2,5</sup> Intensive care and artificial ventilation have substantially improved the prognosis and most deaths nowadays are attributed to autonomic nervous system instability, nosocomial infections, thromboembolism or gastrointestinal bleeding, instead of respiratory failure.<sup>6,10</sup>

There are four major clinical types of tetanus.<sup>1,2,13</sup> Generalised tetanus (mortality rate around 25%) is the most common and severe form.<sup>1,2,14</sup> In most patients, trismus (lockjaw) is the first presenting symptom, followed later by risus sardonicus, dysphagia, neck stiffness, opisthotonus, and stiffness of extremities in descending order of appearance.<sup>2,5,6,15</sup> Muscle spasms which follow may be localised or generalised, vary in severity, occur spontaneously or when stimulated, and usually affect the trunk more than the limbs.<sup>15</sup> Late in the disease, autonomic dysfunction develops, with a hyperkinetic circulatory state of hypertension, tachycardia and cardiac dysrhythmia alternating with hypotension and bradycardia to the point of cardiac arrest. These may be accompanied by fever, sweating, bowel and bladder dysfunction.<sup>1,2,15</sup> In one series, symptoms on admission were: trismus 96%, back pain 94%, muscle stiffness 94%, dysphagia 83%, muscle spasms 41%, sweating 10%, shortness of breath 10%, and fever 7%.<sup>6</sup> The source of infection may be a wound (65%), chronic ulcer (5%) or no obvious source.<sup>8</sup>

Generalised tetanus in heroin addicts may have a number of clinical features which are different from those of the nonaddicted.<sup>12</sup> There may be much higher fever, absence of trismus at onset or throughout the course of the disease, marked neck and back stiffness (which in the absence of trismus may be confused with meningitis), and early onset of coma. Some of these 'variant' features were present in our patient. Prophylaxis is less effective in the addicted than non-addicted persons. The fatality rate has been claimed to approach 100%.<sup>12</sup>

Localised tetanus is an uncommon variant and accounted for 2-13% of cases.<sup>16-18</sup> It is the less severe form characterised by persistent painful muscle spasms restricted to the proximity of the inoculation site. Partial immunity through previous incomplete immunisation may be the underlying reason for the mild presentation and low mortality (1%).<sup>12,14,16</sup> Cephalic tetanus is a rare local variant (incidence 1-3%), with trismus and cranial nerve palsies after sustaining head and neck wounds or injuries, and has

a much higher mortality (15-30%).<sup>2,15</sup> However, both local and cephalic tetanus can progress to the generalised form.<sup>1,2</sup>

Neonatal tetanus is a form of generalised tetanus as a result of contamination of the umbilical stumps in newborns, almost exclusively in underdeveloped or developing countries. Neonatal tetanus presents with weakness, irritability and poor sucking, followed later by rigidity and spasms as in generalised tetanus.<sup>1,2</sup> It has an extremely high mortality rate (>90%).<sup>1</sup>

The diagnosis of tetanus is solely based on clinical grounds.<sup>1,2,6,8,9,19</sup> Recently, the spatula test has been claimed to have a specificity of 100% and a sensitivity of 94%.<sup>20</sup> Reflex spasm of the masseters on touching the posterior pharyngeal wall with a spatula indicates a positive test result. Laboratory tests are more useful in ruling out other diseases rather than in confirming tetanus.<sup>1,5,8,15,21</sup> *Clostridium tetani* is anaerobic and difficult to grow, and isolation of the organism does not prove that the patient is suffering from the disease as it may just be a contaminant or the patient may have protective immunity. Moreover, a substantial proportion of tetanus occurs in the absence of a recognised acute wound.<sup>1,2,5,6,14,17,21</sup> Low or undetectable levels of serum anti-tetanus antibodies at the time of illness is supportive of the diagnosis, but occasionally 'protective' levels may be present.<sup>12,14</sup> Tetanus can occur even in fully immunised hosts.<sup>11,14</sup> Rises in antibody titres after infections are uncommon, so paired sera study for retrospective diagnosis usually is not helpful.<sup>12</sup> In addition, this form of serological diagnosis is not applicable when therapy also includes active immunisation.<sup>12</sup>

'Shortness of breath' is an uncomfortable awareness of the effort of breathing. Neuromuscular disorders, including tetanus, can create a sensation of 'shortness of breath'. The underlying mechanism is the inability of the weakened respiratory musculature to produce the ventilatory effort to meet the patient's metabolic needs. In a patient complaining of 'shortness of breath' but with quiet breathing and clear lung fields on auscultation, neuromuscular or metabolic causes should be considered.

Tetanus may not be suspected because of the many variants from classical presentations.<sup>15,16</sup> Before diagnosing tetanus, it is reasonable to administer an intravenous dose of benzotropine or diphenhydramine to rule out a dystonic reaction.<sup>2,22</sup> A firm diagnosis of tetanus can only be made after clinical observation and reassessment of the response to treatment.<sup>2,16</sup> It was shown that tetanus had been diagnosed on the first visit to a doctor in only half of the patients, suspected in 28% and not considered in 22%.<sup>4</sup> The main problems are difficulty of early diagnosis and treatment of severe complications. There is a need for prompt diagnosis and treatment because of the risk of respiratory failure.<sup>5</sup> Vigilance and a high index of suspicion are required.<sup>19</sup>

In conclusion, although tetanus is rare in Hong Kong, high vigilance should still be maintained for its atypical presentations, especially in high-risk groups.

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