An infected insect bite?

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Case history

* 48 year old man
* Presented to A&E with 48 hour history
  * double vision
  * drooping of the left eyelid
  * dysarthria

* Over the next 12 to 24 hours
  * bilateral ptosis
  * facial weakness
  * dysphagia
  * breathless on lying flat
Case history

- No fevers
- No weakness of arms or legs
- No sensory symptoms
- No urinary symptoms
- No bowel symptoms
- Insect bite on right arm a week ago
Past medical and social history

- **Past medical history**
  - Traumatic splenectomy
  - Hypogonadal hypogonadism
  - Gastric ulcer on OGD 2006

- **Medications**
  - Penicillin V prophylaxis
  - Calcichew D3 Forte
  - Alendronic Acid
  - Sustanon 200mg daily 4 weeks

- **Social history**
  - Works as a builder
  - Lives with female partner
Examination

- Apyrexial
- Normal pulse rate and blood pressure
- Intubated and ventilated
- Chest clear
- Abdominal examination normal
- Cellulitis / abscess at site of insect bite in right antecubital fossa
Neurological examination

* Complete bilateral ptosis
* Pupils equal and reactive
* Bilateral 6\textsuperscript{th} cranial nerve palsies
* Facial weakness
* Bulbar palsy (drooling saliva)
* Respiratory muscle weakness (FVC 1.34)
* Full strength in arms and legs
* Reflexes intact / plantars down going
* Sensation normal
What is the differential diagnosis?
What investigations would you perform?
Further history from partner

- She been away from home during the preceding week
- She had been told lesion on arm was an insect bite
- Patient had been ‘very down’ recently
- Patient had a history of intravenous drug use but was not thought to be using drugs currently
- No evidence of drug paraphernalia in house
What is most likely diagnosis now?

How would you manage this patient?
Fever, rigors during anti-toxin infusion
Deep tendon reflexes lost and then returned
Full power remained
Haemodynamically stable
Gradual neurological improvement
Respiratory support weaned
Admitted to IV drug use one week prior to admission
Wound botulism confirmed microbiologically by HPA Centre for Infections
Historical aspects

- Botulism derived from botulus = sausage
- 19\textsuperscript{th} century outbreaks of food poisoning related to sausages
- 1820 Justinius Kerner 230 cases of paralytic illness in sausage eaters
- Russians recognised similar illness in fish eaters
- 1897 Ermengen described \textit{C.botulinum} and showed that it produced a toxin
Clostridium botulinum

- Ubiquitous in soil and marine sediments
- Gram-positive bacillus, obligate anaerobe, spore-forming
- Spores are germinate in anaerobic environments and are heat-resistant up to 100°C
- 8 strains distinguished by antigenic specificity of toxins – A, B, C1, C2, D, E, F and G
- Human disease caused by strains A, B, E (rarely F and G)
C. botulinum toxin

- Polypeptide chain MW 150 - 165kD
- Zinc-dependent metalloproteinase
- Cleaved to form 2 subunits – heavy chain and light chain
- Heavy chain binds to pre-synaptic receptor and enters cell by endocytosis
- Toxin inhibits acetylcholine release by various mechanisms
- Usually affects peripheral NM junction and autonomic synapses
Action of *C. botulinum* neurotoxin
Botulism: clinical forms

- Food borne botulism
  - Ingestion of pre-formed toxin in processed foods
- Infant botulism
  - Gut colonisation with spores e.g. in honey
- Wound botulism
  - Injection of spores in intravenous drug users
- Inhalational botulism
  - Rare, occurs in laboratory workers
- Iatrogenic botulism
  - Injection of Botox, rare
Symmetric, descending flaccid paralysis
- Cranial nerve palsies
- Dry mouth, dilated pupils
- Weakness of respiratory muscles
- Smooth muscle paralysis - constipation, paralytic ileus, and urinary retention
- Deep tendon reflexes depressed or absent
- Important negative clinical features
  - Normal sensation
  - Normal mentation and memory
  - Normal temperature
- Intoxication from type A is more severe than from types B, E, or F
Botulism: diagnosis

- Clinical presentation
  - Mainstay of diagnosis

- Laboratory confirmation
  - Detection of neurotoxin in clinical and food samples
  - Detection of organism in clinical and food samples
  - 10ml serum
  - Samples according to clinical presentation e.g. food, vomit, gastric contents, faeces, pus, tissue biopsy
  - Send samples to HPA Centre for Infections, Foodborne Pathogens Reference Unit
Wound botulism

- Usually associated with injection drug use
- Over 160 cases reported to HPA since 2000
- Increase in cases with the emerging practice ‘skin popping’ – subcutaneous or intramuscular injection
- Incubation period ranges from 4 to 51 days
06 March 2009
Dear Colleagues,

BOTULISM IN INJECTING DRUG USERS

Please bring this information to the attention of all clinical staff

In the week between 22/02/09 and 02/03/09, five heroin injecting drug users (IDUs) (four males and one female) have been reported to the Health Protection Agency Centre for Infections (HPA CfI), from London, East of England and the South East with clinically diagnosed wound botulism. All were injecting drug users who are in the habit of injecting subcutaneously (‘skin popping’).
<table>
<thead>
<tr>
<th>Year</th>
<th>Cases</th>
<th>Deaths**</th>
<th>References</th>
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| 2000 | 4     | -        | Eurosurveillance 2000; 4 (20)  
              Eurosurveillance 2000; 4 (21)  
              Eurosurveillance 2000; 4 (25)  |
| 2001 | 3     | -        | Eurosurveillance 2001; 5 (41)  |
| 2002 | 18    | -        | CDR 2002; 12 (44)  |
| 2003 | 11    | 2        |            |
| 2004 | 36    | 2        | CDR 2004; 14 (35)  |
| 2005 | 25    | 2        | CDR 2006; 16 (13)  |
| 2006 | 18    | 2        | HPR 2007; 1 (17)  |
| 2007 | 3     | -        |            |
| 2008 | 4     | -        |            |
| 2009 | 19    | -        | HPR 2009;03 (09)  |
| 2010 | 3     | -        |            |
How should you treat this patient?
HPA algorithm for management of suspected botulism

http://www.hpa.org.uk/webc/HPAwebFile/HPAweb_C/1245309925058
Most patients hospitalised for 1 to 3 months

Mortality

- Ranges from <5% to 8% with prompt supportive treatment
- Mortality lowest (<1%) in infant botulism
- Shortness of breath associated with increased mortality risk (18% versus 1%)

Long term outcome

- Retrospective review of 217 patients
- 211 patients alive at 4.3 years
- 68% health status worse than prior to illness
- 49% rated health as worse or poor