

# Foodborne botulism associated with home-preserved turnip tops in Italy

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## Abstract

In Italy, foodborne botulism is a rare disease mainly due to home-preserved food. In the case reported here, clinical diagnosis was performed on the basis of clinical signs and referred consumption of home-preserved turnip tops in oil. Definitive diagnosis was performed by detection of botulinum toxin in sera and neuro-toxigenic organisms in stools and leftover food. This case report highlights the need of a high medical awareness, prompt clinical diagnosis, and synergic collaboration among the health authorities for a correct management of botulism as well as disease containment.

## Key words

- botulism
- diagnosis
- epidemiology
- PCR

## INTRODUCTION

Foodborne botulism is a severe neuro-paralytic disease caused by a botulinum neurotoxin (BoNT) and human exposure occurs via consumption of contaminated food [1]. In Italy, foodborne botulism is a rare disease mainly associated with the consumption of home-preserved foods, especially vegetables canned in oil or in brine. The laboratory analysis of the food items implicated in foodborne botulism outbreaks showed that in only 40.7% of the cases the neurotoxin is detected in the food, and among the positive food items 71.3% are home-canned vegetables.

Considering the severity and the potential public health impact of the disease, the Italian Health Authorities have included botulism among the notifiable diseases since 1975 [2]. In Italy, the management of a botulism case is based on the synergy among Public Health Authorities at both central and peripheral level: the Ministry of Health, the National Reference Centre for Botulism (NRCB) at the National Institute of Health (Istituto Superiore di Sanità), Regional Food Safety and Public Health Authorities including the Istituti Zooprofilattici Sperimentali in charge of the chemical and microbiological control of foods. The prompt detection of a case of botulism based on clinical suspicion is essential to ensure the detection of the food vehicle and to prevent additional illnesses. The rapid response is important especially if the food is an industrially canned product that can be widely distributed [3].

In this paper we describe a foodborne botulism case associated with the consumption of home-preserved turnip tops in oil. Turnip tops in oil is a typical canned food prepared in the South of Italy and consumed as pasta dressing or as side dish.

## Case report

On 18 May 2013, the Emergency Unit of the Mauriziano Hospital in Turin admitted a 21 years old student with a-day history of nausea, vomiting, abdominal cramps and mouth tingling due to alcohol intoxication and slang smoking. The patient also referred dysphagia, diplopia, dyspnea, dry mouth, constipation, and the consumption of home-canned turnip tops in oil. Neurologic examination revealed bilateral cranial nerve deficits and ophthalmoplegia. He was treated with metoclopramide to mitigate vomiting and with saline solution for hydration. Botulism was suspected and the patient was admitted to intensive care unit. Immediately physicians started the botulism management procedure that consists of botulinum antitoxin request, epidemiological investigation to define the source and potential additional cases, and laboratory confirmation. On the following day, respiratory failure had occurred and the patient was intubated and treated with botulinum antitoxin. Mechanical ventilation went on until 28 May, when the patient was admitted to the Neurologic Unit of the same Hospital where he stayed until June 15. Then he was admitted to day hospital rehabilitation until 28 June when he recovered completely.

## EPIDEMIOLOGICAL INVESTIGATION

On 19 May 2013 the Food Hygiene and Nutrition Department of Local Health Unit of Turin started the epidemiological investigation interviewing relatives and housemates of the case and collected suspected foods. The housemates declared that only the patient consumed the turnip tops in oil for dinner the night before the symptoms onset. The turnip tops eaten by the case have been prepared at home by the case's mother, who declared to have made four cans between 6-7 May, and sent them to the son in Turin, who stored the cans at room temperature until the consumption. The three confiscated cans of home-made turnip tops in oil were submitted to laboratory investigation at the Turin Istituto Zooprofilattico Sperimentale.

## LABORATORY INVESTIGATION

Serum and stool samples, and leftover of turnip tops, the suspected food items, were forwarded to NRCB by the hospital and the Istituto Zooprofilattico Sperimentale.

Type B toxin was detected in serum by mouse bioassay [4]. The multiplex real-time PCR on leftover turnip tops and stools was positive for bont/B gene [5]. Strains of proteolytic *Clostridium botulinum* type B isolated from stool and food samples were identified by biochemical assay and sequencing of 16S rRNA [6], while MLVA did not provide clear results, but limitations of this assay have been already described by Fillo and colleagues [7].

## DISCUSSION

The foodborne botulism case reported here presents at least three distinctive features:

- although the lavished vomiting and the high alcohol consumption, as well as the slang smoking, were referred as possible sources of muddle up or delay of the diagnosis, the physicians immediately made the correct clinical diagnosis;
- in Italy, the respiratory failure and the severe presentation of the disease are commonly associated with type A toxin, while type B botulism usually shows a mild symptomatology;
- the home-preserved food was prepared by the student's family living in Southern Italy and forwarded to the student living in Northern Italy.

Diagnosis of botulism is frequently missed or delayed especially in mild or atypical presentations where un-

specific symptomatology such as nausea, vomiting and intestinal pain may occur before the onset of neurological signs [1]. In this case, although the case referred gastrointestinal symptoms and assumption of alcohol and drugs, the physicians immediately formulated the clinical suspicion of botulism and started the management procedure for a botulism case. The rapid diagnosis of the disease permitted the laboratory identification of the food implicated.

Laboratory identification of implicated food is very difficult when the diagnosis is delayed because patients should have difficulties in recalling food consumed before the onset of symptoms or the food should be unavailable because they discarded the leftover. Moreover, the prompt epidemiological investigation and precautionary requisition of the other home-preserved jars stored at the patient's home avoided the spreading of new cases. Furthermore, the storage conditions, the physical and chemical properties of the turnip tops in oil allowed the germination of spore and the production of toxins.

In Italy, mainly the cases of botulism are due to type B toxin and show a mild symptomatology. Only in few cases, usually due to type A toxin the respiratory failure occurs.

In the last ten years we observed an increase in the number of foodborne botulism occurred in students, and these cases often are students native of Southern Italy, mainly male that consumed home preserved canned food. To avoid or reduce the number of these cases the NRCB adopted some risk communication measures by means of advertising campaigns in the Universities.

In conclusion, this case confirms that medical awareness, prompt clinical diagnosis and the synergic collaboration among the health authorities are essential for the correct management of botulism cases and to prevent additional cases.

### Conflict of interest statement

There are no potential conflicts of interest or any financial or personal relationships with other people or organizations that could inappropriately bias conduct and findings of this study.

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## REFERENCES

1. Sobel J. Botulism. *Clin Infect Dis* 2005;41(8):1167-73.
2. Squarcione S, Prete A, Vellucci L. Botulism surveillance in Italy. 1992-1996. *Eur J Epidemiol* 1999;15(10):917-22.
3. Shapiro RL, Hatheway CL, Becher J, Swedlow DL. Botulism surveillance and emergency response. A public health strategy for a global challenge. *JAMA* 1997;278(5):433-5.
4. Centers for Disease Control and Prevention. *Botulism in the United States, 1899-1996. Handbook for epidemiologists, clinicians, and laboratory workers*. Atlanta: Centers for Disease Control and Prevention; 1998.
5. Anniballi F, Auricchio B, Di Pasquale S, Delibato E, De Medici D, Fenicia L. Multiplex real-time PCR using LNA probes for the detection of BoNT-producing clostridia in clinical, food and environmental samples. 46<sup>th</sup> Interagency Botulism Research Coordinating Committee Meeting. Proceedings. Alexandria, Washington, USA; 2009.
6. Holdeman LV, Cato EP, Moore WE. *Anaerobe laboratory manual* 4<sup>th</sup> ed. Blacksburg, Virginia VA: Polytechnic Institute and State University; 1977.
7. Fillo S, Giordani F, Anniballi F, Gorgè O, Ramiè V, Vergnaud G, Riehm JM, Scholz HC, Spletstoesser WD, Kieboom J, Olsen JS, Fenicia L, Lista F. *Clostridium botulinum* Group I Genotyping by 15-Locus Multilocus Variable-Number Tandem-Repeat Analysis. *J Clin Microbiol* 2011;49(12):4252-63.