



Case Report

Successful treatment of a 15 years-old obese adolescent patient with botulinum anti-toxin after gastric Botox and systemic botulism findings: a case report**Muhammed Furkan Yücer ^a, Alper Kaçar ^a, Hüseyin Dağ ^{a,b,*}, Ahmet İrdem ^a**^a University of Health Sciences, Prof. Dr. Cemil Taşcıoğlu City Hospital, Department of Pediatrics, Istanbul, Turkey^b Istanbul University, Institute of Child Health, Adolescence Health, Department of Pediatric Basic Sciences, Istanbul, Turkey

ARTICLE INFO

Article history:

Received 31 May 2023

Received in revised form 13 July 2023

Accepted 26 July 2023

Keywords:

Obesity

Gastric botox

Botulism

Botulism anti-toxin

ABSTRACT

Obesity is an increasingly common public health problem in children. The main goal in the fight against obesity is to prevent the development of obesity by healthy eating, increasing physical activity and reducing screen time. Patients with obesity should be treated in a multidisciplinary manner in accordance with the guidelines. In children and adolescents, applications such as gastric Botox, which are not included in the guidelines and for which there is insufficient literature information, should be avoided. Obese patients with Botulism side effects should be questioned about this application and Botulism antitoxin should be administered in appropriate cases. In this case report, we present a 15-year-old adolescent girl who developed botulism after gastric Botox administration in another medical institution and was successfully treated with Botulism antitoxin and prostigmine.

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<https://doi.org/10.53986/ibjm.2023.0024>

Tratamiento exitoso de un paciente adolescente obeso de 15 años con antitoxina botulínica posterior a Botox gástrico y hallazgos de botulismo sistémico: reporte de un caso

INFO. ARTÍCULO

Historia del artículo:

Recibido 31 Mayo 2023

Recibido en forma revisada 13

Julio 2023

Aceptado 26 Julio 2023

Palabras clave:

Obesidad

Botox gástrico

Botulismo

Antitoxina botulínica

RESUMEN

La obesidad es un problema de salud pública cada vez más común en los niños. El objetivo principal en la lucha contra la obesidad es prevenir el desarrollo de la obesidad mediante una alimentación saludable, aumentando la actividad física y reduciendo el tiempo de pantalla. Los pacientes con obesidad deben ser tratados de forma multidisciplinar de acuerdo con las guías. En niños y adolescentes deben evitarse aplicaciones como el botox gástrico, que no están incluidas en las guías y para las que no existe suficiente información bibliográfica. Los pacientes obesos con efectos secundarios del botulismo deben ser interrogados acerca de esta aplicación y la antitoxina del botulismo debe administrarse en los casos apropiados. En este reporte de caso, presentamos a una adolescente de 15 años que desarrolló botulismo luego de la administración de botox gástrico en otra institución médica y fue tratada exitosamente con antitoxina botulínica y prostigmina.

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HOW TO CITE THIS ARTICLE: Yücer MF, Kaçar A, Dağ, H, İrdem A. Successful treatment of a 15 years-old obese adolescent patient with botulinum anti-toxin after gastric Botox and systemic botulism findings: a case report. *Iberoam J Med.* 2023;5(4):176-180. doi: 10.53986/ibjm.2023.0024.

1. INTRODUCTION

Obesity, one of the most common chronic diseases in children and adolescents, remains a public health problem on a global scale [1]. The term obesity means excess fat. Since it is not easy to measure this in practice, obesity is defined by calculating body mass index (BMI). BMI is calculated by dividing body weight (in kilograms) by the square of height (in meters). For children aged 2-18 years according to age and gender, if BMI is 95p and above and BMI Z score is 2 or above, this is defined as obesity [2-4]. In a study conducted in the USA, it was reported that 22.8% of preschool children, 34.2% of school-age children and 34.5% of adolescent children were overweight or obese [5]. In a study conducted in Turkey, the prevalence of obesity has increased approximately 12 times between the ages of 5-19 in the last 20 years [6].

Since children with severe obesity are at risk in many aspects, obesity prevention and obesity treatment are important [7, 8]. Intervention for obesity can be applied according to stages. It is possible to prevent obesity with healthy nutrition, shortening screen time, and adequate physical activity recommendations; however, bariatric surgeries can be performed in patients with obesity in addition to the necessary pharmacologic treatment [9, 10]. In recent years, obesity surgery applications have become widespread in adolescents as well as adults [11, 12].

Although it is not one of the surgical applications, Gastric Botulinum Toxin application applied with an invasive procedure has recently been applied in the treatment of obesity in adults [13]. Botulinum toxin (BTX) is a neurotoxin produced by *Clostridium botulinum* bacteria. The BTX-A isotypes used inhibit muscle contraction by inhibiting acetylcholine release at the neuromuscular junction and have been used in neuropathic diseases, dystonia and tremor for years [14].

With gastric BTX administration, gastric motility slows down, gastric emptying is delayed and weight loss is aimed by decreasing the feeling of hunger and enabling less eating. The effect is reversible and lasts for 3-6 months [15].

Botulism may be caused by intestinal colonization, food-borne, inhalation, wound-borne transmission or iatrogenic. Blockade of acetylcholine release at the neuromuscular junction is responsible for the clinical findings caused by the toxins of *Clostridium spp.* [16] Progressive proximal muscle weakness, cranial nerve paralysis, most commonly ptosis, dysphagia, speech and visual disturbances, constipation or diarrhea, respiratory failure due to paralysis of respiratory muscles are observed. This poisoning should be considered in patients with sudden onset, muscle weakness not accompanied by fever and cranial nerve involvement. After basic and advanced life support, specific treatment should be performed with Botulinum anti-toxin (BAT) [17]. BAT eliminates circulating toxins by binding them [18, 19]. Although bariatric surgery treatments can be applied in

adolescents with appropriate indications, we have not encountered gastric botox administration for this purpose in the literature. In this case report, a case who developed complications after gastric botox administration and recovered after antitoxin administration will be presented.

2. CASE REPORT

A 15-year-old female patient was admitted to the emergency department on March 25, 2023 with complaints of weakness, shortness of breath, difficulty in speaking and swallowing, and constipation. It was learned that her current complaints started 1 day after Gastric BTX application, which was applied 3 weeks ago as obesity treatment, increased in severity in recent days, and her mother, who underwent the same procedure in the same center, had similar complaints. She had no history of any disease. She had not received any treatment for obesity. Her family history was unremarkable. However, obesity was also present in the mother. On arrival to the emergency department, the patient's general condition was moderate to good, consciousness was clear, oriented-coopere, Glasgow coma scale: 15, and she had difficulty walking. Vital signs were peak heart rate 128/min, respiratory rate 30/min, SpO₂ 99% in room air, blood pressure 110/70 mmHg. His weight was 90 kg, height 159 cm and body mass index was 35.16 and 99 percentile. She was in stage 2 according to severity [1]. BMI Z score was 3.39. On physical examination, the patient was dysarthric, bilateral ptosis was present, other cranial nerve examinations were normal, direct and indirect light reflexes were positive bilaterally, upper extremity muscle strength was 3/5, lower extremity muscle strength was 4/5, deep tendon reflexes were normo-active bilaterally. The patient was tachypneic and was using auxiliary respiratory muscles, but lung sounds were normal by auscultation. Cardiovascular and gastrointestinal system examinations revealed no abnormal findings. BAT Heptavalent was administered to the patient who was thought to have iatrogenic botulism with the current clinic. The 20 ml of antitoxin dissolved under appropriate conditions was diluted with 200 ml of saline and infusion was started with a rate of 0.5 ml/min and gradually increased to 2 ml/min due to possible anaphylactic side effects. After BAT administration, Pridostigmine was started as 3 x 60 mg orally and planned as 2 doses per day after 1 week and then as single dose. No pathologic findings were found in complete blood count and biochemical parameters. The patient whose muscle weakness regressed, whose speech improved, and who had no chewing and swallowing

problems was discharged for a follow-up visit after 1 week with all clinical complaints resolved.

3. DISCUSSION

Obesity, which is an important global public health problem, leads to many problems. In particular, severe obesity is associated with shorter life expectancy and leads to obstructive sleep apnea, diabetes, hypertension, dyslipidemia, non-alcoholic fatty liver disease and idiopathic intracranial hypertension, as well as significant comorbidities such as depression and impaired quality of life. Comprehensive and effective weight loss programs should be implemented to combat obesity. Dietary adjustments, reduction of screen time, increase in physical activity, as well as medication or bariatric treatments can be applied in appropriate cases. In 2019, the American Academy of Pediatrics reported that surgical treatment can be performed in appropriate indications in adolescents with severe obesity. Selection of appropriate adolescent patients for surgical treatment varies according to BMI and presence of comorbid diseases. Class 2 patients are those with a BMI of 120% of the 95th percentile or a BMI of 35 kg/m² and above. If comorbid disease accompanies these patients, surgery is indicated. However, patients with a BMI of 40 kg/m² or 140 percent of the 95th percentile and above, with or without comorbid disease, are candidates for surgery [20]. Although our patient met these criteria according to BMI values, she may benefit from diet, exercise and calorie restriction or pharmacologic treatment before surgical option since she did not have comorbid diseases [21-23]. Although it is an invasive procedure applied to the stomach with the help of endoscopy, gastric botox application, which is not a surgical treatment, is not an accepted treatment in adolescents. Iatrogenic botulism, which has life-threatening consequences as a result of increasing medical applications, has a wide clinical spectrum ranging from simple muscle weakness to respiratory depression. Early treatment initiation based on history and clinical findings prevents progressive symptoms. Although there are no cases of iatrogenic botulism in the pediatric patient population in the literature, there are case reports in adult patients. In a study of 67 adult patients with a mean age of 38 years who underwent endoscopic intragastric botox administration, one patient had dyspnea, fatigue, bilateral ptosis starting 1 week after administration and muscle weakness was found on physical examination. The patient had normal oxygen saturation and did not require respiratory support. Imaging and laboratory tests were normal. The ptosis of the patient, who was started on 60 mg Pridostigmine twice a day,

regressed within 4 weeks. Complete disappearance of other symptoms took 8-12 weeks [24].

There are some publications supporting stomach botox in the treatment of obesity in adults [25-28]. However, gastric botox is not superior to standard treatments and other surgical treatments because these publications published in the treatment of obesity are not systemic and the study methods are different. In a comprehensive review in which 60 studies on the effects of BTX-A use in obesity were examined and 11 studies were appropriately selected and included, it was reported that the effect of ultrasound-guided intra-gastric administration of BTX-A was transient and did not have a significant sustainable weight loss role [29]. Similarly, Şen et al. [30], Bustamante et al. [31], reported that gastric botox was not effective in the treatment of obesity in their study in the adult group.

4. CONCLUSIONS

As a result, there is no study in the literature about the applicability of gastric botox to adolescents. Therefore, it is important to protect adolescents against new treatment strategies and to provide appropriate counseling. In patients with clinical suspicion and a history of botulinum toxin exposure, botulinum antitoxin treatment should be started as soon as possible and treatment should not be delayed. In the fight against obesity, it is vital to implement stepwise treatments with appropriate guidelines.

5. CONFLICT OF INTERESTS

The authors have no conflict of interest to declare. The authors declared that this study has received no financial support.

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