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Short communication

Botulinum toxin B ultrasound-guided injections for sialorrhea in amyotrophic lateral sclerosis and Parkinson's disease

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Abstract

Sialorrhea is frequent and invalidating in patients with amyotrophic lateral sclerosis (ALS) or Parkinson's disease (PD). Botulinum toxin (BTX) emerged as an alternative to traditional treatments. We evaluated efficacy and tolerability of ultrasound-guided BTX-B injections in parotids and submandibular glands in 18 patients with ALS or PD. At 1 week, both objective (cotton rolls weight) and subjective evaluations (dedicated clinical scales) documented sialorrhea reduction ($p<0.01$). ALS patients reported shorter benefit duration ($p<0.001$) and higher prevalence of viscous saliva (seven vs one patients), possibly due to different pattern of autonomic involvement. BTX-B seems efficacious in reducing sialorrhea in ALS and PD but the risk–benefit ratio might differ between these two conditions. This might have implications for clinical practice.

Keywords: Botulinum toxin; Sialorrhea; Parkinson's disease; Amyotrophic lateral sclerosis; Ultrasound guidance

1. Introduction

Sialorrhea is a frequent and invalidating symptom of amyotrophic lateral sclerosis (ALS) and Parkinson's disease (PD) [1,2]. Anticholinergics, radiation or surgical procedures are often ineffective or cause side-effects. Published studies concerning BTX treatment for sialorrhea in PD differ in patients selection and methodology and report different efficacy and side effects [1]. Very few studies deal with ALS patients treated with BTX-A [2–7] while data on BTX-B are not available.

We performed an open-label evaluation of ultrasound-guided BTX-B injections in parotids and submandibular glands in ALS and PD patients.

2. Patients and methods

2.1. Patients

We included consecutive PD or ALS patients with troublesome sialorrhea, who have been unsuccessfully treated by oral anticholinergics (trihexyphenidyl or amitriptyline). Patients previously treated with BTX, radiation or surgery were excluded. The Ethical Committee approved the study and the patients gave written informed consent.

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2.2. Methods

Ultrasound-guided BTX injections into parotids and submandibular glands were performed by the same skilled physician (M.P.). A 7-MHz superficial probe was used to explore the glands and to perform injections, with B-mode and color Doppler ultrasound. Using a scan oriented along each gland major axis, we injected 1000 U (in 0.4 cm^3 of saline) in two sites in the parotids and 250 U (in 0.1 cm^3 of saline) in a single site in the submandibular glands.

2.3. Clinical evaluations

Standardized evaluations were performed before treatment, 1 week after and on a monthly schedule thereafter. Latency and duration of the effect were assessed by telephone calls upon the patients' and caregivers' self-reports. When patients considered that benefit was over, they were asked if they wished to be treated again.

Saliva production was measured by weighing five cotton rolls before and after keeping them for 5 min in the mouth. Assessments were performed at each visit at the same time of the day, with the patient seated, having not drunk or eaten since 1 h, and after a swallow of saliva.

Evaluation of impact of drooling on daily life was performed using the Drooling Severity Scale (DSS), the Drooling Frequency Scale (DFS), an adapted version of the Drool Rating Scale [8] and a Visual Analogic Scale (VAS).

2.4. Statistical analysis

All values are expressed as means ± SD. Statistical analyses were performed, using the SPSS package (version 12.0), with *t*-test for independent samples and Wilcoxon signed-rank test. The χ^2 test with Fisher's correction was applied to determine differences in the frequencies of categorical variables. Bonferroni's correction for comparisons between different times was then carried out. Any p values <0.05 were considered statistically significant.

3. Results

Twenty-one patients were included. Ultrasound scanning revealed monolateral parotid dysgenesia in one patient and, in two ALS patients, rich vascularization (as per inflammatory process) in submandibular glands, which were therefore not injected due to safety concerns. These three patients were not included in the study, as they could not receive the full 4-glands treatment. Nine PD and nine ALS patients underwent treatment. The delivered toxin was visualized in real time as hyperechoic spots (Fig. 1). The Table 1 summarizes patients characteristics at baseline. All patients reported benefit from treatment. Efficacy was maximal within 1 week and lasted 3–6 months (Table 1).

At 1 week, significant reduction of sialorrhea (−64.1% according to cotton rolls weight), and significant improvement in all four clinical evaluation scales was obtained. All variables had similar trend throughout the follow-up (Fig. 2).

When BTX effect vanished and drooling relapsed to pre-treatment condition, all but one patients asked to be treated again.

When considered separately, differences between the two groups of patients in objectively and subjectively measured drooling at baseline, latency and demographics (excluding sex ratio, $p = 0.016$) were not

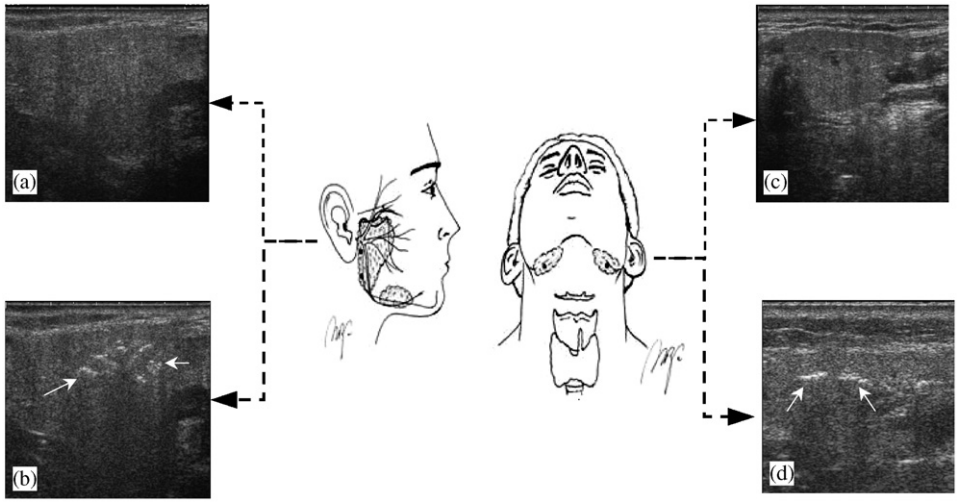

Fig. 1. Ultrasound images of parotid (a) and submandibular (b) gland before treatment. After botulinum toxin injection, delivery of the drug can be visualized as hyperechoic spots (white arrows) within the gland parenchyma ((c) parotid, (d) submandibular). Diagram shows anatomical location of the four glands: spots within the glands are the preferred sites of injection.