ISSN 2307-8960 (online)

World Journal of *Clinical Cases*

World J Clin Cases 2019 June 26; 7(12): 1367-1534

Published by Baishideng Publishing Group Inc

World Journal of Clinical Cases

Contents

Semimonthly Volume 7 Number 12 June 26, 2019

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World Journal of Clinical Cases (*World J Clin Cases*, *WJCC*, online ISSN 2307-8960, DOI: 10.12998) is a peer-reviewed open access academic journal that aims to guide clinical practice and improve diagnostic and therapeutic skills of clinicians.

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RESPONSIBLE EDITORS FOR THIS ISSUE

Responsible Electronic Editor: *Jie Wang*

Proofing Production Department Director: *Yun-Xiaojian Wu*

NAME OF JOURNAL
World Journal of Clinical Cases

ISSN
ISSN 2307-8960 (online)

LAUNCH DATE
April 16, 2013

FREQUENCY
Semimonthly

EDITORS-IN-CHIEF
Dennis A Bloomfield, Sandro Vento

EDITORIAL BOARD MEMBERS
https://www.wjgnet.com/2307-8960/editorialboard.htm

EDITORIAL OFFICE
Jin-Lei Wang, Director

PUBLICATION DATE
June 26, 2019

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World J Clin Cases 2019 June 26; 7(12): 1508-1514

DOI: 10.12998/wjcc.v7.i12.1508

ISSN 2307-8960 (online)

CASE REPORT

Premonitory urges located in the tongue for tic disorder: Two case reports and review of literature

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Author contributions: Cui YH supervised the inpatient treatment and hospitalization; Li Y wrote the case presentation; Zhang JS, Lu XY, Yan CM and Wen F took in charge the patient and contribute to describe the case presentation; Wang F and Cui YH reviewed the literature.

Informed consent statement: Written informed consent was provided by the two patients prior to study inclusion. All details of these two cases that might disclose the identity of the subject were omitted or anonymized.

Conflict-of-interest statement: All the authors declare that they have no conflicts of interest to disclose.

CARE Checklist (2016) statement: The authors have read the CARE Checklist (2016), and the manuscript was prepared and revised according to the CARE Checklist (2016).

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Abstract

BACKGROUND

Premonitory urges (PUs) was defined as the uncomfortable physical sensations of inner tension that can be relieved by producing movement responses. Nearly 70%-90% patients with Tourette syndrome reported experiences of PUs.

CASE SUMMARY

In this paper, we present two cases of young patients with PUs located in their tongue, which is very rare and easily misdiagnosed in clinical work. Both two young patients complained of an itchy tongue and cannot help biting their tongue. These two cases were worth reporting because it was rare that PUs was the initial symptom and located in the tongue. The results indicated that PUs seem to play an important role in the generation of tics.

CONCLUSION

Thus, PUs may be the first process, and an essential part, of the formation of tics.

Key words: Premonitory urges; Sensory tics; Tic disorders; Tourette syndrome; Case report

Core tip: These two cases were worth reporting because it was rare that premonitory urges (PUs) was the initial symptom and located in the tongue. The results indicated that PUs seem to play an important role in the generation of tics.

Citation: Li Y, Zhang JS, Wen F, Lu XY, Yan CM, Wang F, Cui YH. Premonitory urges located in the tongue for tic disorder: Two case reports and review of literature. *World J Clin*

Manuscript source: Unsolicited manuscript

Received: February 2, 2019
Peer-review started: February 11, 2019
First decision: March 9, 2019
Revised: March 28, 2019
Accepted: April 9, 2019
Article in press: April 9, 2019
Published online: June 26, 2019

P-Reviewer: Abundo R, Chen YK, Gorseta K, Munhoz EA, Rattan V
S-Editor: Ji FF
L-Editor: A
E-Editor: Wu YXJ

Cases 2019; 7(12): 1508-1514
URL: https://www.wjgnet.com/2307-8960/full/v7/i12/1508.htm
DOI: https://dx.doi.org/10.12998/wjcc.v7.i12.1508

INTRODUCTION

Sensory tics, which were first described by Bliss[1] in 1980, have mainly been described as uncomfortable physical sensations of inner tension that can be relieved by producing movement responses. Over subsequent years, many researchers have used different terminologies to define this symptom[2-4]. For instance, Cohen and Leckman called it the "Sensory phenomena" including descriptors such as "Urge", "Somatic Sensation" and "Heightened sensational Impulsivity"[3]. Some studies have demonstrated that sensory phenomena mainly include bodily sensations, mental urges and feelings of incompleteness, the need for things to be "just right", and motor or vocal responses to the sensations are required[5,6]. However, most recent studies have used the term "premonitory urges (PUs)" to describe this sensory symptom[7-9].

Nearly 70%-90% patients with Tourette syndrome (TS) report experiences of PUs[10,11]. It has been proposed that there are three parts to PUs, including sensory urges (focal visceral-sensations or muscular-skeletal), autonomic urges (symptoms such as nausea, sweating, and palpitations) and cognitive urges (feelings of incompleteness)[5]. Although PUs were not included in the diagnostic criteria of TS, some published studies have regarded it as the core symptom of TS[12,13].

In this paper, we present two cases of young patients with PUs located in their tongue, which is very rare and easily misdiagnosed in clinical work. Both young patients complained of an itchy tongue and cannot help biting their tongue. These two cases were worth reporting because it was rare that PUs were the initial symptom and were located in the tongue. We also provide a literature review on PUs.

CASE PRESENTATION

Chief complaints

Case 1: A 9-year-old girl, started to eat less and less for half a year prior to examination. Her main complaint was "Why is my tongue itchy?" The girl described her feeling as "My tongue was so itchy that I cannot help biting my tongue!". Her weight went from 70 pounds to 36.

Case 2: A 5-year-old boy, also complained of an itchy tongue and could not stop biting the tip of his tongue (Figure 1).

Personal and family history

Case 1: Her medical and family history did not reveal any relevant information.

Case 2: His medical and family history did not reveal any relevant information.

Physical examination

Case 1: Her temperature was 36.1, heart rate was 95 bpm, respiratory rate was 16 breaths per minute, blood pressure was 120/85 mmHg with oxygen saturation in room air was 98%. A clinical intraoral examination was conducted but no significant signal was found.

Case 2: His temperature was 36.4, heart rate was 98 bpm, respiratory rate was 18 breaths per minute, blood pressure was 120/80 mmHg with oxygen saturation in room air was 95%. We also performed a clinical intraoral examination but no significant indicator was found.

Laboratory examinations

Case 1: During the hospitalization, the girl received a series of blood testing, but no significant clinical indicators were found (Table 1).

Case 2: There was no significant clinical indicators were found (Table 2).

Imaging examinations

Case 1: An Magnetic resonance imaging scan of her brain was also obtained but no

Figure 1 The tip of tongue for case 2. The boy can't help biting his tongue, the tip of the tongue has been bitten through.

significant findings were found (Figure 2).

FINAL DIAGNOSIS

Case 1

Provisional Tic Disorder (the Diagnostic Criteria of Provisional Tic Disorder see Supplementary Materials). The symptom of an "itchy tongue" was recognized as a PU, and "biting the tongue" was regarded as a symptom of the tic.

Case 2

The boy was finally diagnosed as having a Provisional Tic Disorder (the Diagnostic Criteria of Provisional Tic Disorder see Supplementary Materials). The symptom "itchy tongue" belonged to one kind of PU.

TREATMENT

Case 1

For medical treatment, Aripiprazole (2.5 mg per day) was used. Psychological interventions were also performed to relieve the PUs (*e.g.*, habit reversal training). The therapeutic effects and safety of this comprehensive treatment program were assessed during those treatments.

Case 2

Clonidine transdermal patch on his back for 4 wk (1 pin).

OUTCOME AND FOLLOW-UP

Case 1

The PUs was mostly relieved, "biting the tongue" has resolved, and her diet returned normal, as well, after four weeks. Finally, by following this treatment program, the girl recovered and was sent back to school after eight weeks.

Case 2

After 6 wk treatment mentioned above, the boy recovered, and the "itchy tongue" was gone.

DISCUSSION

Although most children with TS report PUs[10], few cases have shown the onset of PUs at such a young age (*i.e.*, Case 2). It should be noted that the reporting of PUs relies on an age-related ability to describe sensory phenomena[14]. Rozenman *et al*[15] reported that the severity of PUs increased with age. Woods *et al*[16] found that there were no correlations between the PUs and the severity of tics in young patients before the age of ten. Based on general clinical observations, Leckman *et al*[17,18] reported that young

Table 1 Blood tests of case 1

Items	Abbreviation	Results	Items	Abbreviation	Results
Potassium	K	4.86 mmol/L	White blood cell count	WBC	5.45×10^9
Sodium	Na	141.4 mmol/L	Red blood cell count	RBC	4.26×10^{12}
Chlorine	Cl	105.7 mmol/L	Hemoglobin	HGB	130 g/L
Bicarbonate	CO_2	25.3 mmol/L	Hematocrit	HCT	39.80%
Total protein	TP	76.2 g/L	Mean corpuscular volume	MCV	93.4 fl
blood urea nitrogen	Urea	6.41 mmol/L	Mean corpuscular hemoglobin	MCH	30.5 pg
Creatinine	Cre	43.0 μmol/L	Mean corpuscular hemoglobin concentration	MCHC	327 g/L
Cholesterol	Chol	4.23 mmol/L	Platelet	PLT	238×10^9
Uric acid	UA	352.8 μmol/L	Platelet distribution width	PDW	12.0 fl
Glucose	GLU	4.85 mmol/L	Mean platelet volume	MPV	10.8 fl
Calcium	Ca	2.52 mmol/L	Platelet larger cell ratio	PLCR	30.10%
Phosphorus	P	1.60 mmol/L	Plateletcrit	PCT	0.26
Alkaline phosphatase	ALP	298 U/L	Neutrophil ratio	NEUT	2.50×10^9
Aspartate aminotransferase	AST	33.3 U/L	Lymphocyte ratio	LYMPH	2.31×10^9
Alanine aminotransferase	ALT	26.6 U/L	Monocyte ratio	MONO	0.30×10^9
Gamma-GT	GGT	11.6 U/L	Eosinophil ratio	EO	0.32×10^9
Total bilirubin	TBIL	9.96 μmol/L	Basophil ratio	EASO	0.02×10^9
Triglyceride	TG	0.49 mmol/L	Neutrophil count	NEUT%	45.80%
Creatine kinase	CK	134 U/L	Lymphocyte count	LYMPH%	42.40%
Creatine kinase-MB	CK-MB	22 U/L	Monocyte count	MONO%	5.50%
Lactate dehydrogenase	LDH	235 U/L	Eosinophil count	EO%	5.90%
α-hydroxybutyric dehydrogenase	HBDH	195 U/L	Basophil count	BASO%	0.40%
High-density lipoprotein cholesterol	HDL-C	1.54 mmol/L	Antistreptolysin	ASO	75.30%
Low-density lipoprotein cholesterol	LDL-C	2.09 mmol/L	C-reactive protein	CRP	3.37 mg/L
Very low-density lipoprotein	VLDL-C	0.10 mmol/L	Ceruloplasmin	CER	296.0 mg/L

No significant clinical indicators were found in blood tests of case 1.

children with simple tics (*e.g.*, a quick head jerk or blinking) did not always show sensory phenomena or were unaware of these symptoms until they were ten years old. The first case report for the present study supported that being 10 years old may play an important role in tic awareness. However, a low level of PUs has also been reported in younger patients (such as Case 2). For example, Gulisano found a low level of PUs in young patients with TS (mean age, 7.3 years ± 1.5)[11]. We should pay more attention to the "uncomfortable feelings" in young children and take PUs into consideration in clinical work. Developmentally, PUs often appeared three years after the first onset of tics[12,19]. However, in the two abovementioned cases, PUs was regarded as the initial symptom, which is rarely reported in clinical work. These cases indicate that PUs might be the first process in tic disorders for some clinical cases. Indeed, in many studies on PUs, patients always report that tics were executed to alleviate distress-related PUs[13,20]. Some researchers have proposed that there are two processes related to tics: The PUs (negative reinforcement) and the relief after tic expression (positive reinforcement)[16,21]. In the two case reports discussed here, the PUs (itchy tongue) may be an early indicator for tic generation. With the development of PUs, tics (biting the tongue) emerged later.

Moreover, it should be noted that the feelings of PUs might be vague and poorly localized in a certain area, such as the face, neck, shoulder or arms, but rarely in the tongue[8,22]. For the assessment of PUs, two validated scales, the University of São Paulo Sensory Phenomena Scale (USP-SPS) and the Premonitory Urge for Tic Scale, have been developed, and both have shown good psychometric properties[16,23]. While these two scales have been widely used in clinical research related to tics, they report the feelings before tics and the corresponding severity, but they do not include the locations of PUs. Kwak *et al*[6] also designed a questionnaire to identify PUs in patients with TS, which included the locations of PUs. He found that the anatomical locations, including the face/head, neck, shoulders, arms, hands, throats, feet, and stomach/abdomen, were more often reported in TS with PUs. From the two abovementioned cases, we found that PUs could be easily misdiagnosed in clinical works. It seems that

Table 2 Blood tests of case 2

Items	Abbreviation	Results	Items	Abbreviation	Results
Potassium	K	4.15 mmol/L	White blood cell count	WBC	5.43×10^9
Sodium	Na	139.7 mmol/L	Red blood cell count	RBC	5.26×10^{12}
Chlorine	Cl	107.7 mmol/L	Hemoglobin	HGB	128 g/L
Bicarbonate	CO2	26.8 mmol/L	Hematocrit	HCT	37.80%
Total protein	TP	61.8 g/L	Mean corpuscular volume	MCV	92.4 fl
blood urea nitrogen	Urea	4.12 mmol/L	Mean corpuscular hemoglobin	MCH	31.6 pg
Creatinine	Cre	48.1 μmol/L	Mean corpuscular hemoglobin concentration	MCHC	318 g/L
Cholesterol	Chol	2.66 mmol/L	Platelet	PLT	227×10^9
Uric acid	UA	268.0 μmol/L	Platelet distribution width	PDW	11.7 fl
Glucose	GLU	4.93 mmol/L	Mean platelet volume	MPV	11.1 fl
Calcium	Ca	2.41 mmol/L	Platelet larger cell ratio	PLCR	32.10%
Phosphorus	P	1.74 mmol/L	Plateletcrit	PCT	0.29
Alkaline phosphatase	ALP	336 U/L	Neutrophil ratio	NEUT	2.34×10^9
Aspartate aminotransferase	AST	19.3 U/L	Lymphocyte ratio	LYMPH	2.35×10^9
Alanine aminotransferase	ALT	9.5 U/L	Monocyte ratio	MONO	0.28×10^9
Gamma-GT	GGT	12.5 U/L	Eosinophil ratio	EO	0.31×10^9
Total bilirubin	TBIL	13.33 μmol/L	Basophil ratio	EASO	0.02×10^9
Triglyceride	TG	0.51 mmol/L	Neutrophil count	NEUT%	45.60%
Creatine kinase	CK	79 U/L	Lymphocyte count	LYMPH%	41.40%
Creatine kinase-MB	CK-MB	17 U/L	Monocyte count	MONO%	5.45%
Lactate dehydrogenase	LDH	134 U/L	Eosinophil count	EO%	5.85%
α-hydroxybutyric dehydrogenase	HBDH	123 U/L	Basophil count	BASO%	0.42%
High-density lipoprotein cholesterol	HDL-C	1.53 mmol/L	Antistreptolysin	ASO	74.45%
Low-density lipoprotein cholesterol	LDL-C	0.73 mmol/L	C-reactive protein	CRP	3.21 mg/L
Very low-density lipoprotein	VLDL-C	0.10 mmol/L	Ceruloplasmin	CER	287.0 mg/L

No significant clinical indicators were found in blood tests of case 2.

the clinical information about the locations of PUs was an indispensable piece of information for the assessment of PUs.

Several recent studies on children with TS have reported that the severity of PUs increases with the severity of the tics[8,24]. It has been indicated that increased insight into PUs could help patients recognize alleviating factors for tic symptoms and improve their ability to suppress them. For example, higher awareness of PUs could benefit tic suppression[20]. Furthermore, as a potential focus for behavioral or psychological therapy, PUs has received increasingly more attention in recent years[25-27]. The structured behavioral therapy called Comprehensive Behavioral Intervention for Tics has mainly focused on improving the awareness of tics such as PUs[28]. Although the exact role of PUs is unknown, it has been postulated that they could reflect subjective experiences below the tic-production threshold[12]. PUs might be a useful predictor for treatment response due to their relationship with tic severity[29]. It is believed that the hyperactivity of the insula, as well as the anterior cingulate cortex and the supplementary motor area was involved in the neural mechanism of PUs[30-32]. A recent structural neuroimaging study suggested that tic generation was mediated by the insula, which is responsible for the subjective perception of PUs[33]. The study indicated that the insula might play an important role in the translation of urges to tics[34,35].

CONCLUSION

These two case reports are the first to describe PUs as the initial symptoms of TS in clinical work in China. The results indicated that PUs seem to play an important role in the generation of tics. Thus, PUs may be the first process, and an essential part, of the formation of tics. The study of PUs, especially neural mechanisms underlying PUs, would facilitate the understanding of the pathophysiology and pathogenesis of tics.

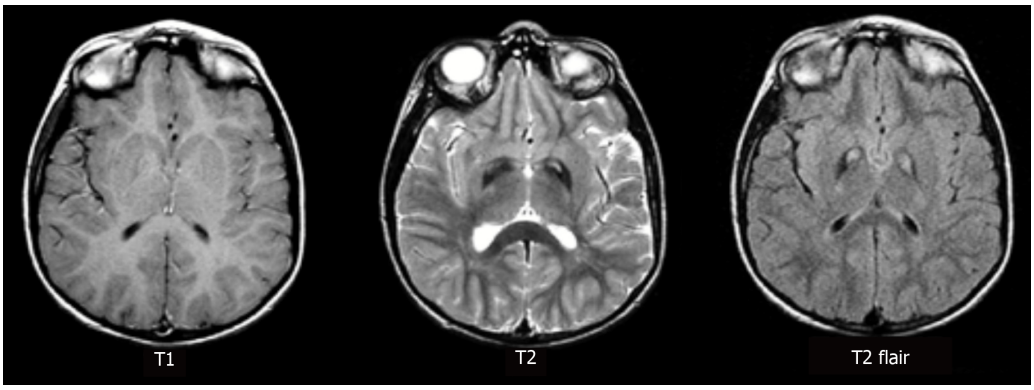

Figure 2 Magnetic resonance imaging scan for case 1. There was no abnormal signal found on T1, T2 and T2 FLAIR of brain scan for case 1.

REFERENCES

1 **Bliss J**. Sensory experiences of Gilles de la Tourette syndrome. *Arch Gen Psychiatry* 1980; **37**: 1343-1347 [PMID: 6934713 DOI: 10.1001/archpsyc.1980.01780250029002]
2 **Kurlan R**, Lichter D, Hewitt D. Sensory tics in Tourette's syndrome. *Neurology* 1989; **39**: 731-734 [PMID: 2710364 DOI: 10.1212/WNL.39.5.731]
3 **Cohen DJ**, Riddle MA, Leckman JF. Pharmacotherapy of Tourette's syndrome and associated disorders. *Psychiatr Clin North Am* 1992; **15**: 109-129 [PMID: 1549543 DOI: 10.1016/S0193-953X(18)30260-0]
4 **Chee KY**, Sachdev P. A controlled study of sensory tics in Gilles de 1a Tourette syndrome and obsessive-compulsive disorder using a structured interview. *J Neurol Neurosurg Psychiatry* 1997; **62**: 188-192 [PMID: 9048721 DOI: 10.1136/jnnp.62.2.188]
5 **Miguel EC**, do Rosário-Campos MC, Prado HS, do Valle R, Rauch SL, Coffey BJ, Baer L, Savage CR, O'Sullivan RL, Jenike MA, Leckman JF. Sensory phenomena in obsessive-compulsive disorder and Tourette's disorder. *J Clin Psychiatry* 2000; **61**: 150-156; quiz 157 [PMID: 10732667 DOI: 10.4088/JCP.v61n0213]
6 **Kwak C**, Dat Vuong K, Jankovic J. Premonitory sensory phenomenon in Tourette's syndrome. *Mov Disord* 2003; **18**: 1530-1533 [PMID: 14673893 DOI: 10.1002/mds.10618]
7 **Rajagopal S**, Seri And S, Cavanna AE. Premonitory urges and sensorimotor processing in Tourette syndrome. *Behav Neurol* 2013; **27**: 65-73 [PMID: 23187151 DOI: 10.3233/BEN-120308]
8 **Ganos C**, Garrido A, Navalpotro-Gómez I, Ricciardi L, Martino D, Edwards MJ, Tsakiris M, Haggard P, Bhatia KP. Premonitory urge to tic in Tourette's is associated with interoceptive awareness. *Mov Disord* 2015; **30**: 1198-1202 [PMID: 25879819 DOI: 10.1002/mds.26228]
9 **Draper A**, Jackson GM, Morgan PS, Jackson SR. Premonitory urges are associated with decreased grey matter thickness within the insula and sensorimotor cortex in young people with Tourette syndrome. *J Neuropsychol* 2016; **10**: 143-153 [PMID: 26538289 DOI: 10.1111/jnp.12089]
10 **Sambrani T**, Jakubovski E, Müller-Vahl KR. New Insights into Clinical Characteristics of Gilles de la Tourette Syndrome: Findings in 1032 Patients from a Single German Center. *Front Neurosci* 2016; **10**: 415 [PMID: 27672357 DOI: 10.3389/fnins.2016.00415]
11 **Gulisano M**, Calì P, Palermo F, Robertson M, Rizzo R. Premonitory Urges in Patients with Gilles de la Tourette Syndrome: An Italian Translation and a 7-Year Follow-up. *J Child Adolesc Psychopharmacol* 2015; **25**: 810-816 [PMID: 26288345 DOI: 10.1089/cap.2014.0154]
12 **Cox JH**, Seri S, Cavanna AE. Sensory aspects of Tourette syndrome. *Neurosci Biobehav Rev* 2018; **88**: 170-176 [PMID: 29559228 DOI: 10.1016/j.neubiorev.2018.03.016]
13 **Houghton DC**, Capriotti MR, Conelea CA, Woods DW. Sensory Phenomena in Tourette Syndrome: Their Role in Symptom Formation and Treatment. *Curr Dev Disord Rep* 2014; **1**: 245-251 [PMID: 25844305 DOI: 10.1007/s40474-014-0026-2]
14 **Banaschewski T**, Woerner W, Rothenberger A. Premonitory sensory phenomena and suppressibility of tics in Tourette syndrome: developmental aspects in children and adolescents. *Dev Med Child Neurol* 2003; **45**: 700-703 [PMID: 14515942 DOI: 10.1017/S0012162203001294]
15 **Rozenman M**, Johnson OE, Chang SW, Woods DW, Walkup JT, Wilhelm S, Peterson A, Scahill L, Piacentini J. Relationships between Premonitory Urge and Anxiety in Youth with Chronic Tic Disorders. *Child Health Care* 2015; **44**: 235-248 [PMID: 27110050 DOI: 10.1080/02739615.2014.986328]
16 **Woods DW**, Piacentini J, Himle MB, Chang S. Premonitory Urge for Tics Scale (PUTS): initial psychometric results and examination of the premonitory urge phenomenon in youths with Tic disorders. *J Dev Behav Pediatr* 2005; **26**: 397-403 [PMID: 16344654 DOI: 10.1097/00004703-200512000-00001]
17 **Leckman JF**, Walker DE, Cohen DJ. Premonitory urges in Tourette's syndrome. *Am J Psychiatry* 1993; **150**: 98-102 [PMID: 8417589 DOI: 10.1176/ajp.150.1.98]
18 **Leckman JF**, Peterson BS, King RA, Scahill L, Cohen DJ. Phenomenology of tics and natural history of tic disorders. *Adv Neurol* 2001; **85**: 1-14 [PMID: 11530419 DOI: 10.1016/s0387-7604(03)90004-0]
19 **Steinberg T**, Shmuel Baruch S, Harush A, Dar R, Woods D, Piacentini J, Apter A. Tic disorders and the premonitory urge. *J Neural Transm (Vienna)* 2010; **117**: 277-284 [PMID: 20033236 DOI: 10.1007/s00702-009-0353-3]
20 **Himle MB**, Woods DW, Conelea CA, Bauer CC, Rice KA. Investigating the effects of tic suppression on premonitory urge ratings in children and adolescents with Tourette's syndrome. *Behav Res Ther* 2007; **45**: 2964-2976 [PMID: 17854764 DOI: 10.1016/j.brat.2007.08.007]
21 **Evers RA**, van de Wetering BJ. A treatment model for motor tics based on a specific tension-reduction technique. *J Behav Ther Exp Psychiatry* 1994; **25**: 255-260 [PMID: 7852608 DOI: 10.1016/0005-7916(94)90026-4]

22 **Jeter CB**, Patel SS, Morris JS, Chuang AZ, Butler IJ, Sereno AB. Oculomotor executive function abnormalities with increased tic severity in Tourette syndrome. *J Child Psychol Psychiatry* 2015; **56**: 193-202 [PMID: 25040172 DOI: 10.1111/jcpp.12298]

23 **Rosario MC**, Prado HS, Borcato S, Diniz JB, Shavitt RG, Hounie AG, Mathis ME, Mastrorosa RS, Velloso P, Perin EA, Fossaluza V, Pereira CA, Geller D, Leckman J, Miguel E. Validation of the University of São Paulo Sensory Phenomena Scale: initial psychometric properties. *CNS Spectr* 2009; **14**: 315-323 [PMID: 19668122 DOI: 10.1017/S1092852900020319]

24 **Kano Y**, Matsuda N, Nonaka M, Fujio M, Kuwabara H, Kono T. Sensory phenomena related to tics, obsessive-compulsive symptoms, and global functioning in Tourette syndrome. *Compr Psychiatry* 2015; **62**: 141-146 [PMID: 26343478 DOI: 10.1016/j.comppsych.2015.07.006]

25 **Hollis C**, Pennant M, Cuenca J, Glazebrook C, Kendall T, Whittington C, Stockton S, Larsson L, Bunton P, Dobson S, Groom M, Hedderly T, Heyman I, Jackson GM, Jackson S, Murphy T, Rickards H, Robertson M, Stern J. Clinical effectiveness and patient perspectives of different treatment strategies for tics in children and adolescents with Tourette syndrome: a systematic review and qualitative analysis. *Health Technol Assess* 2016; **20**: 1-450, vii-viii [PMID: 26786936 DOI: 10.3310/hta20040]

26 **Burd L**. Ten-week comprehensive behavioural intervention for tics decreases tic severity compared to supportive therapy and education. *Evid Based Ment Health* 2010; **13**: 123 [PMID: 21036985 DOI: 10.1136/ebmh.13.4.123]

27 **Whittington C**, Pennant M, Kendall T, Glazebrook C, Trayner P, Groom M, Hedderly T, Heyman I, Jackson G, Jackson S, Murphy T, Rickards H, Robertson M, Stern J, Hollis C. Practitioner Review: Treatments for Tourette syndrome in children and young people - a systematic review. *J Child Psychol Psychiatry* 2016; **57**: 988-1004 [PMID: 27132945 DOI: 10.1111/jcpp.12556]

28 **Woods DW**, Walther MR, Bauer CC, Kemp JJ, Conelea CA. The development of stimulus control over tics: a potential explanation for contextually-based variability in the symptoms of Tourette syndrome. *Behav Res Ther* 2009; **47**: 41-47 [PMID: 19026406 DOI: 10.1016/j.brat.2008.10.013]

29 **Jankovic J**, Jimenez-Shahed J, Brown LW. A randomised, double-blind, placebo-controlled study of topiramate in the treatment of Tourette syndrome. *J Neurol Neurosurg Psychiatry* 2010; **81**: 70-73 [PMID: 19726418 DOI: 10.1136/jnnp.2009.185348]

30 **Jackson SR**, Parkinson A, Jung J, Ryan SE, Morgan PS, Hollis C, Jackson GM. Compensatory neural reorganization in Tourette syndrome. *Curr Biol* 2011; **21**: 580-585 [PMID: 21439830 DOI: 10.1016/j.cub.2011.02.047]

31 **Neuner I**, Werner CJ, Arrubla J, Stöcker T, Ehlen C, Wegener HP, Schneider F, Shah NJ. Imaging the where and when of tic generation and resting state networks in adult Tourette patients. *Front Hum Neurosci* 2014; **8**: 362 [PMID: 24904391 DOI: 10.3389/fnhum.2014.00362]

32 **Worbe Y**, Lehericy S, Hartmann A. Neuroimaging of tic genesis: Present status and future perspectives. *Mov Disord* 2015; **30**: 1179-1183 [PMID: 26377151 DOI: 10.1002/mds.26333]

33 **Cavanna AE**, Black KJ, Hallett M, Voon V. Neurobiology of the Premonitory Urge in Tourette's Syndrome: Pathophysiology and Treatment Implications. *J Neuropsychiatry Clin Neurosci* 2017; **29**: 95-104 [PMID: 28121259 DOI: 10.1176/appi.neuropsych.16070141]

34 **Tinaz S**, Malone P, Hallett M, Horovitz SG. Role of the right dorsal anterior insula in the urge to tic in Tourette syndrome. *Mov Disord* 2015; **30**: 1190-1197 [PMID: 25855089 DOI: 10.1002/mds.26230]

35 **Conceição VA**, Dias Â, Farinha AC, Maia TV. Premonitory urges and tics in Tourette syndrome: computational mechanisms and neural correlates. *Curr Opin Neurobiol* 2017; **46**: 187-199 [PMID: 29017141 DOI: 10.1016/j.conb.2017.08.009]

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