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7 **Peri-ictal Water Drinking in an Omani Patient with Bilateral Mesial** 8 **Temporal Sclerosis**

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16 **Abstract**

17 Peri-ictal water drinking (PIWD) is a rare vegetative manifestation of temporal lobe epilepsy
18 without a definite lateralization value. We report a case of PIWD in a 22-year-old Omani man
19 with post-concussion syndrome and epilepsy presented to a tertiary care hospital in Muscat,
20 Oman in 2021 for evaluation of paroxysmal events. His behaviour of PIWD was misinterpreted
21 by his family until characterized in the epilepsy-monitoring unit as a manifestation of epilepsy
22 that was treated medically. To our knowledge, this is the second reported case in our region.

23 **Keywords:** Peri-ictal water drinking, Ictal Spitting, Epilepsy, Autonomic
24

25 **Introduction**

26 Vegetative manifestations have been well-described in patients with epilepsy during the seizure
27 in both pediatric and adult age groups.^{1,2} Peri-ictal vegetative symptoms (PIVS) may occur
28 without any particular relationship to the cause of epilepsy.³ PIVS include cardiovascular,
29 respiratory, gastrointestinal, and urinary signs and symptoms. Peri-ictal water drinking (PIWD)
30 is an infrequently described automatism in an epileptic patient, often among those with temporal
31 lobe epilepsy.^{3,4} Among patients with focal epileptic seizure, 65 cases only are reported to have

32 Peri-ictal water drinking behavior.⁴ PIWD has been defined as the urge to drink water ictally or
33 up to 2-minute in the post-ictal phase of epileptic seizures.¹ Peri-ictal water drinking as a
34 manifestation of epileptic seizure signifies a reliable sign of lateralization to a non-dominant
35 temporal lobe.⁵

36
37 Herein, we report a case of peri-ictal water drinking (PIWD) in a 22-year-old man with post-
38 concussion syndrome with bilateral mesial temporal sclerosis. To our knowledge, this is the
39 second reported case in our region. We found that PIWD has localizing but no lateralizing value.

40

41 **Case report**

42 A 22-year-old right-handed man had a road traffic accident at the age of 11 years and suffered a
43 post-concussion syndrome with behavioural changes of impulsiveness and seizures. His seizures
44 were described as chest discomfort followed by lip and hand automatism and excessive water
45 drinking during the event. His family thought that he would drink water to relieve his chest
46 discomfort. After that, he was routinely offered a bottle of water whenever his seizure started, in
47 the context of this recurrent habitual behaviour.

48

49 To better characterize his seizure semiology and localize the ictal onset, he was admitted for 3-
50 day in the Epilepsy Monitoring Unit at a tertiary care hospital in Muscat, Oman for long-term
51 EEG evaluation (Figure 1). During evaluation, his anti-seizure medications (ASM) including
52 Lacosamide 200 mg BID, Sodium Valproate SR 750mg AM/1000 mg PM and Clobazam 15mg
53 AM/20 mg PM were tapered off. His interictal recording showed intermittent slowing in the right
54 temporal chain and bitemporal sharp waves: 80% on the right (maximum at F8>T4), 20% on the
55 left (maximum at F7>T3). He had five seizures of the same semiology. Seizures started with him
56 holding his chest, either due to discomfort or as a reaction to a gastric aura. This was followed by
57 swallowing movements and hand automatism. Out of 5 seizures, 3 seizures had clear water
58 drinking during the seizure or after the seizure terminated. He would ask for or grab a nearby
59 water bottle to drink multiple times. The water bottles were 500 ml, and he drank almost 2/3 the
60 amount of the bottle in each seizure. During the other 2 seizures, the patient was alone, and his
61 behaviour seemed restless, looking for water through his bed sheets but not found. He would
62 always ask for water and no other types of fluids.

63
64 Table 1 summarize the details. (Any gross variations in the pattern of seizure may be
65 summarized here in 1-3 sentences. Rest of the paragraph may be superfluous. The table gives fair
66 details). In seizure 1, he used his hands to perform body language to his attendant indicating the
67 need to drink. He grabbed the bottle again from his attendant to drink the second and third time
68 after giving it back after first request to drink. In the third time, he pointed to his chest as of
69 explaining the reason for drinking. All 3 events of water drinking in seizure one happened
70 ictally. In seizure 2, he drank twice ictally and 24 seconds post ictally. In both events, he grabbed
71 the water bottle off his attendant's hand to drink. In seizure 3, the seizure woke him up from
72 sleep while the attendant was not aware of the event. There were no water bottles close to him,
73 so he seemed restless and looking around the room frequently. Finally, he got off bed and walked
74 around the bed but that was not visualized by the video. In the 4th seizure, again he was alone and
75 seemed restless when the seizure started as attendant was not around. There was a bottle close to
76 his pillow, but he did not visualize it. He seemed in discomfort and wiping his face and left nose
77 multiple times with his hands. In seizure 5, it started again by chest sensation as he held his
78 hands against his chest then started swallowing movements. His attendant walked into the room
79 and patient pointed by hand gestures that he wants to drink and again pointed to his chest as of
80 explaining his reasoning. He started spitting and he drank all the bottles given to him (~ 400 ml).

81
82 His MRI brain showed evidence of bilateral hippocampal atrophy and bilateral mesial temporal
83 sclerosis (Figure 2). His PET/CT of brain was unremarkable with no focal hyper or
84 hypometabolism. The patient's consent was obtained for publication purposes.

85 86 **Discussion**

87 Peri-ictal water drinking was first reported upon a statistical review of aura in epilepsy among
88 1359 cases by Lennox,⁶ defined as the urge of drinking water ictally or up to 2-minutes in the
89 post-ictal phase of epileptic seizures.¹ Seeking water in epileptic patients has been noticed
90 mostly in ictal phase, yet post-ictal water drinking has been reported as well.¹ Reported cases of
91 PIWD in literature remain infrequent all over the world, with around 65 cases have been reported
92 to date, including one case in our region.^{4,7}

93

94 Water-seeking behavior has been correlated electro-clinically and neuropathologically with
95 pathologies in the mesial temporal lobe, emphasizing further on the value of localization
96 hypothesis.⁸ However, a recently published retrospective study in surgically confirmed patients
97 with focal epilepsy in which PIWD occurs more often in frontal lobe epilepsy (FLE) than
98 temporal lobe epilepsy (TLE) indicating that PIWD might not be specific symptom of TLE.⁹ The
99 epileptic discharges in our patient's seizure confirmed the localization hypothesis of temporal
100 lobe origin. The epileptic discharges from the temporal lobe structures propagating to the
101 hypothalamus is proposed to be a stimulus for water-seeking behavior and sense of thirst in
102 epilepsy.^{8,10}

103
104 Several cases of peri-ictal water drinking have been published in the literature highlighting the
105 value of lateralization of peri-ictal water drinking in patients with temporal lobe epilepsy. Water
106 seeking behavior has been concluded as a sign representing epileptic focus on the non-dominant
107 temporal lobe.^{11,12} This lateralization may be explained by asymmetrically represented network
108 of central autonomic system implemented in water-seeking behavior, control of fluid and thirst.¹¹
109 However, other studies have shown no consistent lateralization of epileptiform activity in similar
110 cases.^{3,5,13} In our patient, we could not conclude definite lateralization as he had seizures with
111 water drinking behavior evident in either of the temporal lobes. Even though, seizures number 1
112 and 2 that originated from the right temporal lobe started earlier at 12 and 15 seconds compared
113 to seizure number 5 that may argue that it lateralizes to the non-dominant hemisphere. However,
114 we have incomplete data of seizure number 3 and 4 that may change the equation, therefore, the
115 significance of lateralization in patient presenting with Peri-ictal water drinking is still uncertain
116 as demonstrated in our case.

117
118 The autonomic manifestations of epilepsy have a risk to progress into status epilepticus as
119 reported in the literature.¹⁴ Therefore, the importance of detecting other semiologies of epileptic
120 events as autonomic manifestations such as cardiac and respiratory, is very crucial as it may lead
121 to sudden unexpected death in epilepsy (SUDEP).

122
123 As noticed in our case, the patient had also other epileptic semiologies of temporal origin like
124 post-ictal spitting. Spitting as an ictal phenomenon which has been evoked by direct electrical

125 stimulation to temporal lobe in many trials, confirming the value of localization again with no
126 lateralization value.¹⁵

127
128 Focal epileptic syndromes are estimated to affect 60% of patients with epilepsy, in which 15% of
129 those patients' condition cannot be controlled by anti-seizure medications adequately and as
130 observed assumption, half of them may be considered potential candidates for a surgical
131 intervention of epilepsy. A published case of middle-aged man diagnosed with epilepsy since
132 childhood with features of peri-ictal water drinking on anti-seizure medications of right temporal
133 lobe origin, remained seizure-free in 1-year follow up after right anterior temporal resection.⁷
134 Moreover, a recent retrospective study discussing occurrence of PIWD in focal epilepsy patients
135 with favorable outcome postoperatively, including frontal lobe epilepsy (FLP) and temporal lobe
136 epilepsy (TLE) signifying the value of preoperative evaluation in patients with focal epileptic
137 syndromes.⁹ In the present case, the patient had bi-temporal lobe epilepsy secondary to bilateral
138 mesial temporal sclerosis that was better controlled with anti-seizure medications but has
139 significant behavioral issues requiring follow up with psychiatry. A multidisciplinary discussion
140 to consider if he would benefit from surgical management aimed at improvement in both his
141 seizures and behavioral issues is planned.

142

143 **Conclusion**

144 Peri-ictal water drinking, and ictal spitting are infrequent vegetative symptoms seen in the
145 temporal lobe epilepsy without a definite lateralization value.

146

147 **Authors' Contribution**

148 YA did the literature review and wrote entire discussion and analysed of the case. HA wrote the
149 case, analysed the EEG findings in detail with tables and supervised the entire paper. AG
150 reviewed the paper. All authors approved the final version of the manuscript.

151

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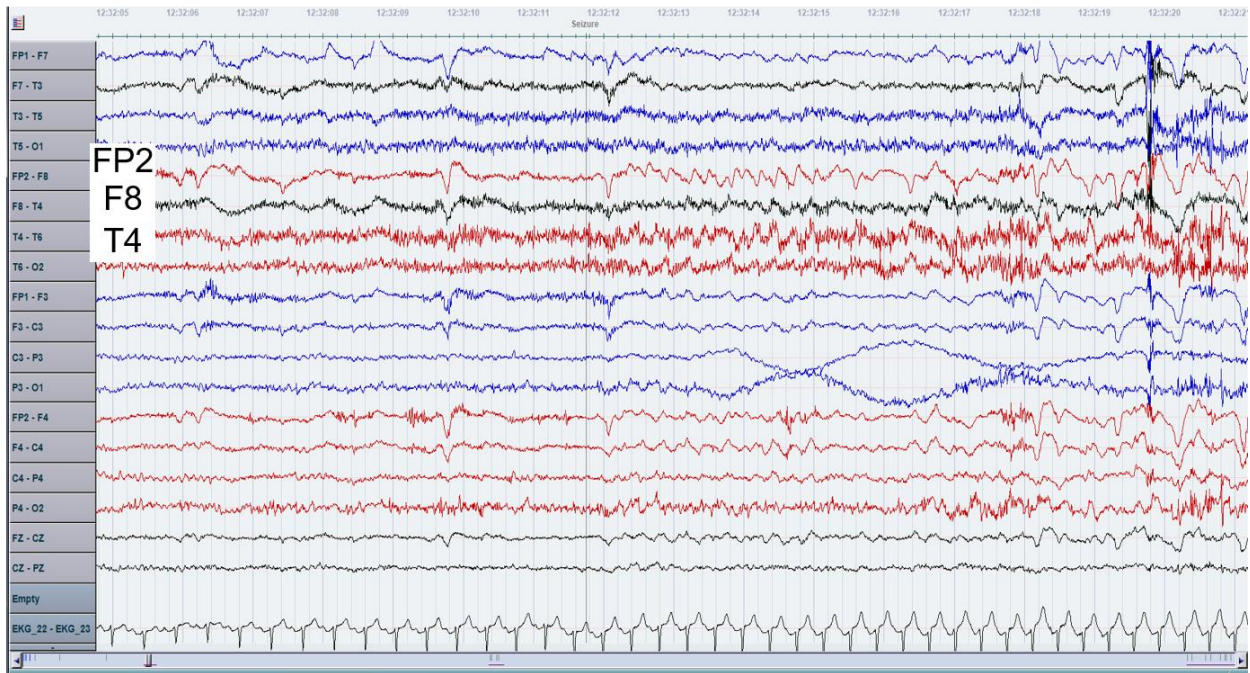
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 198 **Table 1:** Summary of seizures, EEG onset, duration and details of water drinking phenomenon.
 199 Sz (seizure), sec (seconds), NA (not available).

| | EEG Onset | Sz Duration | Onset of first drinking during a sz | Number of times drinking during the sz | Further remarks |
|--------|----------------|-------------|-------------------------------------|---|---------------------|
| Sz # 1 | Right Temporal | 44 sec | 12 sec | 3 times | |
| Sz # 2 | Right Temporal | 66 sec | 15 sec | 2 times during a sz and 1 after sz ends (1.5 min after sz ended) | |
| Sz # 3 | Left Temporal | 47 sec | NA | NA | Nocturnal seizure |
| Sz # 4 | Left Temporal | 54 sec | NA | NA | Left nose wiping |
| Sz # 5 | Left Temporal | 63 sec | 55 sec | 1 time | Post Ictal spitting |

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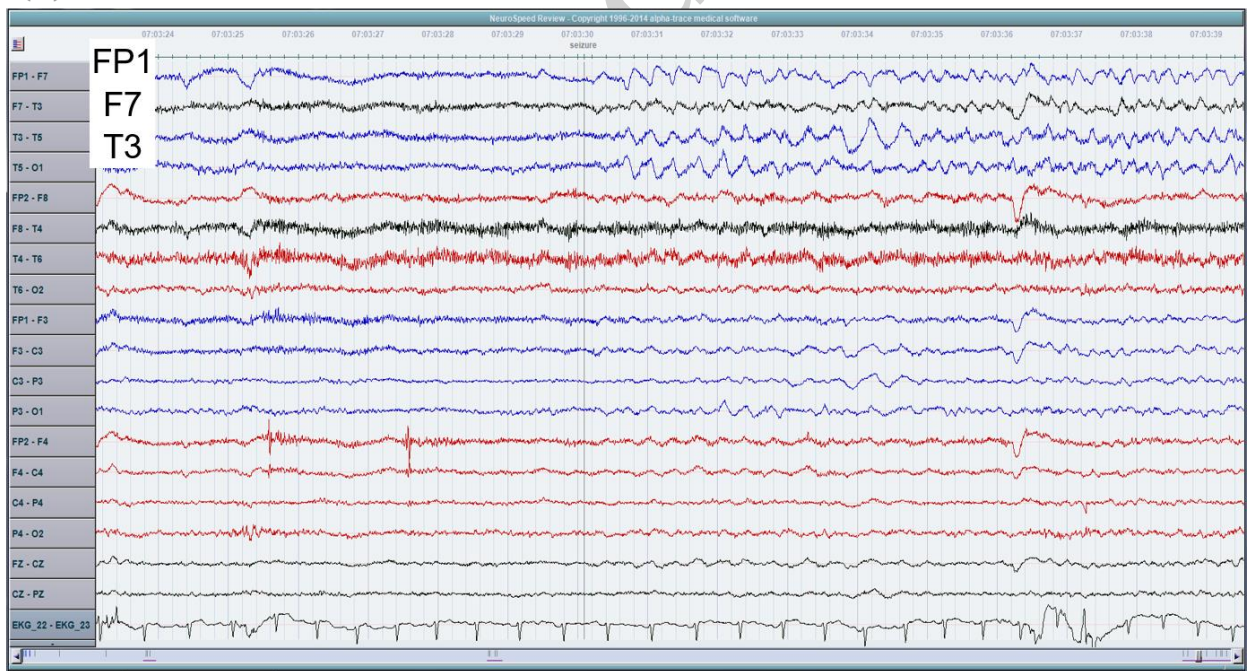
(A) Seizure1, M1, HF 70Hz



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203

(B) Seizure 4, M1, HF 70Hz



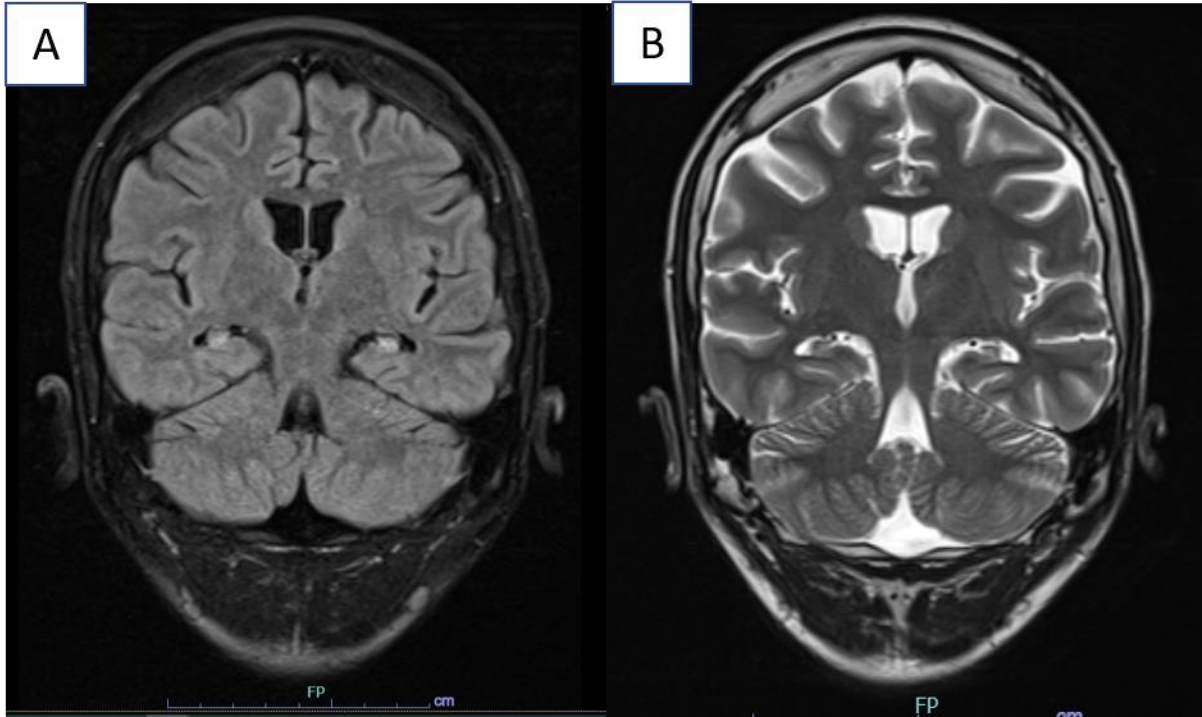
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Figure 1: (A) Ictal EEG onset with rhythmic discharges in the right temporal chain, maximum at F8/T4. (B) Ictal EEG onset with rhythmic discharges in the left temporal chain, maximum at T3



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Figure 2: MRI brain (A) Flair, (B) T2 that both showed evidence of bilateral hippocampal atrophy and mesial temporal sclerosis.

Accepted