

Inductive Stimuli of the Startle Response and Critical Points of Psychological Treatment in a Severe Burn Patient

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Severe burn patients often have anxiety, depression, and stress-related disorders. The case we reported was very nervous and exhibited a long-term high-frequency startle response, which disrupted his sleep seriously and decreased treatment compliance. However, after psychological treatment, his startle response in the daytime and nervousness gradually improved, but the startle response at night remained unchanged. Furthermore, after his wife was given three sessions of psychological treatment to manage her fear of surgery, the startle response at night was significantly reduced. Herein, we summarize the inductive stimuli of the startle response and the critical points of psychological treatment in this case to provide the clinical experience for future research.

Severe burn patients often have anxiety, depression, and post-traumatic stress disorder (PTSD).¹ However, the patient in this case was very nervous and exhibited a long-term high-frequency startle response. Startle is a fast-twitch of facial and body muscles evoked by a sudden and intense tactile, visual, or acoustic stimulus, such as the darkness² or high-decibel sounds.³ Recently, aversive imagery⁴ and fear memory imagery⁵ have also been defined as inductive stimuli. The startle pattern consists of eyelid closure, a contraction of the facial, neck, and skeletal muscles, an arrest of ongoing behaviors, and an acceleration of the heart rate.⁶ The physiological mechanisms of startle response were the activation of the amygdala and the bed nucleus of the stria terminalis.⁷ The psychological mechanisms were sensitization, fear-conditioned stimulus, and reduced attenuation,^{6,8} and these might be mediated by some circuits consisting of several neurotransmitters, such as dopamine, cholecystokinin, etc.⁶ Shalev et al reported that the startle response treated with clonazepam among the patients with PTSD showed abnormally slow habituation and was not significantly different from drug-free PTSD patients.⁹ Currently, there is no reference and standard treatment for a severe burn patient with a long-term high-frequency startle

response. Thus, we report it to provide a different experience for future research and clinical practice.

CASE PRESENTATION

A 43-year-old male patient was deeply burned on his head, face, neck, trunk, and limbs. He underwent four operations during his hospital stay. His wife complained of two problems: first, he was so nervous that his muscles were highly tense. His body curled up, and his head stayed elevated. He always counteracted the therapists' strengths during rehabilitation therapy. Second, he exhibited a startle response frequently (approximately once every several minutes) for more than 3 months, and because of it, his sleep was seriously disturbed. The problems remained unchanged after taking clonazepam (2 mg per day) and sertraline hydrochloride (100 mg per day) for 1 week. After being given 4 mg of clonazepam per day, the startle response was still unchanged, and he became somnolence. Therefore, he took 2 mg of clonazepam per day and was referred to a psychologist.

METHODS

Psychological Assessment

Clinical Interview. He had no history of startle response but had experienced occasional insomnia due to worrying about his mother's poor health around 11 years old. After he took night shifts around 25, his insomnia appeared once a month. Since the frequent startle response appeared, he could not sleep soundly anymore. He had experienced two life-threatening events: his neighborhood was burned down when he was 10 years old, and his colleague was burned to disability 3 years ago. Due to working in different cities, he and his wife left their two daughters living with his parents. He was satisfied with his couple relationship and the parent-child relationships.

Assessment Instruments. The Chinese Version of the Hospital Anxiety and Depression Scale (CHADS) consists of the

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CHADS-A and the CHADS-D, designed to assess anxious and depressive states, respectively.¹⁰ The total scores for each subscale range from 0 to 21, and scores ≥ 8 indicate positive. Higher scores indicate higher levels of anxiety or depression.¹¹ The Impact of Event Scale-Revised (IES-R) comprises 22 items that measure symptoms of PTSD.¹² The total scores range from 0 to 88, and scores >35 indicate positive. Higher scores indicate a greater impact of the event. The Social Supporting Revalued Scale (SSRS) comprises 10 items divided into objective support, subjective support, and social support utilization.¹³ The total scores range from 11 to 60, and scores <35 , 35 to 47, >47 indicate low social support, medium social support, and high social support, respectively.

The patient's scores on the CHADS-A, CHADS-D, IES-R, and SSRS were 13, 12, 42, and 55, respectively. These scores indicated that he had severe anxiety, depression, PTSD, and high social support.

Differential Diagnosis

- (1) Paroxysmal sympathetic hyperactivity (PSH) mainly occurs in patients with brain injury.¹⁴ The patient had no history of brain injury, and his MRI testing result was normal. Therefore, PSH was excluded.
- (2) Startle response caused by gene mutation, such as *GLRA1* and *GlyT2*, usually occurs in infancy and can be improved by clonazepam.^{15,16} Because he had no history of startle response and clonazepam had the little curative effect, gene mutations were excluded.
- (3) Epilepsy was excluded for his EEG was normal, and he was aware when a startle response attacked.

In summary, the psychologist inferred that his startle response was caused by psychological problems.

Psychological Treatment

The psychologist used relaxation therapy accompanied by *Jasmine*, which made the patient most relaxed (for approximately 30 minutes once a day, including abdominal breathing, gradual muscular relaxation training, and meditation). The purposes were to get his body used to relax and a better sense of control over his nervousness. Since sometimes he exhibited the startle response when traumatic images appeared in his mind, exposure therapy was used to help him desensitize and reprocess the traumatic events for approximately 45 minutes once every two days. As he demonstrated much thought avoidance,¹⁷ burn injury-related videos were used as the exposure stimuli. For example, when explosions and sparks appeared on the screen, he jumped up from the wheelchair, sniffed, and looked around. The psychologist asked him to keep abdominal breathing while the videos looped playback. Ten minutes later, he stopped the hyperarousal behaviors and began to talk about the reason for the accident—he thought it was his retribution. Thus, his irrational thought was also intervened for two sessions. In addition, when seeing a woman on fire rolling on the ground on the screen, he recalled some details and cried uncontrollably. Since tearing might slow down the recovery of the injuries in his eyes, relaxation therapy was conducted. The recalled details were repeated to strengthen the treatment effect for two sessions until he could control his crying. Besides, he felt burdensome spending much money

on treatment instead of earning money during exposure treatment; thus, his guilt was also treated for three sessions.

After 15 relaxing therapy sessions and 7 exposure therapy sessions, his nervousness and startle response significantly improved, and he became willing to share his feelings. He could lie down by putting his head on a pillow and complete the rehabilitation by learning relaxation methods. The startle response in the daytime was reduced to once every 2 to 3 hours, and 4 weeks later, it was reduced to once half a day. Strangely, the startle response at night had little improvement, even if he slept with the nightlight on. After performing behavioral observations for the startle response at night, the psychologist found that he slept with his head hanging over the bed. His wife explained this unique behavior—preventing the scar contracture by keeping over-extension while sleeping. Because the doctor had told them that his scar contracture could only be solved by surgery, the psychologist worked with his wife to manage her fear of surgery for about 30 minutes once a day. After he was allowed to sleep on the pillow, the startle response only appeared when he turned over. One week later, it only appeared when he had nightmares. Besides, his scores on the CHADS-A, CHADS-D, and IES-R were reduced to 8, 7, and 29, respectively, indicating that anxiety, depression, and PTSD significantly improved.

DISCUSSION

The results indicated that his nervousness and long-term high-frequency startle response greatly improved. Thus relaxation therapy and exposure therapy could work not only for anxiety and PTSD¹⁸ but also for the nervousness and startle response caused by psychological problems.

Unlike the inductive stimuli found in previous studies,²⁻⁵ we inferred that sleeping with the head hanging over the head of the bed might be a new inductive stimulus since the startle response decreased significantly with sleeping on a pillow. Additionally, the startle response sometimes appeared involuntarily when he rested with eyes closed in a quiet room and his mind was blank (this environment did not have any inductive stimuli in previous studies). Thus we also inferred that the body that had become used to the startle response might be another inductive stimulus.

Although obtaining patients' information from family members is essential, it might be influenced by family members' psychological states. Thus, the behavioral observations for the patient were necessary. In addition, concerning fear of surgery, the patient's wife might have secondary traumatic stress (the natural, consequent behaviors and emotions resulting from the knowledge about a traumatizing event experienced by a significant other¹⁹). Therefore, the family member's psychological states should be assessed early.

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