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Contents

Thrice Monthly Volume 11 Number 9 March 26, 2023

REVIEW

- 1888 Endoscopic transluminal drainage and necrosectomy for infected necrotizing pancreatitis: Progress and challenges

Zeng Y, Yang J, Zhang JW

MINIREVIEWS

- 1903 Functional role of frontal electroencephalogram alpha asymmetry in the resting state in patients with depression: A review

Xie YH, Zhang YM, Fan FF, Song XY, Liu L

- 1918 COVID-19 related liver injuries in pregnancy

Sekulovski M, Bogdanova-Petrova S, Peshevska-Sekulovska M, Velikova T, Georgiev T

- 1930 Examined lymph node count for gastric cancer patients after curative surgery

Zeng Y, Chen LC, Ye ZS, Deng JY

- 1939 Laparoscopic common bile duct exploration to treat choledocholithiasis in situs inversus patients: A technical review

Chiu BY, Chuang SH, Chuang SC, Kuo KK

- 1951 Airway ultrasound for patients anticipated to have a difficult airway: Perspective for personalized medicine

Nakazawa H, Uzawa K, Tokumine J, Lefor AK, Motoyasu A, Yorozu T

ORIGINAL ARTICLE

Observational Study

- 1963 Clinicopathological features and expression of regulatory mechanism of the Wnt signaling pathway in colorectal sessile serrated adenomas/polyps with different syndrome types

Qiao D, Liu XY, Zheng L, Zhang YL, Que RY, Ge BJ, Cao HY, Dai YC

Randomized Controlled Trial

- 1974 Effects of individual shock wave therapy vs celecoxib on hip pain caused by femoral head necrosis

Zhu JY, Yan J, Xiao J, Jia HG, Liang HJ, Xing GY

CASE REPORT

- 1985 Very low calorie ketogenic diet and common rheumatic disorders: A case report

Rondanelli M, Patelli Z, Gasparri C, Mansueto F, Ferraris C, Nichetti M, Alalwan TA, Sajoux I, Maugeri R, Perna S

- 1992 Delayed versus immediate intervention of ruptured brain arteriovenous malformations: A case report

Bintang AK, Bahar A, Akbar M, Soraya GV, Gunawan A, Hammado N, Rachman ME, Ulhaq ZS

- 2002** Children with infectious pneumonia caused by *Ralstonia insidiosa*: A case report
Lin SZ, Qian MJ, Wang YW, Chen QD, Wang WQ, Li JY, Yang RT, Wang XY, Mu CY, Jiang K
- 2009** Transient ischemic attack induced by pulmonary arteriovenous fistula in a child: A case report
Zheng J, Wu QY, Zeng X, Zhang DF
- 2015** Motor cortex transcranial magnetic stimulation to reduce intractable postherpetic neuralgia with poor response to other therapies: Report of two cases
Wang H, Hu YZ, Che XW, Yu L
- 2021** Small bowel adenocarcinoma in neoterminal ileum in setting of stricturing Crohn's disease: A case report and review of literature
Karthikeyan S, Shen J, Keyashian K, Gubatan J
- 2029** Novel combined endoscopic and laparoscopic surgery for advanced T2 gastric cancer: Two case reports
Dai JH, Qian F, Chen L, Xu SL, Feng XF, Wu HB, Chen Y, Peng ZH, Yu PW, Peng GY
- 2036** Acromicric dysplasia caused by a mutation of fibrillin 1 in a family: A case report
Shen R, Feng JH, Yang SP
- 2043** Ultrasound-guided intra-articular corticosteroid injection in a patient with manubriosternal joint involvement of ankylosing spondylitis: A case report
Choi MH, Yoon IY, Kim WJ
- 2051** Granulomatous prostatitis after bacille Calmette-Guérin instillation resembles prostate carcinoma: A case report and review of the literature
Yao Y, Ji JJ, Wang HY, Sun LJ, Zhang GM
- 2060** Unusual capitate fracture with dorsal shearing pattern and concomitant carpometacarpal dislocation with a 6-year follow-up: A case report
Lai CC, Fang HW, Chang CH, Pao JL, Chang CC, Chen YJ
- 2067** Live births from *in vitro* fertilization-embryo transfer following the administration of gonadotropin-releasing hormone agonist without gonadotropins: Two case reports
Li M, Su P, Zhou LM
- 2074** Spontaneous conus infarction with "snake-eye appearance" on magnetic resonance imaging: A case report and literature review
Zhang QY, Xu LY, Wang ML, Cao H, Ji XF
- 2084** Transseptal approach for catheter ablation of left-sided accessory pathways in children with Marfan syndrome: A case report
Dong ZY, Shao W, Yuan Y, Lin L, Yu X, Cui L, Zhen Z, Gao L
- 2091** Occipital artery bypass importance in unsuitable superficial temporal artery: Two case reports
Hong JH, Jung SC, Ryu HS, Kim TS, Joo SP

- 2098** Anesthetic management of a patient with preoperative R-on-T phenomenon undergoing laparoscopic-assisted sigmoid colon resection: A case report
Li XX, Yao YF, Tan HY
- 2104** Pembrolizumab combined with axitinib in the treatment of skin metastasis of renal clear cell carcinoma to nasal ala: A case report
Dong S, Xu YC, Zhang YC, Xia JX, Mou Y
- 2110** Successful treatment of a rare subcutaneous emphysema after a blow-out fracture surgery using needle aspiration: A case report
Nam HJ, Wee SY

LETTER TO THE EDITOR

- 2116** Are biopsies during endoscopic ultrasonography necessary for a suspected esophageal leiomyoma? Is laparoscopy always feasible?
Beji H, Chtourou MF, Zribi S, Kallel Y, Bouassida M, Touinsi H
- 2119** Vaginal microbes confounders and implications on women's health
Nori W, H-Hameed B

ABOUT COVER

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The primary aim of *World Journal of Clinical Cases* (WJCC, *World J Clin Cases*) is to provide scholars and readers from various fields of clinical medicine with a platform to publish high-quality clinical research articles and communicate their research findings online.

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Motor cortex transcranial magnetic stimulation to reduce intractable postherpetic neuralgia with poor response to other therapies: Report of two cases

Huan Wang, Yu-Zhong Hu, Xian-Wei Che, Liang Yu

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Abstract

BACKGROUND

Postherpetic neuralgia (PHN) is a typical neuropathic pain condition that appears in the lesioned skin regions following the healing of shingles. The pain condition tends to persist, which is often accompanied by negative emotions (e.g., anxiety and depression) and substantially reduces the quality of life. In addition to analgesia (e.g., pregabalin and gabapentin), nerve radiofrequency technology is an effective treatment for intractable PHN. However, there is still a significant portion of patients who do not benefit from this treatment. As a non-invasive form of brain stimulation, repetitive transcranial magnetic stimulation (rTMS) targeting the motor cortex is able to reduce neuropathic pain with grade A evidence.

CASE SUMMARY

Here we report two cases in which motor cortex rTMS was used to treat intractable PHN that did not respond to initial drug and radiofrequency therapies. Moreover, we specifically investigated rTMS efficacy at 3 mo following treatment.

CONCLUSION

Motor cortex rTMS can treat intractable PHN that did not respond to initial drug and radiofrequency therapies.

Key Words: Post herpetic neuralgia; Repetitive transcranial magnetic stimulation; Radiofrequency; Case report

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Core Tip: Postherpetic neuralgia (PHN) is a kind of refractory neuropathic pain, which seriously affects the quality of life. Repetitive transcranial magnetic stimulation can be used as an effective complement to the treatment of patients with refractory PHN.

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INTRODUCTION

Postherpetic neuralgia (PHN) is a typical neuropathic pain condition that appears in the lesioned skin regions following the healing of shingles[1]. The pain condition tends to persist, which is often accompanied by negative emotions (*e.g.*, anxiety and depression) and substantially reduces the quality of life[1]. In addition to analgesia (*e.g.*, pregabalin and gabapentin), nerve radiofrequency technology is an effective treatment for intractable PHN[2,3]. However, there is still a significant portion of patients who do not benefit from this treatment.

As a non-invasive form of brain stimulation, repetitive transcranial magnetic stimulation (rTMS) targeting the motor cortex (M1) is able to reduce neuropathic pain with grade A evidence[4]. Here we report two cases in which motor cortex rTMS was used to treat intractable PHN that did not respond to initial drug and radiofrequency therapies. Moreover, we specifically investigated rTMS efficacy at 3 mo following treatment[4].

CASE PRESENTATION

Chief complaints

Case 1: A 65-year-old woman was admitted with persistent pain in the left chest and back (T5/T6) for 6 mo after herpes zoster.

Case 2: A 75-year-old woman was admitted with left lower back pain (T11/12) for 4 mo after herpes zoster.

History of present illness

Case 1: The patient's pain was characterized by persistent tingling and burning sensations, with a visual analog scale (VAS) score of 8. She was prescribed pregabalin 150 mg bid, but she did not want to continue increasing the dose of the drug because of the side effect of dizziness, and received a spinal nerve radiofrequency surgery. However, there was no clear analgesia following these treatments.

Case 2: The patient was prescribed gabapentin 0.6 g tid. However, she had renal insufficiency so the drug dose was not increased further, as well as a spinal nerve radiofrequency surgery. The patient reported slight pain relief after treatment but still with a VAS score of 6.

History of past illness

Case 1: The patient claimed no history of past illness.

Case 2: The patient had a history of renal insufficiency for 5 years and was on drugs regularly.

Personal and family history

Neither patient had any relevant personal or family history.

Physical examination

Physical examination of both patients revealed no abnormalities.

Laboratory examinations

Laboratory examination of both patients revealed no abnormalities.

Imaging examinations

Imaging examination of both patients revealed no abnormalities.

FINAL DIAGNOSIS

Cases 1 and 2

PHN.

TREATMENT

Both patients provided written informed consent for rTMS treatment. rTMS was delivered to the contralateral motor cortex once daily for 10 consecutive days using an RT-50 stimulation system connected to a figure-of-eight coil (Sichuan Junjian Wanfeng Medical Equipment Co.). Each rTMS session delivered 3000 pulses at 10 Hz with 5-sec trains and 25-sec intervals at 100% resting motor threshold. Patients were assessed at baseline, the fifth treatment, the end of treatment, and 2 wk, 1 mo, and 3 mo after treatment. Clinical assessment included VAS, McGill Pain Questionnaire (McGill), Pittsburgh Sleep Quality Index (PSQI), Hamilton Depression Scale (24 items), Hamilton Anxiety Scale (17 items), Mini-mental State Examination (MMSE), and Perceived Deficits Questionnaire-Depression (PDQ-D). Drug dose remained the same as that before this treatment.

OUTCOME AND FOLLOW-UP

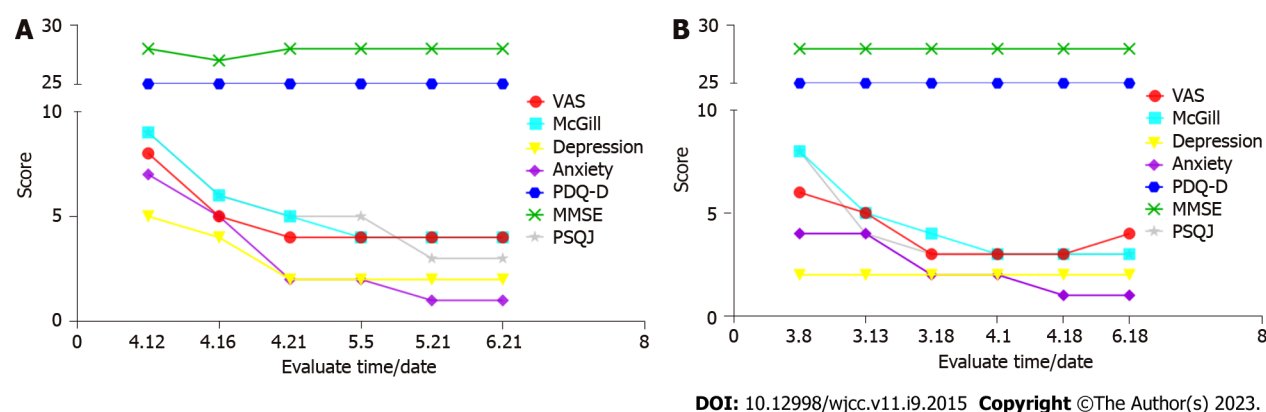
Both patients demonstrated a promising analgesia effect, with pain experience changing from severe to mild-to-moderate level (Figure 1). There was also a protect effect on negative emotions, especially in the first case with an initial mild depressive symptom. We also observed a significant improvement in sleep quality in both cases. More importantly, the protective effects of motor cortex rTMS lasted for 3 mo following treatment (Figure 2).

DISCUSSION

Here we report two cases in which motor cortex rTMS was able to significantly reduce intractable PHN that did respond to first-line drug and radiofrequency therapies. Drugs and radiofrequency therapies are first-line treatments in clinical settings for PHN[5]. Our results indicated that motor cortex rTMS could be considered when the pain become intractable and/or the patient does not seem to benefit from regular drug and radiofrequency therapies. Some studies have shown that rTMS treatment is safe for patients with PHN and has better efficacy at 10 Hz[6], which is the frequency that we chose for these two patients. More importantly, our results indicated a long-term analgesic effect for 3 mo. Most previous studies have shown that pain relief from neuroplasticity can last for several days, usually a week to a month, after transcranial magnetic stimulation treatment[4]. This long-term 3-mo effect was potentially associated with a relatively large dose of pulses in daily treatment[7]. Previous studies tended to deliver approximately 1500 daily pulses whereby the number of pulses was doubled in these two cases.

TMS is a non-invasive stimulation technique that produces analgesic effects similar to those of invasive techniques by targeting rTMS to M1[8]. High-frequency rTMS delivered to M1 areas obtains analgesic effects by modulating several distant brain regions involved in the processing or control of nociceptive information. This pain relief can last for several weeks beyond the duration of stimulation, especially during repetition, and may be related to the process of long-term synaptic plasticity[9]. rTMS is now mainly used for the treatment of neuropathic pain and requires a trained physician or nurse to perform this procedure, which is a technique that can be widely used. The most common side effects are dizziness and scalp discomfort, which are transient and disappear after the treatment.

The mechanism of rTMS analgesia remains an open question. There is evidence that motor cortex rTMS could drive top-down pain modulation[10]. In addition, motor cortex stimulation is also able to activate cortical and subcortical regions (*e.g.*, insular and cingulate cortex) involved in the processing of



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Figure 2 A patient treated by repetitive transcranial magnetic stimulation.

ffective-emotional aspects of pain[11]. In either case, cortical and/or subcortical responses to rTMS may help explain the poor response to radiofrequency therapies, in which spinal nerves may not be well damaged by the surgery or become recurrent following surgery.

We have also observed a promising effect on negative emotions in these two cases. This is in line with the finding of a study that rTMS treatment had a significant effect on the whole brain functional network in PHN patients with inhibited sensory-motor functions and improvements in mood, cognitive, emotional, and memory functions[12]. rTMS has been approved by the United States Food and Drug Administration to treat depression by targeting the dorsolateral prefrontal cortex. Recent studies have also tried to manage comorbid pain and depression with rTMS in one setting[13]. In addition, we provide an interesting finding that motor cortex rTMS is able to improve sleep quality in the two cases, which has been rarely investigated compared to evidence on depression and neuropathic pain[14,15].

CONCLUSION

To conclude, we provide two cases in which motor cortex rTMS is able to reduce pain sensations in intractable PHN when first-line drug and radiofrequency therapies had no clear benefits. These findings need to be further validated in large, randomized controlled trials.

FOOTNOTES

Author contributions: Wang H contributed to literature search, and manuscript drafting and writing; Che XW contributed to supervision and writing of the manuscript; Hu YZ and Yu L contributed to literature search; all authors made substantial contributions to conception and design and data acquisition, analysis, or interpretation; took part in drafting the article or revising it critically for important intellectual content; gave final approval of the version to be published; and agree to be accountable for all aspects of the work.

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