

Exploring the Treatment of Post-Stroke Gastrointestinal Dysfunction with Herbal Enemas Based on the Brain-Gut Axis Theory: A Case Report

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Abstract: Based on the theory of the brain-gut axis, this paper discusses the application of herbal enema in patients with post-stroke gastrointestinal dysfunction, which often manifests as constipation, blood in stool, diarrhea, epigastric distension, nausea, belching and other symptoms that seriously affect the recovery process. Current treatment programs are mostly symptomatic but with suboptimal clinical efficacy. This study reports a case of a 77-year-old male patient who presented with unfavorable left limb movement and speech disorder for more than one month after infarction in the right basal ganglia region, accompanied by obvious manifestations of gastrointestinal dysfunction including watery diarrhea, abdominal distension, and positive fecal occult blood. Despite receiving conventional anti-platelet aggregation, antihypertensive, and cerebral circulation improvement treatments, as well as oral acid-suppressing and stomach-protecting medications, intestinal flora regulators, and antidiarrheal drugs, the symptoms were not relieved. Abdominal and pelvic CT examination revealed a large amount of stool accumulation in the intestine, based on which herbal enema therapy was administered with a formula composed of Shengdihuang (*Rehmanniae Radix*), Beishashen (*Glehniae Radix*), Huangqi (*Astragali Radix*), Dahuang (rhubarb root and rhizome), Zhishi (*Aurantii Fructus Immaturus*), Houpo (*Officinal magnolia bark*), and others, delivered once daily for four consecutive days. Following this regimen, the patient exhibited dark-brown, hard stools with reversion of fecal occult blood test results to negative, accompanied by clinical stabilization and marked improvement in mental status and consciousness level. As a safe and effective complementary therapy, herbal enema has shown promising applications in relieving gastrointestinal dysfunction and improving patients' mental status and consciousness level after ischemic stroke; however, large-scale randomized controlled studies are needed to verify its complementary or synergistic effects on patients' full recovery.

1. Introduction

Stroke has a very high rate of disability and mortality, and the latest Global Burden of Disease study showed that stroke is the third leading cause of death worldwide (after ischemic heart disease and COVID-19) in 2021^[1]. Gastrointestinal dysfunction is one of the common complications after stroke, mostly manifested as belching, nausea, constipation, blood in stool, diarrhea, and epigastric distension, which occurs in more than 50% of patients^[2] and significantly affects neurological recovery and prognosis of stroke patients^[3].

Studies have shown that the occurrence and development of cerebrovascular diseases are closely related to the brain-gut axis^[4,5]. The brain-gut axis is a bidirectional signaling system between the brain and the gut that regulates brain and gut functions, which involves a variety of mechanisms, including neural, endocrine, and immune pathways^[6,7]. There is a bidirectional pathway between the central nervous system and the enteric nervous system, where stimuli from the gastrointestinal tract are transmitted through the brain-gut axis to the central nervous system to regulate brain responses, and the central nervous system can also issue instructions through the brain-gut axis to regulate gastrointestinal activities. In this process, the two nervous systems working together can secrete brain-gut peptides^[8]. The enteric nervous system can operate under the control of the central nervous system or independently of it, with a complete set of self-innervating and outgoing nerves. The neurotransmitters and modulators released by the neurons of the enteric nervous system are numerous and mostly overlap with those in the central nervous system. Its neuronal composition, secreted neurotransmitters, and ability to independently complete neural reflexes are highly similar to the brain, hence it is also known as the abdominal brain or the second brain^[9].

When the organism is normal, the excitatory and inhibitory gastrointestinal hormones in brain-gut peptides regulate each other and work together to promote intestinal motility. When a patient has a stroke, the body's function of synthesizing and releasing brain-gut peptides is abnormal, and brain-gut peptide levels change, and this change is particularly associated with the location of the lesion, the size of the lesion, and the presence or absence of gastrointestinal complications^[10].

Chinese medicine believes that the foot yangming stomach meridian and hand yangming large intestine meridian through the meridian circulation and the brain to produce contact, meridian affiliation to strengthen the connection between the two qi and blood operation. Numerous ancient books of Chinese medicine have clearly documented the gastrointestinal tract lesions can lead to abnormalities in the mind, Yangming meridian through the brain, intestinal and bowel qi dysfunction, conduction of intestinal dregs of slow or no, turbid gas can not be normal precipitation of reverse upward impulse brain, triggering brain disorders^[11]. Therefore, it is very important to regulate the qi function of the large intestine when treating stroke and other brain diseases. Only by making the qi of the large intestine smooth, the orifices of the brain can be kept fresh, thus improving brain diseases.

2. Case Presentation

2.1 Patient History and Admission Findings

On June 8, 2021, a 77-year-old male patient experienced difficulty in moving his left limbs and speaking due to an infarction in the right basal ganglia region one month prior. After receiving symptomatic treatment at another hospital, his condition was stable. However, his symptoms worsened, and the patient's family noticed that his left limb paralysis and speech difficulties had intensified compared to before. He was unable to move his left limb, spoke little, and could not respond. Consequently, he was admitted to our hospital for treatment. Upon admission, the patient was found to be conscious but slow to react, with weak spirits, left limb paralysis, and speech

difficulties. There was no vomiting observed, and he had little white phlegm. He experienced coughing while eating and drinking, and was fed with liquid food through a nasogastric tube. His sleep at night was poor, but his urination was normal, with several episodes of watery diarrhea daily. In 2018, the patient was diagnosed with "cerebral infarction" at another hospital and received inpatient treatment, which did not leave any significant sequelae. He has a history of hypertension and coronary heart disease.

2.2 Physical Examination

Physical examination revealed that the patient was conscious but slow to react and in a passive position. The patient had dysarthria and a weakened swallowing reflex. The abdomen was distended, with negative shifting dullness, and there was no edema in both lower limbs. The Babinski sign was positive on the left side. The muscle strength of the left limbs was grade I, while that of the right limbs was grade V. The muscle tone and volume of all limbs were normal.

2.3 Conventional Treatment and Outcomes

During the hospital stay, the patient was administered conventional treatments, including anti-platelet aggregation, antihypertensive, and measures to improve cerebral circulation and metabolism. Additionally, since admission, the patient has had several episodes of watery diarrhea daily, with positive fecal occult blood. Oral rabeprazole was given for acid suppression and gastric protection, while Bifidobacterium, Lactobacillus, and Enterococcus triple-live-bacteria tablets were administered to improve the gut microbiota. Smectite powder was also provided for anti-diarrhea treatment. However, after one week, the patient's symptoms did not improve. The abdomen was distended, and the patient had watery stools, even developing black stools. The fecal occult blood test remained positive. Therefore, the anti-platelet aggregation medication was discontinued. Physical examination revealed marked abdominal distension with visible intestinal peristaltic patterns and multiple palpable indurated masses in the abdominal quadrants, suggestive of fecaloma formation. An abdominal and pelvic CT scan showed a large amount of fecal accumulation in the intestines.

2.4 Herbal Enema Therapy and Response

Considering the patient's dark tongue with yellow and dry coating (Figure 1) and a taut, slippery, and rapid pulse, traditional Chinese medicine enema was administered. The prescription consisted of Shengdihuang (*Rehmanniae Radix*) 60g, Beishashen (*Glehniae Radix*) 30g, Huangqi (*Astragali Radix*) 60g, Dahuang (*Rheum palmatum*) 15g, Tianhuafen (*Trichosanthes kirilowii*) 30g, Zhishi (*Aurantii Fructus Immaturus*) 18g, Sanqi (*Notoginseng Radix et Rhizoma*) 3g, Houpo (*Magnoliae Officinalis Cortex*) 20g, Huangqin (*Scutellariae Radix*) 9g, and Pugongying (*Taraxaci Herba*) 30g. The herbal enema was performed once daily for four consecutive days. During this period, the patient expelled a considerable amount of brown, hard, "chestnut-like stools" (Figure 2), and the follow-up fecal occult blood test turned negative. After the treatment, the patient's condition stabilized, with a noticeable improvement in spirits. The patient became conscious and able to engage in simple communication, and the muscle strength of the left limbs reached grade II+.



Figure 1: The patient's tongue appearance



Figure 2: The feces expelled after herbal enema treatment

3. Discussion

3.1 Analysis of the Pathogenesis in This Case

In this case, the patient presented with unfavorable movement of the left limb after cerebral infarction, accompanied by consciousness and speech disorders, watery stools, and persistent positive fecal occult blood, which proved that there was gastrointestinal hemorrhage, and did not see significant improvement after conventional acid-suppressing and stomach-protecting and antidiarrheal treatments. Although the patient had symptoms of diarrhea, the patient's abdomen was found to be distended through observation, and it was initially determined that there was accumulation of stools, which was subsequently confirmed by CT examination with a large amount of stools in the intestines. Based on the diagnostic findings of a darkened tongue body with yellowish, dry coating and a wiry-slippery-rapid pulse, the patient underwent continuous herbal enema therapy targeting Tongfu Xiezhuo (unblocking the fu organs and eliminating turbid pathogens). Following the evacuation of dark-brown, hardened stools, the patient exhibited marked improvement in mental status and consciousness levels. Concurrently, fecal occult blood test reverted to negative.

Fecal matter for a long time in the rectum embedded, the water in the fecal matter is gradually

absorbed by the rectal mucosa, resulting in the fecal matter is more and more dry and hard, embedded in the anal canal and the lower part of the rectum is difficult to be discharged, affecting the self-control function of the anus; at the same time, embedded fecal matter oppresses and stimulates the rectal mucosa, resulting in rectal mucosal edema, erosion, mucus and secretion increase, behind the fecal matter is thinner, and from the two sides of the dry, hard, embedded fecal matter outflow, appearing in the so-called "*Rejie Pangliu*(Diarrhea with retention)"^[12]. In this case, the patient's watery stools were actually due to dry feces obstructing the intestines, leading to impaired qi movement and preventing turbid qi from descending, which then ascended to the brain, causing mental disturbances.

3.2 Mechanism of Herbal Enema Therapy

Therefore, the treatment used was a modified Dachengqi decoction administered via enema to unblock the intestines and eliminate turbidity. Dachengqi decoction, from the ancient text *Shang Han Lun*, is a foundational herbal formula designed to restore gastrointestinal function through vigorous purging of accumulated pathogenic heat in severe excess patterns. The pathogenesis of stroke involves qi and blood deficiency, imbalance of yin and yang in the heart, liver, and kidneys, yin deficiency with yang exuberance, impaired qi movement, dry stools, and blockage of clear orifices. This leads to qi reversal and disease onset. Dachengqi decoction can be used to treat this condition by unblocking the intestines, eliminating turbidity, opening the orifices, and resolving phlegm, making it an important method for treating acute stroke^[13].

Simultaneously, this enema formula incorporates substantial dosages of Shengdihuang (*Rehmanniae Radix*), Beishashen (*Glehniae Radix*) and Huangqi (*Astragali Radix*) to tonify qi and generate fluids. Sanqi (*Notoginseng Radix et Rhizoma*) serves to arrest bleeding while concurrently exerting a protective effect on the gastrointestinal mucosa.

The stomach and intestines physiologically manifest their functions through unobstructed movement and descending regulation. Whether obstructed by tangible pathogens such as dry stool, static blood, or phlegm-fluid retention, or impeded by intangible pathogenic factors like qi stagnation and damp-heat, such intestinal obstructions inevitably result in bowel qi obstruction, clinically manifesting as abdominal distension and constipation. The therapeutic strategy of unblocking and descending serves to eliminate stagnant qi, blood, and body fluids, thereby restoring the organism to its balanced state of yin-yang harmony, qi-blood circulation, and unobstructed regulation among the five zang organs^[11]. Dachengqi decoction may exert its therapeutic effects by enhancing gastrointestinal motility and promoting the intestinal elimination of excess fluid and metabolic toxins, thereby reducing intracranial pressure, improving cerebral microcirculation, and mitigating neuronal injury in cerebral tissues^[14].

3.3 Correlation between Constipation, Brain-Gut Axis and Stroke Prognosis

Long-term clinical observations have demonstrated that constipation presents as a significant clinical manifestation in the majority of acute stroke patients, reflecting the critical role of brain-gut axis pathology in cerebrovascular pathogenesis. Evidence-based studies reveal distinct incidence rates of post-stroke constipation: 51% following cerebral infarction and 66% subsequent to intracerebral hemorrhage^[15]. Constipation disrupts intestinal homeostasis and may induce or exacerbate neuropsychiatric manifestations in acute stroke patients through gut-brain axis dysregulation^[16,17]. Evidence-based analyses demonstrate a 50% elevated risk of ischemic stroke in constipated populations compared to non-constipated controls^[18]. Persistent constipation during the month preceding acute stroke onset serves as an independent predictor of adverse clinical outcomes, correlating with prolonged neuroinflammatory responses and impaired cerebral autoregulation^[15].

3.4 Modern Medical Mechanism of Consciousness Improvement via Regulating Gut Function

Modern medicine identifies metabolic disorders as a key factor in post-acute stroke intestinal paralysis and constipation, which can trigger or worsen consciousness impairment. This is linked to abnormal absorption of metabolic waste from intestinal paralysis and an imbalance in neuropeptide secretion due to local metabolic issues in the gut and brain. Together, these factors exacerbate consciousness problems. Additionally, substances from gut microbiota translocation (like lipopolysaccharides) can disrupt the blood-brain barrier, worsen brain injury, and impact the prognosis of consciousness impairment^[19].

The human body maintains the interaction between the gut and the brain through the brain - gut axis, a bidirectional system. The brain-gut axis is regulated by the central nervous system, enteric nervous system, and autonomic nervous system. The central nervous system and gastrointestinal tract maintain the dynamic balance of the brain - gut axis by secreting neurotransmitters or related hormones through a neuro - endocrine network^[20]. The brain-gut axis is the communication pathway between the gut and brain. Brain lesions causing systemic stress can lead to gastrointestinal functional changes. Conversely, gastrointestinal disorders and dysfunction of the brain-gut axis can impact the development of central nervous system diseases. "Simultaneous gut and brain involvement" is a characteristic of acute stroke^[19].

Brain-gut peptides constitute the primary signaling molecules of the brain-gut axis, serving as biochemical mediators of bidirectional communication between the gastrointestinal tract and neuropsychiatric functions. Specifically, they refer to the shared bioactive peptides co-expressed in both the enteric and central nervous systems. These peptides modulate gut-brain homeostasis through integrated neuro-endocrine-immune pathways, establishing the biological substrate for "treating the brain via the gut". The gut microbiota and central nervous system maintain bidirectional communication via the brain-gut axis, while microbial dysbiosis can adversely affect cerebral function and host behavioral patterns through microbiota-derived metabolites^[21]. The gut microbiota exerts neuromodulatory effects on cerebral functions through the secretion of hormonal mediators, immunoregulatory cytokines, and microbiota-derived metabolites. This multi-modal crosstalk establishes the gut microbiota as a pivotal therapeutic target for "treating the brain via the gut", wherein microbial reprogramming strategies may rectify dysregulated gut-brain axis signaling^[22].

In this case, the post-stroke bidirectional regulatory dysfunction of the brain-gut axis was addressed using herbal enema to unblock the intestines and eliminate turbidity. This method regulated the brain-gut axis, alleviated gastrointestinal dysfunction, and contributed to cerebral protection, thereby aiding in the recovery of the patient's consciousness and illustrating the brain-gut interaction in "treating the brain via the gut".

4. Conclusions

In summary, this case based on the brain-gut axis theory used herbal enema to treat post-stroke gastrointestinal dysfunction. This method not only alleviated symptoms like abdominal distension, hematochezia, and watery stools but also improved consciousness and aided brain function recovery. It underscores the importance of timely and comprehensive management of post-stroke gastrointestinal issues, which may enhance both gastrointestinal recovery and central nervous system prognosis. Future research should explore the specific indications and optimal combinations of herbal enema for different stroke types, and further investigate the mechanisms of brain-gut axis to provide more scientific evidence for stroke prevention and treatment.

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