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PRACTICAL PEARL

Treating Therapy-Resistant Headache After Aneurysmal Subarachnoid Hemorrhage with Acupuncture

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Abstract

Introduction: Subarachnoid haemorrhage (SAH) is usually associated with severe headache, whereas the options of pharmacological analgesia are restricted. Acupuncture is a promising method in treatment of headaches associated with meningeal sensitivity or irritation, such as migraine or post-dural puncture headache.

Case Report: We report on 3 patients, who suffered severe headache due to aneurysmal SAH, and received acupuncture when pharmacological measures were exhausted. After acupuncture treatment all patients reported at least 50% pain reduction and could stop or reduce analgesics without side effects.

Discussion: Acupuncture may be an effective pain treatment method in patients suffering from headache due to SAH. Randomized trials using acupuncture as an add-on to standard analgesic therapy would help evaluate the role of acupuncture for this purpose.

Keywords: Subarachnoid hemorrhage, Headache, Acupuncture

Introduction

Subarachnoid hemorrhage (SAH) is a sudden, life-threatening condition, where more than 90% of survivors report severe to worst headache despite steady consumption of analgesics [1, 2]. The headache due to SAH is the second-leading cause for 30-day hospital readmission after the hemorrhage [3] and may persist for years after SAH in case of inadequate treatment [1, 4]. Opioid analgesics are avoided to prevent somnolence and respiratory depression; non-steroidal anti-inflammatory drugs may enhance SAH due to impairment of platelet aggregation [5]. Because of restricted options of pharmacological analgesia, the success of treatment of headache due to SAH is limited [1, 2, 5].

Acupuncture is a complementary medicine technique with an excellent safety profile and positive effect in treatment of headaches associated with meningeal sensitivity or irritation, such as migraine or post-dural puncture headache [6, 7]. According to a recent summary of systematic reviews and meta-analyses of randomized controlled trials, acupuncture is associated with better clinical outcomes than sham procedures, prophylactic drugs or usual care in treatment or prevention of migraine, tension type headache, and chronic headache disorders up to 2 months after randomization [8].

We describe three consecutive cases, where patients, who suffered severe headache due to aneurysmal SAH, were successfully treated using acupuncture, when pharmacological measures were exhausted.

Cases Description

Patient 1

A 48-year-old woman with a history of arterial hypertension, chronic obstructive pulmonary disease, and

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Table 1 Clinical features of three female patients, who received acupuncture to treat severe headache after subarachnoid hemorrhage

Nr	Age (years)	Bleeding source was aneurysm of:	Hunt and Hess scale	SAH treatment	Onset of headache (day following SAH)	A	Headache intensity (VRS-11)		Analgesics (daily doses, mg)	
							Before A	After A	Before A	After A
1	48	Right internal carotid artery	3	Coiling	1	2	10	5	Acetaminophen 4000	None
						3	9	4	Ibuprofen 500 p.o.	
						4	8	1	Piritramide 15	
2	32	Ramus communicans of the right internal carotid artery	2	Coiling	9	11	10	3	Acetaminophen 4000	Metamizole 2000 p.o.
						12	3	1	Acetaminophen 2000 p.o.	
						13	1	0	Piritramide 15	
3	41	Right medial cerebral artery	3	Clipping	3	5	10	5	Acetaminophen 4000	Metamizole 2000 p.o.
						6	9	4	Metamizole 2000 p.o.	
						7	7	2	Piritramide 15	

SAH subarachnoid hemorrhage, *A* acupuncture, *VRS-11* verbal rating scale, where 0 = no pain and 10 = maximal pain; piritramide: weak opioid with the analgesic potency 0.8 of morphine; Metamizole (non-opioid analgesic with the analgesic potency 0.4 of morphine)

obesity developed spontaneous SAH, accompanied by somnolence. Computed tomography revealed the signs of brain edema due to SAH from the ruptured aneurysm of the right internal carotid artery (Table 1). After emergency coiling of the aneurysm under general anesthesia, the patient re-gained full consciousness in the intensive care unit (ICU) and complained of severe fronto-parietal headache with hypersensitivity to light and sounds. The headache was associated with local cerebral vasospasm verified by ultrasound. Intravenous nimodipine was given for treatment of the vasospasm; the headache was treated using intermittent boluses of piritramide (a weak opioid with the analgesic potency 0.8 of morphine) up to 15 mg daily and non-opioid analgesics (Table 1). Despite pharmaceutical analgesia, the headache intensity was 9–10 (taken on a verbal rating scale VRS-11, where 0 = no pain and 10 = maximal pain) on the 2nd day following SAH, and acupuncture was tried by a consultant physician with previous expertise in this complementary medicine technique.

Patient 2

A 32-year-old woman with a history of obesity developed spontaneous SAH with severe headache, vertigo, and seizures. She underwent an emergency coiling of the aneurysm of the ramus communicans of the right internal carotid artery on the following day. On the 9th day following SAH, she developed a partial cerebral infarction due to vasospasm that was treated with nimodipine. The episodes of vasospasms were associated with severe fronto-occipital headache, accompanied by the signs of meningeal irritation. Despite treatment with opioid and non-opioid analgesics (Table 1), the headache intensity persisted with 9–10 on VRS-11. Acupuncture, as described below, was tried on the 11th day following SAH.

Patient 3

A 41-year-old otherwise healthy woman developed spontaneous SAH and underwent an emergency clipping of an aneurysm of the right medial cerebral artery under general anesthesia. During recovery after anesthesia, the patient received oral nimodipine for prevention of cerebral vasospasm, and continuous norepinephrine was administered to maintain the mean blood pressure around 100 mmHg. On the 3rd day following SAH, she developed severe continuous fronto-occipital headache, which was worsened by movement and light; its intensity was 9–10 out of 10 on VRS-11 despite pharmaceutical analgesia (Table 1). Acupuncture was applied at this time according to the method described below.

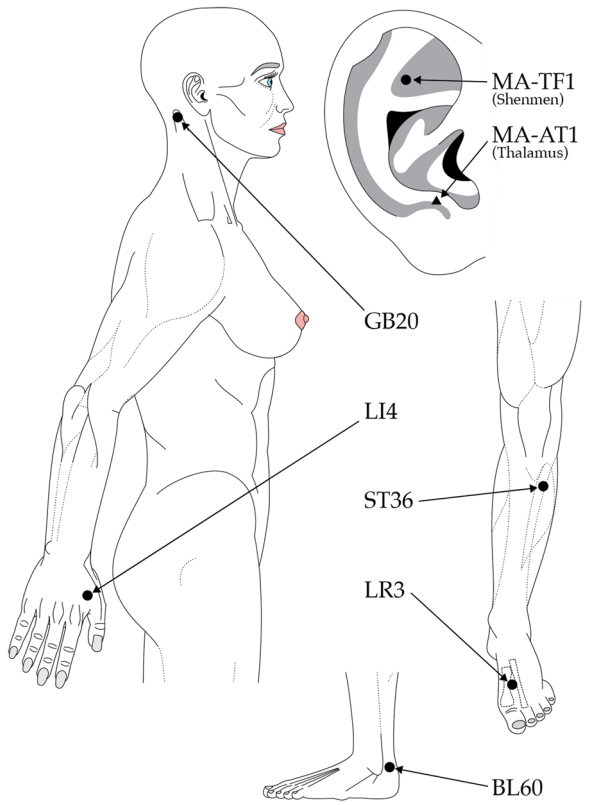

Fig. 1 Acupuncture points used for treatment of therapy-resistant headache after aneurysmal subarachnoid hemorrhage. For precise anatomical localization, see references [[9], [10]]

Acupuncture

All patients received body acupuncture daily, on 3 days following the onset of headache according to the recommendations of experts [9]. In brief, disposable stainless steel needles (0.2 × 15 mm, Seirin Corp., Japan) were applied bilaterally to acupoints LR3, ST36, LI4, and GB20 (Fig. 1) to a depth of 10 mm, depending on the underlying anatomical structures, and were retained in situ without manipulation for 30 min. Patient 3 received supplementary bilateral needling of acupoint BL60 (Fig. 1). Additionally, in all three patients auricular acupuncture was performed using semi-permanent fixed acupuncture needles New Pyonex (0.2 × 1.5 mm, Seirin Corp., Japan) applied to MA-TF1 (Shenmen) and MA-AT1 (Thalamus) acupoints bilaterally [10]. These fixed auricular needles remained in situ for 3 days.

Outcome

All patients reported more than 50% decrease in headache intensity immediately during and after the 1st acupuncture session (Fig. 2, Table 1). Two patients experienced relapse of headache 6 h following acupuncture (Fig. 2); however, after the 2nd acupuncture session headache intensity decreased to 4 (VRS-11), remained at this level and decreased to under 3 points (VRS-11) after the 3rd acupuncture session. Opioid analgesics could be stopped after the 1st acupuncture session; the dose of non-opioid analgesics was progressively reduced (Fig. 2, Table 1) so that the patients could be transferred from the ICU to a regular ward. None of these three patients reported any side effect of acupuncture nor developed chronic headache after the treatment.

Discussion

Three patients with severe headache due to aneurysmal SAH reported clinically relevant pain reduction and could stop or decrease further analgesic intake after a single acupuncture treatment. It is unlikely that the decrease of pain intensity after acupuncture in these cases was due to 'the natural course of the disease,' since severe headache due to SAH usually persists for longer than 2 weeks, even with high potency analgesia using opioid and non-opioid analgesics [1–3].

Our observation supports the findings of two investigations, where acupuncture was associated with relief of local vasospasm and improvement in the neurological outcome in patients with SAH, thus suggesting the potential usefulness of acupuncture in this situation [11, 12].

Nevertheless, the relief of headache after acupuncture in these cases could have been due to either specific or non-specific (including placebo) effects of acupuncture, although it would be problematic to attempt to differentiate these effects in an ICU environment using a randomized sham controlled trial (RCT). A more realistic approach would be the evaluation of acupuncture as an option for treatment of severe headache in patients who survive SAH in an RCT using acupuncture as an add-on to standard therapy versus standard therapy alone.

There is an ongoing RCT, studying the efficacy, safety, and the mechanisms of acupuncture in treatment of cerebral vasospasm after SAH, thus demonstrating the increased interest of medical community to this specific topic [13].

On the other hand, the analysis of the Chinese acupuncture literature from 1949 to 2010, which was performed by He et al. [14], retrieved 1038 cases with serious complications due to acupuncture. In 64 of these cases, acupuncture treatment was suggested as a cause for traumatic SAH. In these cases, acupuncture was applied to the acupuncture points on the head and neck, in the proximity of subarachnoid space, thus supporting the causal mechanism of traumatic SAH due to acupuncture.

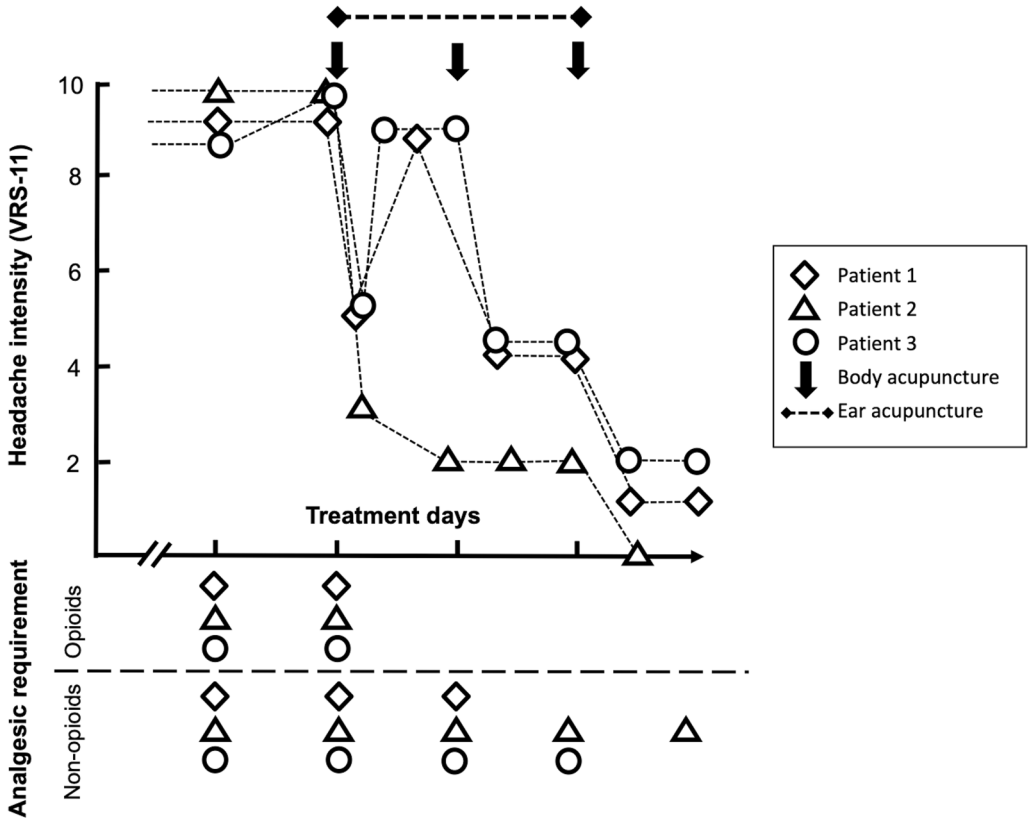

Fig. 2 Pain intensity and analgesics requirement in three female patients who received acupuncture for treatment of headache after subarachnoid hemorrhage

The majority of acupuncture-related adverse effects were associated with acupuncture treatment performed by traditional acupuncturists, who may not have an orthodox medical background, including the systematic knowledge of human anatomy [15]. Nevertheless, in the three patients described in the present report, we have used the stimulation of acupuncture points, which are situated remote to the subarachnoid space, pericardium, and pleural space (Fig. 1), thus preventing potential serious adverse effects of acupuncture, mentioned by He et al. [14]. Also, the maximal depth of needling 20 mm at acupoint GB20 precludes the accidental puncture of subarachnoid space, making the proposed acupuncture pattern safe for further investigation of acupuncture effectiveness in treatment of headache due to SAH in future RCT.

Conclusion

In conclusion, acupuncture may be an effective pain treatment method in patients suffering from headache due to SAH, where pharmacological analgesia is restricted. RCTs using acupuncture as an add-on to standard analgesic therapy would help evaluate the role of acupuncture for this purpose.

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Author's Contribution
J.D. was involved in the treatment of patients using acupuncture, data collection and interpretation, and writing the MS; T.E. contributed to management of patients at ICU, data collection, and writing the MS; and T.U. was involved in the idea of the investigation, treatment of patients, data interpretation, and writing the MS.

Compliance with Ethical Standards

Source of support
There was no support for this work.

Conflict of interest
The authors declare that they have no competing interests.

Informed Consent
Informed consent was received from each patient, and ethics commission has approved this retrospective case series investigation.

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