

Case reports on adverse effects of acupuncture and moxibustion: A review of papers published between 2007 and 2011

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Abstract

[Objective] To analyze and understand cases of adverse effects of acupuncture and moxibustion published in medical journals between 2007 and 2011.

[Methodology] We searched relevant articles with the Web of Japan Medical Abstracts Society and PubMed. We used keywords for acupuncture, moxibustion and related adverse events.

[Results] We located 39 papers reporting 39 cases that occurred in Japan: infection (7 cases), organ injury (11), foreign body or needle breakage (8), neurological damage (6), cutaneous disease (1), adverse effects of moxibustion (4), and others (2). As for cases published in foreign countries, we located 60 relevant papers: infection (19 cases including 2 outbreaks), organ injury (13), foreign body or needle breakage (5), neurological damage (9), cutaneous disease (5), adverse effects of moxibustion (2), and others (7).

[Conclusion] Although causal relationship has not been established in some cases, occurrences of infection, organ injury, and needle breakage/foreign body are still as high as they were before. This suggests that continual feedback to acupuncturists of information on safety is necessary.

Key words: *acupuncture and moxibustion, safety, adverse event, case report, literature search*

I. Background and purpose

The Committee for Safe Acupuncture, Department of Research, Japan Society of Acupuncture and Moxibustion (JSAM) has searched and analyzed the case reports on adverse events of acupuncture and moxibustion published in medical journals at a rate of once several years. The results have been outlined and presented at the workshop of JSAM's congress and published on the Journal of the Japan Society of Acupuncture and Moxibustion (J-JSAM), which has been contributed to education activities for more safe acupuncture and moxibustion. In 2008, however, the Department of Re-

search was reorganized and the Committee for Safe Acupuncture was dispersed, so that information on cases of adverse events in acupuncture and moxibustion since 2007 have not been reported to JSAM members. This was recognized as a need to promote education before and after graduation for improving the safety and reliability of acupuncture and moxibustion. (Note: In 2012, the Committee for Safe Acupuncture, Department of Research was reestablished.) Then, using the research grant of the Department of Research, we revived the investigation examination group on acupuncture and moxibustion safety in the expert committee of the Department of Research, updated the information database

on recent case reports on adverse events and safety management, and transmitted the data to domestic practitioners of acupuncture and moxibustion.

It is important to know what kinds of adverse event cases for acupuncture and moxibustion are reported in contemporary medical journals domestically and overseas. It must be noted, however, that research based on literature reviews of case reports on adverse events are weak as evidence for verifying acupuncture and moxibustion safety. Case reports have a tendency to report rare cases or severe cases. Thus, how often what kinds of adverse events and side effects occur cannot be determined through literature reviews. Also in the review, the definition of adverse event is, "An undesirable event that occurs during treatment or after treatment whether or not causal relationship is clear," so it includes the possibility that there may be no real causal relationship. Based on such limitations of literature review, we still hope that the results are useful as teaching materials for acupuncture and moxibustion educational facilities and postgraduate educational systems and as discussion topics for future acupuncture and moxibustion safety assessment and safety management education.

II. Methods

1. Domestic literature

Using Ichushi Web(Japana Centra Revuo Medicina), we searched for papers on adverse events related to acupuncture and moxibustion that were published between January, 2007 and December, 2011. When searching, we combined acupuncture and moxibustion with keywords for adverse events such as adverse effects, infection, pneumothorax, needle migration, needle breakage, foreign body, neurological damage, blood vessel injury, and burn. Among duplicate cases, cases that were less detailed (such as abstracts)^{2, 3)} and cases that acupuncture or moxibustion therapy was not the cause, are excluded. Also, within the same time period, using PubMed (US National Library of Medicine) we searched for papers written by authors with Japanese names or affiliated with Japan.

2. Overseas English literature

On the PubMed website, we retrieved papers on adverse events in acupuncture and moxibustion published during January, 2007 through December, 2011. Specifically, we searched the papers using the following MeSH Terms:

- (1) Case reports on acupuncture: "acupuncture analgesia/adverse effects" OR "acupuncture therapy/adverse effects" OR "acupuncture analgesia/contraindications" OR "acupuncture therapy/contraindications" OR "acupuncture, ear/adverse effects" OR "acupuncture, ear/contraindications"
- (2) Case reports on moxibustion: "moxibustion/adverse effects" OR "moxibustion/contraindications"

The selection criterion was: English papers that report cases of adverse events related to acupuncture and moxibustion (including papers with English abstracts). The exclusion criterion was: Japanese papers (adverse events that occurred in Japan), overseas papers other than English papers, case reports on adverse events that occurred due to acupuncture by bloodletting, pharmacopuncture or bee venom injection, or epidemiological surveys on adverse events, papers without original cases and with opinions or discussion, review papers, and papers on duplicate cases.

3. Classification

The adverse events were classified according to previous reports of the Committee for Safe Acupuncture^{4,5)}. Events about needles found as strays within organs (among needle migration) are classified as "foreign bodies in organs," events with clear neurological symptoms as "neurological damage," and events with no particular subjective symptoms as "needle migration." In addition, the classification "neurological injury" in previous reports^{4, 5)} was changed to "neurological damage", which is more commonly used.

III. Results

1. Domestic literature

From the literature we excluded duplicate cases and cases that were not clearly caused by acupuncture or moxibustion, and identified 39 cases in 39 papers⁶⁻⁴⁴⁾ (Tables 1-2). There were 7 infection cases, 11 organ injury cases, 8 needle migration/foreign body cases, 6 neurological damage cases, 1 cutaneous disease case, 4 cases caused by moxibustion, and 2 other cases. Infection, organ injury, and needle migration accounted for the higher percentage of adverse events.

(1) Infection

There were 6 bacterial infection cases and 1 viral infection case. For pathogens, *Staphylococcus aureus* appeared in 4 cases, *intestines micrococcus* in 1 case, and there was no response given for 1 case. For viral infection, hepatitis B was reported. *Staphylococcus aureus* cases include 1 methicillin-sensitive *Staphylococcus aureus* (MSSA) case and 1 methicillin-resistant *Staphylococcus aureus* (MRSA) case. One patient had an underlying case of diabetes.

(2) Organ injury

Out of 9 pneumothorax cases, 3 cases were bilateral pneumothorax. For acupuncture treatment sites, there were 3 cases, needle insertion to shoulder-back region, lumber region, and GB-21. The papers this time did not report of any deaths by pneumothorax.

Cases of organ injury other than pneumothorax were iliopsoas muscle hematoma in a hemophilic patient (1 case) and popliteal artery aneurysm caused by perforating an artery (1).

Table1. Domestic case reports on adverse events of acupuncture between 2007 and 2011

Classification	Adverse event	Age/Sex	Comments
Infection	Epidural abscess(<i>Staphylococcus aureus</i>)	56M ⁽⁶⁾	Acupuncture on the back for low back pain.
	Thoracic vertebra epidural abscess (<i>Staphylococcus aureus</i>)	20M ⁽⁷⁾	Acupuncture for low back pain (twice).
	Spinal cord epidural abscess	15M ⁽⁸⁾	Acupuncture for headache and neck pain.
	Polyarticular septic arthritis,bilateral psoas abscesses (MRSA)	50F ⁽⁹⁾	Acupuncture on the low back for chronic low back pain.
	Iliopsoas muscle abscess,epidural abscess,encephal meningitis (MSSA)	40s M ⁽¹⁰⁾	Acupuncture for low back pain.
	Osteolysis around the femoral and tibial components (<i>Enterococcus faecalis</i>)	60F ⁽¹¹⁾	Embedded needles on the right knee for knee osteoarthritis.
	Acute hepatitis B (genotype C)	63M ⁽¹²⁾	Acupuncture one month before onset of symptoms.
Organ injury	Traumatic pneumothorax	73F ⁽¹³⁾	Acupuncture for low back pain.
	Pneumothorax	75F ⁽¹⁴⁾	Acupuncture to GB21(moxa needle).
	Bilateral pneumothorax	58F ⁽¹⁵⁾	Acupuncture from cervical region to the back.
	Traumatic pneumothorax	51M ⁽¹⁶⁾	Acupuncture to GB21.
	Bilateral pneumothorax	66F ⁽¹⁷⁾	
	Pneumothorax	22M ⁽¹⁸⁾	Acupuncture to GB21.
	Pneumothorax	32M ⁽¹⁹⁾	Acupuncture on the shoulder and upper back.
	Bilateral pneumothorax	35F ⁽²⁰⁾	Acupuncture on the neck and back.
	Chylothorax, pneumothorax	37F ⁽²¹⁾	Acupuncture on the neck and upper back.
Needle migration /foreign body	Iliopsoas hematoma	20s M ⁽²²⁾	Acupuncture on the low back.
	Right popliteal aneurysm	71M ⁽²³⁾	Acupuncture on the right knee.
	Needle migration in the spleen	66M ⁽²⁴⁾	Needle broken 30 years ago.
	Needle migration in the cervical region	44M ⁽²⁵⁾	Self-acupuncture on the neck.
	Needle migration in the retroperitoneum	44M ⁽²⁶⁾	Self-acupuncture on the low back.
	Bladder calculus	61M ⁽²⁷⁾	Needle broken in the low back 20 years ago.
	Needle migration in the cervical region	62F ⁽²⁸⁾	Acupuncture for tinnitus.
	Needle migration in the cervical region	47M ⁽²⁹⁾	Self-acupuncture for headache.
Neurological damage	Needle migration in the cervical region	62F ^(2,30)	Self-acupuncture on the posterior neck about 30 years ago.
	Needle migration in the cervical region	29M ⁽³¹⁾	Needle broken when being removed after electroacupuncture.
	Sciatica (needle migration in the buttock)	65F ⁽³²⁾	Acupuncture on the buttock.
	Coldness of the right lower limb and temperature sensory dysfunction of right side of the body.	31F ⁽³³⁾	Moxa needle on the neck.
	Intracranial subarachnoid bleeding	32F ⁽³⁴⁾	Acupuncture to GV16 (3 cm in depth) a day before onset .
	Pain in the lower limb (needle migration in the lumbar spinal canal)	66F ⁽³⁵⁾	Acupuncture for low back pain.
Cutaneous disease	Chest pain, dorsal pain, feeling of numbness in the limbs, insomnia	57F ⁽³⁶⁾	Embedded needles (over 2000) for 12-13 years.
	Medullary damage (Cervical needle migration)	44M ^(3,37)	Acupuncture for neck stiffness.
	Localized argyria	62F ⁽³⁸⁾	Embedded silver needles.
Others	Rhabdomyolysis	26F ⁽³⁹⁾	Acupuncture and acupressure.
	Cerebrospinal fluid hypovolemia	29F ⁽⁴⁰⁾	Acupuncture on the low back (insertion of 6cm in depth).

Table2. Domestic case reports on adverse events of moxibustion between 2007 and 2011

Adverse event	Age/Sex	Comments
Squamous cell cancer	73M ⁴¹⁾	Moxibustion on the low back for 20 years.
Burn injury	81M ⁴²⁾	Moxa needle on lumbosacral area.
Lower thigh skin necrosis	73M ⁴³⁾	Moxibustion on the lateral leg for lower limb pain.
Granulocytic sarcoma	70M ⁴⁴⁾	Moxibustion on the leg.

embedding," which is intentionally cutting a needle for the particular treatment. In this review we found 8 needle migration cases that were caused by unintentionally broken needles. For foreign bodies in organs, there was one report of needle migration in spleen, 1 case of bladder penetration, and other cases (cerebellum, medulla oblongata, and retroperitoneum). Among these, there were 4 cases of broken needles caused by self-acupuncture.

(4) Neurological damage

For neurological damage, there were 3 cases caused by needle penetration (cervical region, buttocks, and inside lumbar vertebral canal), 1 case by permanent needle embedding, 1 case of a cool sensation in the right leg and disturbance of thermal feeling in the right side of the body after treatment with a moxa needle to the cervical region, and 1 case of intracranial subarachnoid bleeding after treatment to acupoint GV16.

(5) Cutaneous disease

One local argyria case, which seems to have been caused by permanent needle embedding, was reported.

(6) Moxibustion

There were 4 reports of burns, skin necrosis of the lower leg, squamous cell carcinoma, and granulocytic sarcoma.

(7) Others

One case of rhabdomyolysis and 1 case of cerebrospinal fluid hypovolemia after moxibustion and acupressure were reported.

2. Overseas English literature

From the literature we excluded duplicate cases and cases that were not clearly caused by acupuncture or moxibustion, and identified 60 papers⁴⁵⁻¹⁰⁴⁾ (Tables 3-1, 3-2). There were 19 infection cases (including 2 outbreak cases), 13 organ injury cases, 6 needle migration/foreign body cases, 9 neurological damage cases, 5 cutaneous disease cases, 2 cases caused by moxibustion, and other 7 cases.

The number of affiliated countries/areas of the main authors of the papers was 15; South Korea (18 papers), Taiwan (9), UK (8), USA (7), China (4), Australia (3), Singapore (2), New Zealand (2), Brazil (1), Hong Kong (1), Venezuela (1), Denmark (1), Ireland (1), Spain (1), and Canada (1).

(1) Infection

There were case reports of septic arthritis (5), abscess (5), suppurative osteomyelitis (3), necrotizing fasciitis (2), and cutaneous infection (2). In addition, dessecting aneurysm, Pott's puffy tumor in the parietal region, soft tissue infection of the limbs/infectious endocarditis, papule, and contagious pustular dermatitis were reported. Pathogens included *Staphylococcus aureus* in 7 cases (including 4 cases of MRSA). 1 case was a group infection of 6 persons; mycobacterium in 5 cases included 1 case of a group infection of 109 persons; and pseudomonas aeruginosa in 2 cases. Other cases were listeriosis and enterococcus. There were 2 viral infectious disease cases: papule (herpes simplex virus) and parapoxvirus. There was 1 case that did not mention the pathogen. The group infection cases occurred in Australia and South Korea. The former was 6 patients infected by an MRSA-carrying doctor, and the latter was 109 persons who received acupuncture in an oriental medicine clinic and were infected by mycobacterium.

For these cases, 8 cases included an underlying disease: Three cases of diabetes, 1 case of rheumatoid arthritis, 1 case of renal transplantation, 1 case of aplastic anemia (under immunosuppressant therapy), and 2 cases of atopic dermatitis.

(2) Organ injury

There were 8 cases of pneumothorax (including 2 bilateral pneumothorax cases). Other than pneumothorax, there were cases of retroperitoneum emphysema, popliteal radiocephalic fistula, hematoma inside the gastrocnemius muscle (in a Warfarin dose patient), retinal damage, and intracranial bleeding (in an acute lymphoblastic leukemia patient).

Table 3-1. Adverse events of acupuncture and moxibustion reported in overseas between 2007 and 2011

Classification	Adverse event	Age/Sex	Year of publication	Country or area
Infection	Infectious arthritis of the right knee	78M ⁴⁵⁾	2008	Taiwan
	Right shoulder joint septic arthritis	78F ⁴⁶⁾	2008	Australia
	Right shoulder joint septic arthritis	76M ⁴⁶⁾		
	Lumbar paravertebral pyomyositis	38F ⁴⁶⁾		
	Posterior neck soft tissue abscess	55F ⁴⁶⁾		
	Lumbar paravertebral pyomyositis	76F ⁴⁶⁾		
	Right gluteus maximus/minimus pyomyositis	43M ⁴⁶⁾		
	Ear cartilage abscess	16F ⁴⁷⁾	2008	USA
	Necrotizing Aortitis with Infected <i>Pseudoaneurysm</i> foration	79M ⁴⁸⁾	2008	Korea
	Pott's puffy tumor	12F ⁴⁹⁾	2008	Taiwan
	Left knee septic arthritis	43F ⁵⁰⁾	2009	HongKong
	Bilateral psoas abscess	57M ⁵¹⁾	2009	Taiwan
	Soft tissue infection of limb	23F ⁵²⁾	2010	Venezuela
	Psoas abscess	53F ⁵³⁾	2010	Korea
	Skin infection on the lower abdomen and both thighs	59F ⁵⁴⁾	2010	Korea
	Cutaneous infection	59M ⁵⁵⁾	2010	Brazil
	Skin and soft tissue infection	49(median) ⁵⁶⁾	2010	Korea
	Necrotizing fasciitis	84M ⁵⁷⁾	2010	USA
	Septic endocarditis	15M ⁵⁸⁾	2011	UK
	Right shoulder septic arthritis	53F ⁵⁹⁾	2011	Taiwan
Left forearm papula	56F ⁶⁰⁾	2011	Korea	
Necrotizing fasciitis	44F ⁶¹⁾	2011	Taiwan	
Bilateral knees abscess	56F ⁶²⁾	2011	Korea	
Disseminated parapox	13M ⁶³⁾	2011	Ireland	
Organ Injury	Bilateral pneumothorax	52F ⁶⁴⁾	2007	Singapore
	Pneumothorax	25M ⁶⁵⁾	2007	USA
	Pneumothorax	79F ⁶⁶⁾	2007	UK
	Pneumothorax and pleural empyema	35F ⁶⁷⁾	2008	New Zealand
	Pneumothorax	50F ⁶⁸⁾	2008	UK
	Pneumothorax	54F ⁶⁹⁾	2010	New Zealand
	Bilateral pneumothorax	Middle age M ⁷⁰⁾	2011	Denmark
	Hemopericardium and pneumothorax	54F ⁷¹⁾	2011	Korea
	Pneumoretroperitoneum	25F ⁷²⁾	2008	Korea
	Left gastrocnemius intramuscular hematoma	60F ⁷³⁾	2010	China
	Light popliteal arteriovenous fistula	39F ⁷⁴⁾	2010	Taiwan
	Cerebral leukemic hemorrhage	45F ⁷⁵⁾	2010	China
Ocular perforation	67M ⁷⁶⁾	2011	Canada	

Table 3-2. Adverse events of acupuncture and moxibustion reported in overseas between 2007 and 2011 (

Classification	Adverse event	Age/Sex	Year of publication	Country or area
Needle migration /foreign body	Throat foreign body sensation	46F ⁷⁷⁾	2010	USA
	Recurrent chest pain	69F ⁷⁸⁾	2010	Korea
	Migration of an acupuncture needle from the abdominal cavity to the heart	30M ⁷⁹⁾	2010	UK
	Embedded needles	89F ⁸⁰⁾	2011	Korea
	Periapical needle migration	29F ⁸¹⁾	2011	USA
Neurological damage	Cervical needle migration	29M ⁸²⁾	2007	Taiwan
	Bell's palsy	47M ⁸³⁾	2007	UK
	Cervical cord injury	Middle age F ⁸⁴⁾	2007	Australia
	Lumbar cerebrospinal fluid fistula	52M ⁸⁵⁾	2007	USA
	Isolated median sensory neuropathy	47M ⁸⁶⁾	2008	Korea
	Postdural puncture headache	33M ⁸⁷⁾	2010	Korea
	Postdural puncture headache	21M ⁸⁸⁾	2011	Taiwan
	Intracranial hemorrhage and cerebellar infarction	65M ⁸⁹⁾	2011	Korea
Cutaneous disease	Cervical epidural hematoma	58F ⁹⁰⁾	2011	Korea
	Localized argyria (light anterior proximal thigh)	61F ⁹¹⁾	2007	USA
	Localized argyria (right preauricular area)	56F ⁹²⁾	2010	Spain
	Pigmentation in low back region	49M ⁹³⁾	2011	Australia
	Pigmentation in low back region	26M ⁹³⁾		
	Pigmentation (needle sites)	20F ⁹³⁾		
	Pigmentation (needle sites)	35M ⁹³⁾		
Eruptive lichen planus	41F ⁹⁴⁾	2011	UK	
Koebner phenomenon	32F ⁹⁵⁾	2011	China	
Others	Blackened skin,small bleb of serous fluid (needle site)	35F ⁹⁶⁾	2007	UK
	Post-insertion needle movement	55M ⁹⁷⁾	2008	UK
	Hepatotoxicity	52F ⁹⁸⁾	2008	China
	Factitial panniculitis (both upper arms)	24F ⁹⁹⁾	2008	Korea
	Abdominal factitial panniculitis	22F ⁹⁹⁾		
	Ulcer (right foot)	68M ¹⁰⁰⁾	2009	Singapore
	Primary inoculation tuberculosis (back and abdomen)	77M ¹⁰¹⁾	2010	Korea
	Primary inoculation tuberculosis (back, shoulder, and right thigh)	72F ¹⁰¹⁾		
Primary inoculation tuberculosis (back and both thighs)	75F ¹⁰¹⁾			
Rapid dermal spread of breast cancer	54F ¹⁰²⁾	2011	Taiwan	
Adverse events by moxibustion	Spinal epidural abscess	78F ¹⁰³⁾	2008	Korea
	Superficial basal cell carcinoma (lower part of the abdomen)	58M ¹⁰⁴⁾	2009	Korea

(3) Needle migration/foreign body

There were 4 cases of needle migration and 1 case of permanent needle embedding: pharynx (1), tooth root region (1), cardiac muscle (1), from the cervical to thoracic region, and from the abdominal cavity to the heart (1).

(4) Neurological damage

Two cases in the cervical region and 1 case in the lumbar region caused by needle migration. Other reports included 2 cases of postdural puncture headache, and 1 case of Bell's palsy (caused by needle insertion to ST7), median nerve damage, intracranial hematoma, infarct in left cerebellum and medulla oblongata, and cervical epidural hematoma.

(5) Cutaneous disease

There were 2 cases of local argyria, 1 case of episodic, 1 case of Koebner phenomenon, 4 cases (in 1 paper) of pigmentation.

(6) Adverse events by moxibustion

One case of spinal epidural abscess (in a diabetic patient) and 1 case of superficial basal cell carcinoma were reported.

(7) Others

There was 1 case of needle movement during insertion, 1 case of toxic liver injury, 2 cases (in 1 paper) of engineered fasciitis panniculitis syndrome, 1 case of ulcer (right ankle), 3 cases (in 1 paper) of dermal tuberculosis, 1 case of skin discoloration/small blister, and 1 case of promoting breast cancer infiltration to dermis.

IV. Discussion

1. Domestic adverse events

For domestic adverse events in the previous review (2003-2006), 50 cases were reported in 38 papers⁴⁾, and in the review before that (1998-2002) 45 cases were reported in 39 papers¹⁰⁵⁾. This time 39 cases were reported in 39 papers. Although there is a difference in the periods for the two literature reviews and we cannot simply compare them both, we could not see any significant increase or decrease. As seen in the previous review, infection, organ injury, needle penetration, and foreign body account for a large percentage of the adverse events in this review (26 papers among the 39 total).

For cases of infection, although it cannot be denied that in some cases there is the possibility that the patients were infected before receiving acupuncture, and the causal relationship was not clear, acupuncture was suspected to be the main cause of infection transmission. For diagnostic names, there were 5 cases of abscess among the 7 cases of infection, including spinal epidural abscess^{6-8,10)} and psoas abscess^{9,10)}. Many abscess cases were reported. An underlying disease was seen in only one case of diabetes⁶⁾. Although as it has been said from

olden times that acupuncturists should naturally practice in a sanitary manner for patients prone to infection, it is necessary to verify the evidence whether deep needling is necessary to obtain the acupuncture effect, considering that the infections occur deep within the epidural cavity or iliopsoas muscle.

This time 9 cases of pneumothorax were reported. There were no cases of death. However, actually in December, 2009 there was a death due to pneumothorax at an acupuncture and osteopath office in Ikeda City, Osaka Prefecture¹⁰⁶⁾. This case has not been reported in any medical journal. Pneumothorax due to acupuncture occurred in the cervical and shoulder regions or lower back region. Especially there were 2 cases of pneumothorax caused by stimulating GB21^{14,16)}. Severe pneumothorax may cause death. If just one death occurs, it would have great social influence, and public confidence in acupuncture therapy would be spoiled significantly. Five out of 8 cases associated with needle migration/foreign body^{2, 25, 28-31)} and 3 cases associated with nerve damage^{3, 33, 34, 37)} occurred in the cervical region. Acupuncturists should take extra care during needle insertion and especially during deep insertion of a needle in the cervical region. Pneumothorax, needle penetration caused by needle breakage, and neurological damage can be prevented by understanding safe depths for needle insertion, using stainless and one-time-use or disposable needles, and understanding the locations of important organs, blood vessels, and nerves. It seems to be necessary to increase one's knowledge of safe treatment practices by periodical postgraduate training.

Moreover there were 5 cases of needle migration due to needle breakage during self-acupuncture^{2, 25, 26, 29, 30, 35)}. Among these, 1 case was conducted by a non-licensed practitioner²⁹⁾ and the other papers did not mention the practitioners' licenses. It is likely that a non-licensed person's lack of medical knowledge caused the needle breakage accident during self-acupuncture. There is room for improvement in the present situation that anyone can purchase acupuncture needles regardless if he or she is a licensed person or not.

For moxibustion, 4 adverse events were reported⁴¹⁻⁴⁴⁾. Practitioners should be aware of burns from moxibustion, cancer risk at moxibustion sites due to long-term periodic local scorching, and risk of infection to immunocompromised patients.

2. Overseas adverse events

There were 36 papers in the previous review (2003-2006)⁵⁾ and 60 papers in this review. Although there is a difference between the time periods for each review, and we could not simply compare the two reviews directly, the number of cases of adverse events increased this time. There were reports from 15 countries/areas. The most was South Korea (18), followed by Taiwan, UK, and US. Nine neurological damage cases, which were not reported in the previous review, 5 cutaneous disease

cases, and 2 adverse events associated with moxibustion were reported. There were 9 cases in 2007, 13 cases in 2008, 4 cases in 2009, 16 cases in 2010, and 18 cases in 2011. In particular, many cases were reported in the last 2 years. Safety consciousness has been raised along with worldwide prevalence of acupuncture and moxibustion, so that overseas reports of adverse events are expected to increase continuously.

The most prevalent, one third of all the reports, 19 cases, were associated with infection. In many cases the causal relationship was unknown. However, 8 reports mentioned underlying diseases of the patients such as diabetes, cutaneous diseases and previous surgeries^{45, 48, 53, 55, 57, 58, 61, 63}. This suggests that acupuncturists should pay attention to infection risks for patients suspected of compromised immunity. A group infection of 109 persons in South Korea⁵⁶ was caused by immersing the electrodes for low frequency interference waves in contaminated glutaraldehyde. A group infection of 6 persons in Australia⁴⁶ was said to be caused by "acupuncture under an inappropriate environment with inappropriate needle insertion," and another infection case was said to be caused by "re-use of needle"⁵⁵. Such cases are considered to be preventable by thoroughly sanitary acupuncture techniques. Also there were case reports on cutaneous lesions coincident with acupuncture points⁵⁵, and infections coincident with stimulation sites⁵⁶. Accordingly, these results infer a strong relationship between acupuncture and symptoms.

The second most prevalent adverse event was organ injury. There were 8 cases of pneumothorax, to which considerable attention was paid as a major adverse event. Of 8 cases 2 cases were caused by physiotherapists^{67, 68}, and 1 case in South Korea was caused by an unqualified person who was not a Korean medical doctor⁷¹. Hematoma occurred inside the gastrocnemius muscle in a patient receiving Warfarin⁷³. Acupuncturists need to be very careful with patients who have bleeding diathesis. It was reported that a patient with acute lymphoblastic leukemia died from intracranial bleeding the day after acupuncture. Although the causal relationship is unknown, acupuncture to a seriously ill patient requires delicate handling because of the increased possibility of unexpected complications.

Of the 9 cases of neurological damage, 4 reports were on the cervical vertebrae region^{82, 84, 89, 90}. It must be noted that deep insertion of a needle to this region may cause neurological damage. There was a report of a Bell's palsy case, which seems to have been caused by hematoma due to needle retention technique at ST7⁸³, and a median nerve damage case, due to needle insertion to PC-6⁸⁶. Deep insertion of needles and rough handling near nerves should be avoided. Other reports included 2 cases of postdural puncture headache^{87, 88} and 1 case of lumbar cerebrospinal fluid leakage⁸⁵. It was pointed out that there is a possibility of cerebrospinal fluid leakage due to spinal canal damage by deep insertion of a needle

to the lumber region. The needles used for acupuncture may be less invasive than typical hypodermic needles and have lower risk, but it is necessary to recognize that poor procedures or deep insertion of needles that reach to the dura mater increase the chances of adverse events.

Regarding cutaneous diseases, there were cases of patients with previous histories of melanoma⁹¹ and psoriasis⁹⁵. Other reports included pigmentation⁹³, small blister⁹⁶, and steatitis by electroacupuncture⁹⁹. Although there were also adverse events by electroacupuncture in Japan¹⁰⁷, there are many unclear points about causal relationships and mechanisms, which will be the subject of future investigations.

In addition, there was a report that dermis permeation of breast cancer was promoted by acupuncture¹⁰². From this result, one must avoid inserting a needle into a cancer cell or close to it.

V. Conclusion

Although exact causal relationships and frequencies of occurrence are unknown, since 2007 many case reports on various adverse events relevant to acupuncture and moxibustion have been presented in Japan and overseas. Based on a review of these reports, it was suggested for the cases that adverse events were likely to occur due to acupuncture and moxibustion, it is necessary to carry out education and discussions to improve the safe practices by each practitioner of acupuncture and moxibustion, acupuncture and moxibustion educational facilities, acupuncture and moxibustion business organizations, and acupuncture and moxibustion related societies.

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