

The safety of massage therapy

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Objectives. After many years out of the limelight, massage therapy is now experiencing a revival. The aim of this systematic review is to evaluate its potential for harm.

Methods. Computerized literature searches were carried out in four databases. All articles reporting adverse effects of any type of massage therapy were retrieved. Adverse effects relating to massage oil or ice were excluded. No language restrictions were applied. Data were extracted and evaluated according to predefined criteria.

Results. Sixteen case reports of adverse effects and four case series were found. The majority of adverse effects were associated with exotic types of manual massage or massage delivered by laymen, while massage therapists were rarely implicated. The reported adverse events include cerebrovascular accidents, displacement of a ureteral stent, embolization of a kidney, haematoma, leg ulcers, nerve damage, posterior interosseous syndrome, pseudoaneurism, pulmonary embolism, ruptured uterus, strangulation of neck, thyrotoxicosis and various pain syndromes. In the majority of these instances, there can be little doubt about a cause–effect relationship. Serious adverse effects were associated mostly with massage techniques other than ‘Swedish’ massage.

Conclusion. Massage is not entirely risk free. However, serious adverse events are probably true rarities.

KEY WORDS: Complementary and alternative medicine, Massage, Adverse effects, Safety, Risk.

Massage can be defined as the systematic manipulation of soft tissues of the body for pain reduction or other therapeutic purposes. Manual palpation involved can also be used for diagnostic purposes. ‘Classic’ (‘Swedish’) massage comprises effleurage (stroking and gliding), petrissage (kneading), and tapotement (percussion) [1]. Various forms of massage originate from different parts of the world (Table 1).

Until the early parts of the twentieth century, massage was widely accepted in Europe and elsewhere as an effective treatment for a range of conditions [2]. Even though most of its indications are still not backed up by convincing evidence [e.g. 3, 4], massage is making a comeback. Between 1990 and 1997, the 1-year prevalence of use of massage by the US general population increased from 6 to 12% [5] and massage belongs to the three most popular complementary therapies, both in the US [6] and in the UK [7]. The majority of physicians (83%) feel that massage provides a useful adjunct to their

own practice and many (71%) refer patients to massage therapists [8–10].

The aim of this systematic review is to evaluate all published data about adverse effects of massage therapy.

Methods

Computerized literature searches were carried out using Medline, Embase, The Cochrane Library and AMED (January 1995 to December 2001). The search terms used were adverse events, complications, lymph drainage, manual therapy, massage, risk, Rolfing, safety and shiatsu. In addition, my own files were searched, and other experts ($n=21$) as well as professional organizations of massage therapy ($n=18$) were consulted. The bibliographies of articles thus located were also searched.

All reports (irrespective of language of publication) with original data on adverse effects following any type of massage therapy were included. Treatments not typically carried out by a massage therapist were excluded, for example cardiac

TABLE 1. Brief explanations of different forms of manual massage therapy

Name	Country of origin/originator	Description of technique	Therapeutic aim	Postulated mechanism
Friction massage or connective tissue massage (German: Bindegewebsmassage)	Germany/Dicke	Strong and often painful mobilization of subcutaneous tissues by special stroking of subcutaneous tissues of the torso and the extremities	'Neurotherapeutic' method aimed at loosening adhesions and influencing distant organs	Stimulation of nerve endings of the autonomic nervous system
Lymph drainage	Germany/Földi	Gentle stroking technique along lymph vessels and over lymph nodes	Increase lymph flow	Passive movement of lymph
Rolling	US/Rolf	Deep and sometimes painful manipulation of soft tissues to break down abnormal connective tissue	Loosen up and realign body	Support body's own energy field
Shiatsu	Japan/n.a.	Massage with strong digital pressure over acupuncture points	Restore energetic balance of the body	Stimulate energy flow according to the concepts of acupuncture
Swedish massage (classic muscular massage)	Europe/n.a.	Effleurage (stroking), petrissage (kneading), tapotement (vibration and shaking), friction (rubbing)	Decrease muscle tone, increase blood flow, reduce pain	Wash out local pain mediators, reduce muscular spasm, reduce central pain perception
Urut	Malaysia/n.a.	Forceful massage technique used by Malay traditional healers	Not known	Not known

n.a., not applicable.

massage, prostatic massage or carotid sinus massage. Adverse events related to massage oils, such as allergies to aromatherapy oils, or to the use of ice in conjunction with massage were also excluded [e.g. 11, 12]. All articles were evaluated and validated by the present author according to predefined criteria (see headings of Table 2).

Results

Thirty-one relevant articles were located [13–43]. All adverse effects are summarized in Table 2; exemplary reports are also detailed below.

Massage by professionals

A 45-yr-old American man presented with acute extensor paralysis of the metacarpophalangeal joints and inability to abduct the thumb radially [25]. The problems had occurred 15–20 min after deep tissue massage of the forearm on the affected side. The massage included direct pressure applied laterally with the elbow of the therapist. The patient was diagnosed to suffer from posterior interosseous syndrome. The cause was deemed to be the direct and persistent pressure applied laterally, compressing the posterior interosseous nerve against the interosseous membrane causing neuropraxia.

A 39-yr-old healthy woman, who had no relevant medical history and was taking no medication, had a deep tissue massage that included the abdomen [26]. Within 24 h, she experienced abdominal discomfort, shoulder pain and nausea. Seventy-two hours after the massage, she was admitted to hospital. On admission, she was anaemic (haematocrit = 23 l/l), and an abdominal CT scan showed a large (14 cm × 18 cm) haematoma in the right hepatic lobe. There was no evidence of haemangioma, adenoma or other intrahepatic lesions. A diagnosis of hepatic haematoma was made and the most likely cause was thought to be the forceful abdominal massage. Over the subsequent 6 months, the patient received 2 units of packed red cells, lost 10.4 kg of body weight due to persistent nausea, and developed a low-grade fever. Eventually she made a full recovery.

German otolaryngologists published a series of four patients with adverse reactions to conventional massage therapy [32]. These individuals all suffered from neck pain and were prescribed massage therapy. Subsequently they noted an acute deterioration of hearing, which was verified audiographically in all cases. The authors feel that the time sequence of events renders a causal relationship likely and report that they have seen 'several more cases' of this type.

Clinical trials of massage therapy [e.g. 33–35] rarely mention adverse effects. A laudable exception is a study of premature infant massage [36]. The authors observed a small temperature drop after massage and noted that 'the technique may expose the infant to a slight heat loss'.

Six normal volunteers and two patients with post-thrombotic venous oedema were treated with manual lymph massage with an external pressure of 70–100 mmHg [37]. Subsequently biopsies were taken of the lymphatic vessels. After a 10-min massage, damage of lymphatics

TABLE 2. Reports of adverse events associated with massage therapy

First author (year)	Patient	Type of massage	Therapist	Site of massage	Indication	Adverse event	Causality ^d	Outcome
Thambu ^a (1971)	30-yr-old Malay pregnant woman	Urut	Traditional Malay healer	Abdomen	Pregnancy	Ruptured uterus	Certain	Surgery and subsequent full recovery
Warren ^a (1978)	72-yr-old woman	Vigorous massage for ~ 10 min	Relative	Calf muscle	Leg pain	Pulmonary embolism	Likely	Not mentioned
Tachi ^a (1990)	57-yr-old woman with Hashimoto's disease	Vigorous manual massage	Not mentioned	Neck	Muscle pain and stiffness	Transient destructive thyrotoxicosis	Possible	Full recovery after 6 months
Herskovitz ^a (1992)	61-yr-old man	Shiatsu massage with strong digital pressure	Shiatsu therapist	Base of his palm and thenar muscles	Not mentioned	Painless weakness of left thumb without sensory symptoms	Certain	Full recovery over next 2 months
Sorensen ^a (1993)	38-yr-old diabetic man with peripheral neuropathy	Vacuum boot foot massage with mechanical device	'Alternative therapist'	Feet	Peripheral vascular disease	Ulceration and infection	Certain	Amputation of leg
Liu ^a (1993)	52-yr-old man	Self-massage with 'massage balls'	Self-treatment	Neck	Chronic neck pain	Tapered stenosis of the extracranial internal carotid artery	Possible	Not mentioned
Mumm ^a (1993)	64-yr-old woman	Shiatsu	Shiatsu therapist	Not mentioned	Not mentioned	Pain in left pericervical and suprascapular areas	Possible	Not mentioned
Ram ^a (1994)	1-day-old neonate	'Traditional' with sand bag	Relative	Testes	Hydrocele	Large haematoma	Likely	Full recovery after surgical intervention
Yeo ^a (1994)	62-yr-old anticoagulated patient	Manual massage ^c	Relative	Back	Back pain	Large haematoma, slight anaemia	Likely	Full recovery within 2 weeks
Kalinga ^a (1996)	16-yr-old boy with exostosis on femur	Traditional Chinese massage ^c , 5 sessions	Practitioner of traditional Chinese medicine	Right thigh	Pain in right thigh	Pseudoaneurysm of popliteal artery	Likely	Full recovery after arterial reconstruction
Kerr ^a (1997)	51-yr-old women with ureteral stent	Deep body massage using Rolfing technique	Rolfing therapist	Abdomen, pelvis, lower back	Not mentioned	Displacement of ureteral stent, a pin	Likely	Full recovery after repositioning of stent
Mikhail ^a (1997)	59-yr-old man with aortofemoral bypass	Back massage including walking on back	Relative	Back	Back pain	Embolization of the left kidney	Likely	Full recovery with anticoagulation and new aortofemoral bypass
Giese ^a (1998)	45-yr-old man	Deep tissue massage including pressure applied with elbow	Massage therapist	Forearm	Pain in right forearm	Posterior interosseous syndrome	Likely	Near full recovery after 3 weeks
Trotter ^a (1999)	39-yr-old woman	Deep tissue massage	Not mentioned	Abdomen	Not mentioned	Large hepatic haematoma	Likely	Full recovery after 6 months

TABLE 2. Continued

First author (year)	Patient	Type of massage	Therapist	Site of massage	Indication	Adverse event	Causality ^d	Outcome
Deidiker ^a (1999)	56-yr-old women	Electrical roller massage device	Self-treatment	Neck	Neck pain	Strangulation of neck	Certain	Death
Tsuboi ^a (2001)	80-yr-old man	Shiatsu	Shiatsu practitioner	Upper neck	Neck and shoulder pain, headache	Retinal artery embolism with subsequent partial loss of vision and left hemiparesis	Likely	Permanent ocular effects
Unknown ^b (1980)	167 lactating women	Traditional Russian breast massage	Traditional healers	Breasts	Lactation mastitis	Deterioration of mastitis abscesses	Certain	Not mentioned
Rahman ^b (1987)	3 Malay women	Urut (traditional massage)	Traditional healers	Abdomen	Abdominal pain	Colon rupture	Certain	Full recovery after surgery
Becroft ^b (1989)	48 infants	Traditional massage	Traditional healers	Abdomen of mother	Pregnancy	Cranial haemorrhage in fetus	Probable	Not mentioned
Brügel ^b (1991)	4 patients	Swedish massage	Trained massage therapist	Neck	Neck pain	Deterioration of hearing	Probable	Not mentioned

^aCase report.^bCase series.^cNo further details provided.^dAs estimated by the present author.

was verified by electron microscopy. It affected initially the endothelial lining and subsequently also lymphatic collectors. The pressures applied were in excess of those used in manual lymphatic drainage [38].

Massage by laymen

A 72-yr-old woman was admitted to hospital with thrombosis of the right middle cerebral artery [14]. She later complained of discomfort in the left calf and a diagnosis of deep-vein thrombophlebitis was made. The leg was raised and intravenous heparin was started. The patient's husband massaged her leg vigorously for about 10 min in an attempt to relieve her discomfort. Subsequently, the patient became short of breath and a pulmonary embolus was diagnosed.

A 62-yr-old Chinese male on warfarin with stable INR readings was admitted for an acute swelling over his left back [21]. His wife had given him a vigorous manual back massage for musculoskeletal pain in that area 2 days before. The patient was diagnosed to suffer from a large (20 cm × 12 cm) haematoma, orthostatic hypotension and slight anaemia. Both INR and platelet count were normal. The patient's warfarin medication was temporarily reduced and a blood transfusion was administered. The haematoma gradually resolved over the next 2 weeks and the patient made a full recovery. The most likely cause for the haematoma was the vigorous manual massage combined with the warfarin-induced bleeding tendency.

A 59-yr-old man with an aortobifemoral bypass was admitted after his wife had treated him for back pain with a manual massage, which included walking on his back [24]. The patient subsequently experienced severe left loin pain. The bypass had been performed 18 months previously; it had initially been successful but had occluded later. The massage had dislodged the thrombus in the graft into the left kidney. The patient was anticoagulated, and later a new aortobifemoral graft was implanted. A further abdominal CT scan 4 months postoperatively showed no defect in the left kidney.

Massage using apparatus

A 38-yr-old man was treated by an 'alternative therapist' with a mechanical leg massage (vacuum boot) for peripheral vascular disease in the presence of peripheral diabetic neuropathy [17]. The patient subsequently developed an infected leg ulcer. The leg became gangrenous and had to be amputated. The authors warn that 'patients of this kind [should not] receive treatment from any person without medical experience'.

A 56-yr-old woman placed an electric roller massage device on her bed under her head to treat her neck pain before retiring for the evening [27]. Later, when her husband went to bed he noted that she was in the supine position and the device was apparently functioning normally. The husband was awoken early next morning by a clicking noise and found his wife in the same position. Her blouse had become entangled in the roller of the massage device and was constricted around her neck. The husband called the paramedics who verified her death.

Exotic forms of manual massage

A 61-yr-old man received a shiatsu massage from a trained therapist with strong digital pressure in the region of the base of his palm and the thenar muscles [16]. The procedure was accompanied with 'notable transient pain'. The next day he noticed a weakness of the left thumb without sensory symptoms. On examination, he exhibited moderate isolated weakness of the abductor pollicis brevis muscle without atrophy or sensory dysfunction. Tinel's and Phalen's signs were negative and nerve conduction studies yielded normal findings. Mild active denervation and reduced motor unit recruitment were noticed electromyographically. The authors diagnosed a mono-neuropathy caused by the manual compression of the recurrent motor branch of the median nerve. The patient made an uneventful recovery over the next few months.

Hawaiian authors report the case of a 64-yr-old woman admitted to hospital for suspected myocardial infarction [19]. She complained of increasing pain in the pericervical and suprascapular areas. Myocardial infarction was not confirmed but the pain increased. A typical rash along the left eighth cervical dermatome led to the diagnosis of herpes zoster, confirmed through antibody titres. The patient revealed that she had been treated with 'an overtly vigorous shiatsu massage' 3 days before the onset of pain. The authors speculate that 'zoster resulted from either direct trauma to the nerve or nerve root during the massage, or to subsequent tissue inflammation causing swelling or immunological injury to the nerve'.

A 51-yr-old American woman had undergone placement of a left ureteral double-J stent to relieve flank pain associated with ureteral stricture [23]. Six days later she consulted a 'Rolf'er' and received a deep body massage according to the Rolfing technique, which she had enjoyed previously on a regular basis. The massage was applied to the abdomen, pelvis and lower back. Towards the end of the session, the patient experienced severe flank pain and urinary incontinence. She was admitted to hospital where a visible protrusion of the tip of the stent was noted 1 cm beyond the ureteral orifice. Distal migration of the stent was confirmed by radiographic examination. The patient's stent was repositioned, and she subsequently made a full recovery.

An 80-yr-old Japanese man with a history of transient ischaemic attacks and anticoagulant therapy received a shiatsu massage on the neck in prone position to treat a mild headache [28]. Immediately after rising, the nasal half of his right visual field was impaired. He also showed slight left hemiparesis dominant in the upper extremity. Further investigations showed multiple branch occlusions of the central artery and multiple small infarctions in the right frontal lobe. The patient was treated with urikinasase for 7 days. Subsequently there was full recovery of the hemiparesis but only minimal improvement of ocular symptoms.

Reviews

US authors reviewed the question of whether back massages are contraindicated after an acute myocardial

infarction [39]. They found elevation of blood pressure and decrease of heart rate following back massage in normal volunteers. Thus they caution that 'heart rate and blood pressure should be monitored before and after the procedure to identify patients at risk for sympathetic stimulation'. Other reviews of massage therapy for specific indications [40–42] fail to address any safety aspects. A recent Cochrane review of massage therapy for pre-term infants states that 'no adverse effects of touch or massage were reported in any study' [43].

Discussion

Sixteen case reports and four case series (Table 2) of adverse events after massage therapy were found. Massage was frequently used for rheumatological conditions. In the majority of these cases causality is established convincingly, for instance, through the sequence or nature of events. Some of the adverse effects relate to serious complications.

Considering the popularity of massage therapy, the number of reported adverse events seems minute. However, this could be due to under-reporting. In a related area (spinal manipulation) we have, for instance, shown that under-reporting of serious adverse events is close to 100% [44].

Clearly, one should differentiate between various approaches. The above findings suggest that massage by non-professional and forceful techniques like shiatsu, urut and Rolfing are relatively often associated with adverse events. The reports reviewed above are often incomplete. For instance, the background of the therapist and the type of massage therapy are not always described. This further limits the conclusiveness of the evidence.

Several systematic reviews of controlled clinical trials testing the effectiveness of massage therapies have been published and have arrived at cautiously positive conclusions [e.g. 45–47]. However, too few clinical trials of massage therapy exist and many of its claims are not backed up by evidence [3, 4]. Thus adequate risk–benefit evaluations are not feasible.

In conclusion, massage therapies are not totally devoid of risks. The incidence of adverse events is unknown, but probably low.

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