



# Cutaneous *Mycobacterium massiliense* Infection Caused by Skin Coining 'Gua Sha' in Korean Healthy Female

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Nontuberculous mycobacteria are ubiquitous environmental organisms that are rare pathogens in immunocompetent individuals. However, cutaneous nontuberculous mycobacteria infections have been increasingly associated with invasive procedures, including surgery, liposuction, filler injection, intramuscular injection, mesotherapy, piercing, acupuncture, and cupping therapy. Herein, we report the first case of cutaneous nontuberculous mycobacteria infection caused by the East-Asian traditional treatment 'Gua Sha', also known as scraping, coining or spooning in English. A 35-year-old healthy female presented with widespread, painful skin nodules and pustules on her upper and lower extremities that had developed after Gua Sha treatment for body contouring. Histopathologic examination of the lesions revealed granulomatous inflammation in the dermis and the culture isolates were identified as *Mycobacterium massiliense* with molecular identification. The patient was successfully treated with intermittent incision and drainage of persistent nodules and oral clarithromycin based on antimicrobial susceptibility testing. We recommend implementation of a standard safety protocol for Gua Sha practitioners to minimize the risk of infection transmission.

**Keywords:** East Asian traditional medicine, Mycobacterium infections, Nontuberculous

## INTRODUCTION

Nontuberculous mycobacteria (NTM) are ubiquitous environmental organisms that are rare pathogens of systemic and cutaneous infection more commonly seen in immunosuppressed individuals. Cutaneous NTM infections have been increasingly associated with various invasive procedures even in immunocompetent individuals<sup>1</sup>. Cutaneous infections have been reported following trauma, surgery, liposuction, filler injection, intramuscular injection, mesotherapy, and piercing, as well as various East-Asian traditional medicines such as bee sting therapy, acupuncture, and cupping therapy<sup>1-6</sup>.

'Gua Sha' is an East-Asian traditional healing technique, also known as skin scraping, coining or spooning by English speakers<sup>7</sup>. Gua Sha involves repeated unidirectional pressured strokes

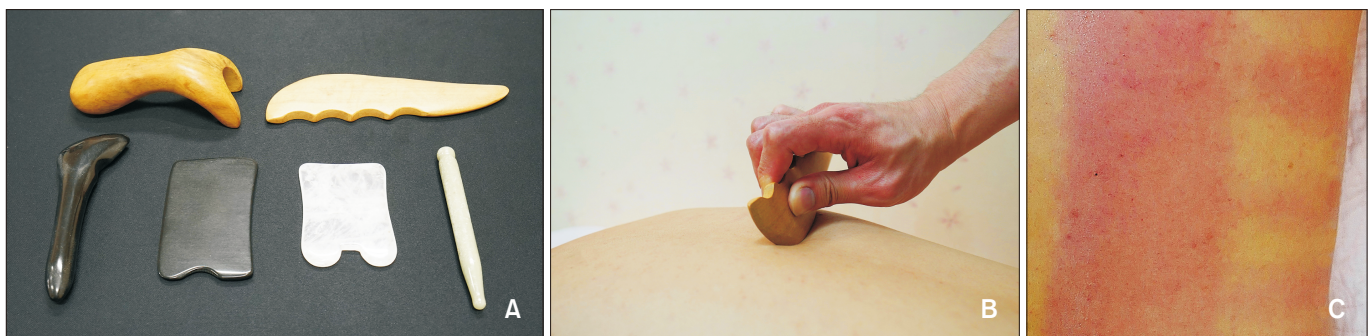
over lubricated skin with a smooth edged instrument such as a ceramic Chinese spoon, worn coin, honed animal bones, metal cap, or jade tool (Fig. 1A, B)<sup>8,9</sup>. It intentionally creates transitory petechiae and ecchymoses which can increase microcirculation and immune function of the skin (Fig. 1C). Although there is little place for Gua Sha in evidence-based medicine, it is widely and regularly used in Asia and Asian immigrant communities for immediate relief from pain, stiffness, fever, chills, cough, wheezing, and nausea, as well as for treating many functional internal organ problems<sup>7</sup>. Herein, we report the first case of cutaneous *Mycobacterium massiliense* infection caused by Gua Sha treatment in an immunocompetent female. We received the patient's consent form about publishing all photographic materials.



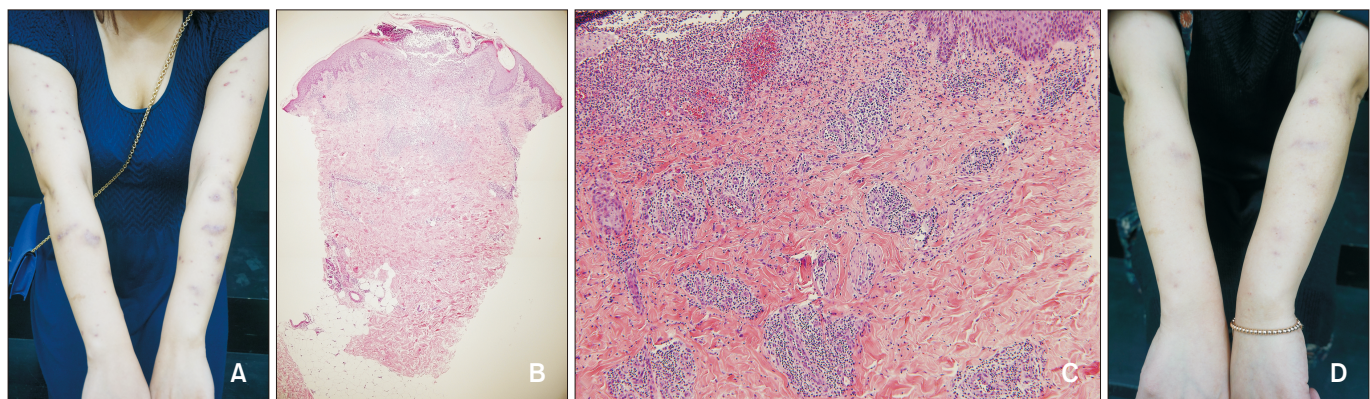
## CASE REPORT

A 35-year-old healthy Korean female presented with a 1-month history of painful multiple skin nodules on her extremities. Two weeks before the symptoms started, the patient had undergone two Gua Sha treatments in a beauty salon, using a palm-sized silver coin for body contouring and to relieve musculoskeletal pain. No other relevant medical history of systemic diseases or medications was noted. Physical examination revealed numerous, tender, erythematous to violaceous nodules (0.5 to 4 cm in size) and pustules on all extremities (Fig. 2A). No other skin or systemic signs were present, and routine laboratory and Chest-X ray findings were unremarkable. Bacterial or fungal folliculitis was initially predicted and the patient was treated with oral antibiotics (cephalosporin and ciprofloxacin)

and an oral antifungal agent (itraconazole) for 2 weeks. However, no improvement was observed. Histopathology of the lesions revealed dense perifollicular and perivascular granulomatous inflammation comprising lymphocytes, histiocytes, neutrophils, and multinucleated giant cells in the dermis and subcutaneous fat layer (Fig. 2B, C). Gram, acid-fast bacillus, and Periodic Acid-Schiff staining results revealed no pathogenic microorganism. Mycobacterial culture revealed ivory-colored smooth colonies with elevated centers on medium after 1 week. Routine polymerase chain reaction (PCR) based on the 16S rRNA gene could not discriminate *Mycobacterium abscessus*, *M. massiliense*, and *Mycobacterium chelonae*. On *hsp65*, it was not identified in the species level. However, it was finally confirmed as *M. massiliense* with multi-locus sequencing for *rpoB* (Mycobacteria rapid identification test; GC labs, Youn-



**Fig. 1.** (A) Common tools for Gua Sha: wooden tool with honed edge, honed animal bone, sliced water buffalo horn, jade tool. (B) Gua Sha involves repeated unidirectional pressured strokes over skin with a smooth edged instrument. (C) Linear reddish patch with petechiae induced by Gua Sha.



**Fig. 2.** Clinical and histopathological features of the lesion. (A) Clinical findings reveal multiple discrete erythematous to violaceous nodules and pustules on the both upper and lower extremities at the first examination. (B) Histologic findings of the lesion reveal dense perivascular and periadnexal granulomatous inflammation in the dermis (H&E,  $\times 40$ ). (C) Granulomatous inflammation composed of lymphocytes, neutrophils, histiocytes, and multinucleated giant cells (H&E,  $\times 200$ ). (D) After 5 months of follow-up period, the lesion resolved with post-inflammatory hyperpigmentation.

**Table 1.** Antimicrobial drug susceptibility pattern of *Mycobacterium massiliense* isolated from our patient

Antimicrobial agent	MIC ( $\mu\text{g/ml}$ )		
	Range	MIC	Sensitivity
Amikacin	1 ~ 128	8	S
Cefoxitin	2 ~ 256	16	S
Ciprofloxacin	0.125 ~ 16	> 16	R
Clarithromycin	0.5 ~ 64	$\leq 0.5$	S
Doxycycline	0.25 ~ 32	32	R
Imipenem	0.5 ~ 64	4	S
Moxifloxacin	0.125 ~ 16	> 16	R
Trimethoprim/ Sulfamethoxazole	0.25/4.75 ~ 32/608	4/76	R
Linezolid	2 ~ 64	32	R

MIC: minimal inhibitory concentration, S: susceptible, R: resistant.

gin, Korea), and *erm* genes (ERM-plus realtime PCR; LG Life Science, Seoul, Korea) or 16S-23S rRNA internal transcribed spacer (ITS) genes (AdvanSure Mycobacteria GenoBlot Assay; LG Life Science). The patient was then empirically treated with oral clarithromycin (500 mg/day) and ciprofloxacin (1,000 mg/day). The ciprofloxacin was discontinued and the patient was maintained on clarithromycin based on the antimicrobial susceptibility of the culture isolates (Table 1). In addition, we performed incision and drainage for persistent fluctuating nodules every 4 weeks. After five months of treatment, the skin lesions resolved, and only post-inflammatory hyperpigmentation was noted (Fig. 2D). No sequelae or recurrence was reported during the 3-month follow-up period.

## DISCUSSION

*M. massiliense* is a newly described species of rapid-growing mycobacteria (RGM) that was previously classified as the *M. chelonae*-*M. abscessus* complex. *M. massiliense* was first isolated from the sputum of a patient with pneumonia by Adékambi et al.<sup>10</sup>, and is responsible for disseminated systemic involvement in immunocompromised patients and rare cutaneous involvement in immunocompetent individuals. A few cases of cutaneous *M. massiliense* infection have been reported, and majority of these were associated with trauma or invasive procedures such as Cesarean section, intramuscular injection, acupuncture, and piercing. A few cases developed following cupping, ultrasonography, swimming, hot spa use, or pedicure

foot baths without an antecedent invasive event<sup>11</sup>. Cutaneous *M. massiliense* infection clinically presents as disseminated subcutaneous nodules in immunocompromised patients and manifests as a single or few multiple tender nodules, pustules, ulcers, or abscesses that are localized at the areas of trauma in immunocompetent patients.

In the present case, cutaneous *M. massiliense* infection developed following Gua Sha treatment in a healthy female. To our knowledge, NTM infection associated with Gua Sha has never been reported. Gua Sha is a complementary and alternative treatment procedure that is widely practiced in public hospitals and massage shops in Asian countries to alleviate musculoskeletal or respiratory problems; however, the exact mechanism and efficacy of this technique are unclear. Gua Sha involves lubricating the skin with massage oil, then scraping with repeated pressured strokes using a ceramic spoon, well-worn coin, honed animal bone, or jade tool to produce light bruising. It is noteworthy that this patient showed widespread skin lesions, similar to the disseminated pattern seen in immunocompromised patients; however, there was no evidence of any other systemic involvement. The disseminated skin lesions seem to originate from the nature of the technique. Although the source of *M. massiliense* infection was not investigated in this case, it is thought to enter the skin through contaminated tools, body oil, towels, or gloves. The stroking tools are commonly re-used on multiple patients and, therefore, are associated with the risk of transfer of blood-borne or contact pathogens and other potentially infectious materials. However, the safety protocol for this procedure is still limited. Gua Sha instruments have been categorized as non-critical instruments that do not require sterilization, high level disinfection before re-use, or safe disposal after use. Preventive measures against infections, including single use disposable devices, strict sterilization of reused materials, and personal protective equipment, are thus recommended during Gua Sha treatment.

Diagnosis of cutaneous NTM infection is difficult, owing to its rarity and variable clinical presentation. A higher index of suspicion is warranted to evaluate NTM infection, especially in patients with chronic skin lesions following skin trauma or exposure risk, negative microbiological tests, and failure to respond to empirical antimicrobial therapy, as in the present case. The current gold standard for diagnosis involves isolation of the organism in culture that also allows for drug susceptibility evaluation. A skin biopsy specimen for mycobacterial culture

and histopathology is recommended, although there are no pathognomonic histologic features and frequent false-negative culture results. A more rapid and sensitive PCR assay based on the 16S rRNA gene is now routinely performed to identify the causative species of NTM infection, but occasional multi-locus sequencing targeting *hsp65*, *rpoB*, *erm*, and 16S-23S rRNA ITS is necessary for the definitive identification of certain species and subspecies. In the present case, the causative species was first thought to be *M. abscessus* as per the routine 16S rRNA PCR results, because the *M. abscessus* and *M. massiliense* sequences are identical. On *hsp65*, it could not be discriminated in the species level. However, the isolate was finally confirmed to be *M. massiliense* with *rpoB*, *erm* sequencing, and 16S-23S rRNA ITS as shown in previous cases<sup>1,11</sup>.

There is no established standard therapy against the recently described *M. massiliense* species. Empirical treatment is recommended prior to antibiotic susceptibility testing for the causative species. *M. massiliense* is usually susceptible to clarithromycin and amikacin but resistant to ciprofloxacin, while doxycycline susceptibility is variable<sup>12,13</sup>. Most previous *M. massiliense* cases were empirically treated with combination therapy containing clarithromycin<sup>11,12</sup>. In contrast, this patient was successfully treated with clarithromycin monotherapy, following antibiotic susceptibility results, in conjunction with surgical abscess drainage.

In conclusion, we report the first case of disseminated *M. massiliense* skin infection after Gua Sha treatment. Despite the global increase in the popularity of East Asian traditional healing techniques, the risk of transmission of pathogens, including NTM, through these procedures seems to be under recognized. Gua Sha practitioners should be aware of the infection transmission risks and apply standard safety protocol during these procedures. Clinicians should suspect the possibility of NTM infection in healthy patients, especially those with persistent skin lesions and failure to respond to antibiotic therapy.

## CONFLICTS OF INTEREST

The authors have nothing to disclose.

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