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Features of *Staphylococcus aureus* colonization in patients with nummular eczema

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MADAM, Nummular eczema (NE) is a common eczematous disorder sometimes complicated by bacterial infection.¹ Although the positive culture rate of *Staphylococcus aureus*, a common transient of skin microflora, and atopic dermatitis severity are positively correlated, few data are available on the microbiological aspects of NE. Therefore, we conducted this study to assess the features of *S. aureus* colonization in patients with NE.

The study protocol was approved by the local ethics committee and informed consent was obtained from all study subjects. Swabs for *S. aureus* were obtained from the skin, anterior nares and right second subungual space of 40 patients with NE and 40 of their healthy close contacts. Healthy close contacts consisted of individuals who lived with the patients with NE, including parents, grandparents, domestic helpers or siblings, and they were considered normal controls. Disease severity was evaluated using a dermatitis score.² Toxin genes and the genotypic composition of all *S. aureus* isolates were determined by polymerase chain reaction (PCR) and pulsed-field gel electrophoresis, respectively.

A summary of the study results is given in Tables 1 and 2. *Staphylococcus aureus* and methicillin-resistant *S. aureus* (MRSA) was found in significantly higher rates in patients with NE ($P < 0.001$ and $P = 0.013$). These results are consistent with those of other studies that investigated the *S. aureus* colonization in atopic dermatitis and hand eczema.^{3,4} In patients with NE with disrupted skin barrier function, bacterial receptors for fibronectin and fibrinogen confer increased adherence of pathogens. This may permit easier and persistent *S. aureus* colonization; thus, the colonization rates in patients with NE were significantly higher than in the normal controls.

The most commonly detected enterotoxin gene was *sea* (81.3%), which was in agreement with previous studies which investigated atopic dermatitis.⁵ Moreover, although it was not statistically significant, the rates of colonization and toxin genes showed a tendency to increase according to the severity of NE. We also obtained additional swabs for *S. aureus* isolation from five patients with NE after 4 weeks of treatment (data not shown) and the culture rate in lesional skin decreased to zero in accordance with the improvement in dermatitis score (from an average of 6.2 to 1.2). These results strengthen the possibility of a positive correlation between NE disease severity and *S. aureus* colonization. However, further large-scale studies need to be performed to verify our results.

A dendrogram showing the similarity of *S. aureus* isolates was created for nine patients with NE and it showed complete concordance of the strain genotypes between lesional skin and anterior nares/subungual space in seven patients (Fig. 1). From these results, we believe that the anterior nares and subungual spaces are important reservoirs for self-contamination or recolonization, and *S. aureus* may be transmitted from patients' anterior nares to their skin by their own fingers. Because infection or recolonization may be an aggravating factor of NE, and microbial resistance of *S. aureus* makes treatment difficult, patients with NE should make an effort to reduce nasal or subungual *S. aureus* colonization.

This is the first study to assess of the frequency of *S. aureus* in patients with NE. Similar to patients with atopic dermatitis, staphylococcal superantigen-producing *S. aureus* was commonly present in NE, although the relationship with disease severity was not significant. We also found that the anterior nares and subungual spaces were important reservoirs.

Table 1 Demographics, virulence factor profiling and dermatitis score in 40 patients with nummular eczema (NE) and 40 of their close contacts (NC). The most common toxin gene was *sea* and the prevalence of *S. aureus* skin colonization increased with NE severity

	NE, n (%)	NC, n (%)	<i>S. aureus</i> /toxigenic <i>S. aureus</i> (%)
No. of patients (M : F)	23 : 17	13 : 27	
Age (years), mean $\pm$ SD	32.9 $\pm$ 21.1	42.5 $\pm$ 14.2	
Virulence factor	16 (40.0)	1 (2.5)	
<i>sea</i>	13 (81.3)	1 (100.0)	
<i>seb</i>	0 (0.0)	0 (0.0)	
<i>sec</i>	0 (0.0)	0 (0.0)	
<i>sed</i>	1 (6.3)	0 (0.0)	
<i>see</i>	2 (12.5)	0 (0.0)	
Dermatitis score ^a			
Mild	12 (30.0)		2 (16.7)/2 (16.7)
Moderate	20 (50.0)		9 (45.0)/4 (20.0)
Severe	8 (20.0)		4 (50.0)/3 (37.5)

^aDermatitis score²: sum of erythema/haemorrhage, scarring/dryness, oedema and excoriation/erosion score; each component were scored as 0 (none), 1 (mild), 2 (moderate) and 3 (severe).

Table 2 Prevalence of *Staphylococcus aureus* colonization in skin, subungual spaces and nares and total colonization rate in 40 patients with nummular eczema (NE) and 40 of their close contacts (NC). The rates of *S. aureus* colonization and toxigenic *S. aureus* detection in patients with NE were significantly higher than in NC subjects

	Skin colonizing <i>S. aureus</i>			Meticillin-resistant <i>S. aureus</i>			Toxigenic <i>S. aureus</i>		
	NE, n (%)	NC, n (%)	P-value	NE, n (%)	NC, n (%)	P-value	NE, n (%)	NC, n (%)	P-value
Skin	15 (37.5)	0 (0.0)	< 0.001	6 (15.0)	0 (0.0)	0.013	9 (22.5)	0 (0.0)	0.001
Lesions	13 (32.5)	—	—	4 (10.0)	—	—	6 (15.0)	—	—
Nonlesions	3 (7.5)	0 (0.0)	0.120	1 (2.5)	0 (0.0)	0.500	1 (2.5)	0 (0.0)	0.500
Subungual spaces	5 (12.5)	1 (2.5)	0.100	3 (7.5)	0 (0.0)	0.120	4 (10.0)	0 (0.0)	0.058
Anterior nares	8 (20.0)	2 (5.0)	0.044	3 (7.5)	0 (0.0)	0.120	5 (12.5)	1 (2.5)	0.100
Total colonization frequency	15 (37.5)	2 (5.0)	< 0.001	6 (15.0)	0 (0.0)	0.013	9 (22.5)	1 (2.5)	0.007

P < 0.05 was considered statistically significant, Pearson's χ^2 test.

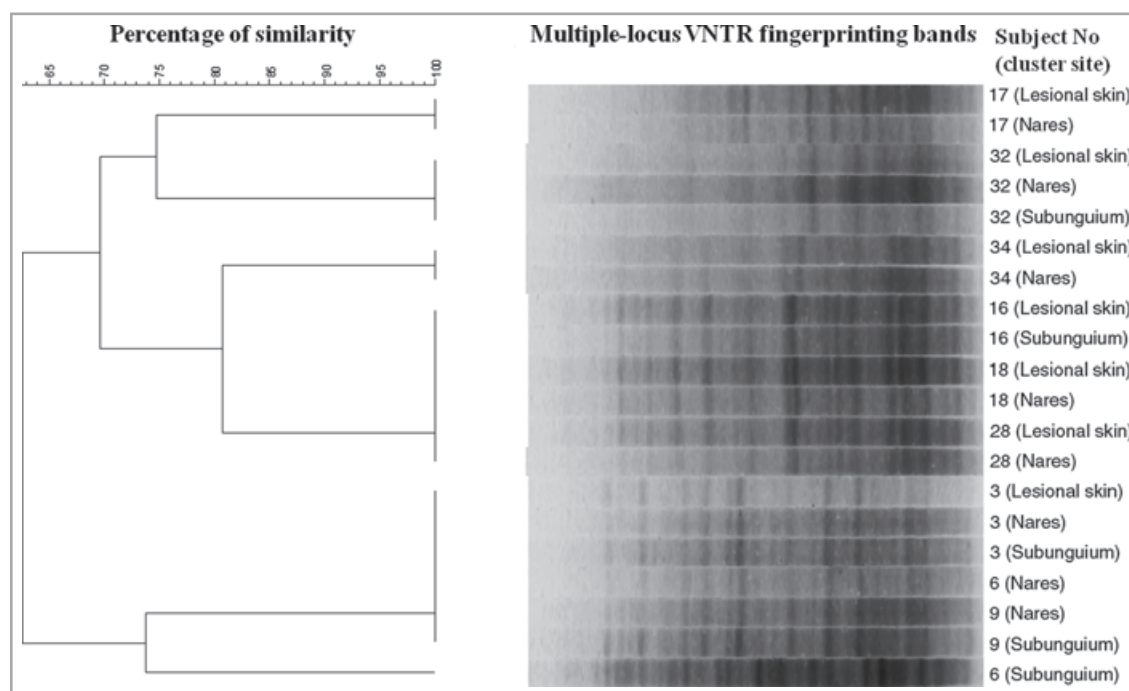


Fig 1. Dendrogram showing the results of the cluster analysis of *Smal*-generated pulsed-field gel electrophoresis patterns from *Staphylococcus aureus* isolated from the skin and nares of nine patients with nummular eczema (NE); it shows complete concordance of the strain genotypes between lesional skin and anterior nares/subungual space in seven patients (subject numbers 3, 16, 17, 18, 28, 32 and 34).

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The effect of weight loss surgery on the severity of psoriasis

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MADAM, Obesity is a growing problem; in 2007–2008, 68% of U.S. adults were obese or overweight [body mass index (BMI) ≥ 25.0 kg m⁻²],¹ and the prevalence of childhood obesity has more than tripled since the 1960s.² Psoriasis is more common in overweight individuals, and increasing BMI is associated not only with greater extent of psoriasis but also with refractory disease,³ including lack of response to biological agents.⁴ Recent publications reporting complete remission of severe psoriasis following bariatric surgery^{5–7} prompted us to perform a retrospective review of our bariatric surgery population to investigate the effects of such surgery on patients with psoriasis.

An electronic search of Geisinger Health System's electronic medical record (EMR), serving over 2.6 million patients, was used to identify adults aged 18 years or older with a diagnosis of psoriasis or psoriatic arthritis and a procedure code documenting weight loss surgery between January 2004 and July 2009. For those meeting the inclusion criteria, contact information and demographic data were extracted and a telephone survey was conducted, after institutional approval.

An opt-out letter was sent to eligible patients. We then called the remaining patients a maximum of three times during the day and evening. The interviewer received permission to conduct the interview and obtained information regarding duration of skin disease, treatment, family history and change in skin disease following surgery.

The primary outcome measure was the percentage of patients who reported improvement in psoriasis after surgery. In secondary analyses, changes in psoriasis since surgery and a change in psoriasis treatment class [categorized as none, only topical, or systemic (including ultraviolet radiation)] were correlated with patient demographics.

We identified 104 patients, none of whom opted out of the study. Fifty-four patients (52%) were contacted by telephone and 34 (63%) of these completed the interview. Twenty patients were excluded because they denied having psoriasis ($n = 8$), they refused to participate ($n = 3$), or their psoriasis

began after ($n = 2$) or cleared prior to surgery ($n = 1$). Six additional patients were excluded because we were unable to confirm bariatric surgery in the EMR.

Baseline demographic data are given in Table 1. Most patients (88%) were female, with a mean age of 50 years and a mean duration of psoriasis of 20 years. All patients were obese (mean presurgical weight, 132 kg; mean BMI, 48.5 kg m⁻²). Thirty patients (88%) underwent Roux-en-Y gastric bypass surgery.

Twenty-one patients (62%) reported improvement in psoriasis after surgery, nine (26%) reported no change and four (12%) reported worsening. Of those reporting improvement, most noted a decrease in redness, scaling, lesion thickness and itch. Three patients who experienced initial improvement subsequently worsened.

A significant downgrade in psoriasis treatment was noted after surgery ($P = 0.046$). Four patients went from systemic to topical therapy, and seven went from topical therapy to none. Only two patients (6%) reported an escalation of therapy.

Age at the time of surgery was significantly associated with a change in psoriasis after surgery ($P = 0.039$, Table 2). Those who worsened tended to be younger (mean age 38.5 years), whereas those who improved were older (mean age 52.7 years). All of the men ($n = 4$, 100%) reported improvement but this was not statistically significant ($P = 0.416$). No other characteristic was statistically associated with self-reported improvement in psoriasis ($P > 0.05$). A similar change in BMI was noted in the three patients who initially improved and then worsened (data not shown). Post hoc analysis demonstrated that subjects aged < 45 years at surgery and

Table 1 Characteristics of study population who completed the telephone survey at the time of surgery

Subjects with psoriasis at the time of surgery		n = 34
Sex	Male, n (%)	4 (12%)
	Female, n (%)	30 (88%)
Age (years)	Mean (SD)	49.8 (10.7)
	Median (range)	48 (27, 71)
Family history of psoriasis	Yes, n (%)	17 (52%)
	No, n (%)	16 (48%)
	Unknown	n = 1
Time with psoriasis (years)	Mean (SD)	20.0 (16.8)
	Median (range)	17 (1, 55)
Psoriasis treatment prior to surgery	Topical, n (%)	22 (65%)
	Systemic, n (%)	10 (29%)
	None, n (%)	2 (6%)
Type of bariatric surgery	Roux-en-Y, n (%)	30 (88%)
	Gastric band, n (%)	3 (12%)
	Unknown, n (%)	n = 1
Weight at surgery (kg)	Mean (SD)	132 (27)
	Median (range)	124 (87, 205)
Height at surgery (cm)	Mean (SD)	165 (8.4)
	Median (range)	165 (147, 190.5)
Body mass index at surgery (kg m ⁻²)	Mean (SD)	48.5 (8.5)
	Median (range)	48.4 (35.3, 70.5)