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### **International Classification of Diseases-based analysis is inaccurate in assessing the prevalence of inflammatory bowel disease in patients with hidradenitis suppurativa**

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#### International Classification of Diseases—based analysis is inaccurate in assessing the prevalence of inflammatory bowel disease in patients with hidradenitis suppurativa



*To the Editor:* Chronic inflammatory skin diseases, including psoriasis and rosacea, have been associated with inflammatory bowel disease (IBD). Recent population-based studies have found a similar association with hidradenitis suppurativa (HS) and IBD. Population-based studies potentially misrepresent the true prevalence of a disease.<sup>1</sup> The aim of our study was to investigate a possible association between HS and IBD by using data pull analysis from the *International Classification of Diseases, Ninth Revision (ICD-9)*, and *International Classification of Diseases, 10th Revision (ICD-10)*, codes and data verification by complete chart review.

**Table I.** Documentation of IBD in patients with HS and controls

Result	HS group (n = 983)	Control group (n = 983)	Chi-square comparison P value
Positive according to ICD	56 (5.7%)	15 (1.5%)	<b>&lt;.001</b>
Positive according to chart review (prevalence)	20 (2.0%)	0 (0.0%)	<b>&lt;.001</b>
False-positive result, n (%)	36 (3.7%)	15 (1.5%)	<b>.003</b>

Boldface indicates statistical significance ( $P < .05$ ).

HS, Hidradenitis suppurativa; ICD, International Classification of Diseases.

We performed a retrospective chart review of dermatology visits from January 1, 2005, to May 31, 2016. Charts of patients with the ICD-10 diagnostic code L73.2 and ICD-9 diagnostic code 705.83 for HS were pulled. A total of 4576 subjects with HS were identified as having 2 or more visits to dermatology with a diagnosis of HS. The HS population was cross-referenced with the diagnosis of IBD by using the ICD-10 codes K51, K50, and K52.9 and the ICD-9 codes 555 and 556. An age-, race-, and sex-matched control population was created from subjects with diagnoses of either keloids or verruca vulgaris. Patients were cross-matched with the diagnosis of IBD. A diagnosis of IBD required confirmation by a gastroenterologist and utilization of a previously reported protocol.<sup>2</sup>

The IBD prevalence rates were compared between the HS and control groups by using the chi-square test.

There were 986 cases of HS identified. ICD coding identified 56 patients as also having IBD. After a chart review, 20 cases were verified. Crohn's disease was diagnosed in 12 cases and ulcerative colitis in 7 cases. One patient had both Crohn's disease and ulcerative colitis. The false-positive rate was 3.7%. The prevalence of IBD in patients with HS was 2.0%. In the control group, 15 of the 983 patients were identified as having IBD, yet none had IBD after chart verification, resulting in a false-positive rate of 1.5% and a prevalence of IBD in the controls of 0. There was a significantly increased risk of IBD in the patients with HS compared with that in the controls ( $P = .001$ ) (Table I).

We found that our population of patients with HS had a higher rate of IBD when compared with the controls. Specifically, subjects with HS were significantly more likely to have both Crohn's disease and ulcerative colitis. As in prior reports, our data support the predominance of Crohn's disease over ulcerative colitis.<sup>3</sup> Our prevalence of IBD in patients with HS of 2% is more than 6 times higher than that reported for the general population.<sup>4</sup> We found that relying on ICD diagnostic codes resulted in a significant number

of false-positive cases (3.7% in our HS population and 1.5% in our controls). *The ICD diagnosis overstated the association of HS and IBD by a factor of 2.8* (5.7% of cases were initially identified as IBD, whereas only 2.0% were actual cases). A careful chart review was necessary to make an accurate diagnosis.

Our results indicate that the risk of IBD in patients with HS is 6 times higher than risk of IBD in the general population. We found that the utilization of ICD coding alone could overestimate disease prevalence by a factor of 2.8.

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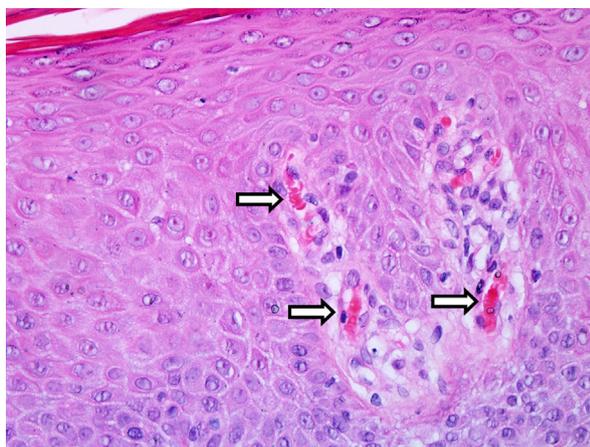
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### Rouleaux: A microscopic clue that helps distinguish psoriasis from dermatitis



*To the Editor:* Psoriasis is a common, chronic inflammatory skin disease affecting 2%-3% of the US population.<sup>1</sup> The histologic appearance of psoriasis is variable and depends on the stage and type of lesion biopsied.<sup>2</sup> In addition, other spongiotic dermatitides are often included in both the clinical and pathologic differential diagnosis, which can make definitive diagnosis difficult.<sup>3,4</sup>

Rouleaux formation, or aggregates of red blood cells resembling a stack of coins (Fig 1), occurs through interactions with increased plasma protein or acute phase reactants, with binding mediated by sialic acid. Although rouleaux formation has been described as a finding characteristic of psoriasis, this observation has not been validated; the phenomenon might also occur with other forms of



**Fig 1.** Rouleaux formation in psoriasis. Aggregates of red blood cells (arrows) resembling stacks of coins in dermal papillae.

**Table I.** Rouleaux

Diagnosis	Rouleaux present			Average, %	$\kappa$
	Observer 1, n (%)	Observer 2, n (%)	Observer 3, n (%)		
Psoriasis	62/100 (62)	70/100 (70)	73/100 (73)	68	0.81
Dermatitis	17/100 (17)	30/100 (30)	27/100 (27)	25	0.55
Benign keratoses	37/50 (74)	36/50 (72)	35/50 (70)	72	0.77

inflammation, infection, and monoclonal gammopathy.<sup>5</sup> In this study, we sought to investigate the presence of rouleaux in psoriasis; other dermatitides (including spongiotic dermatitis, stasis dermatitis, pityriasis rosea, seborrheic dermatitis, tinea); and benign keratosis (seborrheic keratosis and verruca vulgaris).

Slides from cases of psoriasis (n = 100), dermatitis (n = 100), and benign keratosis (n = 50) were obtained from a deidentified slide library of 1 of the authors (Dr Elston). Each slide was reviewed independently by 3 separate observers for the presence of rouleaux, which was defined as  $\geq 3$  red blood cells stacked on each other within the superficial papillary dermal vasculature.

Rouleaux formation was far more common among cases of psoriasis than dermatitis, with a sensitivity and specificity of 68% and 75%, respectively, and a positive likelihood ratio of 2.72. However, we found that rouleaux formation is not a finding unique to inflammatory conditions, as it was noted in the majority of benign keratoses evaluated. With regards to interobserver variability, the kappa statistics ranged from moderate to strong and are summarized in Table I. Our results confirm that rouleaux formation is a helpful feature for distinguishing psoriasis from other dermatitides. Because of the small number of cases included in our study, we were not able to take into account the subtype of psoriasis biopsied. Future studies evaluating rouleaux might provide further information regarding this phenomenon.

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