

Correlation Between Hunter-Schreger Band Characteristics and Dental Attrition: A Pilot Study

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Aim

The aim of this study was to evaluate the orientation and number of Hunter–Schreger (HS) bands in the incisal third of anterior teeth, and their correlation with the degree of tooth attrition.

Methods

This experimental study was exempt from Institutional Review Board (IRB) review by the Ethics Committee of Stony Brook University (Ref. IRB2024-00458).

Sample collection: Extracted anterior teeth were obtained from cadavers. Inclusion criteria consisted of anterior teeth presenting signs of physiological wear, without crowns or restorations covering the incisal edges, and without evidence of traumatic fractures. Exclusion criteria included fractured teeth, teeth with restorations involving the incisal edges, and other signs of crown destruction not attributable to physiological wear. The selection process was conducted by a single calibrated operator trained in identifying and classifying the teeth according to the inclusion and exclusion criteria.

Grouping and wear classification: After selection based on morphological cues, the teeth were grouped in the upper and lower cuspids, centrals, and laterals. After grouping, the degree of tooth wear was classified using the Gustafson’s scoring of attrition level, where 0 indicates no presence of attrition, 1 indicates enamel attrition, 2 indicates attrition at the level of the dentin, and a score of 3 indicates attrition involving the pulp cavity. (Figure 1)



Sample preparation: After classification of the degree of tooth wear, the teeth were sectioned longitudinally in two halves with a diamond cutting disc (K6974 Komet USA). Teeth were then consecutively polished using 300,600,800, and 1,200 coarse sand paper (3M, USA) under water flow. **HS Bands analysis:** To evaluate the angles of HS bands, a line perpendicular to the long axis of the tooth was drawn. Given that the bands run parallel to each other in the incisal third, only the angle of the most coronal dark band was measured. (Figure 2). Next, the teeth were viewed under 100x magnification to count the number of bands present in the the most incisal 2mm of the tooth. (Figure 3).

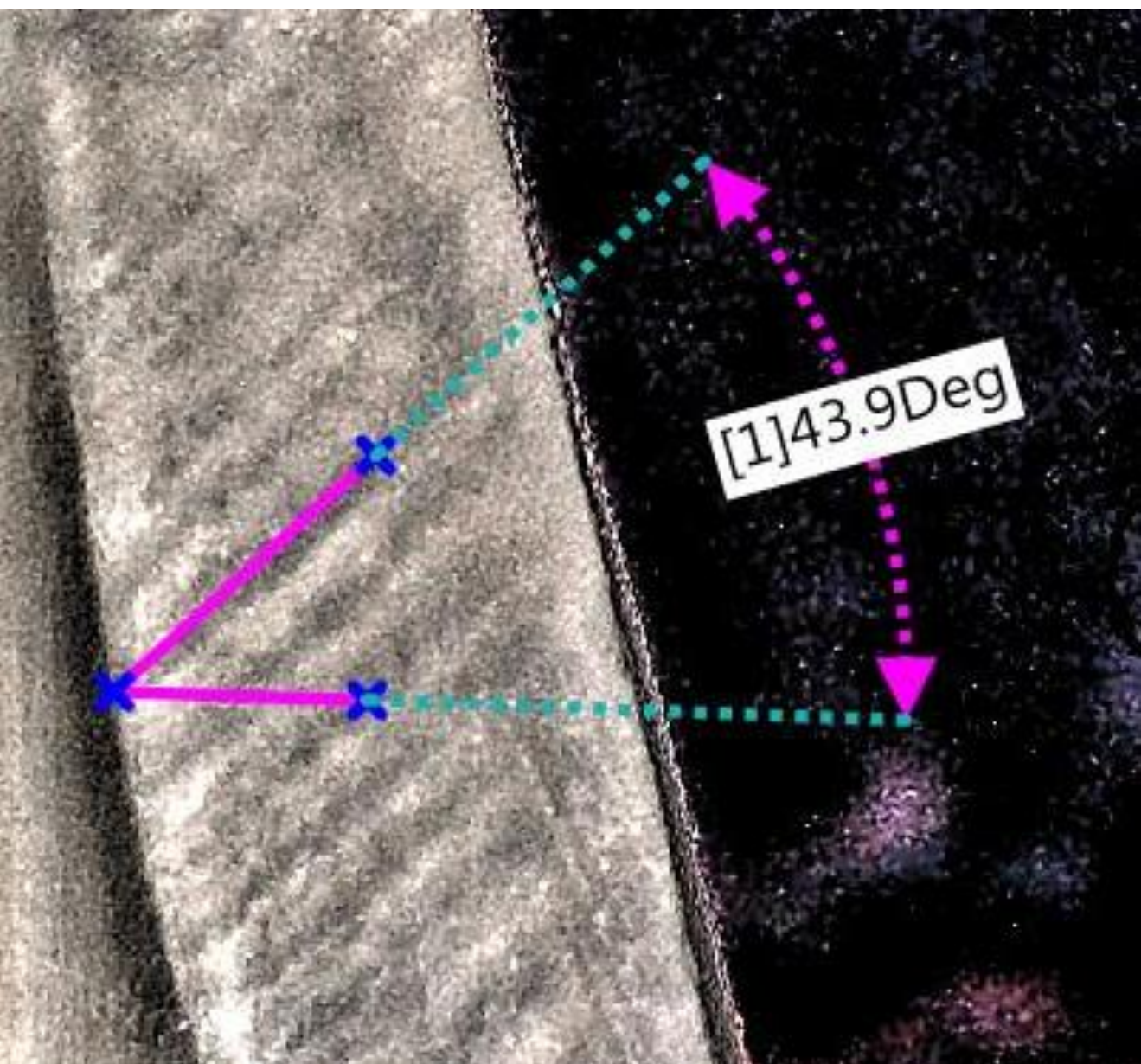


Figure 2. Band angle



Figure 3. Band density

Results

142 teeth were included. Anatomic groups were maxillary centrals (20), maxillary laterals (20), canines (48), and mandibular incisors (54) (Figure 5). For canines, ANOVA showed no significant differences across attrition classes in either band density ($p = 0.796$) or band angle ($p = 0.093$). Similarly, no significant differences were observed for mandibular incisors in band density ($p = 0.171$) or band angle ($p = 0.365$). Because no Class 2 or 3 attrition was present in maxillary central incisors, an independent t-test was applied, revealing no significant differences between Class 0 and Class 1 for band density ($p = 0.411$) or band angle ($p = 0.099$). For maxillary lateral incisors, ANOVA likewise showed no significant differences in band density ($p = 0.163$) or band angle ($p = 0.157$).

class			N	Mean	Std. Deviation	Minimum	Maximum
no attrition	number.bands	canine	6	14.17	.983	13	15
		maxillary laterals	4	12.00	1.826	10	14
		Total	10	13.30	1.703	10	15
	angle	canine	6	32.433	9.9572	20.5	45.0
		maxillary laterals	4	28.025	4.7794	24.4	35.0
		Total	10	30.670	8.2388	20.5	45.0
restricted to level enamel	number.bands	canine	19	13.74	1.522	12	17
		mandibular incisor	7	14.86	2.193	12	18
		maxillary centrals	5	14.20	2.775	11	17
		maxillary laterals	11	14.73	2.796	10	18
		Total	42	14.24	2.151	10	18
	angle	canine	19	41.632	8.7752	28.9	60.7
		mandibular incisor	7	48.629	7.6563	36.5	60.7
		maxillary centrals	5	54.660	8.7897	41.7	64.6
		maxillary laterals	11	35.255	7.6331	25.4	49.7
		Total	42	42.679	10.1479	25.4	64.6
limited to level of dentin	number.bands	canine	22	13.73	1.518	11	18
		mandibular incisor	43	13.51	1.609	10	17
		maxillary centrals	15	13.20	2.145	9	17
		maxillary laterals	5	13.40	1.517	12	15
		Total	85	13.51	1.666	9	18
	angle	canine	22	40.632	8.8649	18.7	53.5
		mandibular incisor	43	50.630	7.8324	33.4	69.5
		maxillary centrals	15	41.507	15.9442	19.8	68.2
		maxillary laterals	5	37.960	8.8121	25.2	49.1
		Total	85	45.687	11.0573	18.7	69.5

Figure 4. Summary of Results

While there were no substantial differences between classes of wear within a single anatomical type, there were some variations in density and angle between different anatomical types that are worn at the same level (Figure 4). This suggests that the density and angle of HS bands may differ between canines, laterals, and central incisors.

Anatomic Group	Number of Teeth (n)
Maxillary centrals	20
Maxillary laterals	20
Canines	48
Mandibular incisors	54
Total	142

Figure 5. Sample Size

Conclusions

Within the limitations of this study, no correlation was found between Hunter-Schreger band density and angles with tooth wear.

References

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