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Original Research

Predictive Value of Swede Colposcopy Score for Predicting Cervical Intra Epithelial Neoplasia in Cervical Cancer Screening with Visual Inspection with Acetic Acid

Shubham Bidhuri	Department of Obstetrics & Gynaecology, VMMC & Safdarjung Hospital, New Delhi, India.
Saritha Shamsunder	Department of Obstetrics & Gynaecology, VMMC & Safdarjung Hospital, New Delhi, India.
Harshitha K	Department of Obstetrics & Gynaecology, VMMC & Safdarjung Hospital, New Delhi, India. 2
Sunita Malik	Department of Obstetrics & Gynaecology, VMMC & Safdarjung Hospital, New Delhi, India.
Akriti Gautam	Department of Obstetrics & Gynaecology, VMMC & Safdarjung Hospital, New Delhi, India.
Priyanka Pangtey	Department of Obstetrics & Gynaecology, VMMC & Safdarjung Hospital, New Delhi, India.
Rashmi Arora	Department of Pathology, VMMC & Safdarjung Hospital, New Delhi, India.
Charanjeet Ahluwalia	Department of Pathology, VMMC & Safdarjung Hospital, New Delhi, India.

Objectives: To assess the predictive value of Swede score with VIA as the screening method and identify a cut-off score that predicts high grade CIN.
Methods: Records of 324 women who were VIA positive and had acetowhite lesion on colposcopy graded according to Swede score followed by biopsy/excisional procedure were included in the analysis. Sensitivity, Specificity, PPV & NPV for each Swede score were calculated and area under the ROC curve (AUROC) for score predicting high grade histopathology (≥ CIN 2) was estimated. A p value less than 0.05 was considered statistically significant.
Results: As the swede score increased from 0 to 10, the sensitivity decreased and specificity increased i.e. sensitivity of score < 6 was high whereas specificity of score > 6 was high. At a cut-off of Swede Score ≥6, it predicted high grade histology with a sensitivity of 51%, and a speci-ficity of 79%. The highest diagnostic accuracy was at swede score cut off >6 i.e. 64.6%.
Conclusion: We recommend biopsy at a Swede score of 5 or less and treatment by excision at a Swede score of 6 or more.

Introduction

GLOBOCON 2020 states cervical cancer as the fourth commonest cancer in women worldwide with an estimated 604,000 new cases and 342,000 deaths worldwide in 2020 [1]. Cervical cancer also leads the cause of cancer deaths in 36 countries, majority in Africa, South America and South-Eastern Asia [2]. South East Asia alone recorded 1,90,874 new cases and 1,16,015 deaths as per GLOBOCON 2020.1 Many developed countries have successful nationwide screening programs using cervical cytology which have successfully reduced the incidence of cervical cancer [3]. However cytology-based screening programs are difficult to implement in low-resource settings as they are laboratory based, require expensive equipment with technician support and skilled personnel to prepare and interpret the slides [4,5]. Moreover to be effective, cytological screening

needs to be repeated regularly [6,7] which is logistically not feasible on low resource settings.

WHO recommends VIA (Visual Inspection with Acetic Acid) as a screening test till a low cost HPV test becomes available in low income countries; the benefits of VIA being immediate results and decisions for treatment [8]. In addition, VIA is inexpensive, its results are immediately available, and the treatment can be administered on-site or by referral to a colposcopy clinic for biopsy and/or treatment [7]. However, the reproducibility and accuracy of VIA is doubtful since it is subjective and observer dependent [5,9,10]. Consequently, for assessing the validity of VIA or any other screening method, colposcopy and biopsy is considered as the triage standard [11]. Colposcopy is an OPD based, simple, non-invasive procedure that helps to locate the lesion, determine the size and extent of involvement of cervix. Colposcopy guided biopsy of the abnormal suspicious areas on cervix is considered the gold standard in diagnosis of cervical intraepithelial lesions [12]. However, colposcopy is also not free from limitations that includes inter and intra operator variability. A standard scoring system to assess variables such as the degree of whiteness, margins and borders of the lesion, vessel pattern and iodine negativity encourages systematic appraisal of the colposcopic picture, forcing the colposcopist to judge every variable and documenting the result [13]. A validated scoring system could also provide a good basis for individual colposcopists to evaluate his or her skill.

Reid Colposcopic Index (RCI) proposed by Reid and Scalzi, which includes density of aceto-whiteness, margins, vascular pattern and iodine staining is the well-known scoring system to grade the severity of premalignant lesions and to make colposcopy diagnosis less subjective [13]. Strander et al in year 2005 devised the Swede score [14], which includes lesion size as a variable in addition to the above four colposcopic signs along with modifications to definitions of the scores for the remaining variables. Bjorn Stander's weighted scoring system described in 2005, identified a group of women with a score of 5 as low grade lesion and 5 or more as high grade. The Swede score is simple to use, with no major learning curve; it can also be used by any grade of colposcopist. Their results showed that the specificity for a total score of 8 or higher was 90% and that no lesion of CIN 2 or higher resulted in a score of less than 5. Both the scoring systems have been validated in a cytology-based screening programs.

A SEE AND TREAT approach by Large Loop Excision of the Transformation Zone (LLETZ) at the same visit as colposcopy has been described in women having a high grade lesion on colposcopy and had high grade abnormalities on the referral Pap smear. Our study was aimed to assess the predictive value of Swede score with VIA as the screening method and identify a cut-off score which can predict high grade CIN.

Materials and Methods

This was a retrospective study of records after institutional review board approval of women who had colposcopy in our colposcopy clinic in the Department of Obstetrics and Gynecology, Safdarjung Hospital, New Delhi.Colposcopy was performed by colposcopists at various levels of training period supervised by trained colposcopists. Women whose referral screening test was VIA test positive and had acetowhite lesions on colposcopy were included in the analysis. IFCPC 2011 terminology was used for reporting. Acetowhite lesions were further scored by the Swede score using five colposcopic variables, acetowhiteness, margins plus surface, vessel pattern, lesion size and iodine staining (Table 1).

	0	1	2
Aceto uptake	Transparent	Shady, Milky (not transparent, not opaque)	Distinct opaque white
Margins	Diffuse	Sharp but irregular, jagged, geographical	Sharp and even, difference in surface level including cuffing.
Vessels	Fine, regular	Absent	Coarse or atypical

Lesion size	<5 mm	5-15mm	>15mm
Iodine staining	Brown	Faintly or patchy yellow	Distinct yellow
Total score (maximum 10)			

Table 1. Swede Scoring System.

Score of 0,1 & 2 points were given for the various parameters and compared with histopathology as the gold standard. Any acetowhite area seen was biopsied. Records of 324 women who had a biopsy/excisional procedure were included in the analysis. Pregnancy, previous treatment of CIN, diagnosed and treated cases of cervical cancer, obvious cervical growth on per speculum examination, post total hysterectomy and inadequate colposcopy were excluded from the study.

Data entry was done by using MS Excel 2019 and Analysis was done by using SPSS version 25.0. Swede score was compared with final histopathology as the gold standard. Proportions were calculated for categorical variables. Chi-square test was used to test the statistical significance between two categorical variables. Sensitivity, Specificity, PPV & NPV for each score were calculated and area under the ROC curve (AUROC) for Swede score predicting high grade histopathology (≥ CIN 2) was estimated. A p value less than 0.05 was considered statistically significant.

Results

Records of 324 women who had acetowhite lesions on colposcopy after a positive VIA test performed for opportunistic screening were analysed. The mean age of the study group was 40.5 years; the mean parity was 3; 3 of them were nulliparous.

Most of the women had Swede scores between 5-7; 127 (39.1%) had a score of < 5, 197 (60.8%) had a score of ≥ 5. In the group with a score of < 5 (n=127); 3.8% (n=43) had normal histology, 46.4% (n=59) had CIN1, 18.1% (n=23) had CIN 2 and 1.6% (n=2) had CIN3. In the group with a Swede score of ≥ 5 (n=197), 3.5% (n=7) had normal histology, 36% (n=71) had CIN 1, 43.6% (n=86)

had CIN 2 and 16.7% (n=33) had CIN 3. Swede score 0 was found in 5 women, 4 of them had CIN 1 and one had CIN 2 (Figure 1).

Figure 1. The Box-and-Whisker Plot Depicting the Distribution of SWEDE Score in the 2 Groups of Histopathological Findings.

Chi-squared test was used to explore the association between histopathology and Swede score. There was a significant difference between the various groups in terms of distribution of histopathology ($\chi 2 = 74.094$, $p = <0.001$).

The sensitivity and specificity at various scores were calculated. As the swede score increased from 0 to 10, the sensitivity decreased and specificity increased i.e. sensitivity of score < 6 was high whereas specificity of score > 6 was high (Table 2).

Swede Score Cut off	Sensitivity (%)	Specificity (%)	PPV (%)	NPV (%)	Diagnostic Accuracy (%)
Score 0	100	0.00	52.60	80	52.60
Score 2	99.30	3.10	53.20	70	53.60
Score 3	97.90	5.40	53.40	78.40	54
Score 4	94.40	22.30	62.60	70.20	60.20
Score 5	82.60	45.40	73.30	59.50	64

Score 6	51.40	79.20	81.60	53.80	64.60
Score 7	27.80	93.10	76.90	48.70	58.80
Score 8	6.90	97.70	66.70	47.80	50
Score 9	2.80	98.50	0.00	47.30	48.20
Score 10	0.00	99.20	0.00	47.40	47.10

Table 2. Sensitivity and Specificity of Various Swede Score Cutoffs.

ROC curves were plotted to compare the sensitivity and specificity of each score for ≥ CIN 2. The area under the ROC curve (AUC) for Swede score at a cut off of ≥6 for predicting high grade (CIN2/3) vs low grade histopathology (CIN1) was 0.711 (95% CI: 0.714 - 0.814), (Figure 2) thus demonstrating fair diagnostic performance as it was statistically significant (p = <0.001).

Figure 2. ROC Curve Analysis Showing Diagnostic Performance of Swede Score in Predicting Histopathology: High Grade vs Histopathology, Low Grade (n = 324).

At a cutoff of Swede Score ≥6, it predicted high grade histology with a sensitivity of 51%, and a specificity of 79%. The highest diagnostic accuracy was at swede score cut off >6 i.e. 64.6%.

Discussion

The main goal of cervical screening is to identify women with moderate-severely dysplastic lesions which are the true precursors of invasive cancer and require treatment, thus ultimately decreasing morbidity and mortality due to cervical cancer. The Swede score devised by Strander et al. lesion size is also in included addition to aceto-whiteness, vessel pattern and iodine negativity with specific score for each parameter spelt out. It is simple to use, with no major learning curve, and can be used by any grade of colposcopist.Strander et al in 2005 performed colposcopy on 279 women by two trained colposcopists; a score of >5 suggested CIN 2+ lesion, two women with score =5 had CIN 2. A score ≥ 8 had a specificity of 90% for high grade lesion thus “See & Treat” was advised at this score.They recommended biopsy to be reserved for score 5-7.

Bowring et al [15] evaluated the Swede score and found that scores of 8 or more had a sensitivity, specificity, and positive and negative predictive values of 38%, 95%, 83%, and 70%, respectively, for lesions where the final diagnosis was ≥CIN 2. Using the same cutoff score of 8 or higher, the first 100 examinations had similar results compared with the second set, showing that no major learning curve existed while using the Swede score.

Nessa et al [16] evaluated cervical lesions in women with abnormal VIA findings using Swede score by Gynocular and colposcope in 540 VIA positive women. A cut-off value of >5 by the colposcope had a sensitivity of 83.3% and specificity of 24.2%; Score ≥ 8 had sensitivity and specificity of 40% and 87.9% respectively and was highly correlative with CIN2+ and thus could serve as the cut off score for excisional method. They recommended cut off Swede score of ≥4 for biopsy.

Kallner HK et al [17] evaluated the diagnostic accuracy of cervical lesions by stationary colposcope and the gynocular. At a cut-off 5 for Swede score, stationary colposcope had a sensitivity of 73.5% and specificity of 58.5%. In a study by Ranga et al [18] 150 women underwent colposcopy for abnormal Paps/VIA+/ HPV + and only one trained colposcopist reviewed the pictures.All women with CIN 2+ had Swede Score ≥ 5. In women with Swede Score ≥ 8 all had CIN 3.Score of 5 was found to be 100% sensitive for CIN 2+ and score 8 to be 100% specific for CIN 2+.

Pimple et al [19] tried to evaluate the performance of colposcopy in estimating the presence and grade of cervical disease v/s conventional cytology as a secondary modality to triage women found positive on VIA test. Colposcopic diagnosis and grading was done based on Reid’s score and punch

biopsies were taken from the worst of any abnormal areas. They found sensitivities of high and low threshold colposcopies to be 58.0% and 74.5% respectively with specificity of 57.5% and 92.9% respectively. They also found a false negative rate of 41.9% at a higher threshold and positive predictive value of high grade colposcopic impression for high grade histology was 42.9% as compared to 89.4% with conventional cytology.

If Strander et al. were applied in our practice and no biopsy was done for Swede Score <5, 20% of high grade lesions would be missed and if See & Treat was done for a swede score ≥ 8 =55% of women with CIN 2+ and with a Swede score of 5-7 may be lost to follow up.

Bowring et al [15] proposed that a modified Swede score in low-resource settings could predict cervical abnormalities and avoid over treatment. Strander et al suggested See-and-Treat approach when the Swede score was 8 and more. It important to note that the observed high specificity for high grade lesions for Swede score of 7 and above in our study is well in line with the results from both Strander et al [14] and Bowring et al [15] and support the see-and-treat method when the patient has a Swede score of 7 and above.

The performance and accuracy of colposcopic scoring largely depends on the training and experience of the colposcopist.In a meta-analysis by Mitchel et al [20] the sensitivity of colposcopy for diagnosing the normal cervix from other diagnosis varied between 87-99% and specificity from 30-93%.Massad and Collins [21] reported a sensitivity of 89% for any lesion detected and 56% when the threshold was raised to a higher grade result. In a See and Treat approach using a low threshold for biopsy and treatment of abnormal colposcopic lesion by ablation (if criteria fulfilled) for a Swede colposcopy score of ≤ 5 and excision for a score of ≥ 6 would reduce loss to follow up.

Author Contributions

Shubham Bidhuri, Saritha Shamsunder: manuscript writing and editing.

Sunita Malik,Saritha Shamsunder:Designing and planning of the study

Harshitha Sanvi,Akriti Gautam, Priyanka Pangtey: performed colposcopy and data collection

Rashmi Arora, Charanjeet Ahulaw alia: Histopathological examination of biopsies.

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Conflicts of Interest

This statement is to certify that all Authors have seen and approved the manuscript being submitted and there is no conflict of interest between Authors.

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