Evaluate the Diagnostic Accuracy of Velscope Versus Other Non -Invasive Devices in Detecting Benign, Precancerous and Cancerous Lesions

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Abstract:

Background: The early detection of benign, precancerous, and cancerous oral lesions is essential for improving patient outcomes. Traditional diagnostic methods, such as biopsies, are invasive and can cause discomfort, leading to the development of non-invasive diagnostic tools like VELscope, toluidine blue staining, brush biopsy, and autofluorescence imaging. This review assesses the diagnostic accuracy of VELscope in comparison to other non-invasive devices.

Methods: A systematic literature review was conducted, focusing on studies published between 2020 and 2024. Data sources included PubMed, Web of Science, Scopus, and Google Scholar. Studies were selected based on specific inclusion criteria, including human-based studies that report diagnostic accuracy metrics for non-invasive devices. Data extraction was standardized, and the QUADAS-2 tool was used for quality assessment. Comparative analysis was conducted across diagnostic devices to evaluate sensitivity, specificity, and overall accuracy.

Results: Eighteen studies met the inclusion criteria. VELscope demonstrated mean sensitivity of approximately 70.19% and specificity of 65.95%. OralID showed high sensitivity (78%-100%) but variable specificity (31%-100%), while Identafi had sensitivity ranging from 71%-100% and specificity from 32%-100%. Autofluorescence imaging devices presented a broad range of sensitivity (30%-100%) and specificity (15%-100%). Combined diagnostic approaches were found to enhance diagnostic accuracy, particularly when VELscope was used alongside toluidine blue or brush biopsy.

Conclusion: Non-invasive diagnostic tools, including VELscope, offer valuable supplementary options for identifying oral lesions early. VELscope's real-time visualization is beneficial, but its diagnostic accuracy improves when used in conjunction with other non-invasive methods. Standardized protocols, clinician training, and further research are necessary to optimize the clinical use of these tools, ultimately improving early detection and patient outcomes.