The integration of dermoscopy and reflectance confocal microscopy improves the diagnosis of lentigo maligna

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To the Editor: The clinical diagnosis of lentigo maligna (LM)/lentigo maligna melanoma (LMM) often represents a challenge due to its overlapping features with benign lesions. Dermoscopy and reflectance confocal microscopy (RCM) are non-invasive skin imaging techniques that can help the clinical diagnosis of this tumor[1–10]. However, there is no study that compares these techniques used alone to their combination for LM/LMM and there are only two studies that directly compared their diagnostic accuracy for LM/LMM[8,9]. The largest study was performed by our group on 223 facial lesions with histological diagnosis and compared dermoscopy to RCM alone[9], whereas the other compared dermoscopy plus digital dermoscopic monitoring to RCM in 70 lesions (33 with histological diagnosis)[8].

Here, our aim was to evaluate if the combination of dermoscopy and RCM could improve the diagnosis of LM/LMM compared to dermoscopy and RCM alone.

Having both dermoscopic and RCM images available, seven experts in non-invasive skin imaging techniques evaluated the same series of 223 clinically equivocal facial lesions in clinical differential diagnosis with LM/LMM (including 115 LM/LMM, 20 basal cell carcinomas and 88 benign lesions) previously diagnosed[9] either by dermoscopy alone (evaluation performed by 4 of them) or RCM alone (evaluation performed by 6 of them) one year before and results were compared with the previous study. Mean sensitivity, specificity and overall diagnostic accuracy (ACC) and 95% CI were calculated for the specific diagnosis of different facial lesions (Table 1).

As expected, considering the evaluation of the seven experts, the combination dermoscopy/RCM had a higher mean ACC for both malignant tumor (including LM/LMM) and LM/LMM of the face (84%, CI 80-89 and 84%, CI 79-89, respectively) than the two imaging techniques alone (74%, CI

68-80 for dermoscopy versus 80%, CI 75-85 for RCM in case of LM/LMM and 75%, CI 68-80 for dermoscopy versus 80%, CI 74-85 for RCM in case of malignant tumor). Notably, ACC increased for each investigator. The superiority of the ACC of the combination dermoscopy/RCM on the single imaging techniques for LM/LMM was also observed when comparing the current data to the results obtained in the previous study by all the 21 investigators. Considering all evaluations, the ACC increased from dermoscopy to RCM and to dermoscopy plus RCM. According to the CI, the combination dermoscopy/RCM improved both mean sensitivity and mean specificity of RCM alone for LM/LMM, whereas it highly improved mean sensitivity of dermoscopy alone but not its mean specificity (sensitivity of 65% CI 57-73, 82% CI 76-89 and 85% CI 80-91 and specificity of 88% CI 82-95, 77% CI 68-86 and 83% CI 75-91 for dermoscopy, RCM, and dermoscopy plus RCM, respectively). As already discussed, this fact was probably related to the presence of hyper-reflective dendritic Langerhans cells under RCM mistaken for neoplastic melanocytes in the epidermis of most misdiagnosed benign lesions[9]. Concerning the facial lesions other than LM/LMM we also observed an increase in ACC with the combination dermoscopy/RCM (Table1).

In conclusion this study shows that the integration of dermoscopy and RCM increases the ACC of both these techniques used alone for facial tumors. More in-depth studies should be carried out, even using machine learning techniques, for optimal integration of dermoscopic data with RCM data, in order to increase ACC by reducing possible false positives induced by the RCM examination.

Key words: Dermoscopy; reflectance confocal microscopy; lentigo maligna; melanoma; face; tumor; diagnosis; imaging.

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Abbreviation and acronym list:

Lentigo maligna (LM)

Lentigo maligna melanoma (LMM)

Overall diagnostic accuracy (ACC)

Reflectance confocal microscopy (RCM)

Table 1. Inter-observer mean sensitivity, specificity and overall diagnostic accuracy of dermoscopy, RCM and dermoscopy plus RCM of different facial tumors:

		Current study (7 investigators)			Previous study *(21 investigators including the 7 of the current study)	
		Dermoscopy	RCM	Dermoscopy and RCM	Dermoscopy	RCM
		4 investigators	6 investigators	7 investigators	15 investigators	12 investigators
Malignant tumor (n.136)	SE (95% CI)	65 (57-73)	82 (76-89)	85 (80-91)	69 (61-78)	84 (78-91)
	SE range	51-80	78-85	77-96	51-86	75-92
	SP (95% CI)	88 (82-95)	77 (68-86)	83 (75-91)	85 (78-91)	75 (66-84)
	SP range	84-95	73-80	73-88	74-95	62-84
	ACC (95% CI)	74 (68-80)	80 (75-85)	84 (80-89)	75 (69-81)	81 (76-86)
LM/LMM (n.115)	SE (95% CI)	56 (47-66)	76 (68-84)	80 (73-87)	61 (51-71)	80 (72-88)

	SE range	35-80	66-82	69-97	35-83	66-90
	SP (95% CI)	94 (90-99)	84 (77-91)	89 (83-94)	92 (88-96)	81 (75-88)
	SP range	89-98	81-86	83-94	84-98	73-90
	ACC (95% CI)	75 (68-80)	80 (74-85)	84 (79-89)	76 (70-82)	81 (76-86)
Basal cell carcinoma (n.20)	SE (95% CI)	80 (62-100)	84 (68-100)	89 (62-100)	81 (63-100)	82 (65-99)
	SE range	75-85	75-95	75-100	70-90	65-95
	SP (95% CI)	97 (95-99)	96 (94-99)	98 (97-98)	98 (96-100)	97 (95-99)
	SP range	95-99	94-98	94-99	95-100	94-99
	ACC (95% CI)	96 (93-98)	95 (92-98)	97 (95-99)	96 (94-99)	96 (93-98)
Solar lentigo (n.37)	SE (95% CI)	53 (37-70)	50 (34-66)	58 (41-74)	60 (44-76)	51 (34-67)

	SE range	43-68	41-57	43-73	43-76	35-70
	SP (95% CI)	88 (84-92)	92 (89-96)	92 (88-95)	87 (82-91)	93 (89-96)
	SP range	84-90	84-95	84-99	80-93	84-97
	ACC (95% CI)	83 (79-88)	86 (82-90)	87 (83-91)	83 (78-87)	87 (83-91)
Seborrheic keratosis (n.23)	SE (95% CI)	90 (80-100)	57 (36-77)	75 (57-93)	81 (65-96)	62 (41-82)
	SE range	83-100	35-70	61-87	65-100	35-83
	SP (95% CI)	91 (87-95)	95 (92-98)	95 (92-98)	93 (90-96)	95 (92-98)
	SP range	84-94	93-98	91-96	84-99	92-98
	ACC (95% CI)	91 (88-95)	91 (88-95)	93 (89-96)	92 (88-95)	92 (89-95)
Pigmented actinic keratosis	SE (95% CI)	28 (5-52)	19 (2-40)	29 (3-54)	30 (6-54)	17 (0-35)

(n.15)	SE range	20-33	13-27	13-53	0-55	0-40
	SP (95% CI)	93 (90-97)	95 (92-98)	96 (93-98)	94 (91-97)	96 (94-99)
	SP range	90-96	92-99	89-99	89-99	92-100
	ACC (95% CI)	89 (86-93)	90 (87-94)	92 (88-95)	90 (86-94)	91 (88-95)
	SE (95% CI)	69 (36-100)	63 (26-99)	63 (24-100)	53 (14-92)	54 (16-92)
	SE range	50-88	25-88	25-88	13-88	25-88
Nevus (n.8)	SP (95% CI)	98 (96-100)	99 (98-100)	100 (99-100)	98 (97-100)	99 (98-100)
	SP range	97-99	97-100	100	97-100	97-100
	ACC (95% CI)	97 (95-99)	98 (96-100)	98 (97-100)	97 (95-99)	97 (95-99)

ACC: overall accuracy;
LM: lentigo maligna;
LMM: lentigo maligna melanoma;
RCM: reflectance confocal microscopy;
SE: sensitivity;

SP: specificity.

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