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CASE STUDY

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Clinical, onychoscopic, nail clipping, and histopathological findings of malignant onychopapilloma

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Abstract

This report describes the clinical, onychoscopic, nail clipping, and histopathologic features of a malignant onychopapilloma. A 71-year-old male presented to our outpatient clinic for a stable, asymptomatic lesion on his left middle finger that had been present for 2 years. Prior nail clipping histopathology showed nail plate thinning with subungual abnormal onychocytes. Clinical examination revealed a 2-mm-wide streak of longitudinal xanthonychia extending to the proximal nail fold, with distal hyperkeratosis and onycholysis. Onychoscopy showed irregular longitudinal nail plate ridging with scattered punctate hemorrhagic foci. An excisional nail unit biopsy demonstrated cellular atypia of the nail bed epithelium, matrix metaplasia, longitudinal abnormal onychocytes, increased Ki-67 staining, and negative HPV immunoperoxidase staining, confirming the diagnosis of malignant onychopapilloma.

KEYWORDS

malignant onychopapilloma, nail clipping, nail unit, onychoscopy

1 | INTRODUCTION

The nail unit comprises several unique elements, including the matrix, bed, and plate. Neoplasms originating from these components can manifest as a variety of benign and malignant processes, often presenting as an acquired localized longitudinal (ALL) band.[1,2] A recent addition to the differential diagnosis of ALL bands is the malignant onychopapilloma, originating from the mid to distal nail matrix.[3,4] This malignancy displays architectural features akin to its benign counterpart, the onychopapilloma, but with notably aggressive histopathological traits. This report describes a case of malignant onychopapilloma, emphasizing its clinical, onychoscopic, nail clipping, and histopathological features.

2 | CASE REPORT

A 71-year-old male with hypertension and hyperlipidemia presented to our outpatient clinic, reporting a 2-year history of a stable and asymptomatic lesion on his left middle finger (Figure 1). A prior nail clipping demonstrated nail plate thinning atop abnormal onychocytes (Figure 2), with no evidence of concomitant fungal infection. On clinical examination, a 2-mm-wide longitudinal streak of xanthonychia (yellow discoloration of the nail) could be appreciated, spanning from the proximal nail fold to the hyponychium, and was accompanied by distal hyperkeratosis and onycholysis. Onychoscopy of the affected digit highlighted the xanthonychia and revealed irregular longitudinal ridging of the nail plate with interspersed punctate hemorrhagic foci (Figure 3A,B). A head-on onychoscopic view distinctly depicted the subungual keratotic mass (Figure 3C,D).

After a longitudinal incision and avulsion of the nail plate, the nail bed and matrix underneath were inspected. A longitudinal excision, extending from the distal matrix to the hyponychium and reaching the periosteum in depth, was obtained (Figure 4) and the defect was left to heal by secondary intention. Architectural features resembling onychopapilloma were observed on the specimens at low power (Figure 5). A closer examination of the nail avulsion revealed abnormal

onychocytes beneath the nail plate in a longitudinal pattern (Figure 5). Similar abnormal onychocytes were found in the nail clipping specimen, accompanied by loculations of serum and diaminobenzidine-positive hemorrhage (Figure 2).

The nail bed epithelium exhibited a sharply delineated area of pronounced cellular atypia adjacent to the unaffected nail unit epithelium (Figure 6), as well as matrix metaplasia[5,6] and a zone of parakeratosis (Figure 6). Ki-67 staining demonstrated a distinct zone of full-

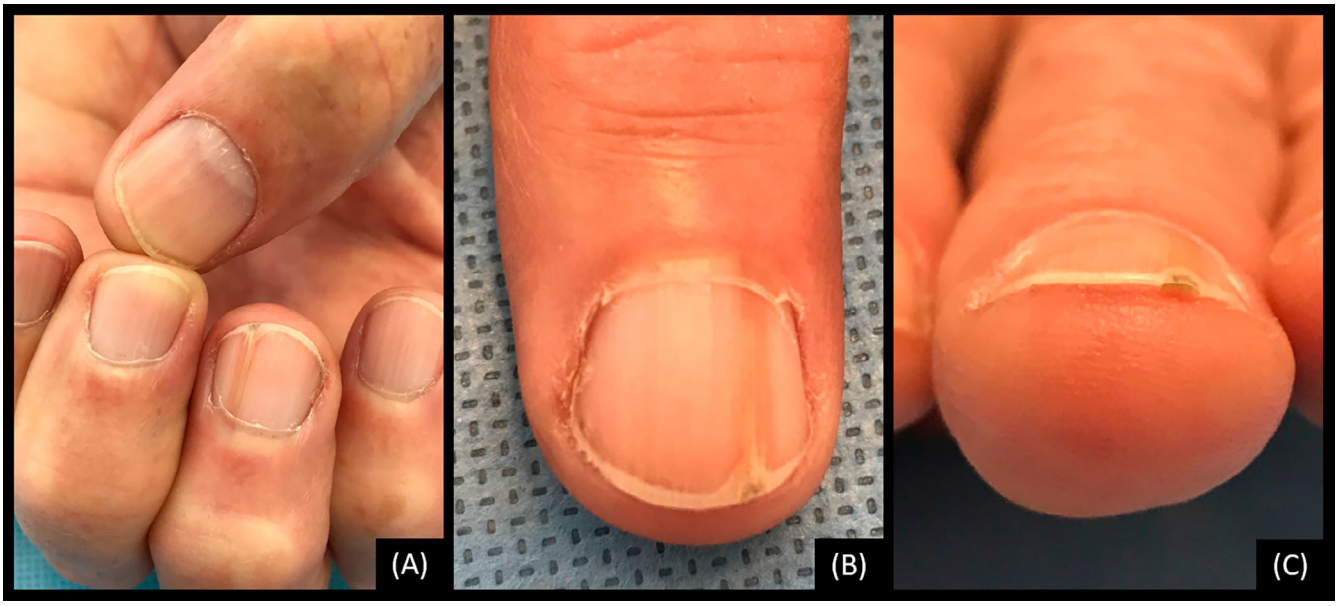

FIGURE 1 Clinical examination. (A) Five-digit view demonstrating affected the third digit. (B) Dorsal view of affected digit demonstrating longitudinal xanthonycia and distal onycholysis. (C) Head-on view showing subungual hyperkeratosis and thinned overlying nail plate.

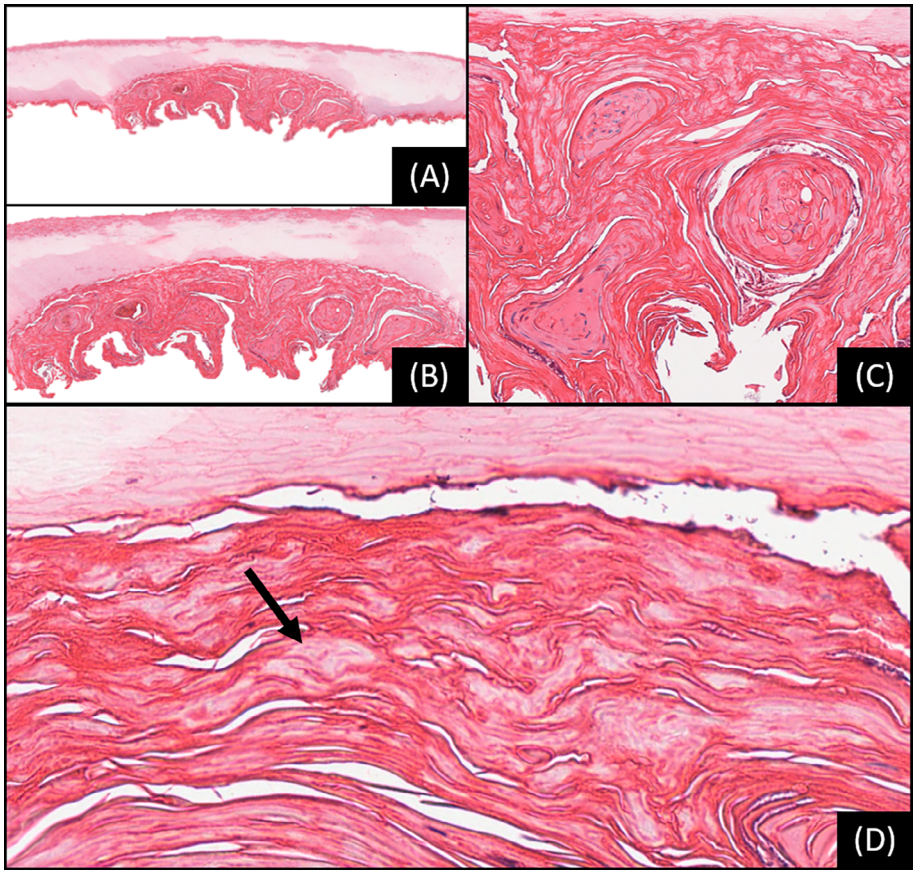

FIGURE 2 Nail clipping histopathology. (A–D) Increasing magnification of abnormal onychocytes subjacent to the thinned nail plate intermixed with loculations of parakeratosis and serous crust. Enlarged, abnormal onychocyte demarcated by arrow in (D). All specimens are stained with hematoxylin and eosin. Magnifications A, ×40; B, ×70; C, ×220; D, ×400.

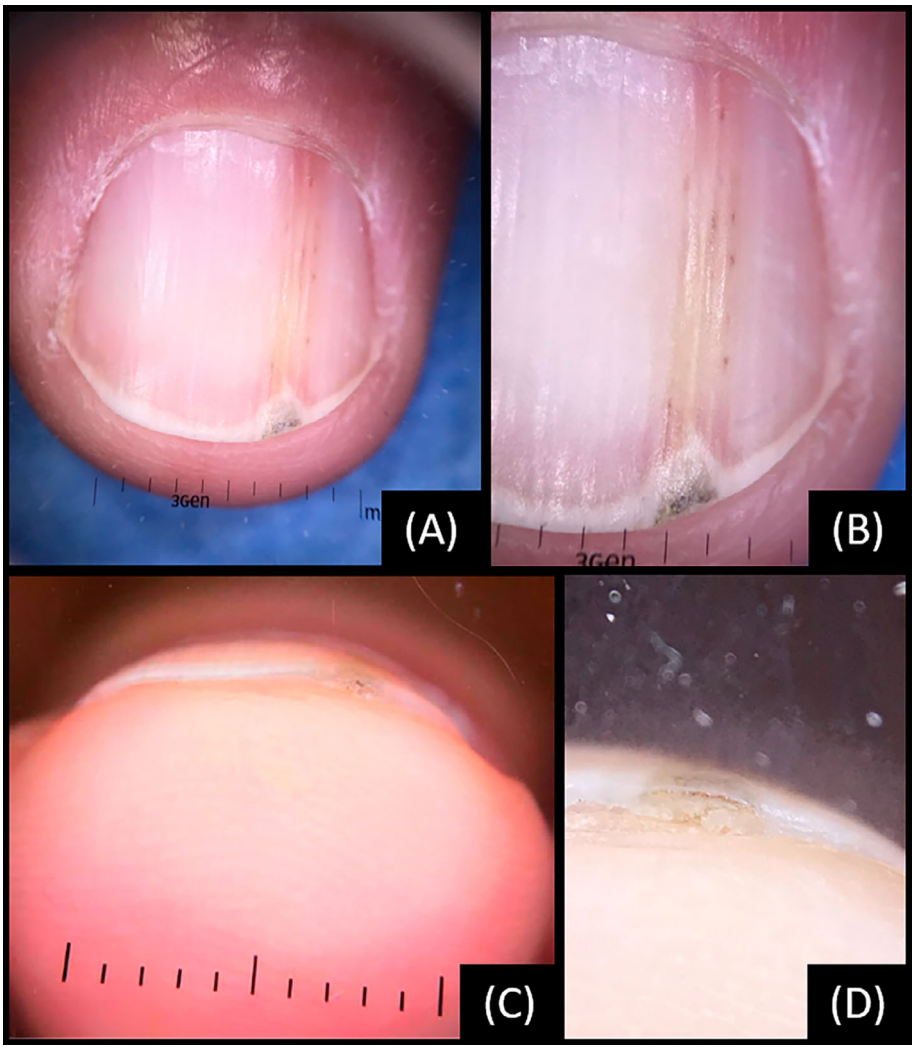

FIGURE 3 Onychoscopy. (A, B) Dorsal view showing longitudinal xanthonychia, scattered splinter hemorrhages, parallel ridging, and distal onycholysis. (C, D) Head-on view highlighting subungual keratotic mass and thinned overlying nail plate.

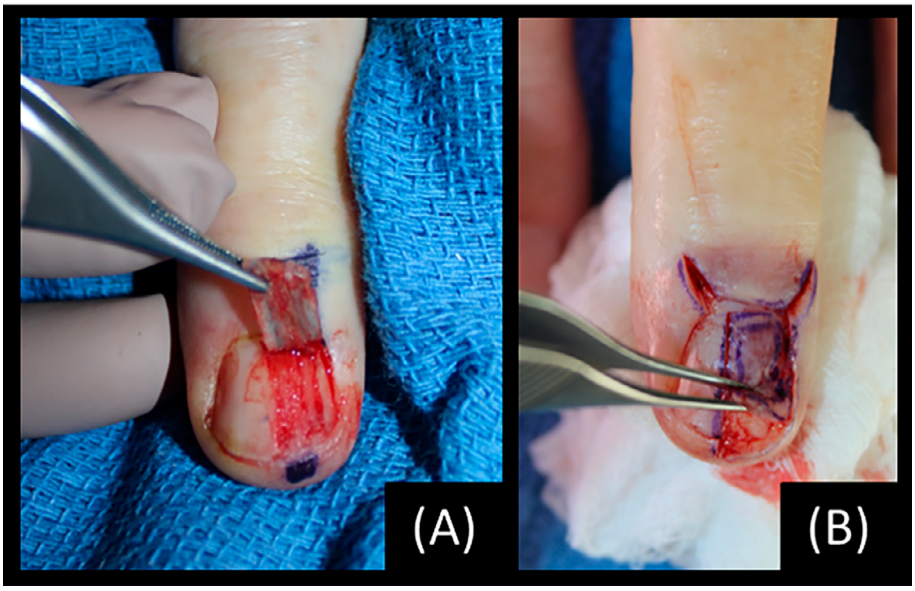

FIGURE 4 Procedural findings. (A) Nail unit biopsy. Reflection of the nail plate reveals the lesion adherent to the nail plate and present in the underlying nail bed and matrix. (B) Mohs layer. Reflection of the nail bed revealing underlying periosteum.

thickness epithelial labeling of cells in the nail bed, contrasting with the unaffected adjacent nail unit epithelium (Figure 6). Notably, Fontana Masson, SOX10, and MART-1 stains showed no remarkable pattern of staining, while both Gomori methenamine silver and periodic acid–Schiff-stained samples were negative for fungal elements. HPV immunoperoxidase staining was also negative. The observed

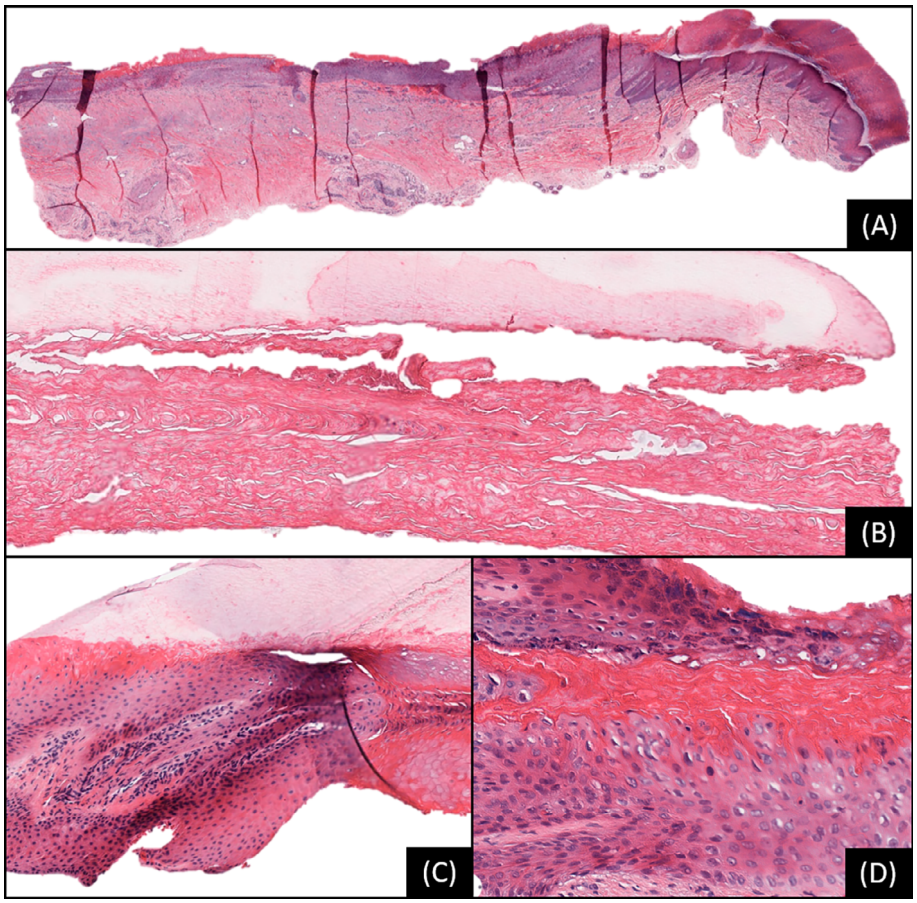

FIGURE 5 Malignant onychopapilloma histopathology. (A) Scanning view of the longitudinal excision (hematoxylin and eosin [H&E], ×10). (B) Abnormal onychocytes are seen organized in a longitudinal fashion beneath the avulsed nail plate (H&E, ×200). (C) Matrix metaplasia of the distal nail bed, resembling the keratogenous zone of the nail matrix (H&E, ×100). (D) The proximal nail bed demonstrates cellular atypia and acanthosis (H&E, ×280).

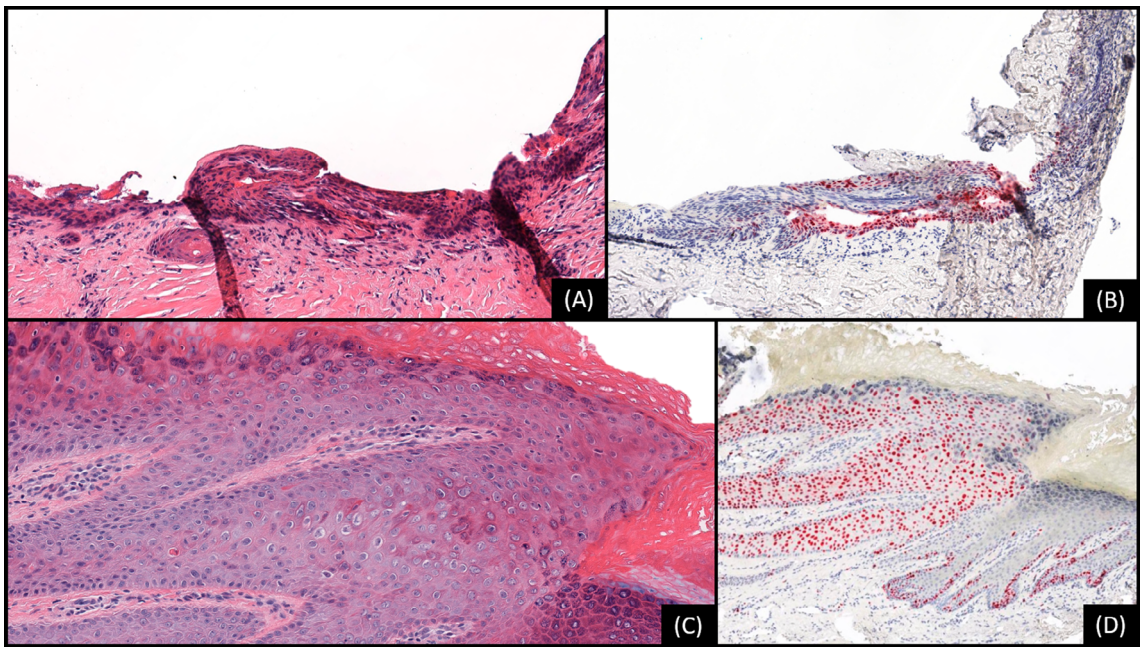

FIGURE 6 (A) hematoxylin and eosin (H&E) section of nail matrix with higher magnification view of inset. (B) Corresponding Ki-67 staining of matrix demonstrating focally increased activity. (C) Distal nail bed with the abrupt transition of the atypical epithelium to the unaffected epithelium of the hyponychium (H&E, ×165). (D) Corresponding Ki-67-stained section of distal nail bed showing sharp demarcation of increased Ki-67 activity within the malignant onychopapilloma (Ki-67, ×120).

histopathological characteristics aligned with previously identified malignant onychopapilloma features while also establishing novel features and correlation with head-on onychoscopy and nail clipping histopathological findings.

3 | DISCUSSION

Malignant onychopapilloma is a newly described nail unit tumor.[3] Our report further describes its clinical, onychoscopic, and histopathological features and highlights the importance of consideration for tissue sampling to rule out malignancy in onychopapilloma, a condition previously considered to be purely benign.

Clinically, malignant onychopapilloma may have a varied presentation. Our patient presented with asymptomatic longitudinal xanthonychia; however, the index case reported in the literature experienced painful longitudinal erythronychia.[3] Distal onycholysis and subungual hyperkeratosis appear to be common, though nonspecific, clinical features.[1,2] Notably, both clinical and onychoscopic findings of malignant onychopapilloma remain undifferentiated from its benign counterpart, onychopapilloma.[7] The nail clipping from our malignant onychopapilloma case revealed large, irregular abnormal onychocytes, differentiating it from a benign onychopapilloma, which shows layered subungual hyperkeratosis with focal hemorrhage.[5] Future studies are necessary to determine if these nail clipping histopathological findings are a sensitive and/or specific indicator of malignant onychopapilloma.

Histopathological evaluation remains the preferred method for distinguishing malignant from benign onychopapilloma. Onychopapilloma, in both its benign and malignant variants, is characterized by papillomatosis and acanthosis, particularly in the distal nail bed, along with matrix metaplasia and distal subungual keratosis accompanied by focal parakeratosis.[3–5,8] In the presented case, histopathological evaluation confirmed the diagnosis of malignant onychopapilloma based on the presence of abnormal onychocytes and nailbed epithelium demonstrating high levels of Ki-67 staining with a sharp demarcation from unaffected epithelium.

HPV testing, particularly when negative, as demonstrated in this case, can also be leveraged to help differentiate malignant onychopapilloma from nail unit Bowen disease.[3] Features suggestive of Bowen disease over malignant onychopapilloma include full-thickness epithelial dysplasia, loss of orderly epithelial stratification, common mitotic figures with associated keratinocyte necrosis, frequent corps ronds, and irregular parakeratosis.[3]

A recent case series retrospectively re-evaluated onychopapilloma cases following the recognition of malignant onychopapilloma by Haneke.[3,4] In this case series, 3 of 52 cases for which immunohistochemistry could be performed were upgraded from "typical" to "atypical/malignant," suggesting that this entity has been perhaps underrecognized and further challenging the existing paradigm of onychopapilloma as a strictly benign condition. In their study, abnormally increased p53 and Ki-67 expression were observed in 33% and 16% of all onychopapilloma cases, respectively, including all three upstaged atypical/malignant cases, with no cases demonstrating p16 expression.[4] The authors conclude that increased Ki-67 and p53 expression, along with the absence of p16 expression and histopathological architecture resembling onychopapilloma, helps to differentiate atypical/malignant onychopapilloma from benign/typical cases and from Bowen disease.[4]

Onychoscopy of malignant onychopapilloma may reveal a band of longitudinal erythronychia or xanthonychia, splinter hemorrhages within a colored streak, and a subungual filiform hyperkeratotic mass stretching from the lunula to the hyponychium. These characteristics are reminiscent of benign onychopapilloma and can be confounded with other entities in the ALL band differential. Onychomatricoma may also manifest with ungual hyperkeratosis, splinter hemorrhages, and xanthonychia coupled with nail plate overcurvature.[9] Head-on onychoscopy may help differentiate malignant onychopapilloma from onychomatricoma; however, the latter displays nail plate thickening with honeycomb-like cavities.[10] Moreover, the nail clipping findings of onychomatricoma display a distinct pattern with an overly curved, thickened plate that is dotted with multiple, various-sized, ovoid cavitations, including serous material. Other nail unit disorders presenting with longitudinal erythronychia may include amelanotic melanoma (differentiated by buckshot spread of S-100 positive cells on nail clipping[11]), glomus tumor (recognized by its distinctive blue–red patches or "candy-cane" streaking with onychoscopy[12]), and squamous cell carcinoma.[13] Longitudinal xanthonychia, although less common, is often associated with dermatophytoma (distinguishable with fungal stains on nail clipping) and onychomatricoma.[14] Splinter hemorrhages and ungual hyperkeratosis are nonspecific and frequently concomitantly described in many of the above processes, most notably squamous cell carcinoma, onychomatricoma, and onychopapilloma.[15]

Data on the prognosis and natural history of malignant onychopapilloma remain scarce. Our patient displayed no metastasis or recurrence at follow-up. Although surgical excision with clear margins remains the primary treatment, the extent required for effective local control remains uncertain. In our case, Mohs micrographic surgery proved advantageous for thorough lesion removal with minimal normal tissue loss.[16]

In sum, this report describes clinical, histopathological, nail clipping, and onychoscopic features of a malignant onychopapilloma, a recently identified nail unit neoplasm. Further research is imperative to elucidate the molecular intricacies, prognosis, and optimal treatment for this condition.

AUTHOR CONTRIBUTIONS

Each named author has contributed substantially to the conception and design of this article, was involved in drafting and revising the manuscript critically, gave final approval of the version to the published, and agreed to be accountable for all aspects of the work.

CONFLICT OF INTEREST STATEMENT

The authors declare no conflict of interest.

DATA AVAILABILITY STATEMENT

Data sharing is not applicable to this article as no new data were created or analyzed in this study.

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