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Case Report

Transverse Leukonychia (Mees Lines) in Pediatric T-cell Acute Lymphoblastic Leukemia a Rare Manifestation During Combination Chemotherapy's Maintenance Phase: A Case Report

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ABSTRACT

An array of clinical manifestations, majority of which are relevant to dose and fade away after drug discontinuation, may accompany drug-induced nail abnormalities, but rarely do they endure over a long time. However, only a few groups of medications are reliably implicated in nail symptoms. Chemotherapeutic drugs have well-known effects on organs that include hair, skin and the digestive tract, which present clinically as exfoliative contact dermatitis, receding hair loss respectively. As a "skin" appendage, Nails are not an exemption. Patients undergoing systemic chemotherapy may experience an assortment of nail anomalies with chemotherapeutic drugs being the most common contributors. These alterations might only affect just one or many nails and could lead to discomfort and pain Nails. Transverse Lines can be passed down genetically or triggered by a range of illnesses and drugs. We report a case of a cancer patient who experienced transverse leukonychia as a result of antineoplastic therapy.

Keywords: Transverse Leukonychia, Chemotherapy drugs, Maintenance phase, Combination Chemotherapy, Pediatric Hemato-Oncology.

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INTRODUCTION

The nail unit includes the nail plate, bed, matrix, folds and hyponychium. The bed supports the plate, while the hyponychium protects its edge. Knowing these relationships aids in diagnosing nail disorders.[1,2] There are numerous chemotherapeutic drugs used in the management of various malignancies. Nail bed deterioration could arise as a direct consequence of the offending medications or as a result of indirect damage to the underlying blood vessels.[3] In severe circumstances, the offending drug must be terminated or the dosage should be reduced. There are numerous nail modifications which can be caused by cancer chemotherapy drugs. The nail modifications can be categorised as those impacting the nail plate, the nailbed, or the nailfolds, depending on which component of the nail structure is implicated. Nail alterations are frequently incorrectly diagnosed or attributed to other reasons, which can be worrisome for the patient. Anticancer treatment is associated with an extensive array of systemic adverse effects. There is a high rate of chemotherapy-induced nail changes with many classic chemotherapeutic agents as well as the newer molecularly targeted agents.[4] It is imperative that the chemotherapy dose be changed or reduced in order to improve the quality of life of patients, who are negatively affected by chemotherapy dose intensity. Finger nails develop at a typical pace of 0.1 mm each day (3 mm each month) requiring four to a half year for complete regrowth and toenails at 0·03 mm each day (1 mm each month) requiring 12 to year and a half for toenails.[5] It is common for drugs to induce changes in nails, usually involving a few or each of the twenty nails. In general, they frequently coincide with the onset of drug use.[6] A toenail takes 80 days and a fingernail 40 days for it to emerge from the proximal nail fold. It is important for one to consider a medication as a likely causal factor provided it was taken two to three weeks prior to the onset of symptoms. Typically, drug-induced nail anomalies are fleeting and go away with the discontinuation of drugs, despite they may endure for an extended period of time. Nail anomalies are reported in both adult and paediatric populations, as well as across a wide range of ethnic groups. A white opacity of the nail plate referred to as true leukonychia may impact the whole plate or may be punctuated or striate.[7] Transverse leukonychia is indicative of nail matrix degeneration affecting the keratinization process of the

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nail plate. This could occur from chemotherapy which includes multiple medication regimens.[8] True leukonychia (Mees lines), which results from medication toxicity, appears as one or more parallel transverse white bands that affect all nails equally and progress gradually with nail growth. The aspect of white streaks on nails in patients endure cancer chemotherapy is more likely a side effect of the treatment than an effect of the underlying cancer.[9] Unna categorized leukonychia into three morphological manifestations in 1896: complete, transverse and longitudinal striated and punctuate. A few years later, Weber introduced an additional presentation, which he termed leukonychia partial is for incompletely white nails.[10] Leukonychia can be categorized anatomically in addition to morphologically into three groups: true leukonychia, which is caused by anomalies in the matrix and plates intrinsically. When the condition affects subungual tissues, it leads to apparent leukonychia and Pseudo-leukonychia is the medical term for the superficial nail plate's (ventral or dorsal) whiteness.[11]

The most frequent type of cancer among children is leukemia, with Acute Lymphoblastic Leukemia (ALL) accounting for as much as eighty percent of all cases. With enhanced chemotherapy, the prognosis for Acute Lymphoblastic Leukemia (ALL) pediatric patients has improved. Oral 6-Mercaptopurine (6MP) and weekly Methotrexate (MTX) are the "BACKBONE" of the protocols for ongoing therapy for pediatric Acute Lymphoblastic Leukemia (ALL). Many drug-sensitive malignancies, including children acute lymphoblastic leukemia, have been shown to be correlated with treatment intensity and treatment outcome.[12] Vincristine (VCR), a vinca alkaloid, interrupts the production of microtubules in the mitotic spindle, resulting in metaphase arbitrary arrest in dividing cells.[13]

CASE REPORT

An 8-year-old child who had leucocytosis was referred to the Paediatric Hemato-Oncology OPD for examination. He had been receiving Maintenance chemotherapy. Over the nails, Mother noticed Transverse Lines. The fingernail displayed significant white, non-blanching transverse stripes that ran parallel to the lunula across the nail's length (Figure 1a and 1b). The child's blood picture revealed Haemoglobin 7.8 g/dL, Total Leukocyte Count 1,80,000/dL and platelet 1,10,000 dL. Lymphoblasts constitute 80% of the peripheral smear. T-cell Acute Lymphoblastic Leukaemia (T-ALL) was identified by flow cytometry and it was managed in accordance with the ICiCLe-ALL 14 Protocol, after the induction phase, the child responded to the chemotherapy and developed no signs of minimally recurrent disease. The child completed his Induction phase, Consolidation Phase, Interim-Maintenance Phase and Delayed Intensification Phase, but during Maintenance Phase, Methotrexate 20 mg/m^2/per oral once in a week, 6 Mercaptopurine 50 mg/m^2/per oral, Injection Vincristine 1.4 mg/m^2 was administered. When reviewed the child's nails during 7th Course of Maintenance Phase. Investigating the fingernails showed two transverse lines of leukonychia. Nails on toes were usual, the width of these bands were approximately 1.5 mm. (Figure 1a and 1b) on admission day. Chemotherapy was to be held accountable in our patients. By analyzing the distance

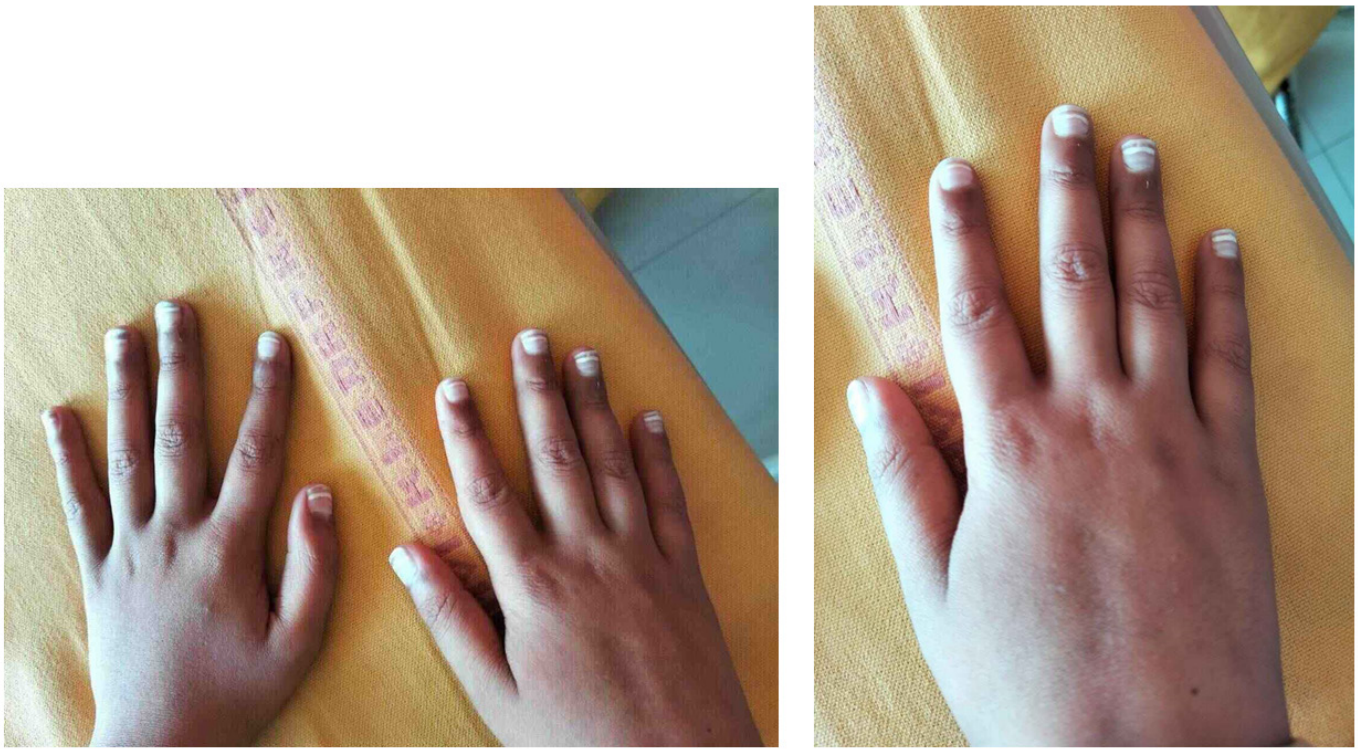

Figure 1: Mees Lines developed after treatment of vincristine, methotrexate and mercaptopurine.

between each band and the proximal nail fold, we were able to figure out when Leukonychia initially appeared. The predicted dates with the admission dates were matched. Methotrexate, 6-Mercaptoprine and Vincristine regimens to produce transverse leukonychia (mees lines) in our patient is rare. It has not been previously reported and proves that a specific anti-neoplastic drug combination is not necessary for the onset of Transverse Leukonychia (Mees Lines). Mees lines eventually subside on their own and do not require to be treated, but underlying conditions should be addressed if they exist. These innocuous nail alterations resolve on their own by migrating distally and do not require any special treatment (Figure 2).

DISCUSSION

The result of nail matrix damage that causes a disruption in the keratinization process in the nail plate is transverse leukonychia.[2] The use of several medication regimens throughout chemotherapy may be the reason for this. Due to medication toxic effects, transverse leukonychia (Mees lines) appears as one or more parallel transverse white bands that affect all nails equitably and progress distally with nail growth. A multitude nail toxicities are frequently related to systemic therapies for cancer. Chemotherapeutic drugs, either on their own or in combination, can cause adverse effects, including nail alterations, which may negatively impact patient's quality of life. For the treatment of rapidly progressing malignancies, oncologists frequently titrate the dosages of the regimen, which may further increase accumulating toxins to the growing nail. The survival rates of cancer patients have increased as a result of new chemotherapeutic drugs and novel oncology protocols. Because of their high specificity, oncological medications nowadays are more selective and have fewer systemic toxicity, but nevertheless frequently induce side effects. Since chemotherapy is typically administered in combination today, it is unusual to pinpoint a single agent as the underlying cause of leukonychia.[14] In our study, the combined administration of 6 MP, MTX and VCR has been observed to cause Mees lines (true leukonychia), despite the fact that several chemotherapy agents and their combinations are known to cause nail changes. However as far as the authors to authors are aware, this is the first instance of mees lines (Transverse Leukonychia) in T-cell Acute Lymphoblastic Leukemia (T-ALL) that presented while receiving maintenance phase of chemotherapy. White bands propagated progressively with successive nail growth, as seen. Nail alterations resulting from chemotherapy are typically transient and disappear once the therapy is stopped.[8] Confounding variables that complicated the investigation of chemotherapy-induced nail alterations included the following a) Most Regimens comprised a combination of several medications turned out to be difficult to identify or isolate the underlying culprit medication. b) the continuous change of the regimens for the treatment of quickly advancing or resolute

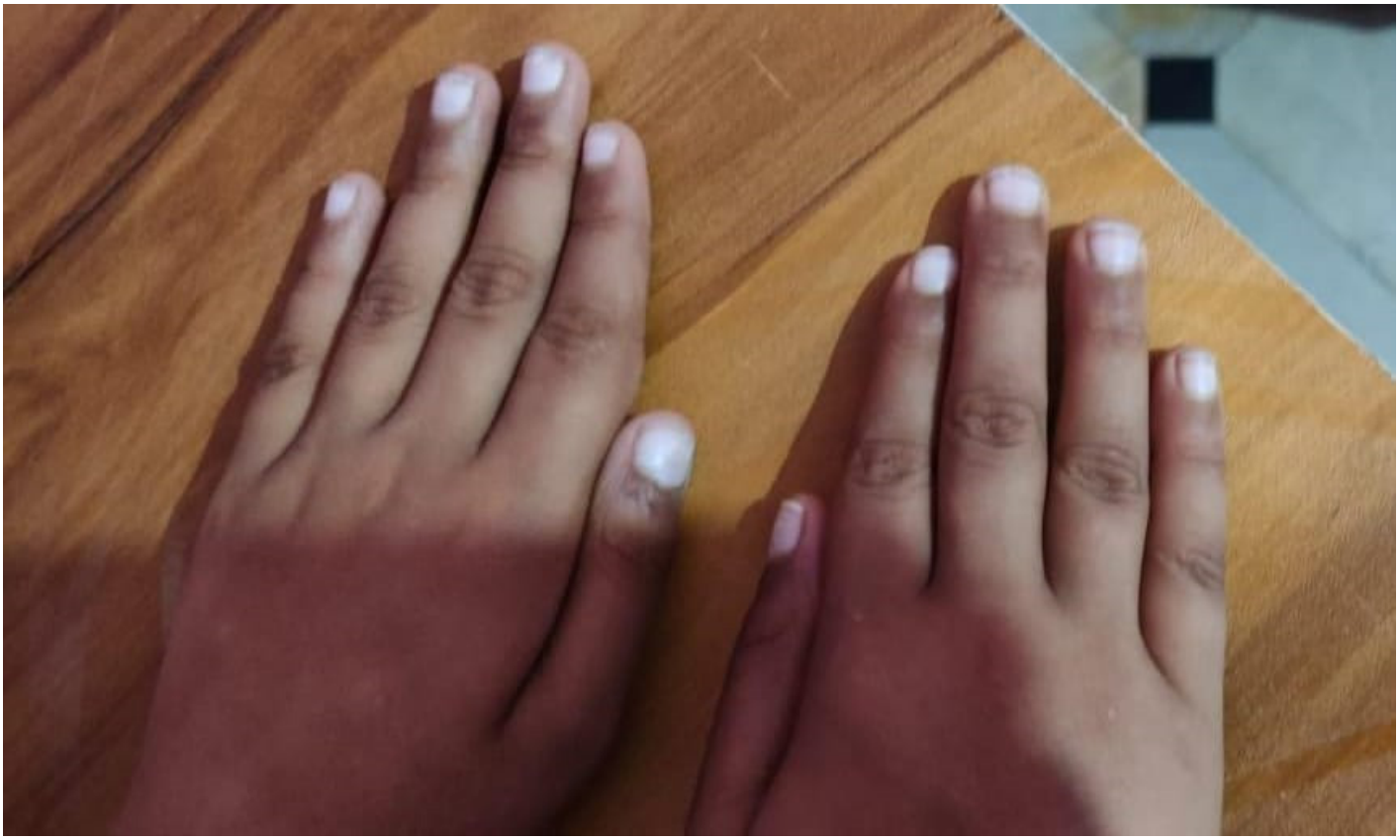

Figure 2: After certain duration (3-4 weeks of post chemotherapy) disappearance of Transverse leukonychia (mees lines).

malignancies.[15] Mees lines are benign conditions that fade away after inflicting damage and do not require any special treatment.

CONCLUSION

Numerous nail alterations may be associated with cancer chemotherapy. Considering the fact that cancer chemotherapy has been described following the administration of diverse combinations, no particular drug combination or particular class of medications is related to this event. Understanding the way chemotherapy impacts nails will be beneficial while counselling cancer survivors who are already apprehensive. Early identification and management of nail toxicities may mitigate the impact and enhance adherence to both established and advanced oncology therapies.

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ETHICS APPROVAL

Case reports and studies intended for quality improvement are often considered not research and do not need IRB approval.

CONFLICT OF INTEREST

The authors declare that there is no conflict of interest.

ABBREVIATIONS

MTX: Methotrexate; **VCR:** Vincristine; **6 MP:** 6- Mercaptopurine; **T-ALL:** T-Cell Acute Lymphoblastic Leukemia; **OPD:** Out Patient Depatment.

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