doi:10.36849/JDD.8965

 ORIGINAL ARTICLE

The Emerging Role of Oncodermatology in a Hemato-Oncology Unit in a Tertiary Hospital

Rhiannon Nancarrow-Lei MBBS, Emily Durity MBBS, Yasmin Alfallouji MBBS, Claire Martyn-Simmons MBA, Evangelia Panagou MBBS

University College London Hospitals NHS Foundation Trust, London, United Kingdom

ABSTRACT

Background: Our dermatology department consistently receives the largest proportion of internal on-call referrals from the hematology-oncology department. Individuals with hematological malignancies are particularly susceptible to dermatologic conditions secondary to immunosuppression and multi-agent exposure, which can impact cancer therapy, leading to morbidity and mortality.

Methods: Our primary objective was to analyze the range of dermatologic conditions observed in patients with hematologic malignancies and to identify potential associations with anticancer therapies. We conducted a retrospective, single-center review of acute hematology-oncology referrals to our on-call service between August 2020 and November 2022. Consultations were identified retrospectively through the on-call referral log.

Results: One hundred and thirty-four (134) patients were included. The most common diagnoses were cutaneous adverse drug eruptions (22%), leukemia or lymphoma cutis (13%), infections (13%), and acneiform eruptions (10%). Notably, cutaneous drug reactions were more prevalent in patients with myeloid neoplasms (32%). Acneiform eruptions predominantly occurred in patients with myeloid lineage malignancies.

Conclusion: Dermatology plays a vital role in providing consultative services to patients with hematology-oncology conditions. With the emergence of novel therapies, the landscape of dermatologic complications in this population is evolving. Consequently, the demand for dermatology expertise is expected to increase to facilitate prompt diagnosis and management and to ensure optimal patient outcomes.

J Drugs Dermatol. 2025;24(10):1018-1023. doi:10.36849/JDD.8965

INTRODUCTION

Oncodermatology is an emerging, growing field of Dermatology aiming to provide supportive care to cancer patients and to prevent unnecessary interruption of cancer treatment. Dermatologic conditions are increasingly prevalent among patients with hematological malignancies. Phillips et al reported that hemato-oncology patients were 6 times more like to receive dermatological consultations compared with patients with non-hematological malignancies.[1] This occurrence can be attributed to factors such as immunosuppression and exposure to multiple therapeutic agents. In addition, the introduction of novel therapies is likely contributing to this trend. The impact of dermatologic disease on cancer treatment outcomes, along with its potential to cause significant morbidity and mortality, underscores the crucial role of oncodermatology in the care of patients with hematology-oncology conditions.

The primary objective was to quantify and analyze dermatologic conditions observed in patients with hematology-oncology diagnoses at a central London tertiary hospital. The secondary objective was to explore potential associations between these conditions and specific subtypes of hematologic malignancies, as well as the anticancer therapies employed.

MATERIALS AND METHODS

We conducted a retrospective, single-center review to analyze acute hematology-oncology referrals received by our on-call dermatology service between August 2020 and November 2022. Data were collected from inpatient notes, clinic letters, and histopathology reports available in the electronic patient record system.

RESULTS

A total of 134 patients were referred to the dermatology department from the hematology-oncology department. Patient ages ranged from 13 to 88 years, with a median age of 54 years. The cohort included 58 males and 76 females (male-to-female ratio, 1:1.3).

Hematologic malignancies were classified as lymphoid neoplasms (45%), myeloid neoplasms (29%), plasma cell dyscrasias (13%), Hodgkin lymphoma (6%), and other malignant or nonmalignant diagnoses (7%). The most common diagnosis overall was acute myeloid leukemia (20%).

The observed dermatology presentations were classified into the following categories: drug eruptions (22%), leukemia or lymphoma cutis (13%), infections (13%) (including bacterial,

viral and fungal), acneiform eruptions (10%), eczematous dermatoses (7%), benign skin lesions (7%), vasculitis (4%), graft-versus-host disease (GVHD), panniculitis, skin cancer, ulcers, dermatomyositis and other miscellaneous conditions.

Of the 134 patients included in our cohort, a diagnostic skin biopsy was performed on 83 patients (62%). Notably, in 13% of the patients, cutaneous involvement confirming leukemia or lymphoma cutis served as a significant indicator of disease relapse or persistent disease. This finding aligns with similar studies conducted in this field, highlighting the clinical value of assessing cutaneous manifestations in detecting disease progression or persistence.[2] The other diagnoses encountered are summarised in Table 1.

We analysed specific chemotherapy agents against the dermatological presentations observed. We did not observe an association between individual anticancer treatments and dermatological conditions observed. This may be due to the low number of cases included in our study.

Drug Eruptions

A total of 30 cases of drug eruptions (22%) were identified, with the majority classified as exanthems (70%). More severe presentations included erythema multiforme, Stevens-Johnsons syndrome, Sweet's syndrome, and drug reaction with eosinophilia and systemic symptoms (DRESS).

Notably, drug eruptions were found to have the highest frequency among patients diagnosed with myeloid lineage neoplasms, accounting for 60% of the observed cases. The reasoning behind this observation is unclear. One possible explanation is that myeloid lineage neoplasms were the most frequently encountered hematologic malignancies in our studied cohort. There was no clear association between a single chemotherapeutic agent and drug eruption; however, most reactions in our cohort occurred with cytarabine (23%) and melphalan (13%). High-dose cytarabine, a chemotherapy agent that inhibits pyrimidine synthesis and is commonly used in the treatment of acute myeloid leukemia, has been associated with cutaneous reactions.[3] This has been found to be dose-dependent, particularly with doses exceeding 700 mg/m2. Moreover, newly diagnosed patients undergoing induction therapy have been identified as being at the highest risk.[3,4]

Notably, 43.3% of our cohort who suffered cutaneous drug eruptions were neutropenic (defined as neutrophil count $<1.5 \times 10^9$ cells per litre) at the time of review. They might have required concurrent antimicrobial therapy, thus increasing their risk of developing a drug eruption. This aligns with the findings of Hines et al who reported significantly more drug reactions in severe neutropenia (33.2% vs 15.0%).[5]

TABLE 1.

Dermatological Conditions Encountered		
Dermatological Condition	**Number**	**%**
Drug eruptions	30	22%
Leukemia/lymphoma cutis	17	13%
Infections (bacterial, viral and fungal)	17	13%
Acneiform eruption	13	10%
Eczematous dermatoses	10	7%
Benign skin lesions	10	7%
Vasculitis	6	4%
GVHD	3	2%
Panniculitis	2	1%
Skin cancer	2	1%
Ulcers	2	1%
Dermatomyositis	1	<1%
Others:	21	16%
Ecchymosis	2	--
Mucositis	1	--
Oedema blisters	1	--
Erythema annulare centrifugum	1	--
Psoriasis	1	--
Pruritis	1	--
Granulomatous dermatitis	1	--
Acquired ichthyosis	1	--
Dysaesthesia	1	--
Hyperpigmentation	1	--
Pityriasis rosea	1	--
Xerosis	1	--
Urticaria	1	--
Intertrigo	1	--
Chronic inflammation	1	--
Resolving/Unknown	5	--

Table 2 demonstrates the cases of drug eruptions with the associated chemotherapy and hematological malignancy.

Immunotherapy Agents

Within the patient cohort, seven (7) immunotherapy agents were associated with a range of dermatology presentations, with drug eruptions most frequently observed and occurring in association with 5 (71%) of the agents.

TABLE 2.

Drug Eruption Associated Chemotherapy and Hematological Malignancy				
Clinical or Histological Diagnosis	**Hematological Malignancy**	**Chemotherapy**	**Other Culprit Drugs**	**Neutropenia**
Morbilliform drug eruption	AML	Gemtuzumab Ozagamicin Daunorubicin Cytarabine	Meropenem Amikacin Clindamycin	Yes
Drug eruption	Myelofibrosis	Ruxolitinib	Tazocin Desferal Exjade	No
Drug eruption	POEMS	Melphalan	Tazocin Ciprofloxacin	Yes
Stevens Johnson Syndrome	Relapsed Follicular lymphoma	Rituximab Bendamustine	Aciclovir Co-trimoxazole	No
Drug-related skin toxicity rash (Grade 1 skin rash)	IgG Kappa MM	CAR-T therapy	N/A	No
Drug eruption	IgG Kappa MM	Melphalan	Aciclovir	No
Erythema multiforme	Classical Hodgkin's lymphoma	Gemcitabine Vinorelbine Doxorubicin Pembrolizumab	Allopurinol Azathioprine	Yes
Erythema multiforme	DLCBL	Melphalan Etoposide Cytarabine Lomustine	Tazocin	Yes
DRESS	CLL	Rituximab Venetoclax	Allopurinol Co-Amoxiclav	No
Drug-related rash secondary to T-cell therapy	Kappa MM	Clinical trial	N/A	Yes
Drug eruption	Relapsed B-ALL	Cyclophosphamide (withheld)	Meropenem Gentamicin MMF + Tacrolimus	No
Drug eruption	T-AML	Fludarabine Cyclophosphamide (withheld)	Tazocin Meropenem	Yes
Drug eruption	Primary CNS lymphoma DLBCL	Carmustine Thiotepa	Tazocin	Yes
Stevens Johnson syndrome	MM	Bortezomib Cyclophosphamide	Tazocin Co-trimoxazole	Yes
Drug eruption	IgG lambda MM	Melphalan	N/A	Yes
Drug eruption	AML	Fludarabine, Cytarabine and Idarubicin	N/A	No
Sweet's syndrome	Relapsed AML	Venetoclax Azacitidine	N/A	No
Drug eruption	B-ALL	Clinical trial	No	No
Drug eruption	T-ALL	Clinical trial	N/A	Yes
Drug eruption	Kappa MM	Bortezomib Dexamethasone Thalidomide	N/A	No
Drug eruption	IgG Kappa MM	BCMA CAR-T therapy	N/A	No
Drug eruption	Primary plasma cell leukaemia	Melphalan	N/A	No
Drug eruption	AML	Cytarabine	N/A	No
Drug eruption	AML	Fludarabine Cytarabine Idarubicin Ponatinib	N/A	No
Drug eruption	Myelofibrosis	Clinical trial	N/A	No
Drug eruption	Mixed myeloid/lymphoid leukaemia	Fludarabine Cytarabine Idarubicin	N/A	Yes
Drug eruption	AML	Clinical Trial Cytarabine	Meropenem	Yes
Drug eruption	IgG kappa MM	Dexamethasone Ixazomib Lenalidomide	N/A	No
Drug eruption	MM with systemic AL Amyloidosis	Melphalan	Ceftazidime	Yes

Infection

Infections were identified in 13% of patients, with fungal infection being the most prevalent (41%), followed by bacterial infections (29%), and viral infections (24%). The higher proportion of fungal infection could potentially be attributed to the level of immunosuppression in the Hemato-Oncology patient cohort. Notably, a significant number of patients (57%) with fungal infections had a history of prolonged immunosuppression. Among them, 3 patients had undergone stem cell transplant, and one patient had a history of untreated HIV/AIDS. These findings highlight the importance of considering the immunosuppressive status and relevant risk factors when managing and assessing infections in this patient population.

Acneiform Eruptions

Acneiform eruptions were observed in 10% of patients in our cohort. Four (4) of whom had undergone stem cell transplantation (31%).

Acneiform eruptions occurred predominantly in patients with myeloid lineage malignancies, specifically acute myeloid leukemia and myelodysplastic syndrome, accounting for 73% of cases.

A Brazilian study found that acneiform eruptions were the third most frequent cutaneous adverse event, similarly affecting 12% of the population, likely due to the use of systemic corticosteroid therapy alongside chemotherapy.[6]

However, in our cohort, no patients were receiving corticosteroids at the time, and five (38%) were under surveillance, with 80% of them having a malignancy of the myeloid lineage, perhaps suggesting a possible link between myeloid cancers and acneiform eruptions.

There is a well-reported association between myeloid cancers and neutrophilic dermatoses.[7] Emerging evidence suggests that skin-infiltrating neutrophils may share a clonal relationship with neoplastic cells and may have differentiated from them.[8] We hypothesized that skin-infiltrating neutrophils in patients with myeloid malignancies might be implicated in the pathogenesis of acneiform eruptions. Although only 3 patients in our cohort with acneiform eruptions underwent skin biopsies, a substantial 75% displayed evidence of neutrophilic infiltrate. While our case numbers remain limited, these preliminary findings underscore the need for further in-depth investigations to establish a definitive link in this potential association.

Table 3 shows acneiform eruptions and the associated chemotherapy agents, hematologic malignancy, and transplant status.

TABLE 3.

Acneiform Eruptions and the Associated Chemotherapy Agents, Hematological Malignancy and Transplant Status

Hematological Malignancy	Chemotherapy	Transplant Status
Hodgkin's Lymphoma	Lomustine Etoposide Cytarabine Melphalan	Yes
Myelodysplastic Syndrome	Surveillance	Yes
Myelodysplastic Syndrome	Surveillance	Yes
IgG Multiple Myeloma	Melphalan ASCT	Yes
T-cell Acute Lymphoblastic Leukemia	Vincristine Daunorubicin Mercaptopurine	None
Diffuse Large B-cell Lymphoma	CAR-T trial	None
Hodgkin's Lymphoma	Surveillance	None
Myelodysplastic Syndrome	Surveillance	None
Myelodysplastic Syndrome	Azacitidine	None
Acute Myeloid Leukemia	Fludarabine Idarubicin Gilteritinib	None
Acute Myeloid Leukemia	Venetoclax Azacitidine	None
Acute Myeloid Leukemia	Venetoclax Azacitidine Gilteritinib	None
Acute Myeloid Leukemia	Surveillance	None

Trial Patients Including CAR-T Patients

Twenty-four (24) patients participated in research trials, with 10 of them being involved in CAR-T therapy trials. Within this sub-cohort, various dermatologic conditions were observed. These included 7 cases of drug eruptions, including one case of DRESS, accounting for 29% of patients. Additionally, folliculitis, leukemia cutis, and eczematous dermatoses each accounted for 13% of the cases, with 3 cases observed for each condition. Furthermore, benign lesions were observed in 2 cases (8%), and one case (4%) each of erythema nodosum, bullous impetigo, relapsed T-cell lymphoma, granulomatous eruption, pityriasis rosea, and xerosis were documented.

DISCUSSION

Our findings align with those of Hines et al, whose study encompassed more than 500 patients. Both studies identified drug eruptions and infections as the most prevalent diagnoses.[5] However, our study revealed a higher percentage of leukemia/lymphoma cutis cases compared to their findings (13% vs 5.8%).[5] The biopsy rate in our study was higher at 62% compared with their study's rate of 52%.[5] Interestingly, biopsy played a crucial role in securing a definitive diagnosis in 76% in our study, a figure closely aligned with Hines et al's findings (73%). Despite 24% of biopsies in our study yielding nonspecific results, it is important to note that a negative biopsy can hold value by ruling out certain conditions.

Significantly, within our cohort, 43.3% of individuals experiencing cutaneous drug eruptions were concurrently neutropenic. These patients required antimicrobial therapy, thereby heightening their susceptibility to drug eruptions. Again, our observations are in concordance with the research by Hines et al, who noted a substantial increase in drug reactions among those with severe neutropenia (33.2% vs 15.0%).[5]

Fungal infection emerged as the most frequently isolated type of infection (41%), which is possibly attributable to the prolonged immunosuppression experienced by the patients. While Hines et al observed a potential association between lymphoid neoplasms and viral infection, we did not identify a similar pattern within our patient cohort.[5]

A study investigating cutaneous eruptions in oncological patients receiving anticancer therapies reported that acneiform eruptions occurred in 12% of their patient population, which closely aligns with our findings of 10%.[6] However, it is relevant to note that all cases of acneiform eruptions were attributed to concurrent corticosteroid therapy in those patients rather than the anti-cancer therapy. In our study, acneiform eruptions occurred predominantly in patients with myeloid lineage malignancies, ie, acute myeloid leukemia and myelodysplastic syndrome (73%). It remains unclear whether these eruptions were triggered by the underlying malignancy or by the treatment received.

Interestingly, previous studies have not specifically addressed acneiform eruptions, leaving uncertainty regarding whether these eruptions were managed by the Hemato-Oncology team or if our study captured more severe cases that warranted referral to the Dermatology on-call service.[2,5]

Limitations

There are several limitations to our study that warrant acknowledgment. First, it was a single-center study, which may limit the generalizability of the findings to other health care settings with different patient populations and clinical practices. In addition, the retrospective design introduces inherent limitations, including potential bias in data collection and reliance on existing medical records, which may lack comprehensive information.

Another limitation is the inherent complexity of treatment regimens involving multiple drug therapies. This complexity makes it challenging to determine the exact contribution of each drug to the development of a dermatological conditions. It highlights the need for further research, ideally with larger and more diverse cohorts, prospective designs, and controlled settings, to better understand the relationship between underlying malignancy, drug therapies, and dermatological manifestations in hematology-oncology patients.

CONCLUSION

The wide range of dermatology presentations observed in Hemato-Oncology patients underscores the need for comprehensive dermatological care. With the emergence of novel agents such as CAR-T cell therapy and the use of multiple agents in this patient cohort, the demand for Oncodermatology expertise is expected to increase. The significance of preventing and treating dermatological manifestations cannot be overstated, particularly in the context of chemotherapy and immunotherapy. By avoiding or limiting these, we can help prevent the need for treatment withdrawal or dose reduction, which is crucial for ensuring the effectiveness of cancer therapy.

Our study highlights the significance of dermatologic input and the role of skin biopsy in patients with hematology-oncology conditions, particularly for the diagnosis of lymphoma or leukemia cutis, which may present insidiously and is often clinically misdiagnosed. Recognizing the importance of dermatologic evaluation and incorporating skin biopsy can enhance diagnostic accuracy and ensure appropriate management of these patients..

However, it is interesting to consider whether certain Dermatology presentations are indeed more commonly associated with particular Hematological malignancies or specific drug agents. Further, larger-scale studies are warranted to explore this, as this can have significant implications for predicting and pre-emptively addressing skin reactions in

certain malignancies and with certain drugs. Early intervention based on such knowledge may potentially reduce morbidity and even mortality in some cases.

DISCLOSURES

The authors have no conflicts of interest to disclose.

ACKNOWLEDGMENT

We would like to thank the UCLH Hemato-Oncology department for their continued input and support.

REFERENCES

1. Phillips GS, Freites-Martinez A, Hsu M, et al. Inflammatory dermatoses, infections, and drug eruptions are the most common skin conditions in hospitalized cancer patients. *J Am Acad Dermatol.* 2018;78(6):1102-1109. doi:10.1016/j.jaad.2017.12.031.
2. Merlo G, Cozzani E, Canale F, et al. Cutaneous manifestations of hematologic malignancies the experience of an Italian dermatology department. *Hematol Oncol.* 2019;37(3):285-290. doi:10.1002/hon.2569.
3. Cetkovská P, Pizinger K, Cetkovský P. High-dose cytosine arabinoside-induced cutaneous reactions. *J Eur Acad Dermatol Venereol.* 2002;16(5):481-485. doi:10.1046/j.1468-3083.2002.00395.x.
4. Wright LG. Maculopapular skin rashes associated with high-dose chemotherapy: prevalence and risk factors. *Oncol Nurs Forum.* 2006;33(6):1095-1103. doi:10.1188/06.ONF.1095-1103.
5. Hines A, Hazim A, Wetter DA, et al. Retrospective analysis of 578 inpatient dermatology consultations in hematology and hematopoietic stem cell transplant patients. *Int J Dermatol.* 2021;60(11):1385-1391. doi:10.1111/ijd.15650.
6. Ceglio WQGW, Rebeis MM, Santana MF, et al. Cutaneous adverse events to systemic antineoplastic therapies: a retrospective study in a public oncologic hospital. An Bras Dermatol. 2022;97(1):14-21. doi:10.1016/j.abd.2021.05.007.
7. Lepelletier C, Bouaziz JD, Rybojad M, et al. Neutrophilic dermatoses associated with myeloid malignancies. *Am J Clin Dermatol.* 2019;20:325-333.
8. Maglie R, Genovese G, Solimani F, et al. Immune-mediated dermatoses in patients with haematological malignancies: a comprehensive review. *Am J Clin Dermatol.* 2020;21:833-854.

AUTHOR CORRESPONDENCE

Evangelia Panagou MBBS
E-mail:..... epanagou@doctors.org.uk