

Early detection of dermatological diseases in children admitted to a neurological unit: A retrospective study

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Abstract

Background: Both the central nervous system and skin are derived from the same ectodermal origin during the process of embryogenesis, and thus children with neurologic disorders may have associated skin diseases, an area that needs to spotlight.

Objective: The aim of this study was to clarify and analyze the dermatological consultations encountered to a neurological unit.

Methods: Dermatological consultations during the last two years from children admitted in a neurological unit were retrospectively analyzed.

Results: Out of 1,103 dermatological consultations, 318 (28.8%) came from the department of neurology. The ratio of male to female was 1: 0.7. Consults were most frequently found from children with Encephalopathy (25.8%). The most common dermatological consultations were Skin infections (25.7%), Eczema/dermatitis (31.5.0%) followed by cutaneous adverse drug reactions (10.8%).

Conclusion: This study clarifies the significantly high frequency of skin diseases among hospital-admitted children due to neurological illnesses. Integration between the pediatric neurologist and dermatologists as secondary care providers on one side and the family physician as a primary care provider in the other side may improve the quality of patient care, help to early predict the occurrence of these illnesses, early intervention and subsequent better outcome.

Keywords: dermatology; pediatric neurologist; referral, consultation

1. Introduction

Skin disorders may be primary lesions or reflecting an underlying systemic illness. While dermatologic practice occurs primarily in the outpatient clinics, dermatologists also provide essential consultative services for inpatients admitted to other different disciplines. Several researches on the characteristics of dermatologic consultations have been reported. Several studies found that patients from the neurology unit accounted for a significant portion of referrals as reported by Lyu *et al.* who also found the same result [2]. However, other studies showed that the epidemiology of skin diseases among inpatient consultation has been described in the fields of obstetrics and gynecology, rheumatology⁷, pediatrics hematology⁹, and the intensive care unit, in order of frequency. However, data describing dermatology consultations coming from neurology unit are limited [3,4].

The epidermal and neuronal tissues are derived from a common neuro-ectodermal precursor. It is well known that neurologic and dermatologic abnormalities occur concurrently in hereditary disorders such as tuberous sclerosis, neurofibromatosis, and xeroderma pigmentosum. Moreover, much evidence has accumulated supporting an association between acquired neurological disturbances, Parkinsonism, or spinal cord injury and changes on the skin such as seborrheic dermatitis (SD) or fungal infections occurring below the neurologic level of injury [5].

The aim of this study was to clarify and analyze the dermatological consultations encountered in a neurological unit.

2. Methods

This was a retrospective study conducted at Banha Specialized Pediatric Hospital, Ministry of Health and Population, Egypt. The hospital has a dermatology outpatient clinic. All cases either outpatients or referred inpatients were evaluated and reviewed by dermatology trainees and a senior consultant dermatologist. The diagnoses were made according to the International Classification of Disease, 10th Revision. All the in-patient referrals for dermatology consultations were reviewed between July 1, 2013, and June 30, 2015. Data were extracted from medical records and included the clinical record number, age, gender, requesting service, date of application, reason for admission to the hospital, and the final dermatological diagnosis. If the patient was not hospitalized, or had no apparent skin lesion or clinical symptoms related to the skin at the time of the visit, the case was excluded. Neurological conditions were divided to nine categories, as shown in Table (2). Diagnoses made by the consulting dermatologist were divided to twelve categories (Table 3). In addition to the number of consultations, we also determined the relative frequency of consultations made for neurology unit inpatients compared with other specialties.

3. Statistical analysis and ethics statement

Statistical analyses were performed using Statistical Package for Social Sciences (SPSS) software program under windows using a personal computer. Comparisons of dermatologic variables between the groups (patients with specific neurosurgical disorders versus those with other diseases) were

performed using Chi-squared tests and Fisher's exact tests, as appropriate and P-values <0.05 were considered to be statistically significant. This study was approved by the ethical committee of the faculty of medicine, Menoufia University, Egypt.

4. Results

Table 1: Demographic characteristics and clinical diagnosis recorded in reviewed files

Variable	Value	p-value	OR (95% CI)
Sex (n, %)			
Male	192 (60.4)	0.004	2.75 (1.34~5.64)
Female	126 (39.6)		
Age (yr)			
Mean ± SD	9.8±6.7	0.717	
Median	6.1		
Range	2~17		
Neurosurgical conditions (n, %)			
Encephalopathy	82 (25.8)	0.048	1.96 (1.00~3.85)
Cerebral infarction	66 (20.8)	0.379	0.67 (0.27~1.64)
Cerebral hemorrhage	55 (17.3)	0.774	1.13 (0.38~2.96)
Cerebral infection	44 (13.8)	0.804	0.77 (0.26~2.24)
Spinal fracture	24 (7.5)	0.763	1.23 (0.42~3.63)
Other spinal diseases	18 (5.7)	1.000	0.67 (0.15~2.91)
Brain tumor	18 (5.7)	0.445	1.59 (0.45~5.53)
Others	11 (3.4)	0.710	0.46 (0.06~3.46)
Total patients	318 (100.0)		

Table 2: Frequency of In-patient services consulting the dermatologist

Requesting service	Consultations	Total inpatients during the study period	Percentage of inpatients who are referred to dermatology*
Neurology	318 (28.8)	932 (8.9)	34.1
Pediatrics	183 (16.6)	1231 (11.7)	14.9
General surgery	94 (8.5)	1123 (10.8)	8.4
Orthopedics	83 (7.5)	982 (9.4)	8.5
Intensive care unit	119 (10.8)	1532 (14.6)	7.8
Otolaryngology	35 (3.2)	388 (3.7)	9.1
Cardiothoracic surgery	63 (5.7)	605 (5.8)	10.4
Urology	36 (3.3)	879 (8.4)	4.1
Family medicine	130 (11.8)	1417 (13.5)	9.2
Ophthalmology	17 (1.5)	601 (5.7)	2.8
Others	25 (2.3)	789 (7.5)	3.2
Total	1103 (100.0)	10479 (100.0)	10.5

*Values are presented as number (%). (Total consults/total in-patients)×100.

Table 3: Recorded dermatological diagnosis among neurology unit' In-patient consulting the dermatologist

Diagnosis	N (%)
Dermatitis	108 (31.5)
Contact dermatitis	57 (52.8)
Seborrhea dermatitis	41 (38.0)
Other Eczematous dermatitis	10 (9.2)
Infectious skin disorders	88 (25.7)
Fungal infection	34 (38.6)
Viral skin disease	33 (37.5)
Bacterial disease	21 (23.9)
Adverse Drug reaction - eruption	37 (10.8)
Urticaria	24 (7.0)
Folliculo-sebaceous diseases	18 (5.2)
Cutaneous vascular diseases	13 (3.8)
Hair disorders	11 (3.2)
Connective tissue diseases	9(2.6)
Subcutaneous fat diseases	8 (2.3)
Pigment anomalies	7 (2.1)
Nail disorders	5 (1.4)
Miscellaneous	15 (4.4)
Total	343 (100.0)

5. Discussion

Dermatological consultations of 318 child (Table 1) during the last two years from children admitted in a neurological unit were retrospectively analyzed versus 1103 children admitted to other clinical departments (Table2) to clarify and analyze the dermatological consultations encountered to a neurological versus other units.

In recent years, the field of dermatology has evolved into a predominantly outpatient practice, with increasing emphasis on cosmetics and surgical procedures [5]. While the number of patients admitted to dermatology services is decreasing, the need for dermatologists as consultants in the hospital setting is increasing [6].

Although the type and number of referrals from other services vary according to factors such as the healthcare system and the proportion of beds allocated to each department, previous studies have reported a lower proportion of referrals from the department of neurology compared with our study results, accounting for 1.9%¹⁴, 3.0%⁴ and 11.9%² of all referrals. Interestingly, one study found that patients with neurological illnesses were the most frequently referred. (Table 2) Several

other reports have shown that neurology patients also require frequent dermatology consults [7]. This high number of consultations from neurology and/or neurosurgery patients likely reflects the fact that these patients are often bed-ridden and thus have a greater need for dermatologic care [8].

Eczema and cutaneous infections (Table 2) were the two most common dermatologic disorders referred for management, accounting for over half of all consultations. This is consistent with previous findings [9].

The two most common individual 'dermatitis' diagnoses encountered in this study were contact dermatitis and Seborrhea dermatitis (Table 3). A previous report suggested that sweating caused by inappropriate hospital room temperature, detergents used to clean bed clothes, and soaps are factors that can cause contact dermatitis [10]. In addition, antiseptics in general, and specifically those used in surgical washing preparations, occlusive dressings for surgical wounds, confinement to the hospital bed for patients with delirium, athetotic movements or seizures, and use of catheters tend to contribute to dermatologic issues, particularly among neurology unit inpatients.

Reed *et al.* previously reported a high incidence of SD after spinal cord injury due to altered sebaceous secretion, dermatophytosis, and changes in sweat secretion. Similarly, Wilson and Walshe [11] identified SD in 65% of recently injured quadriplegic patients. The accumulation of sebum and scales on inadequately scrubbed skin resulting from a prolonged period of immobilization were suggested as the possible cause of SD. In addition, the histopathologic findings of less differentiated sebaceous glands and thickened germinated layers in the affected area of ipsilateral SD occurred after syringomyelia also suggest that a neurocutaneous mechanism may involve the sebaceous and immune pathways [11]. But, among the neurosurgical disorders, Intracranial hemorrhage only has been significantly associated with Seborrheic dermatitis ($p=0.035$). Proceeding from these findings and quadriplegic state seen in Intracranial hemorrhage patients, it seems reasonable to assume that Seborrhea dermatitis is linked to the abnormal neurologic condition of Intracranial hemorrhage, just in overall perspective. However, there are no studies to address the specific relationship between Intracranial hemorrhage and Seborrhea dermatitis.

Infectious skin disorders were one of the most common dermatologic diagnoses encountered in this study. Contributing factors for skin infection in neurosurgical inpatients are an altered skin barrier due to decreased sweat production [13], increased sebum excretion [14], and immunologic changes including a decrease in the immune function via alterations in natural killer cells, T-cells, and interleukin receptor levels [15]. In contrast to a previous report that suggested an increased rate of fungal infections below the level of spinal cord injury [12], we did not identify a significant correlation between spinal disease and fungal skin infections. This discrepancy is possibly due to the transfer of these patients to the rehabilitation medicine unit.

Adverse drug reactions were the third most frequent reason for consultation, which is consistent with that reported in previous studies [1, 2, 11]. Notably, 37 patients (10.8%) developed adverse drug reactions after exposure to contrast media, of which the most common adverse reaction was skin eruption [15], for computerized tomography or angiography.

However, none of the individual neurosurgical conditions were significantly associated with Adverse drug reactions except for a cerebral aneurysm. There was a greater likelihood of an infectious neurosurgical condition in patients diagnosed with adverse drug reactions. The findings are natural as the major putative drugs implicated in cases of adverse drug reactions among dermatology referrals were antibiotics (50%) and antiepileptics (13%) [15].

The wide spectrum of dermatologic conditions seen in inpatient multidisciplinary hospitals can pose diagnostic and therapeutic challenges to non-dermatologists in patient care. Falanga *et al.* [17], reported a mean diagnostic accuracy for dermatologic diagnoses made by non-dermatologists to be 48%.

Our results enhance understanding of inpatient neurosurgical dermatology consultations and may be helpful in developing educational materials and management guidelines.

6. Limitation of the study

This study has some potential limitations. It has a retrospective design, with all the attendant limitations of a retrospective study. Reliance only on the medical records is a potential limitation. The paucity of histological information limited the interpretation of data. The vagueness of a control group because the study was conducted in in-patients only. Comparing the dermatological findings in neurology unit' inpatients and the general population may make up for this weak point in case of need. And larger prospective studies may help to shed light on useful clinical features that may determine the relationship between underlying neurological disorders and dermatologic conditions such as ICH and SD.

7. References

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