Bullae and Sweat Gland Necrosis: Clinicopathologic Observations

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Bullae and sweat gland necrosis have been often described in patients with mental changes, which commonly manifested as erythematous or vesicobullous lesions on pressure sites. Histopathologically, the necrosis of sweat glands is a characteristic finding. Generalized and/or local tissue hypoxia due to prolonged immobilization may have resulted in these clinical and histopathological manifestations.

To date, we have experienced 15 cases with bulla and sweat gland necrosis. On admission, about half the patients had carbon monoxide poisoning, and the remainders had alcohol overdosage, drug intoxication, and others. All our patients had mental changes caused by carbon monoxide poisoning, alcohol intoxication, and others. Abrupt erythematous swelling and/or vesicobullous lesions affected pressure sites in all patients. Three patietns had erythematous lesions on non-pressure sites simulataneously. Histopathologic examinations of 12 biopsy specimes showed the necrosis of the epidermis, intra- or sub-epidermal bulla, and/or sweat gland necrosis. (Ann Dermatol 8:(1)79~84, 1996).

Key Words : Bullae and sweat gland necrosis, Mental changes, Sweat gland necrosis

Skin lesions in patients with mental changes due to an accident, illness, overdosage of narcotics, or carbon monoxide poisoning may be clinically[1-10] and histologically[1-4,6,7] distinctive. Erythematous swelling or tense bulla developed at sites of pressure during immobilization, which could gradually develope into ulcerative patches[1-10]. Histopathologically, the necrosis of sweat glands are characteristic[11]. Therefore, Lever et al called these clinical and hitopathologic manifestations as bullae and sweat gland necrosis.

We experienced 15 patients with bullae and sweat gland necrosis from 1986 to 1994. In all cases, the mental status ranged from drowsiness to comatous. Herein, we describe the detailed findings of bullae and sweat gland necrosis as displayed in these physical examinations and biopsy specimens.

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REPORT OF CASES

The clinical and histologic data on the fifteen patients with bullae and sweat gland necrosis are summarized in Table 1 and 2.

Clinical findings(Table 1)

The age of patients ranged from 16 to 77 years, with a mean age of 42.4 years. The male-to-female ratio was 4:1. Most of the patients had blanchable erythematous macules which then either progressed to red-blue edematous plaques or to bullae and erosions(Fig. 1,2). Sometimes two or more patterns of skin lesions were simultaneously seen

Table 1. Summary of the 15 patients with bulla and sweat gland necrosis

Case No.	Age& Sex	Cause of Mental change	Mental State on Admission	Clinical findings and course	Histologic findings
1	16/ M	CO poisoning	Semicoma	Erythematous and edematous plaques with variable size, surmounted with bullae on right buttock, right heel, left calf and left dorsum of foot. Lesion on buttock became necrotic and skin graft was done. Other lesions healed spontaneously with simple dressing.	Epidermal necrosis SEB Necrosis of secretary & ductal portion of S.G* Necrosis of arrector pili muscle. Presence of inflammatory cells & fibrins in blood vessel walls.
2	19/ M	CO poisoning	Drowsy	Bullae upon erythematous plaques on right ear , arm and left heel. Ulcer with gangrene on right buttock became necrotic and skin graft was done. Other lesions healed spontaneously with simple dressing.	Epidermal necrosis SEB Necrosis of secretary & dutal portion of S.G* Necrosis of arrector pili musle & pilosebaceous unit
3	21/ F	CO poisoning	Drowsy	Erythematous swelling around left eye and flacid bullae on chest, right palm and both knees. All lesions healed spontaneously with simple dressing.	Epidermal necrosis IEB Necrosis of secretary portion of S.G* Necrosis of pilosebaceous unit Presence of inflammatory cells & fibrins in blood vessel walls.
4	25/ M	CO poisoning	Drowsy	Red-blue raised plaques with erosions and tense blisters on left cheek, both dorsum of hands and proximal interphalangeal joints of left 4th & 5th fingers. All lesions healed spontaneously with simple dressing.	Not done
5	25/ M	CO poisoning	Semicoma	Erythematous patches with erosions and tense blisters on Lt. cheek, left dorsum of hands, proximal interphalangeal joints of 2nd, 4th, 5th fingers, left wrist and left thenar eminence(Fig.1). All lesions healed spontaneously with simple dressing.	Epidermal necrosis SEB Necrosis of secretary portion of S.G*
6	30/ M	CO poisoning	Drowsy	Erythematous swelling on perioral region, flaccid multiple blister on right thenar eminence, both knees and dorsum of proximal interphalangeal joints of both great toes. All lesions healed spontaneously with simple dressing .	Epidermal necrosis IEB Necrosis of secretary portion of S.G* Necrosis of pilosebaceous unit.
7	37/ M	CO poisoning	Drowsy	Erythematous patches with multiple tense bullae on right cheek, right side of chest, right side of thigh and right knee. All lesions healed spontaneously with simple dressing.	Epidermal necrosis SEB Necrosis of secretary portion of S.G.*

Case No.	Age& Sex	Cause of Mental change	Mental State on Admission	Clinical findings and course	Histologic findings
8	37/ M	Acute alcohol intoxication	Drowsy	Erythematous swelling with shallow ulcer on right palm & flaccid bulla on dorsum of hand. Right median nerve palsy became evident within 24 hour. All lesions healed spontaneously with simple dressing.	Epidermal necrosis SEB Necrosis of secretary & ductal portion of S.G*
9	58/ M	Acute alcohol intoxication	Drowsy	Tense bulla on occiput Lesion healed spontaneously with simple dressing.	Epidermal necrosis SEB Necrosis of secretary & ductal portion of S.G*
10	60/ M	Acute alcohol intoxication	Semicoma	Red-blue patch with serpiginous borders, tense blisters on sacro-coccygeal region (Fig. 2). All lesions healed spontaneously with simple dressing.	Epidermal necrosis SEB Necrosis of secretary & ductal portion of S.G*
11	48/ M	Alcohol+Drug (diazepam)	Semicoma	Bullae over left ear, on opposing surfaces of distal interphalangeal joints of left 4th & 5th fingers and left dorsum of hand. All lesions healed spontaneously with simple dressing.	Not done
12	54/ F	Drug(diazepam)	Drowsy	Red-blue patch with serpiginous borders, tense blisters on sacral region & right side of buttock. Well demarcated ulcer on left heel(Fig. 3). All lesions healed spontaneously with simple dressing.	Not done
13	60/ F	Metabolic encephalopathy(D.M.)	Semicoma	Erythematous patches with multiple tense, flacid hemorrhagic bullae on left cheek, left arm, left breast, surface of left ilac crest and left 5th toe. Bluish gangrenous ulcer on left side of thigh. Skin graft was done on left thigh(Fig. 4).	Epidermal necrosis SEB Necrosis of secretary portion of S.G*
14	69/ F	Metabolic encephalopathy(D.M.)	Coma	Red-blue patch with flaccid bullae on sacral region, left side of buttock, both knees and right shin. All lesions healed spontaneously with simple dressing.	Epidermal necrosis IEB Necrosis of secretay & ductal portion of S.G* Precence of inflammatory cells & fibrins in blood vessel walls.
15	77/ M	Neurologic disorder	Semicoma	Closely grouped vesicles on both ankles and left palm	Epidermal necrosis SEB Necrosis of secretary & ductal portion of S.G*

CO : carbon monoxide, D.M. : diabetes mellitus, SEB : subepidermal bulla, IEB : intraepidermal bulla, S.G* : sweat gland

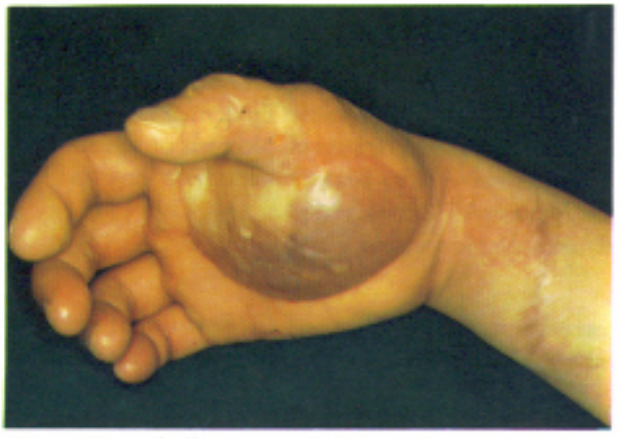

Fig.1. Tense bulla surrounded by erythematous rim on the right palm(Case No.5).

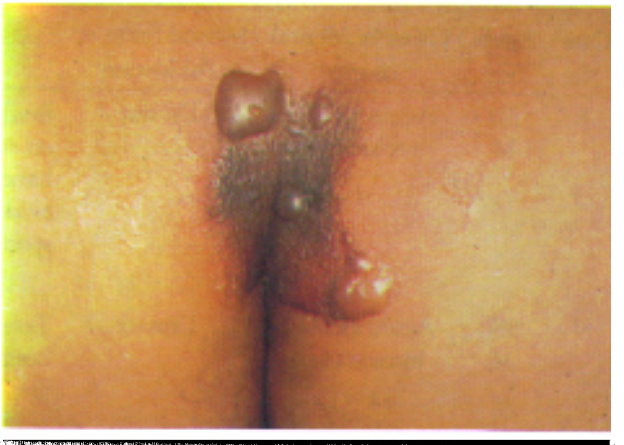

Fig.2. Erythematous, edematous plaque with central necrotic change and multiple tense bullae on the coccygeal area(Case No.10).

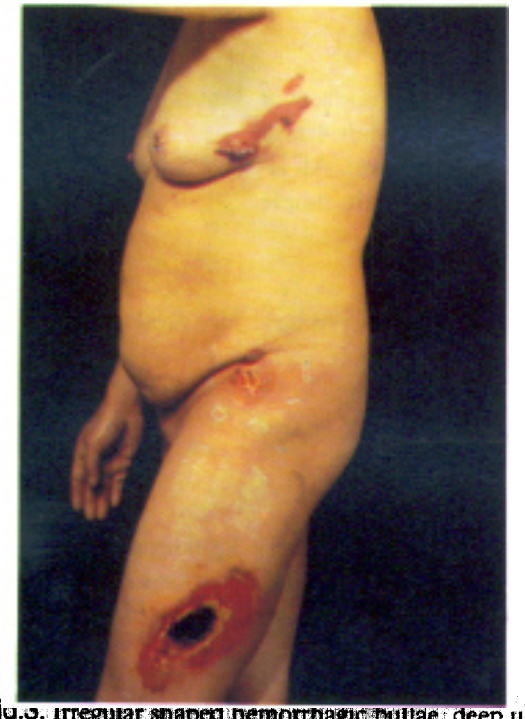

Fig.3. Irregular shaped hemorrhagic bullae, deep ulcerations, and erythematous plaque with central black colored gangrene at pressure sites of left side of the body surface (Case 13).

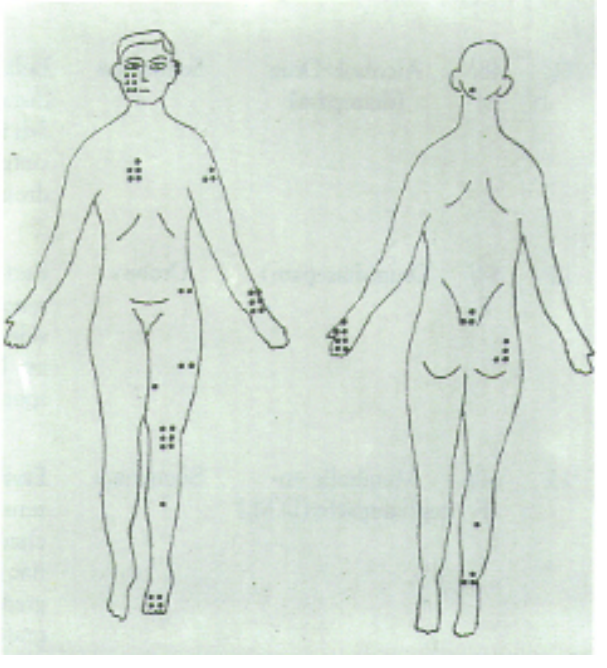

Fig. 4. Distribution of skin lesions in 15 cases.

in the same patient(Fig. 3). In 3 patients(case 2, 12, and 13), parts of the bullous and erosive lesions were followed by gangrenous ulceration(Fig. 3). The skin lesions usually occurred on pressure sites of the body surface(Fig. 4). However, we found skin lesions on non-pressure sites as well as pressure sites in 3 patients(case 1,5,14)

Etiologic factors(Table 1)

All the patients were mentally disturbed on admission; comatose in 1 case, semicomatose in 6 cases, and drowsy in 8 cases. The leading cause of mental change was carbon monoxide poisoning(7 cases). The other causes were acute alcohol intoxication(3 cases), drug intoxication(2 cases), metabolic encephalopathy due to diabetes mellitus(2 cases), and seizure(1 case).

Histopathologic findings(Table 1 and 2)

Skin biopsies were taken from the vesicobullous

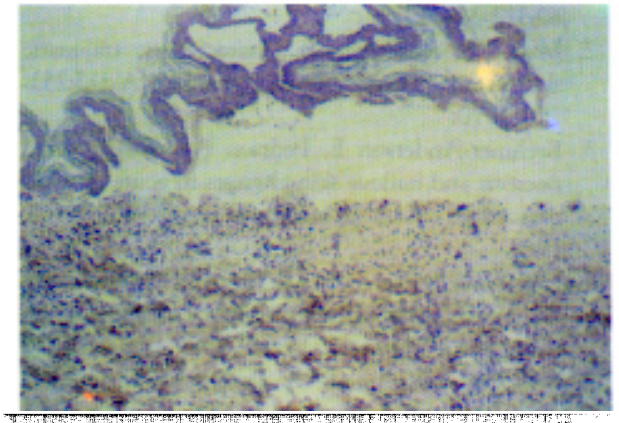

Fig.5. The histopathologic findings from the bullous skin lesion showing subepidermal blister(Case 1, H&E stain, ×40).

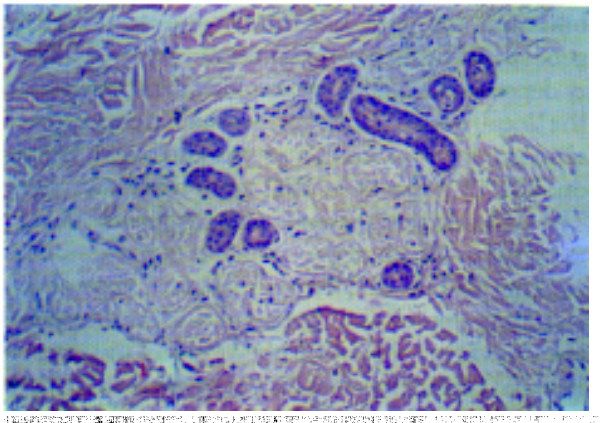

Fig.6. The histopathologic findings of eccrine sweat glands : entire necrotic changes of secretory portions and intact ductal structures in the eccrine glands(Case 1, H&E stain, ×100).

Table 2. Histologic features of bulla and sweat gland necrosis

Necrotic epidermis (12)
Intra- or sub-epidermal bulla formation (12)
Necrosis of secretary portion of sweat gland(12)
Necrosis of ductal portion of sweat gland(6)
Necrosis of pilosebaceous units (3)
Necrosis of arreator pili muscle (3)
Vasculitis (3)

Numbers in parentheses indicate numbers of specimens with given feature.

lesions of 12 cases. All but 3 cases showed subepidermal bulla with necrosis of the overlying epidermis(Fig. 5). The dermis beneath the bullae was infiltrated with sparse inflammatory cells such as neutrophils, lymphoid cells, histiocytes, and a few eosinophils in most cases. Although the dermal collagen fibers were relatively intact, the secretory portions of eccrine sweat glands of 12 cases had selectively necrotic changes with an eosiniphilic homogenization of cytoplasm and a pyknosis or absence of nucleus of glandular cells(Fig. 6). However, the ductal portions of the eccrine gland and pilosebaceous units were only involved in 7 cases and 3 cases respectively. The acute inflammatory cells often invaded into the altered sweat glands.

Clinical courses and treatments

All patients recovered their mental health with adequate management. In most cases, the erythematous and bullous skin lesions also healed with only simple dressing within 1 to 2 weeks. However, further management such as skin grafts were needed in three ulcerative lesions(Table 1).

DISCUSSION

Bullae and sweat gland necrosis can be acutely or gradually manifested in sites of pressure in immobilized patients due to mental changes. Because the cutaneous lesions affecting the pressure sites can be diagnostic, early recognition may be helpful for saving the life of mentally disturbed patients. In all but 3 of our cases skin lesions also appeared abruptly on sites of pressure, acompanying the mental changes. Fortunately, we could recognize the characteristic skin lesions of all the patients, and they could be restored mentally without sequelae due to rapid medical treatment.

The causes of mental disturbance have been described as follows: carbon monoxide intoxication[6-8], drug overdosage due to barbiturate[1-3,12] and other central nervous system depressants(diazepam[10], heroin[2], morphine[1], methadone[2], amitriptyline[4]), ethanol overdosage[1], central nervous system damages including head trauma[1], cerebral vascular accident1, and viral encephalitis[1], and metabolic encephalopathy-hypoglycemic coma induced by diabetes mellitus[5]. In our cases, the most common cause was carbon monoxide poisoning(46.7%). Ethanol overdosage, drug intoxication, metabolic encephalopathy and seizure also were causes.

Mandy and Ackerman[2] suggested that local hypoxia at the pressure site during prolonged immo-

bilization led to tissue injury, and subsequently generalized hypoxia by respiratory and/or circulatory depression would both accelerate and exaggerate the local insult. However, we experienced three semicomatous or comatous patients with lesions on sites of pressure as well as non-pressure sites. The eight drowsy patients who supposedly moved more frequently than the comatous or senicomatous patients also showed the skin lesions. These observations prompted us to maintain that local tissue ischemia was not the only pathogenesis of this disease. Holton[9] considered that any toxic materials might additionally affect the cutaneous manifestations. Therefore, further studies are needed to evaluate the pathomechanism of these lesions.

When the dermal tissues were under a hypoxic state, the glandular secretory cells are more vulnerable than other appendageal cells[13,14]. Therefore, initial histopathologic finding of bulla and sweat gland necrosis is the necrotic change of the secretory cells of eccrine glands. Subepidermal or intraepidermal bulla formation, necrosis of the pilosebaceous unit, acute inflammation of the dermis or subcutaneous fat also could be observed[1,3,7]. Also we could observe the subepidermal bulla formation with necrotic epidermis as well as eccrine sweat gland necrosis in 12 cases.

In nearly all of the reported cases, the skin lesions spontaneously resolved without surgical intervention in 10 to 14 days[2]. Our cases also showed self-limited courses except for 3 cases who needed skin grafts.

Conclusively speaking, although disturbed mental status may result in tissue damages due to a hypoxic state, further observations and studies are needed to clarify the relationship between mental changes and cutaneous manifestations in bullae and sweat gland necrosis.

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