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Sudden Death due to Waterhouse-Friderichsen Syndrome and Purulent Leptomeningitis Caused by Acinetobacter calcoaceticus *(Mima polymorpha)*

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Summary. A case of Waterhouse-Friderichsen syndrome presenting with purulent leptomeningitis causing sudden death is described.
The causative agent, Acinetobacter calcoaceticus (Mima polymorpha), was determined by post-mortem microbiological examination.

Zusammenfassung. Verff. berichten über einen Fall von Waterhouse-Friderichsen-Syndrom mit eitriger Leptomeningitis, das zu einem plötzlichen Tod führte.
Die mikrobiologischen Untersuchungen führten zur Identifizierung eines Acinetobacter calcoaceticus (Mima polymorpha).

Key words. Sudden Death-Waterhouse-Friderichsen Syndrome.

Introduction

Sudden death due to the Waterhouse-Friderichsen Syndrome (WFS) is a very infrequent occurrence, and can be diagnosed conclusively only at autopsy. When death occurs unexpectedly in an apparently healthy individual without any preceding important clinical signs, suspicions and doubts may arise that not only justify legal intervention but also suggest various hypotheses, including the possibility of acute poisoning.

Autoptic examination is often sufficient to reach a diagnosis and dispel original doubts. However, at times supplementary procedures may provide meaningful information, for example, the identification of the etiologic agent, also microbiologically, and thus clarify conclusively the case under investigation.

Microbiological examinations are often underrated regarding their practical execution and the reliabiity of results obtained on cadaveric material. These objections, however, are frequently unfounded and the case reported here is a contribution to the discussion regarding the practical interest that governs the proper programming of microbiological testing in order to clarify some important aspects of medico-legal investigation. We report a case of sudden death due to WFS with purulent leptomenengitis caused by Acineto-bacter calcoaceticus (Mima polymorpha). To our knowledge, this is the second case of its kind reported in the Literature.

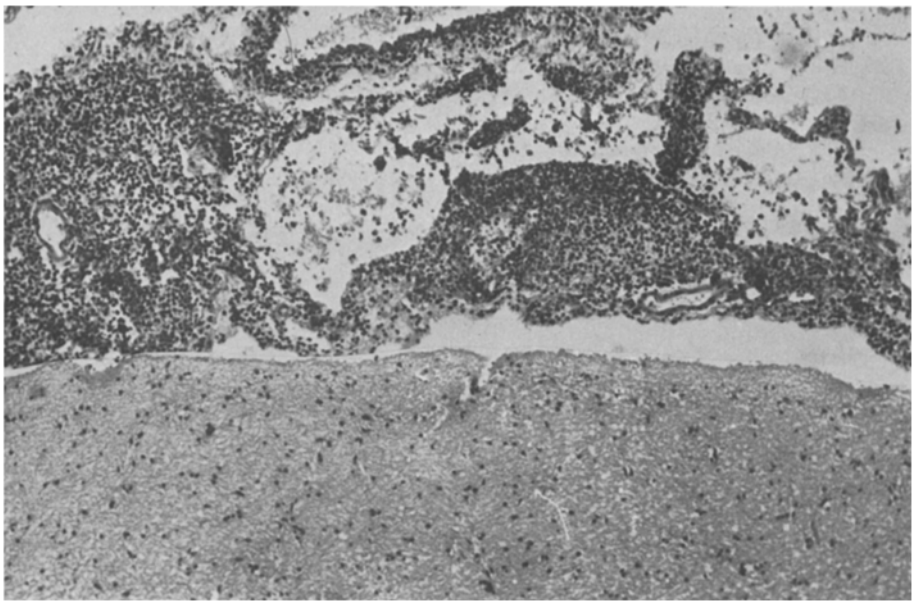

Fig. 1. Purulent leptomeningitis of the base with edema and congestion of the brain fut without encephalitis (H. and E., X 112)

Case Report

A male prison inmate of 44 years, serving a long sentence for a non political crime, suddenly developed severe cephalea with stupor. His face was pallid and petechiae were observed on his chest and arms; fever was slight, 37,8°C. After 7 hours, there was intense tachycardia, marked hypotension, low weak pulse, acrocyanosis, and intense dyspnea. Within 12 hours of first symptons, the patient died in irreversible shock.

The day after autopsy, it was reported that hematological examination disclosed a neutrophilic leukocytosis (12.400).

This case, besides presenting the usual problems associated with sudden death, raised interrogatives due to the circumstances in which it occurred, and the absence of reliable testimony regarding the rapid evolution of the syndrome. Moreover, it posed the problem of evaluating the suitability of the medical assistence given, and, in view of autopsy findings, the necessity of undertaking hygienic measures.

Pathological Examination

Gross Findings. Autopsy was performed 24 hrs following death (no. 2747). Numerous cutaneous petechiae, about 3 mm in diameter, were distributed on the chest and arms. Edema and congestion were noted in the brain, spinal cord, and the respective leptomeninges with purulent liquid present in the subarachnoid spaces at the base. The lungs were edematous and congested. The exterior and interior of the heart was compatible with total terminal dilatation. Diffuse numerous petechiae were present in the pericardium, sub-endocardium and peritoneum, as well as in the gastric and intestinal mucosa. There was acute stasis of the spleen, liver and kidney. Massive bilateral adrenal hemorrhage was noted.

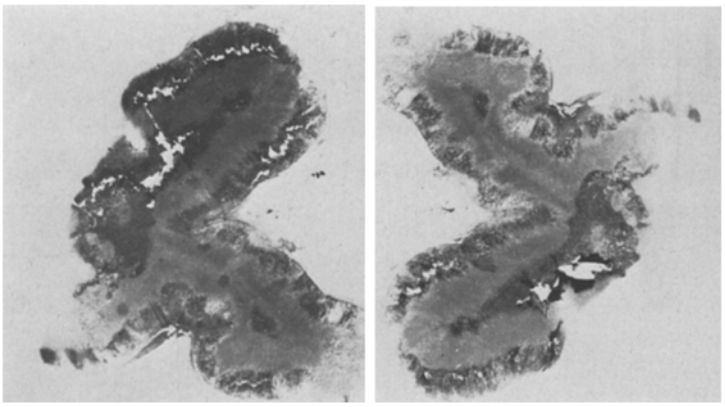

Fig. 2. Massive bilateral adrenal hemorrhage (H. and E., X 3,5)

Histological Findings. Specimens of various organs were fixed in neutral formalin and embedded in paraffin. Sections were stained with hematoxylin and eosin, PAS, Van Gieson and Perls. Microscopic examination confirmed purulent leptomeningitis of the base with edema and congestion of the brain and spinal cord but without encephalomyelitis (Fig. 1). Adrenal hemorrhage was bilateral and massive (Fig. 2). It is not possible to determine the site of its origin because the hemorrhages extend to the medulla and to the capsule of the gland and compress the cords of cells in the zona fasciculata.

Acute stasis of the spleen, liver and kidney were present. In addition the pulmonary alveoli were dilated owing to the presence of edematous fluids, and hemosiderin containing macrophages were observed.

Pathological Diagnosis. Purulent leptomeningitis of the base with notable bilateral adrenal hemorrhage, and diffuse petechiae of the skin, mucosa and serous membranes.

Total terminal dilatation of the heart with acute pulmonary edema and acute polyvisceral stasis.

Microbiological Studies

Unfixed fragments of brain and spinal cord with leptomeninges, kidney, lung, spleen and pus from the pontine cistern were finely minced under sterile conditions, and seeded in brain-heart agar, horse blood agar, McConkey medium, Chapman medium, chocolate agar, and thioglycollate broth. The strains thus isolated underwent routine identification tests, and results are reported in Table 1.

Strains belonging to the genera *Micrococcus* and *Acromobacter*, as well as the alpha-hemolytic streptococci were not further identified in depth because this flora is normally present in cadavers at a certain time following death. Consequently, the strains of immobile short rods and gram-negative coccobacilli which were isolated from brain and spinal cord fragments, and which presented the characteristics of the species *Acinetobacter calcoaceticus,* were examined. Identification tests gave the same results for both strains. Tests for glucose, saccharose and lactose fermentation were negative, as were tests for reduction of nitrates and oxidases, indole production, methyl-red,

Table 1.

Material examined	Strain isolated
brain with leptomeninges	Proteus mirabilis Enterobacter hafniae Escherichia coli Difteroidi Acinetobacter calcoaceticus
spinal cord with leptomeninges	Alpha-hemolytic streptococcus Micrococcus Acromobacter Acinetobacter calcoaceticus
pus from the pontine cistern	Staphylococcus epidermidis Alpha-hemolytic streptococcus
lung	Arizona Beta-hemolytic streptococcus belonging to group D Micrococcus
spleen	Beta-hemolytic streptococcus belonging to group D Alpha-hemolytic streptococcus Escherichia coli
kidney	Beta-hemolytic streptococcus belonging to group D Alpha-hemolytic streptococcus Escherichia coli

Voges-Proskauer, urease, gelatinase, and H_2S production, lysine, arginine and ornithine decarboxylation, and phenylalanine deamination. Tests for catalase and for ammonium citrate utilization were positive. Both strains were resistant to penicillin and bacitracin, and showed weak sensitivity to nitrofurantoin.

Discussion and Conclusion

It is known that the Waterhouse-Friderichsen Syndrome is related to sepsis from meningococcis, and is characterized by notable bilateral adrenal hemorrhage and hemorrhagic purpura; rarely is it accompanied by purulent leptomeningitis. WFS has been described exceptionally in relation to other etiologic agents, specifically Mima polymorpha [1], which in turn very rarely provokes isolated purulent meningitis [2–5]. According to a literature search carried out by Olafsson et al. in 1958, only 4 cases of meningitis from Mima polymorpha have been reported [6] and only 1 case of WFS i.e. the case cited above[1] (Table 2).

[1] From 1958 to the present time no other case has been reported

Table 2. Meningitis and Waterhouse-Friderichsen Syndrome due to Acientetobacter Calcoaceticus (Mima Polymorpha)

Source of data	year	clinical diagnosis	source of positive culture	patient's age yr.	patient's sex	outcome
De Bord[2]	1948	Meningitis	Spinal fluid	?	?	Survival
Schuldberg[7]	1953	Meningitis	Skin lesions; meninges.	1 1/2	F	Death
Townsend et al.[1]	1954	Waterhouse Friderichsen	Skin lesions; spinal fluid.	19	M	Death
Townsend et al.[1]	1954	Meningitis	Spinal fluid; blood.	23	M	Survival
Olafsson et al.[4]	1957	Meningitis	Spinal fluid; blood.	63	M	Survival
Present report	1976	Meningitis; Waterhouse Friderichsen syndrome	Meninges	44	M	Death

The taxonomy of Mima polymorpha has been reviewed, and at present this species, indicated as *Acinetobacter calcoaceticus,* is included in the genera Acinetobacter which together with Branhamella, Moraxella and Neisseria constitute the Neisseriacae family. However the characteristics of this species are obligate aerobiosis, negative oxidase test, and, subordinately, penicillin resistance.

The isolation of *Acinetobacter calcoaceticus* from brain and spinal cord only, together with the results of pathological examination leads to the conclusion that this organism was the causative agent of the WFS with purulent leptomeningitis that we observed. While hemosiderin containing macrophages in the lungs may indicate a chronic pulmonary stasis, in our case their presence represents a non specific finding commonly observed in autopsies performed more than 24 hrs following death in subjects deceased with edema and pulmonary congestion [9].

Microbiological investigation, therefore, through the identification of the etiologic agent, not only clarified the medico-legal questions involved, but also oriented properly the necessary hygienic measures within the penitentiary.

This approach is pertinent to the discussion on the utility of post-mortem microbiological investigation, since the theory that rapid invasion of the organism by commensal bacteria starts with the first phases of agony has recently undergone thorough revision. Currently it is held that bacteria found in various autoptic specimens originate more frequently from the exterior through contamination by the dissecting personnel [10–14].

However, the environment in which autoptic specimens are taken is conditioned by many factors which are not easily controllable, and the correct execution of these procedures is, consequently, very limited. Nevertheless, microbiological studies should be carried out despite the difficulties involved since, not infrequently, they represent the only means of determining the cause of death.

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