Phlycten Syndrome: Traumatic Necrosis of the Lower Limbs in Nazi Concentration Camps

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ABSTRACT Phlycten syndrome was described as a traumatic surgical syndrome of the lower limbs, beginning as streptococcal cellulitis and progressing to necrotizing edema in individuals with starvation-induced hypoalbuminemia and electrolyte imbalance. Independently documented by three physicians during their imprisonment in Nazi concentration camps in World War II, the syndrome also developed when edematous, emaciated prisoners were flogged, causing rapid progression to gangrene and sepsis.

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The term *Phlycten syndrome* is used by physician–prisoners to describe a severe necrotizing soft tissue infection (NSTI) of the lower limbs in profoundly malnourished prisoners in Nazi camps of WW2. [1,2]. The condition typically began as cellulitis in edematous legs and feet, then progressed to extensive necrosis and gangrene, often without fever (apyrexia), and frequently ended in septic death [3,4].

Clinically, Phlycten syndrome combined hunger edema, traumatic injury, and overwhelming infection in a setting of extreme protein-energy malnutrition and micronutrient deficiency [5]. Minor trauma or flogging of swollen lower limbs in emaciated prisoners was followed by rapidly spreading phlegmon, lymphangitis, and deep tissue necrosis, often involving the scrotum and buttocks and culminating in systemic sepsis [4,5].

In this article, we summarized the independent observations of three imprisoned doctors, François Wetterwald, Albert Haas, and Giuseppe Calore, who each described this syndrome in different Nazi camps, unaware of one another's reports [3].

ACCOUNTS OF THREE PHYSICIAN–PRISONERS

François Wetterwald

François Wetterwald, born in French Tunisia, studied medicine in Paris and specialized in urological surgery [4]. From 1943 he was active in the French Resistance and, after his arrest by the SS on 11 May 1944, he was deported to the Mauthausen subcamp of Ebensee, where he served as *Häftlingsarzt* no. 63329 in a heavily industrialized quarry complex for armaments and aircraft production [4]. His surgical work extended far beyond urology and encompassed general surgery on severely debilitated prisoners [4].

Wetterwald emphasized the paradoxical coexistence of organized medical services and systematic extermination. In 1947, he published *Medicine and Concentration Camps*, which discussed medicine, health, and destruction within the same concentration camp system [4,5]. The camp hospital (*Revier*) was nominally organized by SS physicians and medical students, but daily care was largely provided by unqualified prisoner-technicians (*Facharbeiter*), with minimal equipment and no standard laboratory, radiology, or sterilization facilities [3,5]. Medical care was primarily aimed at maintaining a usable workforce and salvaging those whose injuries were covered by work accident insurance. Prisoners deemed unfit or non-recoverable were sent for *gas therapy* or intracardiac phenol injection [5].

In Ebensee, Wetterwald described Phlycten syndrome (or phlegmon) in several hundred cases [5]. The syndrome initially presented as edema of the lower extremities, most often on the dorsum of the feet and the medial aspects of the severely wasted legs. Sometimes it presented as extensive edema of the buttocks and scrotum [5]. A trivial work injury or deliberate flogging of these edematous limbs often precipitated dramatic progression to phlegmon and gangrene. Flogging was sometimes

considered night-time "entertainment" for the guards [5].

The infection spread through the lymphatic system toward the inguinal region. Wetterwald also documented secondary arterial thrombosis [5]. Necrosis of the skin and subcutaneous tissue of the legs or buttocks was extensive and ill-defined, in contrast to the clear margins of a localized abscess [5]. Complete destruction of scrotal skin, including exposure of the testicles, was recorded as a characteristic feature of this phlegmon, often in association with apyrexia [5]. Infected edema could extend to the trunk and upper limbs, leading to overwhelming sepsis and death [5].

Despite extreme constraints, such as no radiology, no laboratory tests, no equipment for sterilizing instruments, and no anesthetics or antiseptics, Wetterwald performed 682 operations during his imprisonment [5]. He noted two striking epidemiological observations: the frequent occurrence of apyrexia in the face of severe infection and the near absence of malignancy in the starving camp population [5]. Among approximately 27,000 prisoners over 3 years, only a single case of cancer was observed, a pattern later echoed in survivors of the Lodz ghetto [5,6].

Liberated on 6 May 1945, Wetterwald required prolonged rehabilitation. He was later decorated with the Légion d'Honneur, and returned to a career in medicine, literature, poetry, and music, remaining active into his eighties [4,5].

Albert Haas

Albert Haas, born in Hungary in 1911 into a non-religious Jewish family, studied medicine in Budapest and later married into a French Jewish family [7]. He first served in the French army, was discharged, and was then arrested by the German occupation forces in 1940 [7]. Considered a French spy, he was severely beaten, but his Jewish origin remained undiscovered. He was classified as Aryan throughout his imprisonment [7]. After escaping from Dachau and being recaptured and tortured, he was transferred to the Aryan side of the Auschwitz concentration camp as a physician, enjoying some privileges until he was sent in 1944 to Mauthausen as chief physician [7]. Registered as Häftlingsarzt no. 1762222, he oversaw the sick bay in the subcamp Gusen II [7].

In his autobiographical account *The Doctor and the Damned* [7] Haas described the appalling conditions of the medical and surgical barracks, such as gross overcrowding, widespread infection, lack of sanitation, and routine disposal and execution of prisoners considered incurable, including nocturnal killing of those unable to work. Against this background of extreme emaciation, malnutrition, and exhaustion, he carefully documented the *edema abscess* process, that is, phlegmon in edematous lower limbs [7].

Haas observed that gangrene was the most common complication of malnutrition in these prisoners [7]. Most inmates presented with severe hunger edema. Any form of trauma, especially beatings, inflicted on these edematous areas resulted in rapid necrosis [7]. Once phlegmon had developed, septic progression was relentless and it was only a matter of time before the patient died either of generalized septicemia in the sick bay or at the hands of the camp commander [7].

He treated many inmates with phlegmon-induced severe infection of lymph nodes, often requiring incision and drainage of purulent collections and the application of wet dressings to the affected lymphatic regions [7]. Lancing and drainage were frequently conducted by non-medical prisoners who had been informally promoted to *surgeon* by the guards [7].

After liberation, Haas was in poor physical condition and required local treatment before he could resume work. He then remained in the camps for approximately three additional months to help rehabilitate surviving prisoners. Haas was awarded the Légion d'Honneur, later emigrated to the United States, and established the first pulmonary rehabilitation center in the world, where he remained active until his death in 1997 [7].

Giuseppe Calore

Giuseppe Calore, born in Padua in 1909, practiced medicine in Italy and was arrested in Milan for anti-fascist activities [8]. After being severely beaten, he was deported in 1944 to the Mauthausen complex and registered as *Häftlingsarzt* no. 113925 [8]. As the camp physician for prisoners in the main Mauthausen camp, he obsessively recorded his observations, which were later published in detailed recollections covering Mauthausen, Ebensee, the Italian prisoners' camp, and the Gunskirchen camp [8].

Calore's clinical observations closely paralleled those from other camps [8]. He described the progressive starvation of prisoners and the emergence of lower limb edema which, when subjected to beating or trauma, readily became infected and necrotic [8]. He distinguished between the *Revier* (infermeria tedesca) for German, Austrian, and Aryan prisoners and the infermeria speciale for other prisoners [8]. The latter functioned as a nominal infirmary (*campo sanitario*) where treatment was minimal or absent [8].

Calore recorded the meager nutrition provided to Jewish prisoners (*Ebrei*), who were considered a useless burden (*peso inutile*), with no anticipated benefit for the camp economy. They were ultimately destined for intracardiac injections or the gas chambers [8]. He noted that children of Jewish prisoners were sometimes secretly fed by prisoner–physicians at considerable personal risk [8].

He characterized the prisoner sick bay as "an enormous extermination camp" (*un gigantesco campo di eliminazione*), documenting extreme physical deterioration and thousands of deaths each week from malnutrition [8]. He described *edema da fame* (hunger edema), circulatory disturbances, phlegmons, septicemia, and inflammatory involvement of the myocardium [8].

Liberated in March 1945, Calore gradually recovered his strength and helped other prisoners during the immediate post-war period [8]. He returned to civilian life in Italy and continued practicing medicine until the age of 93 [8].

RETAINING THE TERM AND THE PATHOGENESIS OF PHLYCTEN SYNDROME

The term *Phlycten* derives from the Greek *phlyktaena*, referring to a superficial blister or vesicle. The word was historically used for corneal or conjunctival inflammatory lesions, often associated with staphylococcal or tuberculous infection [9]. In the context of the Nazi camps, however, the term was applied to a deep, necrotizing process of the lower limbs that extended from skin and subcutaneous tissue into deep fascia and muscle, with lymphatic spread to regional nodes and subsequent systemic involvement [5,7,8].

The syndrome presented in prisoners with profound protein-energy malnutrition, similar but even more severe and more lethal than classical kwashiorkor [10,11]. Hypoalbuminemia led to major shifts in extracellular fluid distribution and generalized edema, particularly in the lower limbs [10,11]. Electrolyte disturbances in sodium, magnesium, potassium, phosphate, and trace elements such as vanadium further impaired cellular function, tissue oxygenation, and host defense [11,12]. Concomitant deficiencies of vitamins A, C, D, and E compounded the defect in both innate and adaptive immunity and compromised collagen synthesis and wound repair [13,14].

Within this milieu, even a minor excoriation of the skin, common under unsanitary, vermin-infested conditions, served as an entry point for bacteria [5,7]. Lymphatic spread produced visible lymphangitis. Any additional trauma, especially beatings or floggings, created a portal of entry for streptococci into edematous, poorly perfused tissue [5,7,8]. The result was rapidly spreading phlegmon, necrotizing cellulitis or fasciitis, and ultimately gangrene of the lower limbs, buttocks, or scrotum [5,7,8].

A striking, consistently reported feature was apyrexia, which is the absence of fever despite severe, often fatal infection [5,7]. This lack of febrile response was interpreted as evidence of starvation-induced immune failure and impaired cytokine and thermoregulatory responses [13-15]. In modern terms, Phlycten syndrome can be considered NSTI occurring in the extreme setting of nutrition-related acquired immune deficiency [13,15].

Related conditions had been described previously, such as Meleney's synergistic gangrene, a severe postoperative infection characterized by combined Staphylococcal and Streptococcal infection descending from abdominal wounds into the lower limbs with fulminant necrosis and high mortality [12]. Since WWII, advances in immunology and nutrition have elucidated the complex interplay between protein–energy malnutrition, micronutrient deficiency, immune dysfunction, and susceptibility to invasive infections, termed as NSTI [13-16].

CONTEMPORARY CLASSIFICATION AND TREATMENT

In current medical terminology, the condition historically labelled *Phlycten syndrome* would be classified under NSTI, particularly necrotizing fasciitis or necrotizing cellulitis [16]. These infections may be monomicrobial (commonly *Streptococcus pyogenes*) or polymicrobial, often including a mixture of aerobic and anaerobic bacteria [16].

In the camps themselves, surgical care was often delivered with minimal or no access to effective antibiotics, anesthesia, or antisepsis, which contributed to the high mortality from phlegmon and gangrene described by Wetterwald [5].

Current standard treatment involves prompt surgical incision and debridement with removal of all non-viable tissue, leaving the wound open for repeated inspection and further debridement as required [16]. This treatment is combined with aggressive fluid and electrolyte replacement and broad-spectrum intravenous antibiotics targeting streptococci and other likely pathogens, typically using a beta-lactam (such as penicillin or a cephalosporin) in combination with clindamycin, adjusted according to culture results and local guidelines [16]. Early recognition, rapid surgical intervention, and intensive supportive care have dramatically improved outcomes in modern settings, in contrast to the near-uniform fatality in the camps [7,8,16].

WHY RETAIN THE HISTORICAL NAME?

From a pathophysiological standpoint, Phlycten syndrome is best understood today as a specific manifestation of NSTI in the setting of extreme starvation, edema, and trauma [5,7,8]. However, the historical term carries unique value because it encapsulates a distinct clinical phenomenon that was independently observed and documented by three physicians imprisoned in separate Nazi camps, unaware of one another's work [3]. Retaining the term preserves the authenticity and provenance of their testimony.

Using the term *Phlycten syndrome* when quoting or paraphrasing these original accounts respects historical accuracy, honors the physicians who risked their lives to document it, and focuses on the specific context of Nazi medical persecution [4,5,7,8]. At the same time, explicitly linking Phlycten syndrome to the modern category of NSTI helps contemporary clinicians understand its pathogenesis and clinical significance [16].

Given this dual role of historic witness and clinical descriptor, the term *Phlycten syndrome* should be maintained in the medical historical literature as a named syndrome of war-related necrotizing infection in profoundly malnourished prisoners [3,5]. In recognition of Wetterwald's detailed original descriptions and the unique wartime setting, it has been suggested that the condition could also be referred to as *Wetterwald war syndrome*, preserving both the historical term and the name of its principal medical chronicler [5].

CONCLUSIONS

Phlycten syndrome remains a unique and tragic chapter in the pathology of war. Independently observed and meticulously documented by three imprisoned physicians–François Wetterwald, Albert Haas, and Giuseppe Calore–this NSTI exemplifies the catastrophic consequences of extreme malnutrition, trauma, and infection in the setting of systematic persecution and medical neglect. The historical term honors the courage of these physicians and their testimonies, while the modern understanding of necrotizing soft tissue infections illuminates the underlying pathophysiology and underscores the importance of early recognition and aggressive treatment. Retaining the name *Phlycten syndrome* preserves an essential historical and medical record of human suffering and resilience.

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Unless someone like you cares a whole awful lot, nothing is going to get better. It's not.
Dr. Seuss (1904–1991), pen name for American writer and cartoonist Theodore Geisel, most widely known for his children's books