TRUE AINHUM: ITS DISTINCTIVE AND DIFFERENTIATING FEATURES
A Clinical Study Based on 100 Patients

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Recent publications referring to conditions that show some resemblance to the clinical entity known as ainhum prompt this summary record of 100 patients with true ainhum personally observed in Central and West Africa over the past twenty-eight years.

The appearances both of the successive stages of the developing condition and of the end-result—spontaneous amputation of the fifth toe—are so typical and constant that it can be confidently asserted that ainhum is a pathological phenomenon in a class of its own, having no etiological or morphological identity with congenital or acquired conditions commonly referred to as "pseudo-ainhum" or "atypical ainhum." Good clinical descriptions of ainhum are to be found in papers by Bloom and Newman (1933), Goehring (1944), Kean, Tucker and Miller (1946) and Bluefarb (1948). Aggarwal and Singh (1963) described as an atypical example of ainhum the case of an Indian (Patiala) girl of ten who had lost "almost all" of the second and fifth toes, and the terminal portions of the remaining toes. Kandhari and Manchanda (1963) described, also from India (Amritsar), three cases of "ainhum and pseudo-ainhum." The first, a boy of thirteen, had progressively lost by ulceration the toes of the left foot following a deep infection: and both the other patients were babies under a week old who had congenital constrictions around one or other extremity. It is sometimes stated that ainhum is practically confined to adult male negroes and that Goehring (1944) alone has reported its occurrence in a woman.

In a clinical study from the Belgian Congo, Browne (1961) reported ainhum in sixty-one males and twenty-two females, representing an incidence of 2.48 per 1,000 in males and 1.08 per 1,000 in females in a whole-population survey. These cases were distributed over the first five decades of life thus—four, six, nine, twenty-four and twenty-four—with sixteen cases above the age of fifty years. This study emphasised for the first time the conception of ainhum as a progressive condition, and drew attention to its incipient and developing stages. The writer has subsequently encountered (not during whole-population surveys) a further seventeen patients with ainhum in West Africa, making 100 in all.

Certain characteristics of classical ainhum as seen in these African patients serve both to delimit the condition as a definite and easily recognisable clinical entity and to differentiate it from diverse conditions causing amputation of the digits in whole or in part that are different in certain essential respects from that of ainhum. From a study of this series of 100 patients with ainhum, the following conclusions may be drawn:

The nature of the condition—Ainhum is an acquired condition, and thus differs from congenital constrictions, bands, fibrosis, etc., generally attributed to intra-uterine conditions of diverse nature. No patient with ainhum in this series was under the age of six years. The four youngest were aged from six to eight years, and in them a fissure had appeared on the plantar aspect of the base of the fifth toe during the year preceding the examination. One had active tertiary framboesial hyperkeratosis of the soles at the time, and another had just completed a course of treatment for the same condition. In all four a chronic open fissure was present on the plantar aspect of the base of the fifth toe, and a constricting band was in process of formation.

Site of lesion—The constriction is almost invariably situated at the level of the proximal phalanx of the fifth toe. In no instance was ainhum found to have begun in any toe other than the fifth. When the condition was advanced in the fifth toe—that is, when the toe was
The dangling on a slender fibrous thread or had already been lost by complete spontaneous amputation—a sulcus or a deepening fissure at the corresponding site was not infrequently present on the fourth toe, and sometimes on the third (Fig. 1).

**Sex incidence**—The sex ratio does not show an overwhelming preponderance in males. It is suggested that male preponderance recorded in the literature is a function of the selected populations studied. In general, more African males than females present themselves for diagnosis and treatment in hospitals and dispensaries. In the whole population survey in the Belgian Congo referred to above, which revealed eighty-three persons with various degrees of ainhum, males were affected more than females in the proportion of approximately five to two.

*The terminal state*—In no case was ulceration present when the dangling digit was about to separate. The junctional tissue was reduced to a slender fibrous thread, almost avascular. The terminal bony phalanges had been absorbed, and all the tissues beyond the constricting band were represented by a fibro-fatty mass covered by dry hyperkeratotic integument (Fig. 2). In the instances in which spontaneous separation had occurred there was no history of any bleeding, and where the inconveniently dangling and uncontrollable toe was removed by cutting the fibrous cord, only the slightest capillary oozing occurred.

*The role of injury*—Injury is a most uncommon exciting cause of ainhum, accounting probably for only three cases out of 100 in the present series: in two there was a history of fracture of the phalanges of the fifth toe. Trauma in the unshod foot was suggested as the cause of ainhum in one of the cases reported by Kandhari and Manchanda (1963).

*Etiology*—The only constant etiological factor observed in the present series was chronic fissuring at the observed site of subsequent constriction, often occurring in hyperkeratotic skin. None of the numerous other suggested etiological factors that have been advanced over the years to account for ainhum itself, and for its occurrence only in negroes, was considered to be operative in the present series. In the Belgian Congo the plantar hyperkeratosis of chronic tertiary yaws appeared to be a contributory or facilitatory factor in two-thirds of the eighty-three patients: whereas in the seventeen Nigerian patients fissuring was frequently associated with non-specific hyperkeratosis in a population in which yaws had not been recently hyperendemic. All the six patients with ainhum in the ten to nineteen age group in the Belgian Congo series had active framoebial plantar (and palmar) hyperkeratosis. The contributory role of hyperkeratosis in negro peoples is in line with its occurrence in the familial disease tylosis palmaris et plantaris, in which fibrous bands develop around fingers and toes. In a patient with a constriction around the finger, due to trauma, framoebial hyperkeratosis was a concomitant finding (Browne and McLoughlin 1962).
Pathogenesis—The pathogenesis of ainhum is essentially an infection of a sulcus on the plantar aspect of the base of the fifth toe. The resultant fissure partially heals, breaks down, becomes reinfected, and the process continues until the fissure extends around the outer and superior aspects of the toe. Because of hyperextension of the toe at the metatarso-phalangeal joint, coupled frequently with rotation of the toe on its long axis and flexion at the interphalangeal joints, a sulcus appears in the skin on the outer and superior aspects of the base of the toe.

This sulcus often becomes continuous with the lengthening and deepening chronic fissure on the plantar aspect of the toe, and the sequence infection-healing-fibrosis-ulceration repeats itself. The process may be halted in its earlier stages, but once the fissure has completely encircled the base of the toe, cicatricial contraction progresses even in the absence of further breaking down and infection of the healed fissure (Figs. 3 to 5). About two-thirds of the patients with ainhum showed evidence at the time of examination of fissuring at the site of the constricting band, or gave a reliable recent history of such fissuring. In about a third of them the fissure was open and infected; in the remaining two-thirds it was temporarily healed with a thin scar liable to break down, especially when the unshod foot was exposed to the trauma of walking either on rough hot paths or through mud.

Other features—Ainhum tends to be bilateral. In about three-quarters of the cases under review both feet were affected, though not necessarily to the same degree. It was found that slight departures from the normal anatomy and functioning of the fifth toes tended to be bilateral (Fig. 6).

The time factor is all-important in the production of the fully fledged condition. All the seven instances of complete spontaneous separation of the fifth toe were in patients over the age of fifty, and the thirteen instances of dangling toe were in patients over forty. It was not possible by questioning to ascertain the exact duration of such a slowly progressive condition.

The likeliest explanation of the occurrence of ainhum only in negroes is most probably connected with the observed propensity of the deeply pigmented skin to over-production of
fibrous tissue in response to repeated injury or infection. This tendency is seen not only in the palmar and plantar skin (Figs. 7 and 8), but also in keloid scars, juxta-articular nodules in tertiary yaws, nodules over bony prominences in onchocerciasis, fibrosed paratrochanteric bursae, excessive lichenification of pruritic eruptions, etc. Chronic tertiary yaws appears to accentuate this racial tendency: the trauma of manual work and of walking barefoot results in excessive keratosis in persons with tertiary yaws. There is no a priori reason why ainhum should not occur in other races, if the primary lesion is most often a chronically infected fissure in the appropriate situation and if the subject reacts in the appropriate manner, but seemingly many recorded cases of atypical or pseudo-ainhum in races other than negroes are of dubious authenticity.

SUMMARY

The distinctive clinical characteristics of ainhum conforming to classical descriptions, as seen in 100 patients in Central and West Africa, are briefly reviewed, special emphasis being laid on those features that serve to differentiate ainhum from other conditions that may in some respects resemble it.

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REFERENCES