EPIDERMAL CYSTS OF PHALANGES

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Cysts lined by epidermis are uncommon in bone; they have been found only in the skull and in the phalanges. Those in the skull appear to arise spontaneously, whereas phalangeal cysts often seem to develop after an injury: these have been termed implantation cysts, sebaceous cysts, epithelial cysts, squamous cysts, epidermoid cysts and epidermal cysts, to mention only those in the English literature.

Four cases of phalangeal epidermal cysts are here reported.

CASE REPORTS

Case 1—A man of thirty-seven recalled having suffered a severe lacerating injury of the left index finger when he was ten. This was treated without operation and healed well, but it left him with a small scar on the base of the nail on the medial side and a hyperextension deformity of the finger tip. Three months before he was seen the finger tip had become tender. Radiographs showed a round, sharply bordered osteolytic lesion in the middle of the terminal phalanx, with expansion of the bone and thinning of the cortex, and a pathological fracture of the volar surface (Fig. 1). The lesion was treated by a splint and after several weeks the pain disappeared. A radiograph three months later showed further expansion of the cyst. The lesion was explored and after a thin layer of bone had been removed a cyst filled with whitish, viscid material was opened. After curettage recovery was complete. The specimen consisted of an irregular, soft, white fragment 8 × 6 × 4 millimetres and histological examination showed an epidermal lining with a well developed keratinising zone supported by a thin, interrupted layer of fibrous tissue (Fig. 2).

Case 2—A woman of forty-five complained of pain around the tip of the left index finger for nine months. Soon after the onset of pain the finger tip swelled. No history of injury could be obtained. The pain disappeared after a while, but the swelling remained. On examination there was a swelling of the terminal phalanx which had the appearance of clubbing. There was no tenderness and the movements of the distal interphalangeal joint were full. Radiographs showed expansion of the distal portion of the terminal phalanx by a round, smooth-walled osteolytic lesion which was surrounded by a rim of sclerotic bone. There was a fracture of the cortex. No active treatment was instituted. Four months later radiological examination showed further expansion of the lesion; the fracture was still present and unhealed (Fig. 3). At operation the pulp was dissected from the phalanges, the anterior
surface of which was then shaved off with a scalpel. This exposed a cavity filled with yellow structureless material which was curetted out.

The specimen consisted in part of a hemisphere of bone 10 × 8 × 3 millimetres with a little yellowish material apparent at the flat surface. Microscopical examination showed a rim of bone undergoing a good deal of reactive activity. Lying in the concavity there was a layer of fibrous tissue which formed the wall of a space filled with keratin. There were some cholesterol crystal clefts in the fibrous tissue (Fig. 4). In addition there were three fragments 2–5 millimetres in size which consisted of epidermal fragments, fibrous tissue and flakes of keratin.

**Case 3**—A man of thirty-seven experienced pain under the left thumb nail for four months. No history of injury was elicited. The tip of the thumb was tender and swollen. The soft-tissue swelling of the pulp was evident in the radiographs which also showed a smoothly defined erosion of the tip of the phalanx (Fig. 5). At operation the nail was cut transversely near the germinal zone and subungual tissue was removed together with the terminal phalanx.

The specimen consisted of the terminal portion of a phalanx to which was attached a small white semicircular mass of firm fibrous tissue. This nodule was oval on cross-section, 18 × 9 millimetres, with an outer rim of whiter tissue. Microscopical examination showed a unilocular cyst filled with keratin flakes lying in connective tissue. The epidermal lining was acanthotic and hyperplastic; it was supported by a narrow zone of granulation tissue heavily infiltrated by histiocytes, plasma cells and a few polymorphs; beyond this was scar tissue in which two small islands of bone were seen lying on either side of the deeper third of the cyst (Fig. 6).
Case 4—A labourer of thirty-two, employed in a china clay pit, struck the pulp of his left middle finger on a sharp stone cutting it down to the bone, and sustained an undisplaced fracture of the terminal phalanx. He was treated with dressings and a splint until the wound had healed three weeks later. He had no further trouble for the next seven years, but then the finger tip began to swell and be painful in cold weather, and to " get in the way " at work (Fig. 7). There was slight tenderness over the swelling, and sensation over the pulp was diminished. The radiograph (Fig. 8) showed expansion of the terminal phalanx, the distal part of which had disappeared. The finger tip was amputated. Recovery was satisfactory and he returned to work three weeks later.

The specimen contained a biloculated cyst measuring 2 x 1 centimetres and 1.5 x 0.6 centimetres, with a thin wall and cheesy contents. Except for the base, the terminal phalanx was occupied by one portion of the cyst; the second smaller portion was in the pulp, the two parts communicating through a stoma 5 millimetres in width. Microscopical examination showed the cysts were lined by epidermis and filled with keratin (Fig. 9). In some areas the lining of the smaller space had disappeared and a foreign body giant-celled granulomatous reaction had occurred in the exposed fibrous tissue in response to the keratin.
DISCUSSION

Fisher, Gruhn and Skerrett (1958) collected thirty-three cases of phalangeal epidermal cysts from the literature to which they added three cases of their own. By 1964 Roth was able to find records of fifty-five cases of these cysts, to which he added a further ten. In this same paper he has also traced over 150 cases of histologically similar lesions in the skull and added eleven cases to this group. It is as well to note here that despite the histological similarity between the epidermal cysts of the skull and the phalanges there is a significant difference in age incidence, sex ratio and antecedent history of trauma. The skull lesions occur at a slightly younger age (two months to seventy-six years, average thirty-two years), appear equally in the two sexes, and are not usually preceded by a history of trauma (Roth 1964). Love and Kernohan (1936) reported a case in which trauma had drawn attention to a cyst in the scalp which proved to have not only an epidermal lining but also apocrine glands in its wall. Since this type of gland is never found in the scalp, there is strong evidence here in favour of the etiological theory of misplaced cell nests that is now usually advanced to account for the occurrence of the cranial (and intracranial) epidermal cysts.

Phalangeal epidermal cysts have been encountered in adolescents and adults, with a peak incidence in the fourth decade (thirteen to eighty-three years, average thirty-nine years). In about two-thirds of cases there is a definite history of trauma to the affected finger which may have occurred up to thirty-five years before the patient presented for treatment. The injury itself usually occurred in late childhood or early adult life; a fairly severe, crushing type of injury being most common. There is a 2:1 ratio of men to women. The most common symptom is swelling of the terminal phalanx, which is often associated with redness, pain and tenderness. Pain and tenderness may be of variable intensity, and may be intermittent, or disappear altogether. The symptoms are always located at the site of the lesion which almost invariably involves the distal phalanx; even in the one case where an intermediate phalanx was involved, the terminal phalanx had previously been amputated. All the lesions recorded have been in the hand except one in the terminal phalanx of a toe (Roth 1964). Any digit may be affected, but lesions in the first two fingers predominate. In only one case has more than one phalanx been affected in the same individual (Roth 1964).

Radiographs show a clear-cut rounded lesion causing destruction and expansion of the phalanx; it is often outlined by a thin rim of sclerotic bone. A pathological fracture is commonly seen and is often the cause of a recurrence of pain and tenderness. Radiologically the lesion has to be distinguished principally from enchondroma, and the absence of calcification is significant. Metastatic carcinoma, solitary (single) bone cyst, osteoid osteoma, glomus tumour and aneurysmal bone cyst may be of a somewhat similar radiological appearance, but are rare at this site. Infections usually show a periosteal reaction or sclerosis.

The usual treatment has been curettage alone or in combination with removal of the cyst, or, less often, amputation of the phalanx, depending on the size of the lesion.

When the intact cyst is divided the contents appear as yellowish, firm or soft cheesy material, contrasting with the lighter appearance of the wall. Microscopical examination shows an epidermal lining of varying thickness which, as in the fourth case, may display pseudoepitheliomatous hyperplasia. The contents of the cysts are desquamated keratin flakes, which usually show up well in polarised light. Not infrequently the epidermis shows patchy erosion and the cyst wall consists of chronic granulation tissue including foreign-body giant cells and cholesterol crystal clefts.

The etiology of phalangeal bone cysts is considered by most authors to be traumatic (Fisher et al. 1958, Roth 1964). In those cases where no such history can be elicited it is supposed that the trauma was minor, such as a needle prick, and has been forgotten. Certainly quite trivial injuries can give rise to epidermal inclusion cysts in the dermis at other sites, for example, in the palm of the hand.

Two theories of the pathogenesis have been proposed by previous writers. One suggests...
that epidermal tissue is forced into the bone at the time of trauma. The second assumes that epidermis is displaced into the subcutis, and because of the confined and non-expansile nature of the finger pulp the expanding cysts erode into the bone. Our fourth case can be cited in support of this theory and the second case might be considered as the more advanced stage of this process.

Although the cases reported here are similar to many of the cases in the literature, a critical examination of them does not lend support to the view that all epidermal phalangeal cysts are due to preceding trauma. Only two of our cases had a history of trauma, thirty-two and seven years before the onset of symptoms; this time factor seriously weakens any argument that is based on them for a cause and effect relationship. The other two cases did not give a history of trauma at all. An examination of the time relationships in other reported cases where the information is adequate, a total of forty-two cases, showed ten cases with no acknowledged trauma, seven cases with symptoms occurring within a year of injury, and twenty-five cases where symptoms developed between one year and thirty-six years after injury. There is no feature in the morbid anatomy of our cases which is conclusive evidence of a traumatic etiology. Nor has such evidence been forthcoming from other cases. Despite the appeal of the traumatic theory it cannot be regarded as an established hypothesis on the basis of our present knowledge.

SUMMARY
1. Four cases of epidermal cysts of the terminal phalanges of the fingers are reported.
2. The literature is reviewed and the etiological factors discussed.

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REFERENCES