Virchows Arch. A Path. Anat. and Histol. 365, 185—191 (1975)

Pathology of "Knuckle Pads"

Study of Four Cases

R. Lagier and R. Meinecke

Department of Pathology, University of Geneva (Switzerland)

Received September 23, 1974

Summary. Histological study of four cases of knuckle pads. — The main lesion is a fibroblastic proliferation which developes into dense fibrosis. It is analogous to that found in Dupuytren's contracture or Ledderhose's disease, with which knuckle pads are often associated. This histological feature and the clinical characteristics suggest a nosological entity of nodules situated at the back of the fingers, as a distinct form of fibromatoses and help to delineate knuckle pads from an abarticular manifestation of inflammatory or degenerative rheumatism.

In 1893 A. E. Garrod described pads which had developed under the dorsal skin of the fingers, at the level of the proximal interphalangeal joints. In 1904 he published a more extensive study with X-rays illustrating a soft tissue nodule (Garrod, 1904). The latter was named "knuckle pad" (Jones, 1923).

These pads were clinically studied by Krantz (1938) under the name "Fingerknöchelpolster", since then adopted in the German literature. In French they are know as "coussinets des phalanges" after Touraine (1942). Knuckle pads are rather rare and little known.

Case Presentation

Biopsies taken from four patients presenting subcutaneous nodes in their customary localisation were studied. Clinical conditions and macroscopy are summarized in Table 1.

The specimens were fixed in formaline, embedded in paraffin. The slides were stained with various methods (hematoxylin-eosin, van Gieson, Mallory's trichrome, toluidine blue, silver impregnation, elastin stain, Prussian blue); they were studied under normal and polarized light.

Histologically the main lesion consisted of fibroblastic proliferation developing into a dense fibrosis (Fig. 1a, 2). The nuclei of the fibroblasts were of regular size without either mitoses or atypical forms. Among them, there were precollagenous argyrophilic fibers embedded in a lightly metachromatic ground substance and a few newly formed capillaries (Fig. 1b). The fibrous areas still contained some vessels but had no elastic fibers. Under polarized light, they appeared more or less dense. This newly formed tissue had a close relationship, particularly obvious in case 2, with adjacent preexisting structures. Generally it was sharply delimited from the subcutaneous connective tissue (Fig. 2), the latter being occasionaly compressed. The fibrous areas may also be partly attached to the dorsal aponeurosis (Fig. 3). There were no inflammation or any iron deposit either in the

Table 1

	Case I (T 4660/54)	Case II (T 6008/74)	Case III (T 8352/74)	Case IV (T 3755/68)
Sex	♂	♂	♀	♀
Age (years)	50	26	69	33
Localisation (finger)	right II–V	left V	left II–V	right III
X-rays	not made	not made	not made	shadow in soft tissue
Operative specimen (number and size)	2 (1.5×1×0.5 cm) each	1 (1.5×1×0.5 cm)	1 (0.7×0.5×0.3 cm)	1 1 cm diameter
Associated Dupuytren's contracture	+ (bilateral)	+ (early-right)	+ (bilateral)	0
Other disease reported (fibromatosis or not)	none	none	early R.A. (?)	none

newly formed tissue or in the adjacent connective tissue. In the latter a mild reaction was occasionally seen in the form of discrete cicatricial non-specific remodelling, and perivascular proliferation of histocytes or fibroblasts.

The histological picture of knuckle pads is thus similar to that of Dupuytren's contracture or Ledderhose's disease (thickening of the palmar aponeurosis).

Discussion

As already stated by Schwander (1953) and Hadorn (1944), nodular lesions published in the literature under the name of "knuckle pads", "Fingerknöchelpolster" or "coussinets des phalanges" can be differentiated into two types.

1. From some of these nodules the lesions basically appeared as scar tissue and acantho-hyperkeratosis (see the expressions used at times such as "tylositas articuli" and "heloderma"). They are often due to a mechanical local stress. They are false "knuckle pads" (Schwander, 1953; Hadorn, 1944).

2. Other nodules are striking because of their spontaneous appearance beneath the dorsal epidermis of the fingers at the level of the proximal interphalangeal joints but without any connection with the bones. Often these pads were associated with Dupuytren's contracture. The histological picture was basically a non-cicatricial fibroblastic proliferation. Even though there were actually very few cases which were histologically studied, these nodules can be regarded as a nosological entity on the basis of their clinical and pathological picture. They correspond to the observations made by Garrod. The term "knuckle pads" should be reserved for them as well as the corresponding terms in other languages. Clinically and histologically our four cases correspond to the second group of nodules. From their study we would like to emphasize the following two points.

a) Situation of Pads in Connective Tissue Pathology. The lesion to be discussed is mainly represented by a non inflammatory fibroblastic proliferation developing

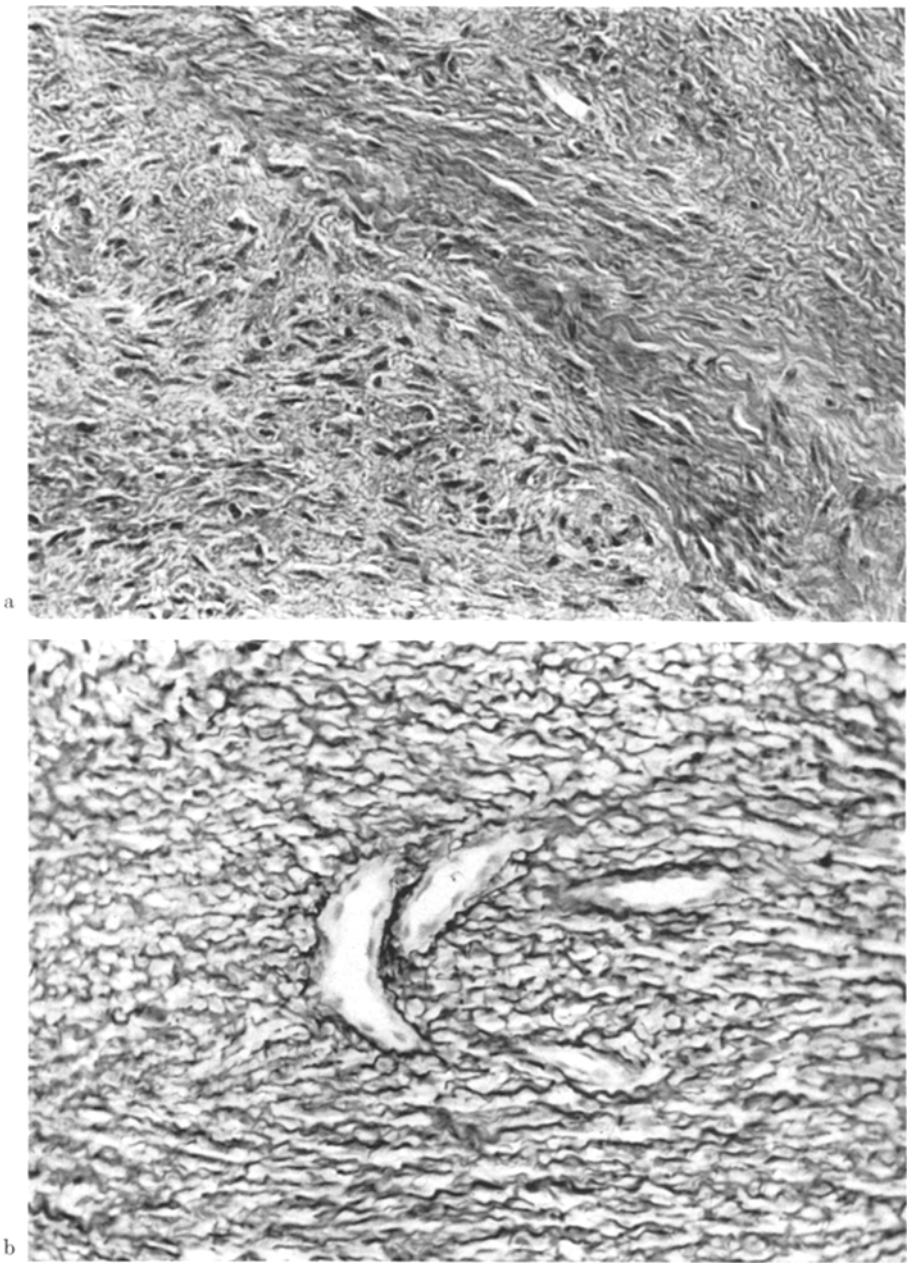

Fig. 1a and b. Case 1: Knuckle Pad: (a) Area of fibroblastic proliferation developing into fibrosis (van Gieson × 200). (b) Precollagenous fibers in a fibroblastic area, with newly formed capillaries (silver impregnation × 200)

into a dense fibrosis, the latter not containing elastic fibers (Schwander, 1953; our four cases). This fibrrosis is in direct contact with the preexisting dorsal aponeurosis of the finger, from which it could be free (Hauck, 1924) or to which it could be

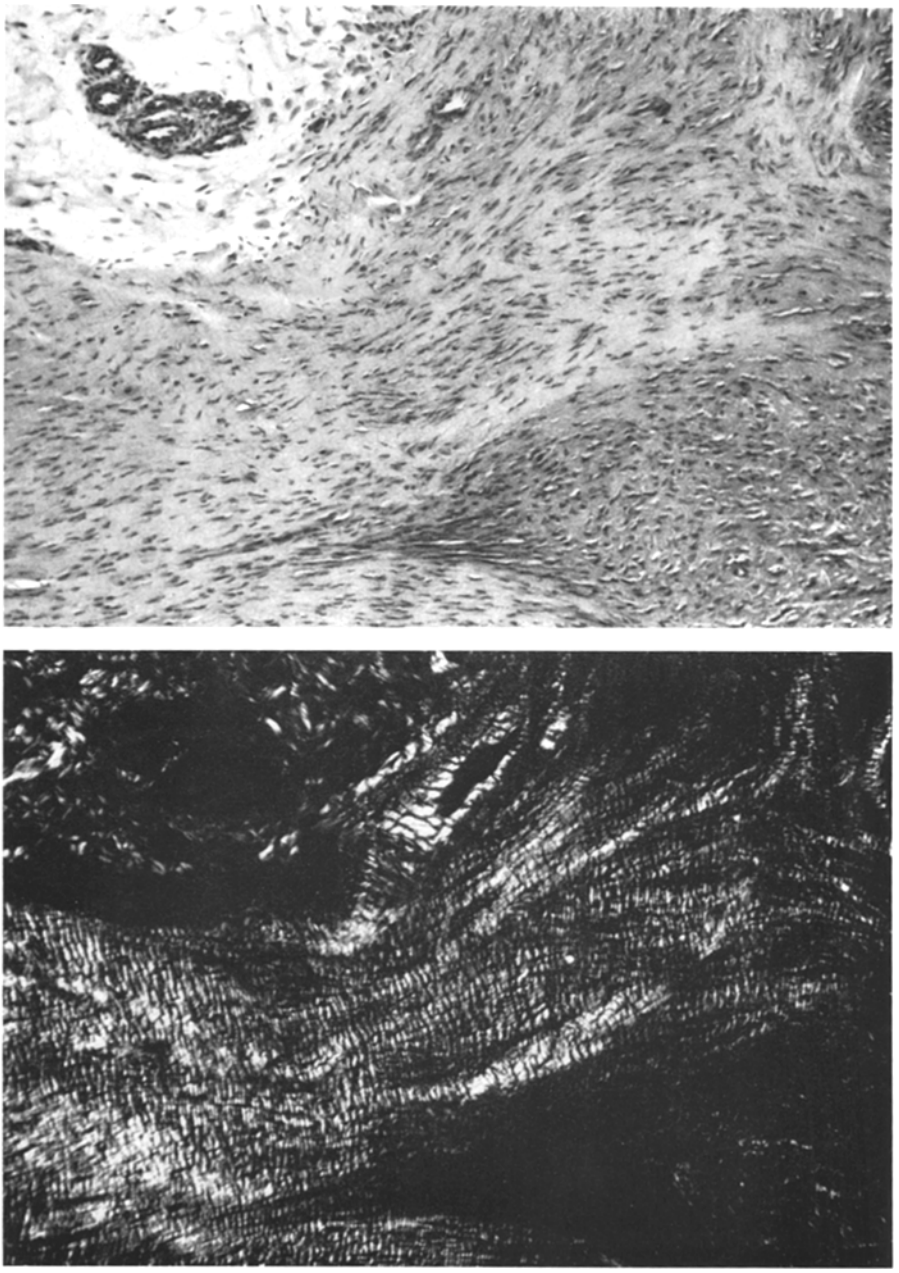

Fig. 2a and b. Case 2: Knuckle Pad: Area of fibroblastic proliferation developing into a dense fibrosis. It is sharply delimited from the preexisting subcutaneous connective tissue situated above on the left (Hematoxylin-Eosin $\times 80$). (a) Under normal light. (b) Under polarized light

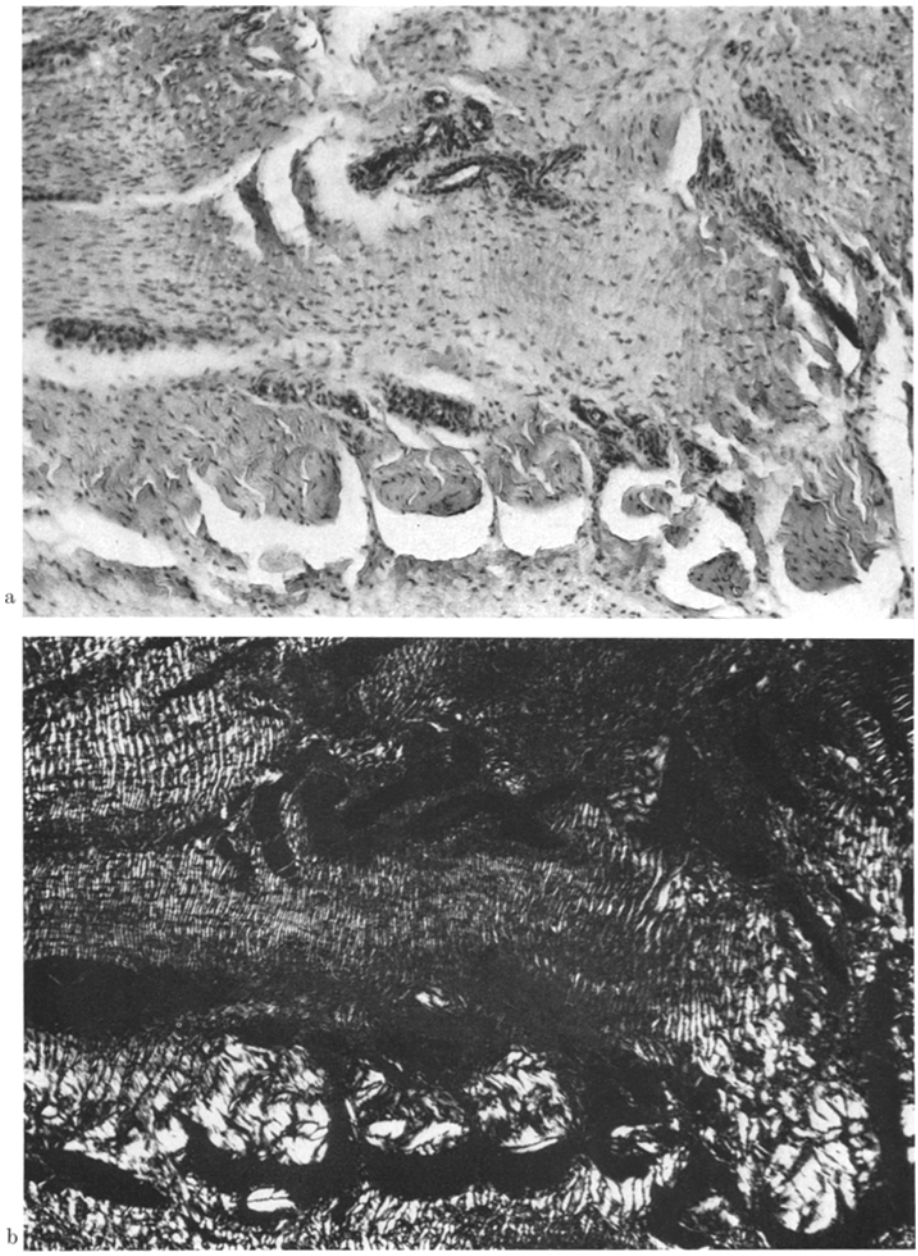

Fig. 3a and b. Case 4: Knuckle Pad: Joining of the newly formed dense fibrosis to the pre-existing dorsal aponeurosis. The different histological structure of this aponeurosis is readily seen (for topographical situation see figure 595 in Hafferl, 1957) (Hematoxylin-Eosin × 80). (a) Under normal light. (b) Under polarized light

attached (Schwander, 1953; Hadorn, 1944; Skoog, 1948; our 2^d case). It is also in contact with the preexisting surrounding connective tissue. When hyperkeratosis is observed (Hadorn, 1944) it is only secondary and more or less discrete (Skoog, 1948).

The lesion is therefore identical to that of the thickening of the palmar aponeurosis in Dupuytren's contracture (Skoog, 1948; Lagier and Exer, 1960; Lagier and Rutishauser, 1956) or of plantar aponeurosis in Ledderhose's disease (Skoog, 1948; Lagier and Morong, 1958). This coincides with the histological studies of the knuckle pads in the literature (Hauck, 1924; Sweitzer and Winer, 1942; Hadorn, 1944; Schwander, 1953; Skoog, 1948) and above all with clinical observations according to which knuckle pads and Dupuytren's contracture are often associated (Garrod, 1904; Touraine, 1942; Sweitzer and Winer, 1942; Skoog, 1948; our cases 1, 2 and 3). In a case where there was association of knuckle pads and Ledderhose's disease, Schwander (1953) stressed the histological similarity of the biopsies made in both affected areas. Thus knuckle pads can be grouped with "hereditary polyfibromatosis" according to Touraine and Ruel (1945) or with "fibromatosis" according to Stout and Lattes (1967).

Nevertheless, additional clinical and pathological studies are necessary to clarify certain points: there is not always an association between knuckle pads and Dupuytren's contracture — the fibrosis of knuckle pads (as well as that of Ledderhose's disease) is less dense and hyaline and quantitatively less abundant than that of the tendon-like cords in Dupuytren's contracture — in the knuckle pads (as, to a lesser extent, in Ledderhose's disease) the newly formed fibrosis appeared more separated from the aponeurosis than in Dupuytren's contracture.

Comparative anatomical and physiological investigations on palmar, plantar, or dorso-digital aponeuroses could show if, in addition to general factors, these differences may be due to mechanical factors. One can expect that these investigations would possibly explain why knuckle pads are classically situated in the dorsal middle line of a finger and at the level of proximal interphalangeal joints. In fact, only exceptionally they are reported in a marginal position (Schwander, 1953) or on the thumb (Hadorn, 1944), and they are doubts as to their existence at the distal interphalangeal joints or on the toes (Weber, 1938).

b) Differential Diagnosis. Such pads have obviously no connection with Heberden's or Bouchard's nodes, which are bony in nature.

A correct clinical investigation (local examination and study of the context) combined with a histological examination should readily permit a distinction between it and various lesions: callosities, scars, infectious or foreign body granulomas such as those of milkman's nodes, goutty tophi, xanthomatous deposits, rheumatic or rheumatoid nodules, cutaneous carcinoma and glomic tumour.

The fibroblastic proliferation should also be differentiated from fibrosarcoma, even more so since some mitosis have been reported (Schwander, 1953). Furthermore, the lesion consists in a newly formed tissue confronting to a preexisting one. Examination of a specimen large enough to show the relationship between the cellular proliferation and the dense fibrosis, as well as an adequate clinical study, should give the right diagnosis. Similarly as it is in other cases of fibromatoses, a histological study of knuckle pads should be carried out together with thorough clinical examination.

Conclusion

At the level of the fingers knuckle pads represent an anatomo-clinical entity similar to — and often associated with — Dupuytren's contracture and Ledderhose's disease. Similarly to the latter, knuckle pads represent a form of fibromatosis and are not an abarticular manifestation of inflammatory or degenerative articular rheumatism.

We express our thanks to Professors R. Megevand and J. Fabre, Doctors J. Argand and L. Sechehaye for their clinical informations.

This paper was partly supported by the "Commission Fédérale des Maladies Rhumatismales" (Bern).

References

Garrod, A. E.: concerning pads upon the finger joints and their clinical relationships. Brit. med. J. **1904II**, 8

Hadorn, W.: Über Fingerknöchelknoten. Schweiz. med. Wschr. **74**, 211–214 (1944)

Hafferl, A.: Lehrbuch der topographischen Anatomie. 2. Aufl., S. 783. Berlin-Göttingen-Heidelberg: Springer 1957

Hauck, G.: Über subkutane Fibrome an der Dorsalseite der Fingermittelgelenke. Med. Klin. **20**, 1569 (1924)

Jones, H. W.: Two cases of "knuckle pads". Brit. med. J. **1923I**, 759

Krantz, W.: Über die "Fingerknöchelpolster" ("knuckle pads"). Derm. Wschr. **107**, 945–949 (1938)

Lagier, R., Exer, B.: Über chemische Untersuchungen des sehnenförmigen Stränge bei der Dupuytrenschen Krontraktur. Vergleichende Untersuchungen an verschiedenen Arten normalen Bindegewebes der Hand. Virchows Arch. path. Anat. **333**, 68–80 (1960)

Lagier, R., Morong, E.: Contribution à l'étude anatomo-pathologique de la maladie de Ledderhose (Epaississement de l'aponévrose plantaire). Presse méd. **66**, 106–109 (1958)

Lagier, R., Rutishauser, E.: Anatomie pathologique et pathogénie de la maladie de Dupuytren. Presse méd. **64**, 1212–1216 (1956)

Schwander, R.: Über einen besonderen Fall von multiplen symmetrischen Fingerfibromen. Arch. Derm. Syph. (Berl.) **196**, 413–421 (1953)

Skoog, T.: Dupuytren's contraction—with special reference to aetiology and improved surgical treatment—its occurrence in epileptics—note on knuckle pads. Acta chir. scand. **96**, Suppl. 139 (1948)

Stout, A. P., Lattes, R.: Tumors of the soft tissues. Atlas of tumor pathology, 2nd series, fasc. I, Washington, D. C.: Armed Forces Institute of Pathology 1967

Sweitzer, S. E., Winer, L. H.: Fibrotic nodules of the skin. Arch. Derm. Syph. (Berl.) **45**, 315–327 (1942)

Touraine, A.: Discussion de l'article Jausion, Cailliau, Calos et Chalopin: Coussinets des phalanges. Etude histopathologique. Ann. Derm. Syph. (Paris) **22**, 278 (1942)

Touraine, A., Ruel, H.: La polyfibromatose héréditaire. Ann. Derm. Syph. (Paris) **25**, 1–5 (1945)

Weber, F.: A note on Dupuytren's contraction, camptodactylia and knuckle pads. Brit. J. Derm. **50**, 26–31 (1938)

René Lagier
Department of Pathology
40, Boulevard de la Cluse
CH-1211 Genève 4
Switzerland