A Case of Infantile Digital Fibromatosis

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We report a case of infantile digital fibromatosis in a 34 month-old boy, who presented with a painless subcutaneous tumor on the medial aspect of the left third toe. A histological examination showed scattered small, round eosinophilic inclusion bodies in the cytoplasm of the tumor cells, which was consistent with infantile digital fibromatosis. A immunohistochemical study revealed that desmin, α-smooth muscle actin, and vimentin were clearly positive in the cytoplasm of the tumor cells, but the inclusions themselves showed negative staining, thus indicating a hollow-like staining pattern. Electron microscopy showed either well-defined or ill-demarcated dense bodies in the cytoplasm of the tumor cells. In some areas, small vesicles and intracellular organells were observed in the inclusions. In the course of conservative treatment, a new lesion developed on the lateral aspect of the left third toe, seven months after the appearance of the initial lesion. (Ann Dermatol 11(3) 174~178, 1999).

Key Words : Infantile digital fibromatosis, Inclusion bodies

Infantile digital fibromatosis (IDF) is a rare non-malignant condition and a distinctive fibrous tumor, first described by Reye in 1965[1]. This type of fibroma differs from other fibrous tumors in three respects: (1) clinically it is limited to the fingers and toes in infants and children, (2) it has a remarkable tendency to recur, and (3) morphologically it is characterized by the presence of cytoplasmic inclusion bodies.

There are many theories about the exact origin of the inclusions and the true nature of the lesion. Recently, by electron microscopic studies, Bhawan et al and Iwasaki et al showed that the tumor consists of myofibroblasts that contain inclusions probably representing abnormal accumulations of cytoplasmic contractile proteins[7,8]. In the Korean dermatological literature, 6 cases have been reported until now (Table 1), but in no case was an attempt made to investigate the nature of the cytoplasmic inclusion bodies. Herein, we report a case of IDF, adding immunohistochemical and electron microscopic findings of the cytoplasmic inclusion bodies.

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CASE REPORT

A 34-month-old boy presented with a two month history of a bean sized, flesh colored, firm, slow growing nodule on the medial aspect of his left third toe (Fig. 1 A). There was no history of previous trauma or physical injury. On physical examination, specific findings were not seen except for skin lesions. Routine laboratory and radiological studies were within normal limits. Histologically the subcutaneous tumor was unencapsulated, and proliferation of the tumor cells began immediately below the epidermis and extended deep into the upper area of the subcutaneous tissue, forming fascicular or nodular patterns in variable directions. The tumor cells were spindle shaped, and their nuclei were oval, blunt, or irregular. Some nuclei were hyperchromatic, but were not so atypical and pleomorphic as to suggest malignancy. A striking feature was that a number of the tumor cells had small, round eosinophilic inclusion bodies in their cytoplasm (Fig. 2 A). These bodies were much more

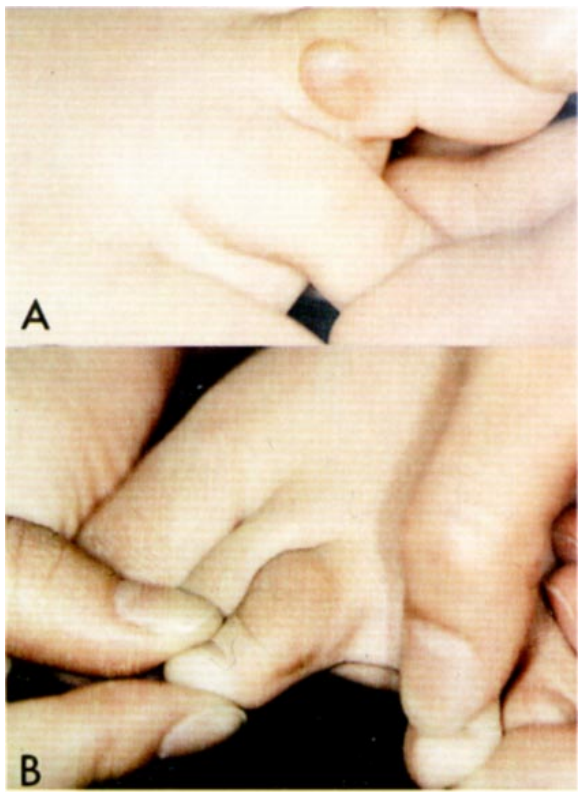

Fig. 1. A: Single, bean sized, flesh colored, dome shaped nodule on the medial side of left 3rd toe.
B: New lesion developed on the lateral aspect of left 3rd toe 7 months after the appearance of initial tumor.

easily seen with Masson's trichrome staining and appeared deep red (Fig. 2 B). On immunohistochemical analysis, desmin, α-smooth muscle actin, and vimentin were clearly positive in the cytoplasm of the tumor cells, but the inclusions themselves showed negative staining, thus indicating a hollow-like staining pattern (Fig. 3). Electron microscopic findings were either well-defined or ill-demarcated dense bodies in the cytoplasm of the tumor cells (Fig. 4 A). In some areas, small vesicles and intracellular organells were observed in the inclusions (Fig. 4 B). Based on the above findings, a diagnosis of IDF was made and was observed without local excision. Seven months later a new lesion appeared on the lateral aspect of the left third toe (Fig. 1 B). Both lesions have been observed for 1 year and definite spontaneous regression has not occurred so far.

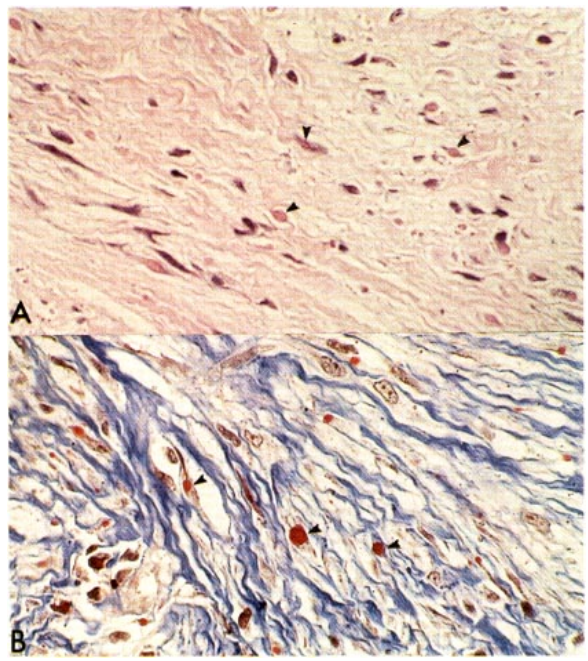

Fig. 2. A: Eosinophilic inclusion bodies(arrow heads) in the cytoplasm of the proliferating spindle cells (H & E, ×200).
B: Inclusion bodies(arrow heads) which stained deep red (Masson's trichrome, ×200).

DISCUSSION

IDF occurs frequently on the fingers and toes of infants under the age of 1 year[1]. Reviews of the literature show that the lesions present within the first year of life in 75% of the children reported[9,10]. This slow-growing soft-tissue tumor involves the fingers and toes with approximately the same frequency; the thumb and great toe are not usually involved[11,12]. The fibrous nodules are often multiple in distribution and rarely exceed 2 cm in diameter[9-12]. Our patient presented with a bean sized, painless subcutaneous tumor on the medial aspect of his left third toe at the age of 34 months.

The most striking histological feature is the presence of small, round eosinophilic inclusion bodies in the cytoplasm of a small percentage of the tumor cells. In our case, these bodies were much more easily recognized on Masson's trichrome staining and appeared deep red. Although this distinct lesion is well-documented, the histogenesis of the tumor and the nature of the inclusions remain to be established. Most authors

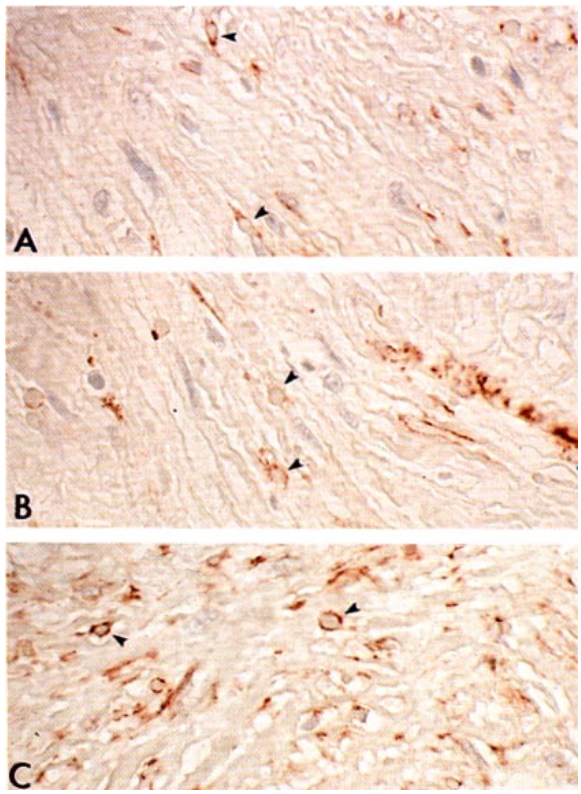

Fig. 3. Immunohistochemical staining. Immunohistochemical reactions were positive in the cytoplasms and negative in the inclusion bodies for desmin (A), α-smooth muscle actin (B), and vimentin (C). Arrowheads indicate inclusion bodies. ×200.

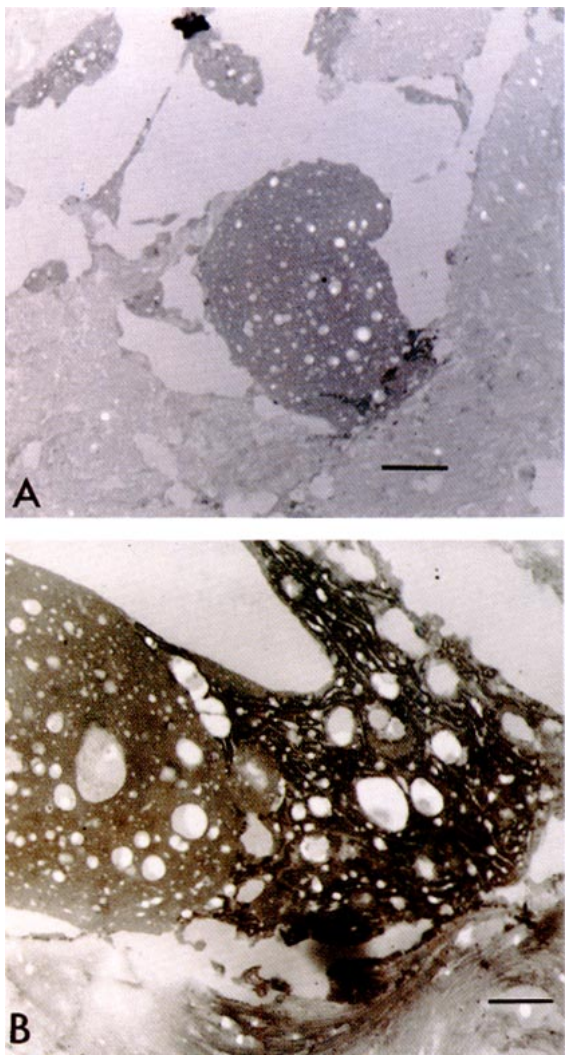

Fig. 4. Electron microscopic features of inclusion bodies. A. Well defined, homogenous electron dense body. Bar=1μm. B. small vesicles and intracellular organells in the inclusion body. Bar = 0.5μm.

suggest that the tumor originates from proliferating myofibroblasts[13,14-16]. Bhawan et al pointed out in 1979 that the tumor was composed of typical myofibroblasts, as the tumor cells contained narrow bundles of microfilaments with many dense bodies[7]. We also observed myofibroblasts on immunohistochemical analysis in this case.

With respect to the nature of the inclusion bodies, some authors suggested that the inclusions bore a close ultrastructural resemblance to viroplasma, that is often seen in cells infected with a variety of viruses[17,18]. However, there has not yet been solid evidence to support a viral origin. In the present ultrastructural study as well, there was no structure which could be considered to represent a virus. Other authors have suggested that the inclusions could be derived from abnormal deposition of a collagenous protein precursor in metabolically deranged tumor cells[15,16]. The cause of this metabolic derangement is not known. Recent evidence has shown that inclusion bodies are related to cytoplasmic actin filaments, suggesting that a defective regulation of cellular filament meshwork architecture plays a role in the development of the inclusions[8,19,20]. According to Iwasaki et al, filamentous structures were definitely recognized in microfilaments surrounding the inclusions, but they were not seen in the inclusions themselves[8]. Hiraoka et al recommended that a pretreatment combining

Table 1. Comparison of infantile digital fibromatosis in Korean dermatological literature

Cases	Age of onset/Sex	Sites of affected	Clinical courses
[1981]Kim et al[2]	9 months/F	Rt 5th toe	No follow-up after resection
[1982]Yoo et al[3]	5 months/M	Rt 2,3,4th finger	Not improved after TA* local injection
[1992]Choi et al[4]	6 months/F	Lt 5th toe	Recurrence 2 years after resection
[1994]Yoon et al[5]	3 days/M	Lt 3rd finger	Recurrence 2 months after resection
〃	12 months/F	Rt 4,5th finger	Spontaneous regression in 30 months
[1995]Sohn et al[6]	6 months/F	Lt 2,3,4th finger	No recurrence after resection
Present case	34 months/M	Lt 3rd toe	New lesion developed in 41 months

Rt : Right Lt : Left * : Triamcinolone acetonide

KOH in 70% ethanol and trypsin, instead of formalin in our case, is required for easy demonstration of actin filaments in the inclusion bodies[21]. In our case, using immunohistochemical stains, desmin, α-smooth muscle actin and vimentin were observed around the inclusions, but they could not be found in the inclusions themselves.

In the electron microscopic study of our case, the inclusions seen in light microscopy were either well-defined or ill-demarcated dense bodies. Although a filamentous structure was not seen, small vesicles and intracellular organells were observed in the inclusions. The presence of small vesicles and intracellular organells in the inclusion bodies, as observed in our case, has been reported previously, indicating that intracellular organells and other structures are involved in the formation of the inclusion bodies[7,22,23].

The number of inclusion bodies in IDF appears to decrease with progression of fibrosis and the age of the lesion[23]. An extremely small number of inclusion bodies in IDF may lead to a misdiagnosis such as dermatofibroma, angiofibroma, neurofibroma, fibrosarcoma, or some other tumors[24].

In dealing with IDF, it is important to recognize the natural history, as it has a remarkable tendency to recur. Recurrence takes place at the same site, or a second tumor develops in an adjacent finger or toe, usually between 2 weeks and 6 years[10]. Metastases have not been reported. In our case, a second tumor developed on the lateral aspect of the same site 7 months after the appearance of the first tumor. Despite the fact that 60% of the cases recur locally, there is sometimes spontaneous regression over a period of several years[9]. Reye described the spontaneous regression of such tumors, and a wait-and-see policy was adopted[1]. Bloem et al strongly recommended continual observation, or limited surgery only for correction of functional change because some aggressive fibromas resolved spontaneously[11]. We have had long term follow-up for 1 year and have not observed spontaneous regression so far. However, as there is no evidence of aggressive behavior or malignant transformation, we believe a mere conservative approach is warranted.

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