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Infantile Myofibromatosis : A Case with Skull and Rib Involvement

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=Abstract= **A case of infantile myofibromatosis with skull and rib involvement was reported. The patient was an 8-month old female infant presented with an enlarging skull mass. On systemic evaluation, 2 skull masses and three rib lesions were detected. Diagnosis was made histopathologically with excised skull mass. The clinicopathological features of the case are described.**

Key Words: *Infantile myofibromatosis, Skull, Rib*

INTRODUCTION

Since the initial report of 2 cases of "congenital generalized fibromatosis" by Stout (Stout 1954), numerous additional examples of this disease entity have been described in the literature under various synonyms. The term of infantile myofibromatosis was coined by Chung and Enzinger based on histologic and ultrastructural evidence that myofibroblasts were the cells of origin(Chung and Enzinger 1985).

The most prominent clinical manifestation of infantile myofibromatosis is the development of firm, discrete nodules in the skin, muscle, or subcutaneous tissues. It could also involve internal organs such as the lung, gastrointestinal tract, etc. The prognosis for solitary lesion is considered uniformly good, except for possible local recurrence. In the multiple form of the disease, the mortality is high when internal vital organs are involved(Wiswell *et al.* 1985).

We here report a case of infantile myofibromatosis in an 8-month-old female infant with multiple skull and rib involvement.

CASE REPORT

An 8-month-old female infant was brought to the Neurosurgery Service of Seoul National University Children's Hospital(SNUCH) because of an enlarging skull mass. Past medical history indicated that she was born via normal full term spontaneous delivery without perinatal problems. At 1 month of age, a right anterior parietal subcutaneous mass was detected by her mother. The mass was about 1-cm in diameter, soft in consistency, and covered by normal skin. She had been admitted to another hospital. On systemic work up done at that hospital a right occipital skull lesion was detected on skull plain X-ray that was impalpable on physical examination. A palpable left antecubital mass was detected. She had no family history of subcutaneous nodules or skull masses. Because of elevated serum aspartate aminotrans-

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ferase(AST), an operation to remove the mass was postponed. The skull masses increased in size and their consistency became hard at 4 months of age, the right parietal mass became 3 cm in diameter, and the occipital one 1.5 cm in diameter.

She was hospitalized in SNUCH at the age of 8 months for further evaluation. The physical examination showed a right parietal, a right occipital mass and a left antecubital mass. The right parietal mass was 3.5 cm in diameter, and 0.5 cm in height, and there was central softening with circumferential bony-hard consistency (Fig. 1). The occipital mass was uniformly hard. The left antecubital lesion represented a poorly delineated subcutaneous mass with a diameter of 2 cm with firm consistency. There was no palpable mass lesion elsewhere. Neurological examination showed no abnormal findings. The patient showed normal developmental milestones. Laboratory data showed no abnormal findings except for a mild elevation of AST(94 U/L).

Plain skull X-ray showed 2 radiolucent lesions, the right parietal lesion was 3 cm in diameter with sclerotic margin, the right occipital lesion was 1 cm in diameter with marginal sclerosis(Fig. 2). Chest X-ray and rib cage view revealed osteolytic lesions of the ribs involving the right 6th, 7th, and left 6th ribs. Involved ribs showed fusiform enlargement with internal low density. Marginal sclerosis was not definite(Fig. 3). There was no pulmonary parenchymal lesion detectable at plain film. Plain X-ray of the left elbow joint area showed no abnormal finding. On brain CT, only the right parietal lesion was detected. Both the inner and outer tables became bulged inside and outside, respectively. The tumor showed slightly increased density on precontrast CT scan, and showed suspicious contrast enhancement on postcontrast CT scan(Fig. 4). No abnormal finding was observed in the brain parenchyma. Abdominal ultrasonography also showed no abnormal findings.

Operation was done on the 5th hospital day(Oct. 21 1991). A separate inverted U-shaped skin incision was made over the occipi-

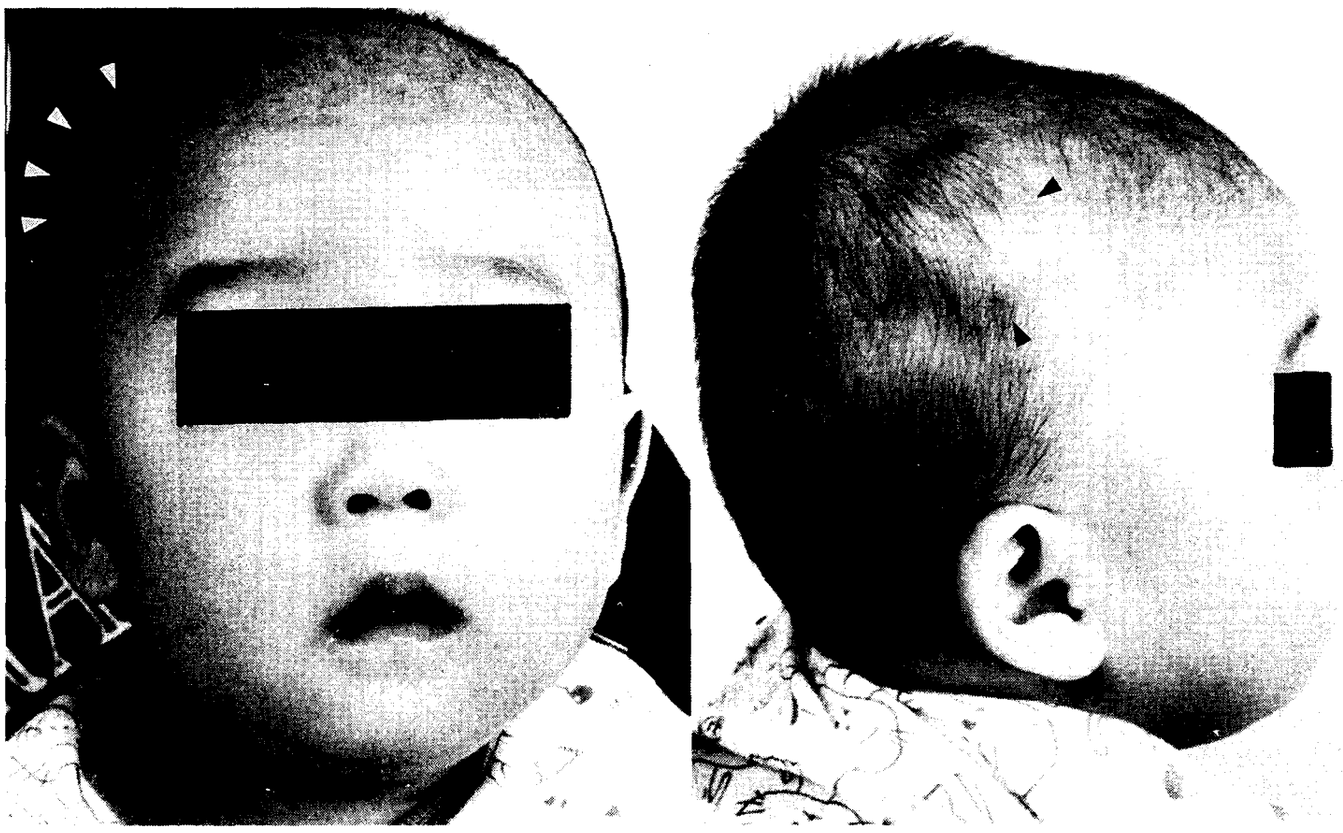

Fig. 1. Preoperative gross photo shows a right parietal bulging mass with smooth contour (arrowheads).

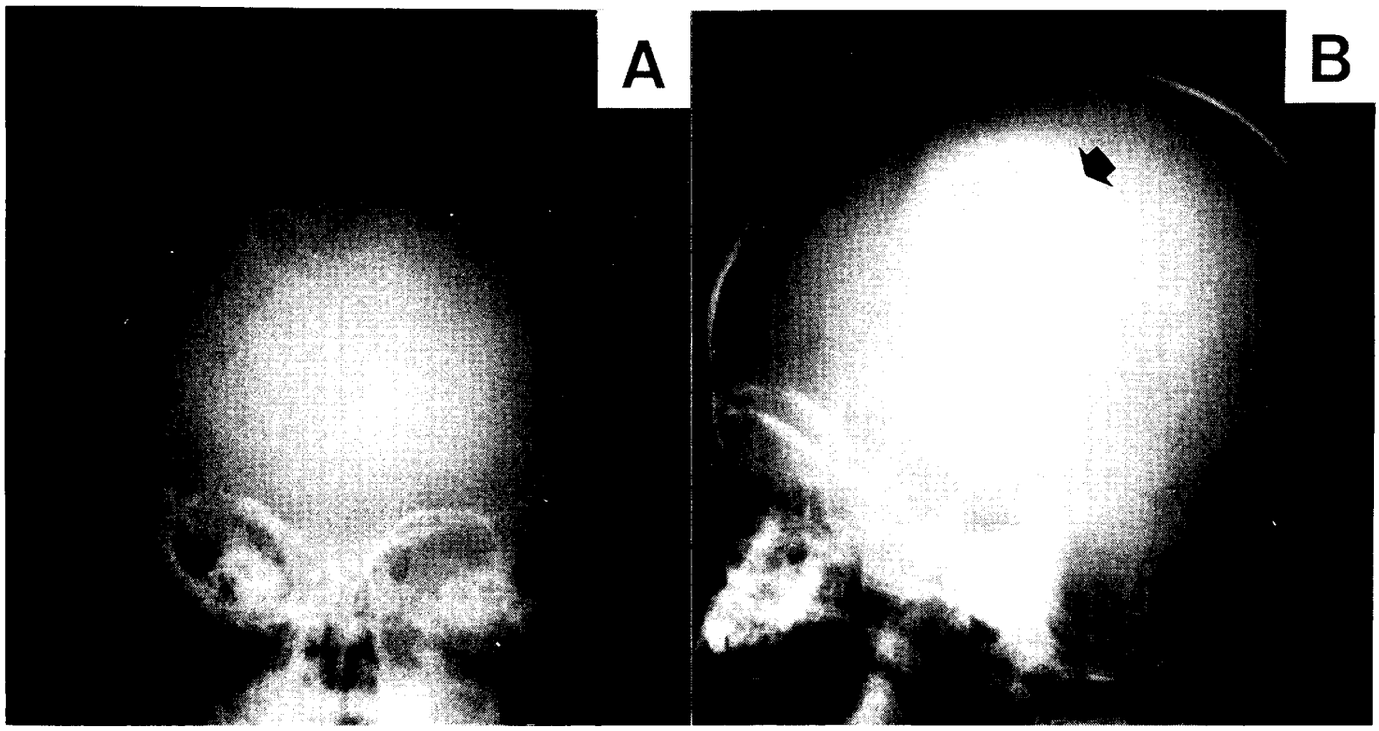

Fig. 2. Preoperative skull X-ray: Towns' view(A) shows right occipital and lateral view(B) parietal radiolucent lesions with smooth borders and marginal sclerosis(arrows).

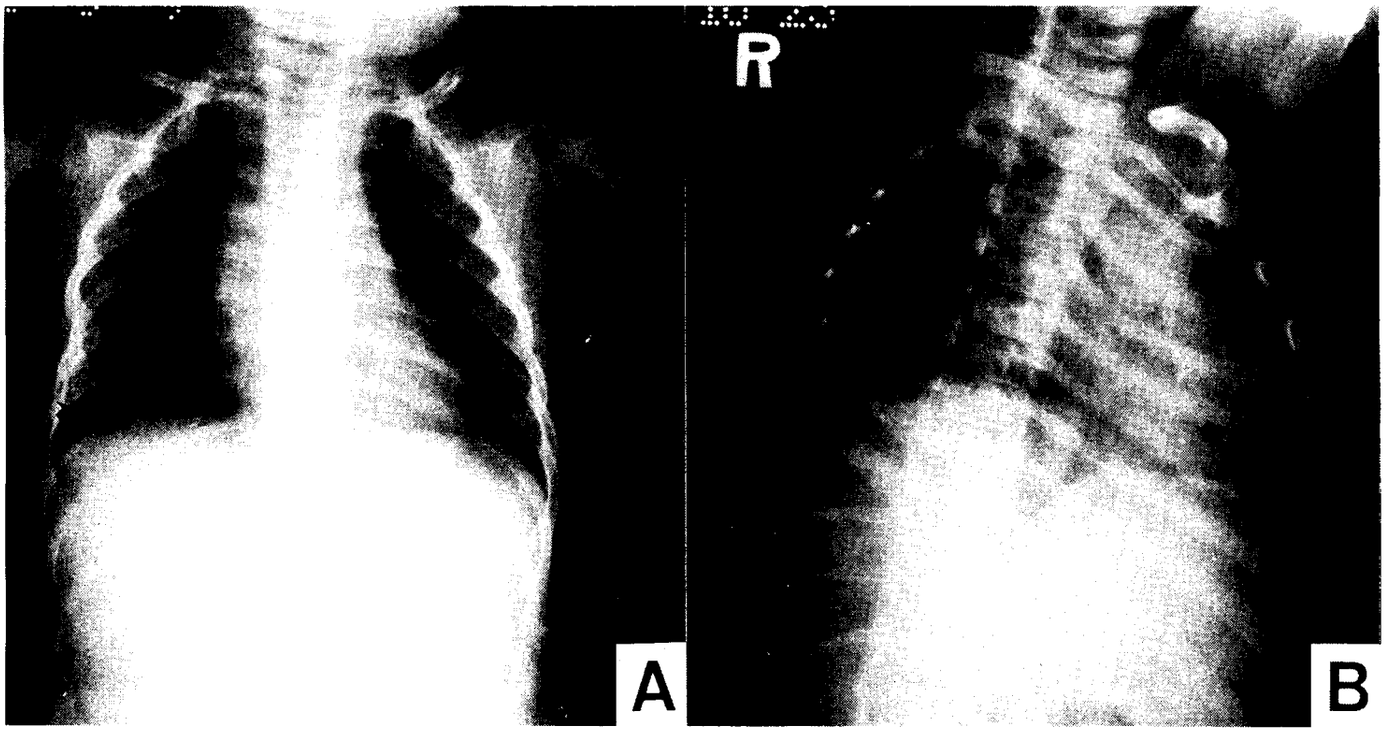

Fig. 3. Chest X-ray: PA view(A) and rib cage view(B) shows rib involvement at the right 6th, 7th, and left 6th(arrows). The involved ribs show fusiform enlargement with internal low density and minimal marginal sclerosis. There was no lung parenchymal lesion detectable on plain film.

tal and parietal mass. Through retraction of the scalp flap including the galea aponeurotica, a mildly elevated mass was exposed at the right occipital area. The mass appeared whitish fi-

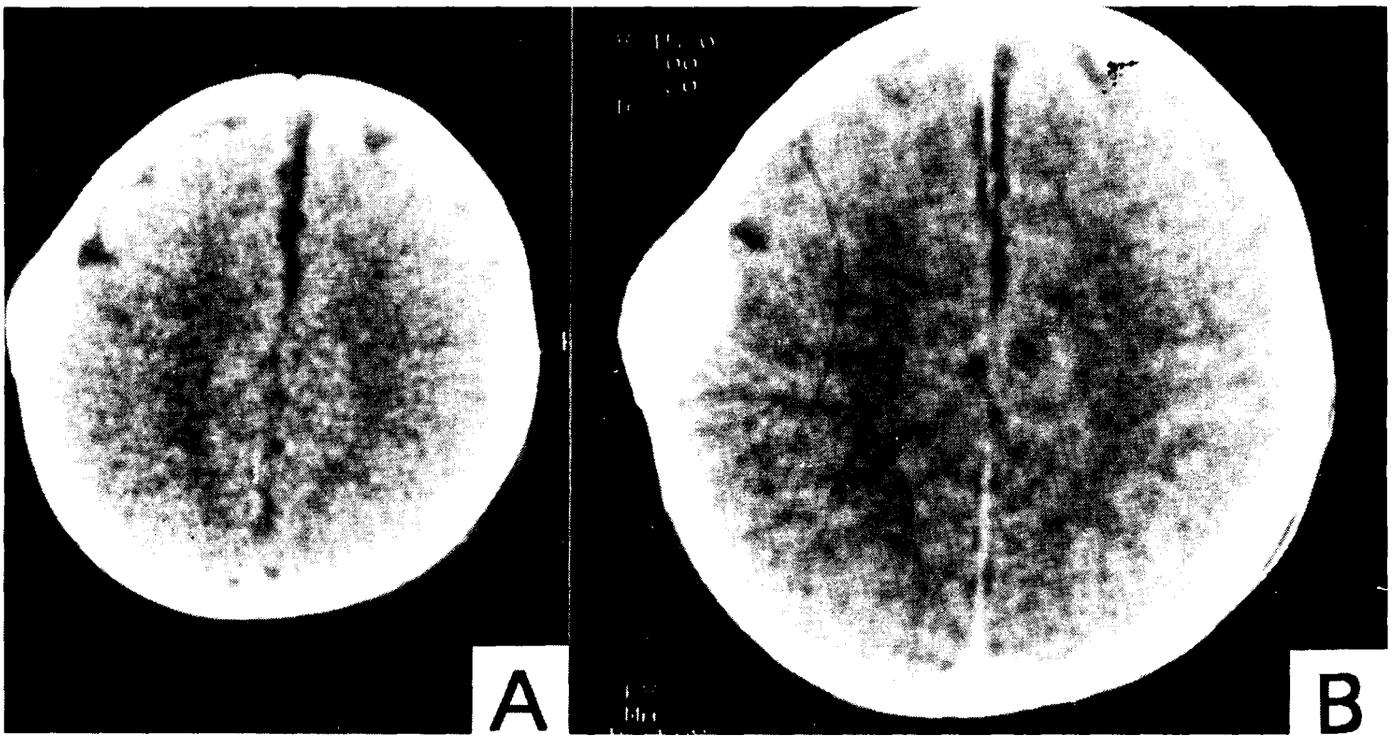

Fig. 4. Brain CT. PCT(A) shows a biconvex lesion involving the right parietal bone with homogeneous signal intensity. ECT(B) shows slight signal increase suggestive of minimal contrast enhancement. There was no evidence of brain parenchymal involvement.

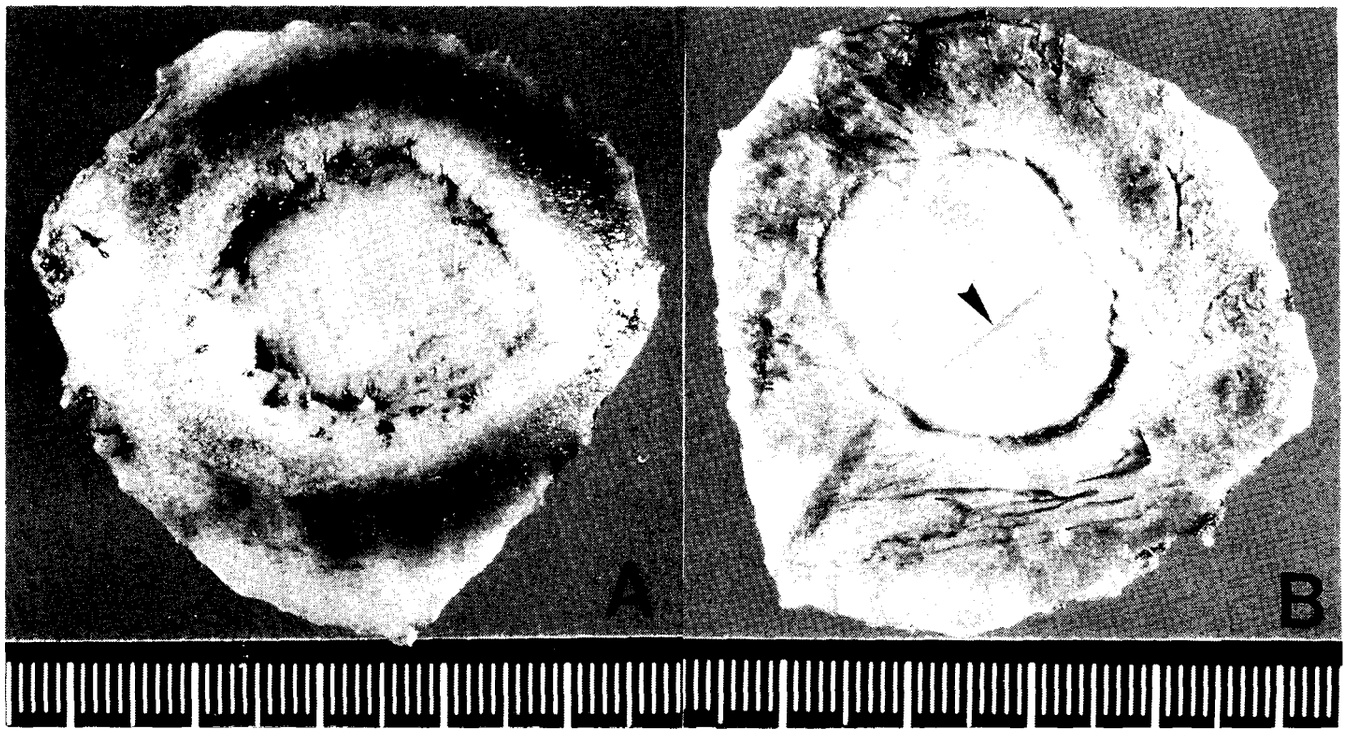

Fig. 5. Gross specimen of right parietal lesion. Outer surface(A) shows fibrous mass lesion with white color with central bone defect. Inner surface(B) shows a similar appearance. The small crease(arrowhead) is a surgical artifact.

brotic and adhered tightly to underlying dura. The occipital tumor was removed by piecemeal rongeuring. By retrcation of the scalp flap, the exposed right parietal mass showed central

bony defect with tight adhesion with overlying periosteum. The bony defect area was filled with slightly tan-colored fibrous tissue. The mass was removed by en-bloc method. After burr hole trephination at the periphery of the mass, circumferential craniectomy by rongeuring was done around the mass. After completion of craniectomy, the bony mass was separated from the underlying dura. Since there was a tight adhesion with the underlying dura, a portion of the outer layer of dura was peeled out with the skull mass. The inner surface of the excised parietal mass showed similar appearance as did the outer surface - fibrous tissue-filled bony defect with tightly adhered outer layer of dura mater(Fig. 5).

Histopathologically, the tumors were composed of spindle cells arranged in a whorled, fascicular pattern. The spindle cells had oval nuclei with fine granular chromatin, and bipolar tapering cytoplasmic processes containing eosinophilic cytoplasm. At the center of the mass, there were multiple cleft-like spaces suggestive of vascular space. With Masson's trichrome staining, the spindle cells showed blue color reaction indicating collagen fibers. This staining pattern became more prominent at the peripheral area(Fig. 6).

There was no postoperative problem. After the tissue diagnosis of skull masses was made, the other masses(rib, antecubital lesions) were spared for spontaneous regression. The patient was discharged on the 5th postoperative day.

DISCUSSION

Infantile myofibromatosis carries numerous synonyms such as congenital generalized fibromatosis, congenital multiple fibromatosis, multiple mesenchymal hamartomas, multiple vascular leiomyomas of the newborn, diffuse congenital fibromatosis, or mesenchymal hamartomatosis. It has long been known as a rare mesenchymal disorder of infancy, but now

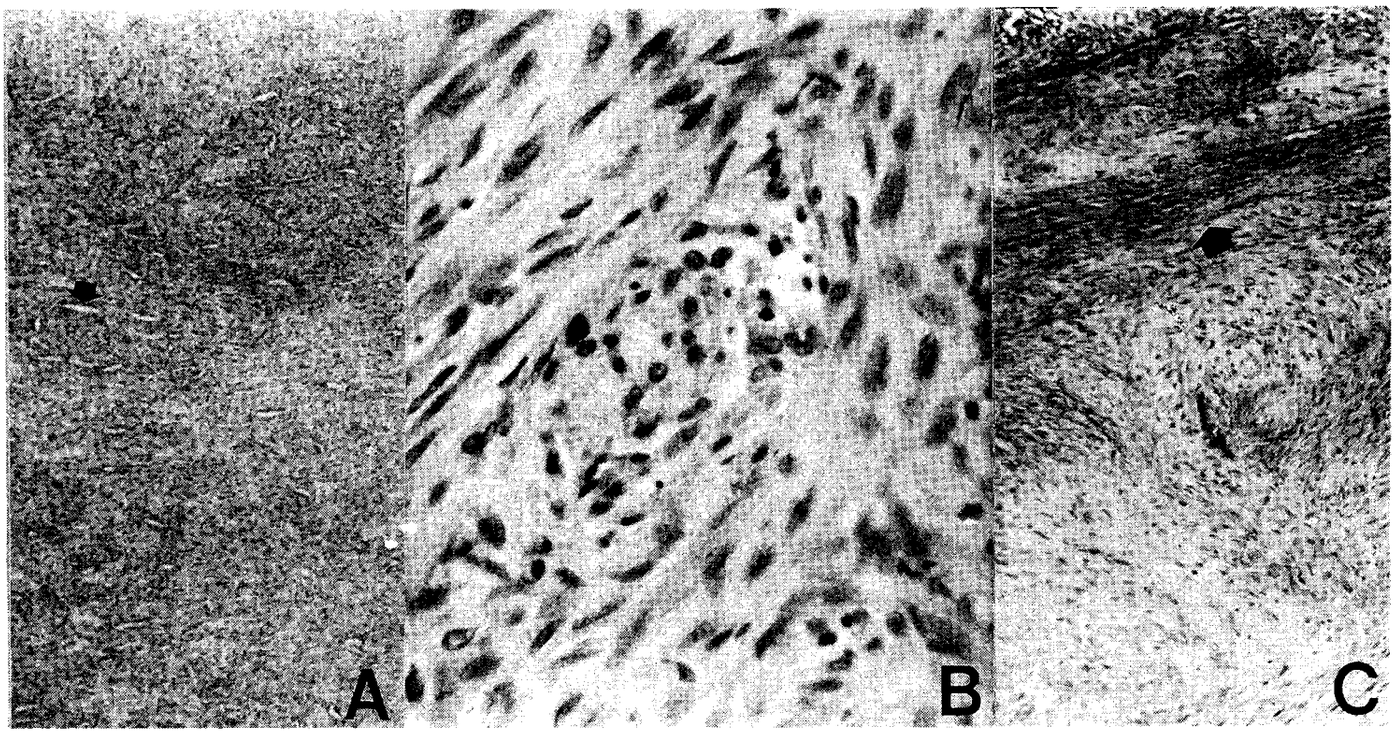

Fig. 6. Photomicrograph of pathologic specimen. Low power photograph(A, X100) shows whorling pattern of spindle-shaped cells with multiple small cavities(small arrow) suggestive of vascular space. At high power magnification(B, X400) the cells are arranged in bundles, with morphologic characteristics of both smooth muscle cells and fibroblasts. Masson's trichrome staining(C, X100) shows positive reaction to collagen mainly at the peripheral area(large arrow).

it is considered as one of the most common fibrous tumors in infancy, and therefore the disease entity should be evaluated with high priority in newborns or young infants presenting with solitary or multiple tumors(Thomas *et al.* 1988).

The age of the patients at the time of initial operation ranged from newborn to 12 years, with a median of 3 months of age and an average of 11 months(Chung and Enzinger 1981). It shows a definite male predominance pattern in sex distribution-male : female = 1.7 : 1(Wiswell *et al.* 1985). It has been previously known as a disease of infancy and childhood, but infantile myofibromatosis can and does occur also in adults(Daimaru *et al.* 1989).

The etiology is unknown, but reports suggesting autosomal inheritance are available(Chung and Enzinger 1981; Jennings *et al.* 1984). Furthermore, some studies have proposed that the lesions of infantile myofibromatosis may represent a hamartoma in nature and that they might have resulted from in utero stimulation by estrogenic hormones (Wiswell *et al.* 1985).

Characteristic clinical manifestations of infantile myofibromatosis include the formation of firm, discrete nodules in skin, muscle, or subcutaneous tissue. The masses are rubbery in nature, diamater of 0.3 to 3 cm. The skin lesions sometimes resemble quite a hemangioma due to its vascularity(Lawrence *et al.* 1988). It has been well established that there are two types of infantile myofibromatosis-the solitary type and the multiple one(Wiswell *et al.* 1985; Wiswell 1988). The solitary type usually involves skin, muscle, and subcutaneous tissue, and a palpable tumor is detectable usually at birth but may be detected late in infancy. The multiple type is generally confined to soft tissue and bone with frequent visceral involvement, and palpable tumors are detected usually at birth. In cases with pulmonary involvement, the disease usually represents either a diffuse interstitial inflammation or bronchopneumonia pattern, but it may be present as a discrete lesion in some cases(Wiswell *et al.* 1985).

In evaluating patients with infantile myofibromatosis, it is stressed to include a thorough family history, along with a complete physical examination. The imaging studies should include chest X-ray, skeletal survey and ultrasonography of the abdomen and heart, and CT of the thorax and abdomen. Other special studies, e.g. contrast study for gastointestinal tract or cranial or spinal CT scan can be done in selected cases(Wiswell *et al.* 1985). The bone lesions usually appear as radiolucent lytic lesions, cystic defects, or circumscribed lytic lesion with sclerotic borders. Frequent involving sites for such bony lesions are the skull, femur, tibia, spine, and rib(Chung and Enzinger 1981). Tumor biopsy is recommended for suspicious cases for tissue diagnosis. The MRI is not an established diagnostic modality for infantile myofibromatosis, but some reports indicate the diagnostic usefulness of the MRI since it clearly delineates the precise location of fibromas in any part of the body, and it may also provide some insights into the biologic stage(Moore *et al.* 1987).

The other disease entities that could be included in differential diagnosis are infantile or juvenile(desmoid-type) fibromatosis, and nodular fascitis, infantile hemangiopericytoma. The characteristic histologic fingings of clear delineated lesion, zoning pattern of central versus peripheral portion, and the composing cells of infantile myofibromatosis make it easy to differentiate these disease entities from it(Chung and Enzinger 1981).

On gross examination of pathologic specimens, the lesions are well demarcated or circumscribed, some were even encapsulated, appearing as disc-shaped, ovoid, or spherical forms, and rubbery or firm on palpation. The cut surface is grayish white, light tan to brown, or purplish, often with central yellow necrotic areas of and/or cystic spaces that were filled with cheesy or hemorrhagic material(Chung and Enzinger 1981). The histopatholgy shows a distinct zoning pattern(Wiswell *et al.* 1985; Chung and Enzinger 1981). At the periphery of the lesion, cells have morphology intermediate

in appearance between fibroblast-like spindle cells and plump fusiform cells resembling smooth muscle cells. The cells have eosinophilic to clear cytoplasm with fairly well-defined cytoplasmic membrane. They are arranged in curving bundles or interwining fascicles of cells, and there are delicate wavy bundles of collagen fibers. At the central part of the lesion, tumor vessels were intimately associated with loosely arranged or packed round to polyhedral cells having large, slightly pleomorphic hyperchromatic nuclei and relatively scanty, pale pink to amorphophilic, poorly outlined cytoplasm. These cells are arranged in hemangiopericytoma-like pattern. There could be necrosis, hyalinization, or calcification. In some cases there is polypoid growth of the tumor cells into the vascular space. The lung lesion shows prominent myogenic differentiation.

With Masson's trichrome, the lesion shows variable staining, partly fuchsinophilic. There are faintly blue or remained unstained, occasional blue-staining longitudinal fibrils on PTAH staining. Other special stains show varying amounts of reticulum or collagen, but there is no intracellular glycogen, which is a differential point from myogenic neoplasms. There is no positive result on Bodian, crystal violet staining(Chung and Enzinger 1981). Immunocytochemistry studies did not disclose the presence of myoglobin and S-100 protein(Lawrence *et al.* 1988)

Electron microscpic studies revealed that spindle-shaped tumor cells which showed the ultrastructural features of both fibroblasts and smooth muscle cells were myofibroblasts (Benjamin *et al.* 1977; Kim *et al.* 1989).

The treatment of choice in infantile myofibromatosis is surgical excision of masses, and the surgery should be done if there is involvement of vital structures(Wiswell *et al.* 1985; Fraser *et al.* 1985). After the tissue diagnosis was made, however, watchful waiting for spontaneous regression of other lesions is reasonable. Other treatment modalities such as radiation have limited success. Some authors reported the application of chemotherapy using vincristine, actinomycin-D, or cyclophosphamide with some success when all other modalities had failed(Salamah *et al.* 1988). Since there are some reports of familial aggregation of infantile myofibroamtosis, one should consider genetic counselling for affected children and his or her family(Wiswell *et al.* 1985).

Initially the prognosis of infantile myofibromatosis was known to be very poor, but nowadays it is well established that the disease is rather self-limited in most cases. The most important factor for poor prognosis is the presence of pulmonary involvement(Roggli *et al.* 1980). Without pulmonary or visceral involvement the clinical course is usually self limited, although there could be initial increase in size and number of lesions prior to regression (Chung & Enzinger 1981; Wiswell 1988). Myofibroblasts cells are thought to play a role in the shrinkage and eventual disappearance of these lesions(Benjamin *et al.* 1977). In fatal cases the cause of death is either cardiopulmonary or gastrointestinal complications resulting from visceral lesion. In multicentric form, a rather high mortality rate has been observed(73%) (Wiswell *et al.* 1985).

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