Fibroma of Tendon Sheath with 11q Rearrangements

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Abstract. *Fibroma of tendon sheath is an uncommon, benign fibroblastic tumor that usually occurs in the upper extremities of young and middle-aged adults. A clonal chromosomal aberration, t(2;11)(q31-32;q12), has been described in one case. We herein present a unique cytogenetic finding of fibroma of tendon sheath arising in the first web space of the right hand of a 38-year-old woman. Physical examination showed a 3.5-cm, firm, mobile, non-tender mass. Magnetic resonance imaging showed a well-defined soft tissue mass with iso- to slightly-low signal intensity relative to skeletal muscle on both T1- and T2-weighted sequences. Contrast-enhanced T1-weighted sequences demonstrated moderate patchy enhancement of the mass. A fibroma or giant cell tumor of tendon sheath was suggested, and the lesion was marginally excised. Histological examination confirmed the diagnosis of fibroma of tendon sheath. Cytogenetic analysis revealed a novel t(9;11)(p24;q13-14) translocation among other karyotypic abnormalities. The postoperative course was uneventful, and the patient is doing well without local recurrence two months after surgery. To the best of our knowledge, this is only the second report of fibroma of tendon sheath with clonal chromosomal abnormalities.*

Fibroma of tendon sheath is a rare, benign fibrous soft tissue tumor of unknown pathogenesis. It has a peak incidence in the third to fifth decades of life, with a male predominance (1). Fibroma of tendon sheath typically presents as a small, firm, slow-growing, painless mass in the peripheral extremities, especially the fingers and hands. Surgical excision is curative (2). There is no risk of metastasis or malignant transformation.

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Histologically, the lesion is well-circumscribed, lobulated, and consists of spindle-shaped cells embedded in a collagenous stroma. A characteristic feature is the presence of elongated cleft-like spaces lined by flattened cells (1). Cytological atypia is quite uncommon. Immunohistochemically, the neoplastic cells are positive diffusely for vimentin and focally for smooth muscle actin (1).

Only one case of fibroma of tendon sheath has been cytogenetically characterized (3). A clonal chromosomal abnormality, t(2;11)(q31-32;q12), has been detected. Interestingly, an apparently identical translocation has been also observed in a subset of collagenous fibromas (4-6). In the current study, we describe the second case of fibroma of tendon sheath with clonal chromosomal aberrations occurring in the right hand of a young adult woman.

Case Report

A 38-year-old, right-hand-dominant woman was referred to our Hospital with a 9-month history of a slow-growing, painless mass in the first web space of the right hand. There was no history of antecedent trauma. Physical examination revealed a firm, mobile, non-tender mass, measuring approximately 3.5×3.0 cm. Neurological and vascular examinations were unremarkable. Plain radiographs of the right hand revealed an increased soft tissue shadow in the first web space. Magnetic resonance imaging (MRI) demonstrated a well-defined soft tissue mass with iso- to slightly-low signal intensity relative to skeletal muscle on both T1- and T2-weighted sequences (Figure 1A and B). Contrast-enhanced T1-weighted sequences demonstrated moderate patchy enhancement of the mass (Figure 1C). Our preoperative differential diagnosis included fibroma of tendon sheath and giant cell tumor of tendon sheath.

The operative procedure was performed under general anesthesia with pneumatic tourniquet control and loupe magnification. A gently curved longitudinal incision was made on the volar aspect of the first web space of the right hand. The mass was attached to the flexor tendon sheath of the index. It was completely excised together with the overlying tendon sheath. On cut section, the lesion was uniform in appearance

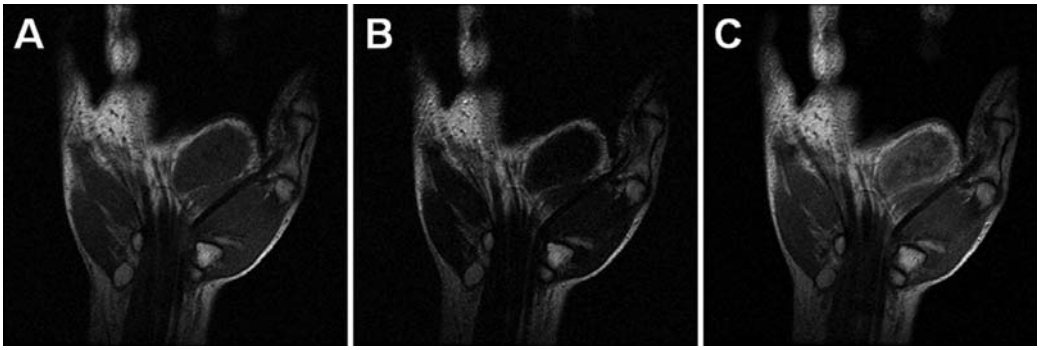

Figure 1. *Coronal magnetic resonance images of fibroma of tendon sheath involving the first web space of the right hand. T1- (A) and T2- (B) weighted images exhibit a well-defined soft tissue mass with iso- to slightly-low signal intensity relative to skeletal muscle. Contrast-enhanced T1-weighted image (C) reveals moderate patchy enhancement of the mass.*

with pearly white color. Microscopically, the tumor was composed of bland fibroblastic spindle cells in an abundant collagenous stroma. Elongated cleft-like spaces lined by flattened cells were also seen (Figure 2). Neither cellular atypia nor mitotic figures were observed. Based on these findings, the tumor was diagnosed as a fibroma of tendon sheath.

Cytogenetic analysis revealed the following karyotype: 46,XX,t(9;11)(p24;q13-14)[10]/46,XX,t (1;20)(p13;q13.1)[2]/46,XX,t(1;2)(q21;q35)[1]/46,XX,t(3;16)(p21;q24)[1]/46,XX[3] (Figure 3).

The postoperative course was uneventful, and the patient is doing well without local recurrence two months after surgery.

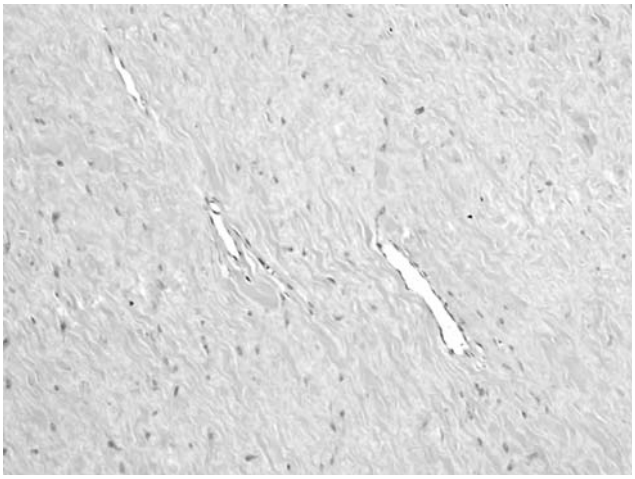

Figure 2. *Histological finding of fibroma of tendon sheath. The tumor is hypocellular and consists of spindle-shaped cells in a dense collagenous stroma. Elongated cleft-like spaces can be seen (hematoxylin and eosin staining, original magnification ×80).*

Discussion

Only one case of fibroma of tendon sheath has been cytogenetically analyzed to date (3). A t(2;11)(q31-32;q12) chromosomal translocation has been identified. Notably, the same translocation has been also observed in a subset of collagenous fibromas (4-6), suggesting a genetic link between these two entities. Collagenous fibroma, also known as desmoplastic fibroblastoma, is a benign fibrous soft tissue tumor that usually occurs in the subcutaneous tissue of upper extremities. It has a peak incidence in the fifth to seventh decades of life, with a male predominance (7). On MRI, collagenous fibroma typically appears as a well-defined mass with low to intermediate signal intensity on T1-weighted images and low to slightly high signal intensity on T2-weighted images (8). Collagenous fibroma demonstrates mild internal enhancement with rim enhancement (8,9). Histologically, the lesion is hypocellular and consists of spindle to stellate-shaped cells embedded in a collagenous stroma, displaying a similar morphology. Recently, Macchia *et al*. proposed that FOS-like antigen 1 (*FOSL1*) is a candidate target gene for 11q12 rearrangements in collagenous fibroma (10). *FOSL1* encodes a nuclear leucine zipper protein that can dimerize with proteins of the Jun family, thereby forming the activator protein-1 transcription factor complex (11). The expression of *FOSL1* is very low in normal cells. Elevated *FOSL1* mRNA and protein have been detected in a variety of human tumors (11). However, it is uncertain if *FOSL1* gene rearrangements are involved in fibroma of tendon sheath.

In the current study, we identified a novel t(9;11)(p24;q13-14) translocation among other clonal abnormalities. To the best of our knowledge, chromosomal rearrangements bearing t(9;11)(p24;q13-14) have never been recorded in mesenchymal neoplasms. The breakpoint on the long arm of chromosome 11 was somewhat different from that of a previously reported case. This observation may be explained by the possibility that the previously reported breakpoint is rearranged cryptically

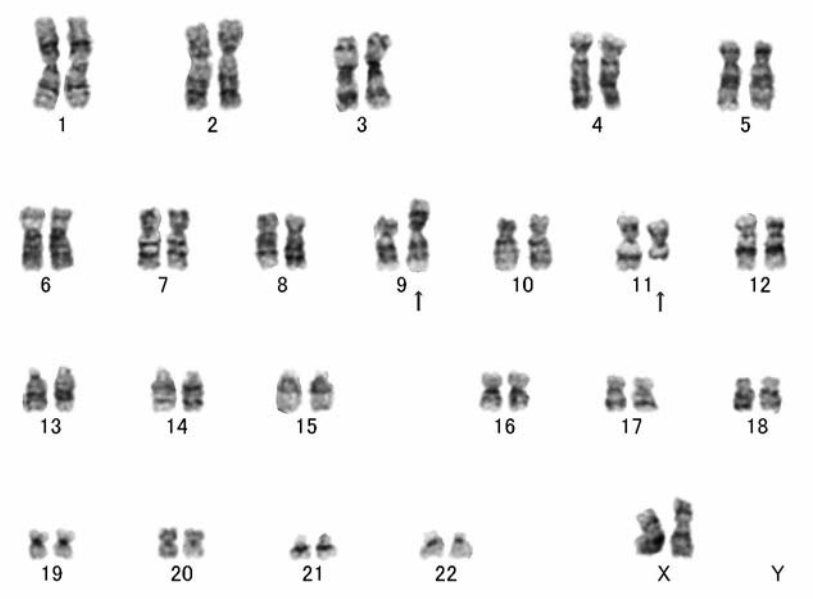

Figure 3. *A representative Giemsa-trypsin-Giemsa (GTG)-banded karyotype of fibroma of tendon sheath showing a t(9;11)(p24;q13-14) translocation (arrows).*

and not identifiable by G-banding. On the other hand, chromosome 9p24 region contains several important genes, including Janus kinase 2 (*JAK2*). *JAK2* encodes a cytoplasmic tyrosine kinase involved in a specific subset of cytokine receptor signaling pathways (12). *JAK2* translocations have been described in hematological malignancies (12, 13).

The differential diagnosis of fibroma of tendon sheath includes giant cell tumor of tendon sheath, as in our case. Despite a distinct morphological appearance, these two lesions can exhibit similar signals on T1- and T2-weighted images. Fibroma of tendon sheath can have a variable enhancement pattern, ranging from no appreciable enhancement to marked enhancement (14). On the other hand, giant cell tumor of tendon sheath typically shows marked enhancement (15). Gradient-echo images of giant cell tumor of tendon sheath may reveal a blooming artifact due to the presence of hemosiderin (16). Cytogenetically, giant cell tumor of tendon sheath is characterized by a translocation t(1;2)(p13;q37), resulting in a collagen type VI alpha-3 (*COL6A3*)-colony stimulating factor 1 (*CSF1*) fusion gene (17).

In summary, we reported on a case of fibroma of tendon sheath with a unique 11q rearrangement. Further studies are required to elucidate the significance of this chromosomal alteration in the pathogenesis of fibroma of tendon sheath.

Acknowledgements

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