Congenital dermatofibrosarcoma protuberans with *PDGFB* gene rearrangement detected using fluorescence in situ hybridization

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To the Editor:

Dermatofibrosarcoma protuberans (DFSP) is a relatively rare fibrohistiocytic skin tumor of intermediate malignancy with an incidence of 0.08 per 100,000 [1]. Congenital cases are infrequent, accounting for 1.5% of all DFSP cases [2]. We report a case of congenital DFSP confirmed by the detection of platelet-derived growth factor beta (*PDGFB*) gene rearrangement on fluorescence in situ hybridization (FISH).

A 14-year-old girl presented at our hospital with a brownish pigmented macule, that had progressed gradually on her left neck and was present since birth. She visited a local hospital two months before the first visit to our department and was suspected of having a malignant tumor based on the biopsy findings. Physical examination revealed a slightly thickened superficial induration covering an area of 35×35mm (**Figure 1**). Histopathologically, the biopsy specimen showed fibroblast-like spindle cells that had densely proliferated in the dermis and subcutis (**Figure 2A**) in a storiform growth pattern (**Figure 2B**). Immunohistochemical staining showed positive expression of CD34 (**Figure 2C**).

As DFSP was suspected, FISH was performed, which revealed *COL1A1-PDGFB* gene fusion (**Figure 3**). Therefore, a diagnosis of DFSP was made and wide local excision with 2cm surgical margins containing the fascia was performed. Postoperatively, no recurrence occurred after three years.

Congenital DFSP often shows unusual clinical findings that mimic hemangiomas, birth marks, and subcutaneous masses. Therefore, its diagnosis is initially challenging. Moreover, reports on congenital DFSP diagnosed using *PDGFB* gene analysis are limited. To our knowledge, *PDGFB* has been detected by reverse transcription polymerase chain reaction in

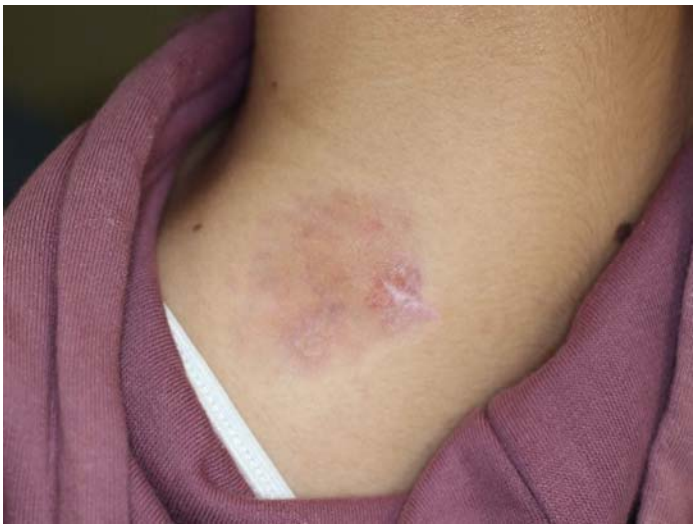

Figure 1: *Clinical findings at the patient's first visit: brownish pigmented macule on the left neck from birth.*

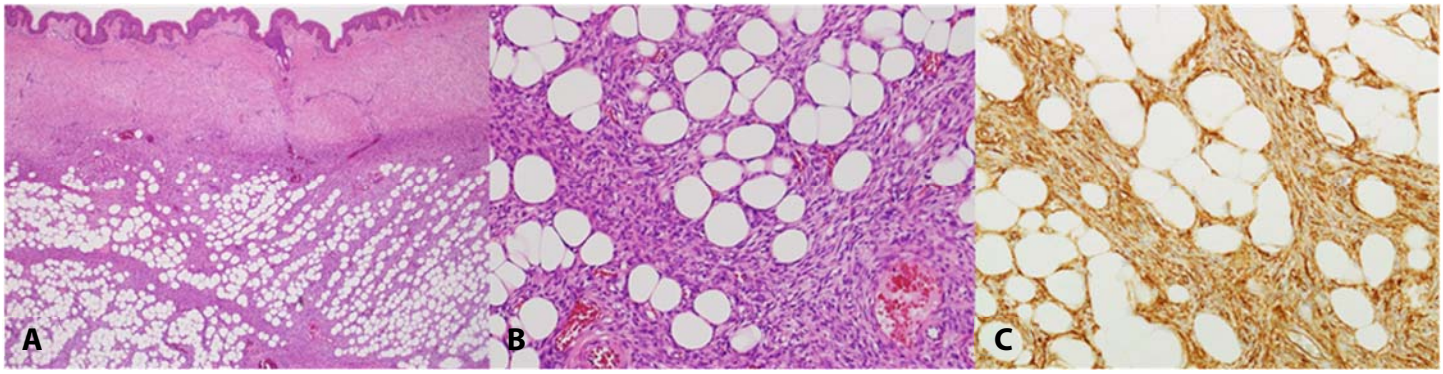

Figure 2*: Pathological findings. H&E staining:* ***A)*** *tumor consists of hypercellular proliferation of spindle cells in a lace-like infiltrative pattern within the dermis and subcutis, 40×.* ***B)*** *Storiform growth pattern of spindle cells is observed, 200×.* ***C)*** *Immunohistochemical staining: tumor cells are positive for CD34, 200×.*

only three reports [3-5]. Despite our case, only one case of congenital DFSP with *PDGFB* gene rearrangement detected using FISH has been reported [5].

A literature review on the initial clinical diagnosis of congenital DFSP cases revealed 76 cases of congenital DFSP, including our case. Among them, 52 case reports described the initial clinical diagnosis. The tumors were initially diagnosed as vascular lesions, including hemangiomas and birth marks, in 44.2% (23/52) and 11.5% (6/52) cases, respectively. Initial DFSP lesions, in both children and adults, often present as plaques or as small, mobile, hard nodules that usually adhere to the skin. If such a lesion newly develops in a patient with a history of hemangioma or birth marks, it is important to initially suspect congenital DFSP.

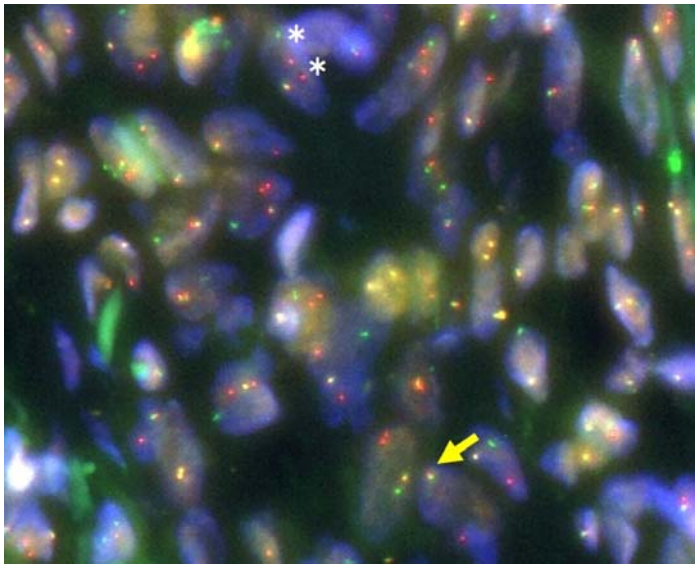

Figure 3*: Fluorescence in situ hybridization analysis for COL1A1-PDGFB fusion gene, 200×. The merged green and red signals indicate COL1A1-PDGFB fusion gene (yellow arrow). Separated green signal (COLA1A probe) and red signal (PDGFB probe) indicate the absence of COL1A1-PDGFB fusion (white asterisks).*

In our case, slightly elevated and firm nodules were recognized. This finding led to a clinical suspicion of DFSP. As a rare disease, medallion-like dermal dendrocyte hamartoma (ML-DDH) was reported as a disease similar to congenital DFSP in terms of both clinical and pathological aspects [6]. Medallion-like dermal dendrocyte hamartoma is very rare, but it should be considered in the differential diagnosis of congenital DFSP. Medallion-like dermal dendrocyte hamartoma can present as plaques and nodules; therefore, the distinction between congenital DFSP and ML-DDH based on only clinical examination is difficult. Since various diseases are considered in the differential diagnosis of congenital DFSP, it is important to perform FISH to confirm the presence of the *PDGFB* fusion in difficult cases.

Potential conflicts of interest

The authors declare no conflicts of interest.

References

1. Bendix-Hansen K, Myhre-Jensen O, Kaae S. Dermatofibrosarcoma protuberans. A clinico-pathological study of nineteen cases and review of world literature. *Scand J Plast Reconstr Surg*. 1983;17:247-252.[PMID: 6673092].

2. McKee PH, Fletcher CD. Dermatofibrosarcoma protuberans presenting in infancy and childhood. *J Cutan Pathol*. 1991;18:241-246.[PMID: 1939782].
3. Makiko M, Shunsuke S, Gen N, et al. Congenital atrophic dermatofibrosarcoma protuberans detected by COL1A1-PDGFB rearrangement. *Diagn Pathlo*. 2016;1:11:24. [PMID: 26932148].
4. Maire G, Fraitag S, Galmiche L, et al. A clinical, histologic, and molecular study of 9 cases of congenital dermatofibrosarcoma protuberans. *Arch Dermatol*. 2007;143:203-10. [PMID: 17310000].
5. Gu W, Ogose A, Kawashima H, et al. Congenital dermatofibrosarcoma protuberans with fibrosarcomatous and myxoid change. *J Clin Pathol*. 2005;58:984-6. [PMID: 16126884].
6. Marque M, Bessis D, Pedeutour F, et al. Medallion-like dermal dendrocyte hamartoma: the main diagnostic pitfall is congenital atrophic dermatofibrosarcoma. *Br J Dermatol*. 2009;160:190-193. [PMID: 19016705].