

Plaque-Like Myofibroblastic Tumor: Report of 4 Cases

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Abstract: Plaque-like myofibroblastic tumor of infancy was first characterized in 2007 by Clarke et al. In the first 2 cases described, large plaque-like tumors presented in the first 3 months of life exhibited microscopic features consistent with dermatofibroma but with immunohistochemical features of myofibroblastic lineage. In 2013, Marqueling et al reported 3 additional cases, 2 of which presented in early childhood, prompting the authors to recommend that the name of this condition be shortened to plaque-like myofibroblastic tumor. We present here 4 additional cases to better characterize clinical and histopathological features of this newly recognized entity. This benign lesion is of myofibroblastic lineage and demonstrates features consistent with multiple clustered dermatofibroma.

Key Words: plaque-like myofibroblastic tumor of infancy, plaque-like myofibroblastic tumor, smooth, muscle actin, clustered dermatofibroma

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INTRODUCTION

Plaque-like myofibroblastic tumor of infancy was first characterized in 2007 by Clarke et al¹ who reported occurrence in 2 infants within the first 3 months of life presenting on the left back and hip. In 2013, Marqueling et al² reported 3 additional cases, 2 of which presented in early childhood, which prompted the authors to recommend shortening the name of this condition to plaque-like myofibroblastic tumor (PLMT). We present here 4 additional cases to better characterize clinical and histopathological features of this newly recognized entity.

Patient 1

A 2-year-old boy presented for evaluation of a firm, slowly growing plaque on the middle lower back. This plaque reportedly began at 4 months of age. Physical examination showed a 2.2 × 1.5-cm irregularly shaped, firm, nodular plaque on the lower back (Fig. 1A). Magnetic resonance imaging revealed an enhanced area where the plaque occurred within the superficial skin tissue but showed no

involvement of muscle, bone, and had not extended to the abdominal area. A biopsy was performed and demonstrated a well-demarcated proliferation of spindle cells extending throughout the entire reticular dermis. A “pushing interface” was present at the dermal–subcutaneous junction, with spindled cells infiltrating minimally among adipocytes (Fig. 1C). Spindle cells were arranged haphazardly or in short fascicles, and acanthosis was visible on the overlying epidermis. The diagnosis of dermatofibroma was subsequently made. At the age of 2.5 years, the tumor was removed by local excision. The histologic pattern was identical to that of the biopsy specimen (Fig. 1B). Given the atypical nature of the clinical presentation for dermatofibroma, additional immunohistochemistry studies were performed and showed strong smooth muscle actin (SMA) positivity and moderate positivity for both calponin and factor XIIIa (Figs. 1C–1F). Immunohistochemistry for CD34 was negative.

After clinicopathological correlation, a diagnosis of PLMT was made. The margins were negative at the periphery but positive at the deep margin. The patient was closely observed after the excision procedure. Although initial scar tissue remained flat, a nodule developed 2 years later, showing an increase in size consistent with recurrence (Fig. 1G). The tumor was subsequently re-excised and examined for histopathological changes. The tumor showed similar features and the margins were negative. There was no evidence of recurrence 6 months after this surgery.

Patient 2

An 18-month-old boy presented to the dermatology department for evaluation of a slow-growing, firm, pruritic plaque first observed at the age of 3 months. Physical examination revealed a 1.7 × 1-cm pink, nodular plaque on the lower back (Fig. 2A). The histologic and immunophenotypic features were identical to patient 1 (Figs. 2B–E). A biopsy revealed a dermal proliferation of spindle and stellate cells arranged in short fascicles with a “pushing interface” at the dermal–subcutaneous junction. The epidermis above the proliferation was acanthotic. Immunohistochemical staining was strongly positive for SMA, moderately positive for calponin and factor XIIIa, and negative for CD34 and S-100 protein, effectively suggesting myofibroblastic lineage. The lesion was excised.

Patient 3

A 5-year-old girl presented with a year history of a slightly pruritic plaque on the outer portion of her left thigh which had been present for 8 months. Her physical

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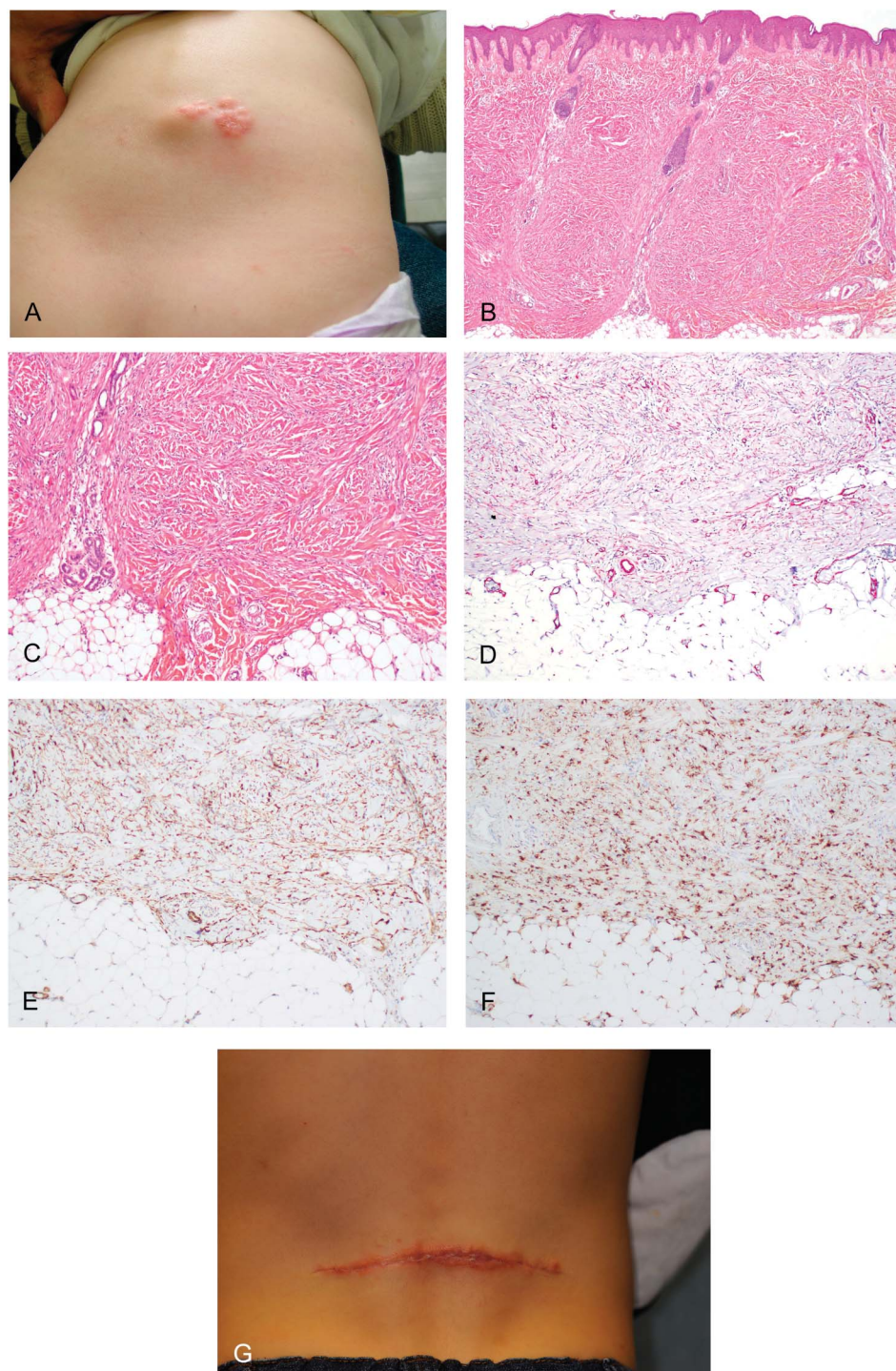


FIGURE 1. A, Irregular, firm nodular plaque on the lower back. B, Proliferation of spindle cells in the dermis below an acanthotic epidermis. C, The spindle cells infiltrate minimally among adipocytes with pushing interface. D, Strong positivity for SMA. E, The cells stain moderately positive for calponin. F, The cells stain moderately positive for factor XIIIa. G, Nodules along the surgical scar consistent with recurrence.

examination revealed that she had a 10-cm plaque on her left outer thigh consisting of multiple grouped infiltrative, pink, firm nodules (Fig. 3A). The histologic and immunophenotypic features were identical to patients 1 and 2, notably in that they all exhibited a proliferation of bland spindle cells that extended through the entire reticular dermis. Immunohistochemical staining was strongly positive for SMA, moderately positive for calponin and factor XIIIa, and

negative for CD34. The diagnosis of PLMT was rendered (Figs. 3B–E) and the child was observed closely.

Patient 4

A 30-year-old Caribbean man presented for evaluation of a slightly pruritic plaque located on his lower back. The lesion was first noticed when he was 3 years old, and a biopsy was performed at which point the diagnosis of dermatofibroma was

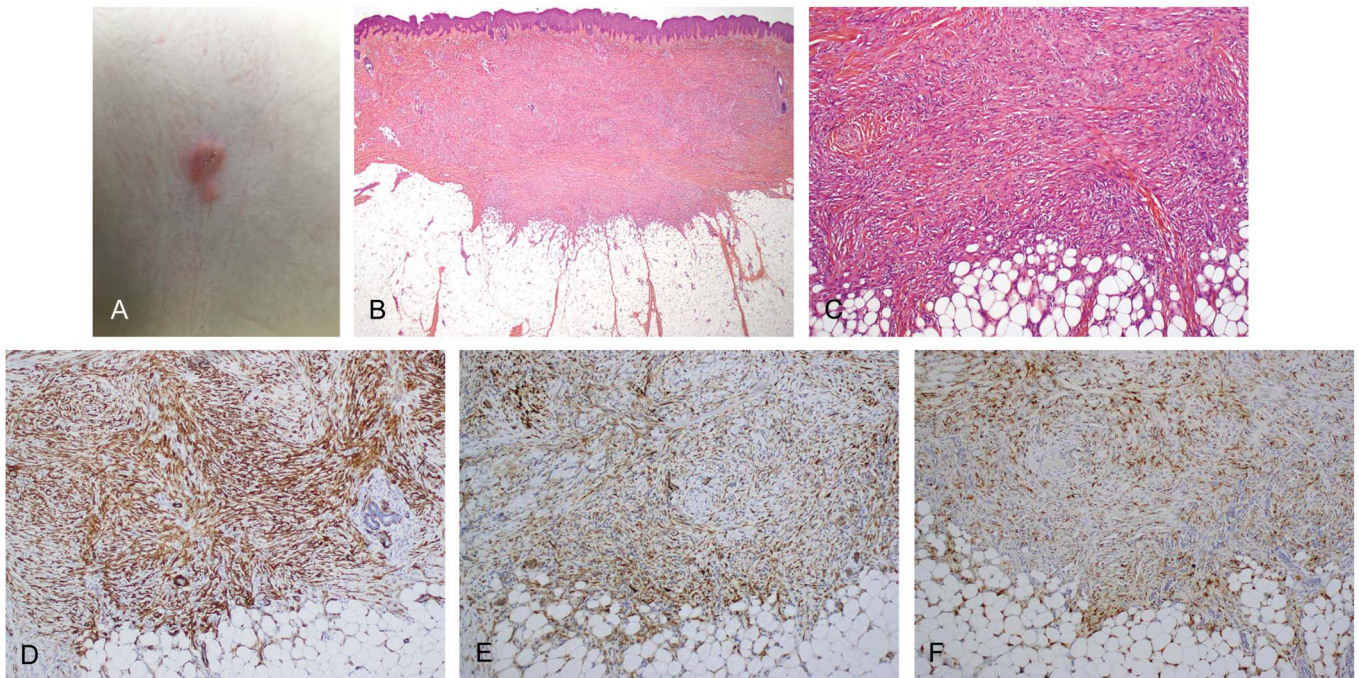


FIGURE 2. A, Erythematous plaque of the back. B, Proliferation of spindle cells through the whole dermis. C, The spindle cells infiltrate minimally among adipocytes with pushing interface. D, Strong positivity for SMA. E, Moderate positivity for calponin. F, Moderate positivity for factor XIIIa.

made. Upon examination, a slightly pruritic 5 × 7-cm firm plaque with grouped brown, firm nodules was observed on the lower back (Fig. 4A). Histologic and immunophenotypic features were identical to the other patients. Microscopic examination demonstrated a proliferation of spindle cells extending throughout the entire reticular dermis, and the overlying epidermis was acanthotic (Fig. 4B). Immunohistochemistry demonstrated strong positivity for SMA, moderate positivity for calponin and factor XIIIa, and lack of expression of S-100 protein and CD34. The diagnosis of PLMT was rendered; the patient elected to not have any surgical procedure.

DISCUSSION

PLMT is a newly recognized entity recently characterized by Clarke et al.¹ The entity that the authors described affected 2 infants. Marqueling et al.² described 3 further cases in early childhood, exhibit similar clinical and histopathological features (Table 1). Common to all 5 patients (2 girls aged 13 months and 5 years, and 3 boys aged 9 months, 11 months, and 5 years) is that they presented firm, irregularly shaped dermal plaques measuring between 5 × 2 cm and 8 × 6 cm. In 3 cases, these lesions were first observed before 3 months of age, and in 2 cases, within the first 4 years. In the cases of the present study, the onset was also noted relatively early; in 2 cases, the outward signs were first noticed in the first year of life and before the age of 3 years for the other 2 cases. The lesions were located on the middle lower back region in 3 cases, on the upper back area in 1 case, and on the left hip area in the last case. In our cases, 3 lesions were located on the back, and in 1 case, on the thigh. Typically, these lesions

consisted of indurated pink, erythematous or brown poorly delimited plaques. Within the plaque or at its periphery, firm dermal nodules were noted. In 1 case, ulceration was observed at the center of the plaque.² One of our cases presented with a nodule rose-brown in color. In 4 cases, the plaque caused pruritus, and in 1 case occasional, mild pain. Plaques in 2 of our cases were also pruritic. No ulceration was observed.

In all cases, the microscopic features were similar, with a relatively well-circumscribed proliferation of spindle cells arranged in short fascicles with wiry collagen bundles extending through the entire reticular dermis and separated from the epidermis by a grenz zone. In 4 of the first 5 published cases, as in our own, the superficial subcutaneous tissue was also minimally infiltrated with a pushing interface present at the dermal–subcutaneous junction. These features are consistent with dermatofibroma, and this was the original diagnosis made in 2 of our cases before the publication by Clarke et al.¹ Immunohistochemical features with actin and calponin positivity suggesting a myofibroblastic lineage were, however, uncommon for dermatofibroma.

The clinical clues favoring the diagnosis of PLMT instead of dermatofibroma include patients' age at the onset, lesion size, physical location, and morphologic characteristics. Dermatofibromas are most frequently located on the lower extremities of adults or adolescents and are relatively small in size, usually measuring less than 1 cm in diameter, whereas PLMT occurring in infancy or early childhood presents as a large plaque rather than nodules and measures several centimeters in diameter. They are commonly located on the back, hip, or the thigh areas. Giant dermatofibromas measuring larger

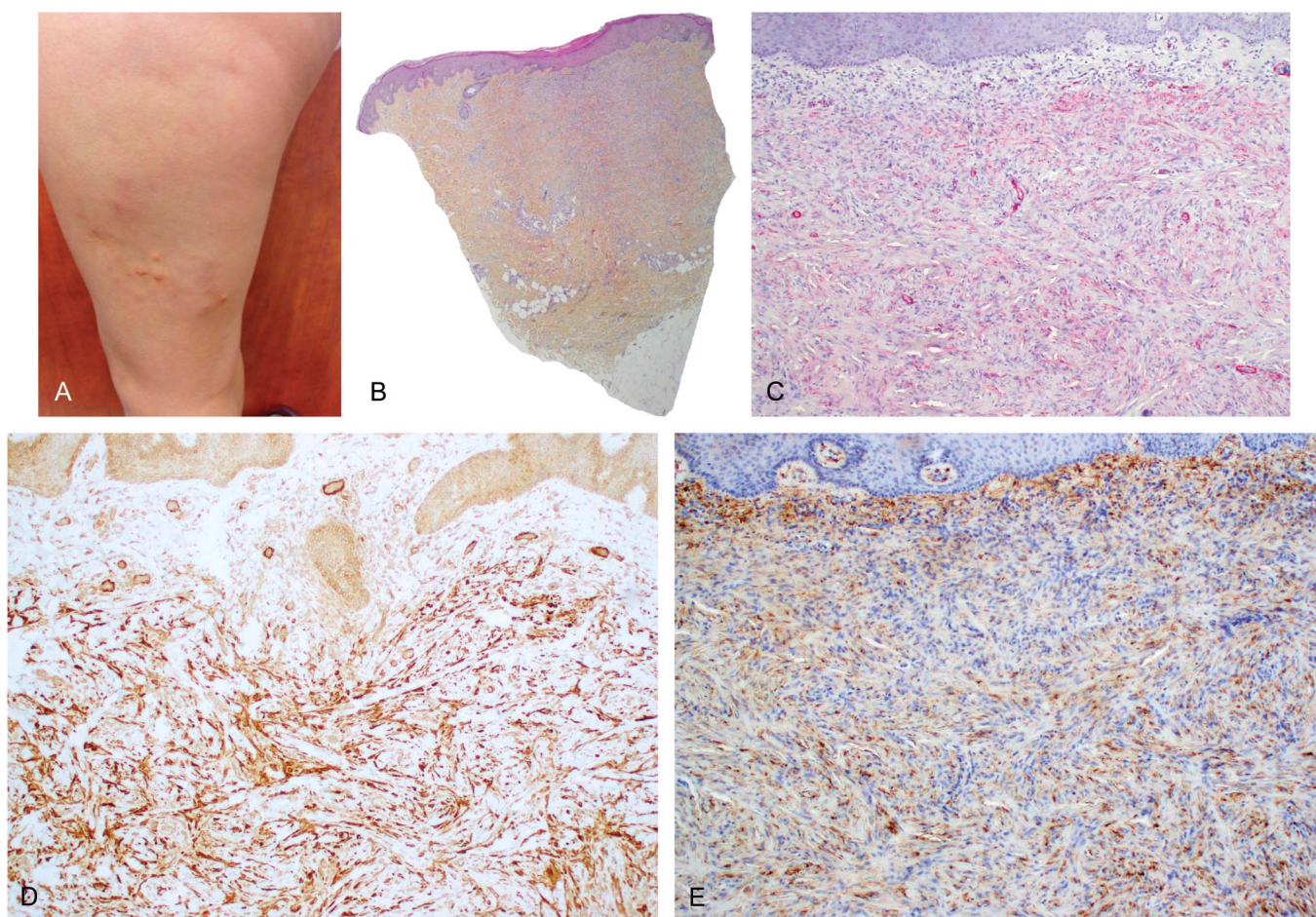


FIGURE 3. A, Multiple plaques of the outer portion of the left thigh. B, Proliferation of spindle cells through the whole dermis. C, SMA staining demonstrating strong positivity. D, The cells are moderately calponin positive. E, Mild positivity for factor XIIIa.

than 5 cm have been reported but they are usually located on the lower extremities, are frequently pedunculated, and, to our knowledge, have not been described in children.⁵ SMA may be positive in some of the spindle cells of dermatofibroma,³ representing myofibroblastic differentiation,⁴ but this positivity is usually less prominent than in PLMT. To the best of our knowledge, immunohistochemistry with calponin has only been performed in cellular variants of dermatofibromas with variable positivity.⁶

The main differential diagnosis is what is known as “multiple clustered dermatofibroma,” a rare condition reported mostly in children and young adults (7–27). Although they often occur in the first and second decades of life, 4 congenital cases have been reported,^{7–10} with an additional case reported in a 17-year-old girl with a lesion initially observed when she was 2 months old.¹¹ Clinically, multiple clustered dermatofibroma presents as grouping of 0.5–1-cm reddish brown papules involving an area larger than 5 cm.



FIGURE 4. A, Multiple pigmented firm dermal nodules of the back. B, Proliferation of spindle cells throughout the whole dermis.

TABLE 1. Clinical Features of Published Cases of TMP

Case No.	Patient No.	Gender	Age	Age at Onset	Site
1	Clarke et al ¹	F	13 mo	3 mo	Left hip
2	Clarke et al ¹	M	11 mo	Shortly after birth	Mid-lower back
3	Marqueling et al ²	M	5 yrs	Present at 1 or 2 yrs of age	Lower back
4	Marqueling et al ²	F	5 yrs	4 yrs	Left upper back
5	Marqueling et al ²	M	9 mo	2 mo	Lower back
6	Present case	M	2 yrs	4 mo	Mid-lower back
7	Present case	M	18 mo	3 mo	Lower back
8	Present case	F	5 yrs	4 yrs	Left outer thigh
9	Present case	M	30 yrs	3 yrs	Lower back

Case No.	Size, cm	Clinical	Evolution
1	8 × 6	Firm, irregular, slightly pink plaque with dermal nodules at the periphery of the plaque; pruritic	Enlargement of the plaque; no recurrence after excision
2	8 × 4.5	Irregular, firm, nodular, pink-tan dermal plaque; mildly pruritic	Enlargement of the plaque; no recurrence after excision
3	9 × 3.5	Erythematous to violaceous, irregularly shaped, indurated plaque with areas of nodularity; pruritic and occasional mild pain	No recurrence after excision
4	5 × 2	Firm, poorly margined plaque with multiple grouped infiltrative, reddish brown, firm dermal nodules at the periphery	Enlargement of the lesion; no recurrence after excision
5	2 × 6	Flesh-colored, indurated dermal plaque; 1 × 3-cm ulceration at the center of the plaque with a peripheral rim of erythema, and induration; minimally pruritic	Excision (deep margin positive); recurrence 6 mo after excision; complete re-excision without recurrence
6	2.2 × 1.5	Firm, irregular nodular pink plaque	Enlargement of the plaque; recurrence 2 yrs after excision
7	1.7 × 1	Firm irregular pink-tan plaque	Enlargement of the plaque; excision without recurrence
8	10	Multiple grouped infiltrative erythematous nodules; mildly pruritic	Slight enlargement
9	5 × 7	Firm plaque with grouped brown, firm nodules; mildly pruritic	Stable

Lesions appear most frequently on the hip or the upper leg but may also be localized on the back. Several such cases share clinical features with PLMT: Soloeta et al¹² reported a case in which a 4-year-old girl presented with a 2-year history of a 10 × 4-cm plaque on the lower back, with firm nodules coalescing to form an irregularly shaped plaque with new nodules appearing at the periphery. Sanli et al⁸ reported a case of congenital multiple clustered dermatofibroma in a 19-year-old boy presenting with a formation of reddish brown, firm pruritic papules arranged in a linear pattern on the lumbar region. Similarly, Navarro Llanos et al¹³ reported a case in which the lesion was located on the lumbar area with numerous coalescing papules. All 3 of these cases of clustered dermatofibroma show strong similarity to several reported cases of PLMT. Furthermore, cases of PLMT have been reported where features closely resemble those of multiple clustered dermatofibroma. One such case reported by Clarke et al¹ presented with a slightly pink, irregularly shaped dermal plaque located on the left hip, with satellite papules and nodules at the periphery of the plaque, and patient 3 in our study exhibited multiple nodules located on the thigh. One could argue that while PLMT shares histologic features with multiple clustered dermatofibroma, the immunohistochemical characteristics of these 2 entities may differ slightly: SMA was positive in the 5 initial case studies as they were in our presented cases of PLMT, whereas in 7 of the total 21 reported cases of multiple clustered dermatofibroma for which SMA was performed, the results were negative^{9,10,15,16,18,26}

or showed only minimal staining.¹⁹ Marqueling et al,² however, hypothesized what our own study supports, which is that multiple clustered dermatofibroma and PLMT are part of a same disease spectrum. Further studies of cases involving both entities and in which immunohistochemical aspects are considered are needed to confirm this hypothesis.

Dermatomyofibromas are tumors composed of spindle cells that can present in plaque-like masses. These lesions typically occur on the upper part of the body, commonly on the neck, arms, and upper trunk regions. Although they occur most commonly in young women, cases have been reported in children,^{28,29} the youngest being an 11-month-old boy.³⁰ Histopathologically, they are composed of spindled cells arranged in intradermal fascicles that are oriented parallel to the epidermis. The proliferation contains collagen bundles thinner than those of the surrounding dermis. Neoplastic cells grow characteristically around preexisting adnexal structures, which is not the case in PLMT. Immunohistochemically, neoplastic cells in dermatomyofibroma often stain positive for calponin,²⁸ but only focally for SMA or negative for this same marker.^{28,30} The expression of SMA seems to depend on the age of the patient and on the activity level of neoplastic cells, with early and active lesions frequently positive for SMA.²⁹

Fibrous connective tissue nevus (FCTN) presents during the first decade of life, typically occurring on the trunk and head or neck, and is seen more frequently in females. It often presents as a poorly defined plaque-like cutaneous thickening and is more rarely reported as a painless, enlarging nodule.

Histologically, it is characterized by a haphazard proliferation of deep dermal cells arranged in short-intersecting fascicles entrapping appendages and dermal collagen bundles, with focal involvement of the superficial subcutis. It is accompanied by acanthotic epidermis. These lesions are positive for CD34 and may show limited staining for SMA. FCTN most likely represents a localized developmental dermal anomaly.³¹

Dermatofibrosarcoma protuberans (DFSP) is most often seen in adults but may also occur in children with reported congenital cases.³² It may show similarities to the adult form with firm nodules sometimes ulcerated on the trunk but may also present as atrophic with a slow-growing pale to red-blue or brown atrophic plaque and possible satellite nodules occurring at the periphery. The histologic and immunohistochemical features are what distinguish DFSP from PLMT: specifically DFSP presents as spindle cells arranged in a storiform pattern infiltrating the dermis and the subcutaneous fat layer. The cells stain positively with CD34 but not for factor XIIIa and SMA. In cases of PLMT, the infiltration of the hypodermis, when present, is only focal and superficial. The cells are immunoreactive with SMA and factor XIIIa but not for CD34.

Patients in 5 previously studied cases of PLMT underwent surgical excision. In 2 of these cases, recurrence was observed but the deep margins of excision were positive.² In our present study, surgical excision was performed in only 2 cases. Recurrence occurred in one of these cases, for which positive margins (deep vs. peripheral) were observed at the time of initial excision. Re-excision of the tumor was then performed with no evidence of recurrence 6 months after surgery. As PLMT would seem to be a benign process, close patient monitoring is sufficient because surgical procedures can lead to extensive scarring.

In conclusion, we present here 4 additional cases of PLMT bringing the total cases reported in the literature to 9. A PLMT diagnosis should be considered in the context of a large, indurated plaque with nodules on the back or the upper or lower limbs. It typically presents at the onset of early childhood, with histologic features mimicking a dermatofibroma, given that this condition is rare in young children.² This benign lesion is of myofibroblastic lineage and shares features commonly associated with multiple clustered dermatofibromas. We recommend that further studies of both entities using immunohistochemistry are needed to elucidate how they may otherwise be related.

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