Neurofibroma and Pectoralis Muscle Hypoplasia: A Mild Degree of Poland’s Syndrome

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Introduction
Poland’s syndrome (PS) is a rare congenital syndrome characterized by the unilateral partial or complete absence of the sternocostal head of the pectoralis major muscle and ipsilateral brachysyndactyly or syndactyly of the fingers. Other common anomalies in conjunction with PS include malformations of the anterior chest wall and breast, absence of the pectoral minor muscle, and dextrocardia [1, 2]. The incidence of PS is reported to be approximately 1:30,000, with a higher frequency among males [3]. Here we present a rare case in which the only clinical expression was dysplasia of the left pectoralis major and minor muscles, accompanied by neurofibroma on the same side.
Neurofibroma with Poland’s Syndrome

Discussion

PS is a rare congenital disorder characterized by hypoplasia of the pectoral muscles along with upper extremity deformities. Besides, other manifestations including hypoplasia or absence of the breast and nipple-areola complex, abnormalities of the anterior ribs, clavicle and scapula, lung herniation, renal agenesis, and dextrocardia may also exist [2, 4, 5]. More than 75% of the defects associated with this syndrome are present on the right side [6]. PS has also been reported to be associated with Moebius syndrome and Pierre Robin syndrome [7, 8], leukemia and non-Hodgkin’s lymphoma [9, 10], and hemangioma [11]. The etiology of PS is most likely due to an interruption of the embryonic blood supply in the subclavian artery during the 6th week of gestation [12]. Besides thrombi or thrombotic emboli within the placenta have also been suggested as a cause of PS [4]. However, the exact etiology and pathogenic mechanisms are still unknown.

PS accompanied by neurofibroma has rarely been reported thus far. In 1994, Alembik et al. [13] first reported on a boy with neurofibromatosis 1 and Poland’s anomaly, and there have been no similar reports since. Hence, more cases of PS accompanied by neurofibroma would have to be reported in order to confirm neurofibroma as part or a variation of PS. Here, we report on a patient with a mass in his left breast accompanied by skin hyperpigmentation and increased body hair. The left pectoralis major and minor muscles were both significantly dysplastic. The patient underwent a simple left mastectomy, and pathologic examination of the surgical specimen showed cutaneous diffuse neurofibroma. PS is usually considered to be a hypoplasia of the pectoral muscles along with upper extremity deformities. However, in our patient, the only manifestation was dysplasia of the left pectoralis major and minor muscles. So is PS the correct diagnosis? There is a lack of literature further describing such patients. David TJ [14] reported 78 cases of congenital absence of the pectoralis major muscle, of which 46 cases met the diagnostic criteria of PS, and the remaining 32 cases were just isolated pectoralis absence without any other similar or related malformations [14]. So could the remaining 32 cases also be diagnosed as PS?

In 1989, Darian et al. [4] described a family in which 3 women had absence of the pectoralis major muscle and 2 men had hypoplasia or agenesis of the pectoral major muscle. Although this feature was felt to be consistent with PS, none of the family members had upper limb abnormalities. However, this case was considered as familial PS. Other cases have also been reported in which the chest wall defect was not accompanied by any limb abnormalities [15]. Furthermore, Perez Aznar et al. [16] considered that hypoplasia of 1 breast or a horizontal anterior axillary fold may be the sole clinical manifestation of this syndrome. Thus, we believe that the manifestation of PS varies from person to person, and some patients may only have 1 clinical manifestation repre-

Case Report

A 16-year-old Chinese man was admitted to our hospital in July 2011 complaining of a breast mass. He was born with a small nodule in his left breast which was growing slowly and was not associated with pain or any other symptoms. Findings from the physical examination revealed deformity of the chest wall, increased body hair, and significant hypertrophy of the left breast with skin hyperpigmentation (fig. 1 a). Palpation of the left breast showed a 3–4 cm, non-tender, freely mobile mass with clear boundaries. No palpable lymph nodes were detected. Breast ultrasound examination showed a mass in the left breast with low echo (fig. 1 b), and abdominal ultrasound showed mild splenomegaly. Computed tomography (CT) showed deformity of the chest wall and a mass in the left breast (fig. 1 c). Inflammation of the lower lobe of the left lung was noted. Laboratory tests, including complete blood count, liver function tests and tumor markers, were all normal. There was no relevant medical or family history. The patient underwent a simple left mastectomy. During surgery, we found that the left pectoralis major and minor muscles were significantly hypoplastic. Intraoperative pathological examination of the mass revealed a neurofibroma. The pathological result was further confirmed by the Fudan University Shanghai Cancer Center as cutaneous diffuse neurofibroma, involving the skin and subcutaneous tissue (H&E ×100).

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Fig. 1. a Deformity of the chest wall and significant hypertrophy of the left breast. b Ultrasound showing a low-echo mass in the left breast. c Axial thoracic computed tomography scan revealing deformity of the chest wall and a mass in the left breast (white arrow). d Pathologic examination showing cutaneous diffuse neurofibroma, involving the skin and subcutaneous tissue (H&E ×100).

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sentative of a mild degree of PS such as in our patient. The main differential diagnoses are gynecomastia and breast cancer in this case. We first diagnosed this patient as gynecomastia, but the final pathological results rejected the primary diagnosis. As was reported, breast cancer may also be associated with PS [17]. In this case, there was no sign of malignancy of the mass, and the pathological results also excluded breast cancer.

Neurofibroma is a common benign tumor which arises from the epineurium of the peripheral nerve system. Because some patients with neurofibromatosis 1 (incidence approximately 1:4,000 [18]) may also manifest as solitary neurofibroma early on, it is difficult to get accurate statistics about the incidence of solitary neurofibroma. To the best of our knowledge, the vast majority of neurofibromas occur in the dermis or subcutis and are rarely detected in the breast tissue itself. The most common location in the breast is the areolar area [19, 20]. Excluding the occurrence of neurofibroma in the presence of neurofibromatosis 1 which is regarded as a separate disease process, solitary neurofibroma of the breast is rare, especially in men [21], and currently there are only sporadic reports. Solitary neurofibroma is generally asymptomatic, grows slowly, and may increase faster at certain times such as puberty or pregnancy, which may lead to deformity, dysfunction, local tenderness, or paresthesia. Treatment of neurofibroma early on, it is difficult to get accurate statistics about the incidence of solitary neurofibroma. To the best of our knowledge, the vast majority of neurofibromas occur in the dermis or subcutis and are rarely detected in the breast tissue itself. The most common location in the breast is the areolar area [19, 20]. Excluding the occurrence of neurofibroma in the presence of neurofibromatosis 1 which is regarded as a separate disease process, solitary neurofibroma of the breast is rare, especially in men [21], and currently there are only sporadic reports. Solitary neurofibroma is generally asymptomatic, grows slowly, and may increase faster at certain times such as puberty or pregnancy, which may lead to deformity, dysfunction, local tenderness, or paresthesia. Treatment of neurofibromas is usually by surgical excision. Because of recurrence and malignant tendency in some cases, postoperative follow-up is necessary.

For this male patient, we performed a simple left mastectomy only, but for a female patient reconstructive surgery after mastectomy should be considered. It has been reported that the use of an omental flap to reconstruct the breast can improve the esthetic outcome better than any other option [22]. It was also reported that transfer of the insertion of the latissimus dorsi muscle can improve the axillary fold deformity in male patients [23]. Recently, Yang et al. [24] reported on reconstructing deformities of a PS patient using autologous fat tissue, and the authors found that a higher condensation of fat tissues achieved by squeezing centrifugation can improve the outcome, increase volume maintenance, and reduce complications.

The postoperative course in our case was uneventful with no evidence of recurrence during 4 months of follow-up. However, since neurofibroma has the potential of recurrence or malignant transformation, long-term follow-up should be carried out to provide more information about long-term effects. In conclusion, we here report a rare case of PS accompanied by neurofibroma which should be differentiated from gynecomastia if there is a growing tumor in the breast.

**Disclosure Statement**

The authors declare that they have no competing interests.

**References**
