

Placental transmogrification of the lung presenting as a peripheral solitary nodule in a male with the history of trauma

A case report

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Abstract

Rationale: Placental transmogrification of the lung is a very rare lesion which was characterized by the presence of papillae resembling placental villi. Its pathogenesis still remains unclear. Some authors think that this lesion is congenital and related to hamartoma, and others advocate it is secondary change after emphysema. So far, the majority of reported cases manifested as bullous lesions, to our knowledge, only two cases presented as a solitary nodule.

Patient concerns: Herein, we report the third case presenting as a small nodule in a 49-year-old male. Chest computed tomography revealed a nodular shadow measuring 2.6 × 1.2 cm in the right lower lobe of the lung. Histologically, the tumor composed of papillary structures covered by cuboidal pneumocytes and bland clear cells and abundant capillaries in the stroma.

Diagnosis: The lesion was diagnosed as a placental transmogrification of the lung.

Intervention: The patient then underwent wedge resection in our hospital.

Outcomes: The postoperative course was uneventful.

Lessons: The patient had a history of traffic accident half a year before the nodule was detected. This prompts placental transmogrification of the lung may at least partially represent a acquired malformation. The present case aims to raise a new suggestion for its possible nature. In our opinion, PT may simply represent a benign morphologic change rather than an independent disease. It may be encountered in both congenital and secondary lesions.

Abbreviations: CK = cytokeratin, CK5/6 = cytokeratin5/6, EMA = epithelial membrane antigen, PT = placental transmogrification of the lung, SMA = smooth muscle actin, TTF-1 = thyroid transcription factor 1.

Keywords: lung tumor, placental transmogrification of the lung

1. Introduction

Placental transmogrification of the lung (PT) is an extremely rare lesion which has a distinctive morphologic appearance. It was first described in 1979 by McChesney.^[1] It was named because the lesion morphologically was reminiscent of placental villi. In fact, it was completely unrelated to placental tissue. Importantly,

the pathogenesis of the disease is still controversial.^[2–6] Thus far, less than 40 cases were reported in English literature.^[7] Radiologically, the majority of reported cases presented as a large bullous change.^[2,6–13] Therefore, PT was considered as a variant of bullous emphysema or secondary change of emphysema by some authors.^[2] In contrast, some authors thought PT as a congenital malformation.^[4] McChesney initially reported PT as an unrecognized hamartoma.^[1] Cavazza et al insisted that PT represented a benign proliferation of immature interstitial clear cells with secondary cystic change, rather than a variant of emphysema.^[3] Further studies from Xu et al, they found that PT was present in 6 of 38 cases of pulmonary fibrochondromatous hamartomas, suggesting its association with hamartoma.^[4]

As the majority of PTs presented as unilateral emphysematous bulla. Thus, the patients usually manifested as cough, chest pain, dyspnea, pneumothorax, and emphysema. And the patients usually had the history of smoking and the inflammatory disease including pneumonia, chronic obstructive pulmonary disease, asthma, and tuberculosis.^[6–13] Besides these, no other history was reported. Moreover, it is extremely rare for this tumor that presented as solitary nodule.^[14,15] Herein, we present a case of PT located in right lower lobe of the lung involvement in a 49 year-old Chinese male. The present case showed a nodular lesion with no other abnormality in the lung. And the patient had a history of chest wall and lung trauma from traffic accident, which was not reported in literature.

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2. Case presentation

2.1. Ethic approval

This study was approved by The Institutional Review Board of Ethics Committee of China Medical University. Written informed consent was obtained from the patient for publication of this case report and accompanying images and the study was performed in accordance with the Helsinki II declaration.

2.2. Clinical history

A 49-year-old male was caught in a traffic accident 4 years ago. The chest wall and lung suffered a slight trauma and then was cured in other hospital. About half a year later, the patient came back to hospital for a check. Chest computed tomography revealed a nodular shadow in the lung without any symptoms. He did not undergo further treatment. The patient referred to our hospital in December 2017 since the shadow still existed. The patient did not show any sign and symptom, the physical examination failed to detect abnormal manifestations. And, the laboratory studies were also all within normal values. Chest computed tomography revealed a nodular high-density shadow measuring 2.6×1.2 cm admixed with small round air bubbles in the right lower lobe (Fig. 1). In contrast to the first scan, the shadow showed no obvious increase in size. The patient then underwent wedge resection in our hospital. During frozen section, the lesion was considered as a sclerosing pneumocytoma. The postoperative course was uneventful.

Informed consent was obtained from the patient for the publication of this case report and any accompanying images. The study was conducted according to the regulations of the institutional review boards at China Medical University.

2.3. Immunohistochemical staining

The resected specimens were fixed with 10% neutral-buffered formalin, then embedded in paraffin blocks and cut into $4\text{-}\mu\text{m}$ thickness slides. The slides were deparaffinized with xylene, rehydrated with graded alcohols, and incubated using the following antibodies: cytokeratin (CK), cytokeratin5/6 (CK5/6), cytokeratin7 (CK7), thyroid transcription factor 1 (TTF-1), surfactant apoprotein A (SPA), Napsin A, CD56, synaptophysin, HMB45, Melan A, smooth muscle actin (SMA), vimentin, CD10,

p63, S-100, epithelial membrane antigen (EMA), CD34, CD31, CD68 and Ki-67, and stained with a streptavidin-peroxidase system (KIT-9720, Ultrasensitive TM S-P, MaiXin, China). The chromogen used was diaminobenzidine tetrahydrochloride substrate (DAB kit, MaiXin, China). Appropriate positive and negative controls were used to exclude the false positivity and negativity.

2.4. Morphological and immunohistochemical findings

Grossly, the resected lung tissue was approximately $6.0 \times 4.4 \times 4.2$ cm in size. And there was a relatively well-circumscribed solid mass measuring 1.5 cm in the central area. The cut face of the nodule was soft, granular, and gray-white in color.

Histologically, the lesion was composed of multiple papillary structures resembling placental villi. The papilla was covered by cuboidal pneumocytes with no atypia, and the core of papillae was predominantly comprised of dense clear cells and abundant newborn capillaries. The clear cells possessed round or oval nuclei and fine chromatin. The atypia and mitosis were absent. Occasionally, the stroma showed edematous to sclerosing change with little cells. Focally, mature adipocytes could also be observed in the stroma (Fig. 2).

Immunohistochemically, the lining epithelial cells showed diffusely positive for CK, TTF-1, SPA, Napsin A, CK7, and EMA, representing they were from type II pneumocytes. The interstitial cells were consistently and diffusely positive for CD10 and vimentin. CD34, CD31, and SMA staining highlighted the capillary endothelial cells distributed in the stroma. S-100 stained the adipocytes rather than interstitial clear cells. The interstitial clear cells showed a Ki-67 proliferation index of less than 1% (Fig. 3).

Taken together, according to the morphologic pattern and immunohistochemical staining, the tumor was diagnosed as a PT.

3. Discussion

In our opinion, PT may simply represent a benign morphologic change rather than an independent lesion. So far, the reported PTs were less than 40 cases,^[7] as it was relatively uncommon for the benign pulmonary lesions. Since the first description by in 1979 by McChesney,^[1] the pathogenesis of the lesion still remains unclear and controversial. It was controversial whether PT belonged to a congenital malformation or an acquired morphologic change.^[1-6] McChesney considered PT as an unrecognized hamartoma.^[1] Subsequently, Fidler et al reported 3 cases of PT and suggested it was a complication of bullous emphysema.^[2] Then Marchevsky et al reported a case of PT in patient with Swyer-James (MacLeod) syndrome, indicating it was a acquired abnormality.^[16] Whereas Xu et al advocated PT was a hamartomatous lesion, as they found that PT was present in 6 of 38 cases of pulmonary fibrochondromatous hamartomas.^[4] Cavazza et al also insisted that PT represented a benign proliferation of immature interstitial clear cells with secondary cystic change, rather than a variant of emphysema.^[3]

Since PT can be both detected in emphysema and hamartoma, we think that it may be an incidental morphologic transformation, rather than an independent lesion. That is, PT may represent a nonspecific morphologic change which can be encountered in congenital and secondary lesions. In the present case, the patient underwent a chest wall and lung trauma because of traffic accident, then the mass was detected. Although the trauma was not severe, and we also did not get the direct evidence that the PT

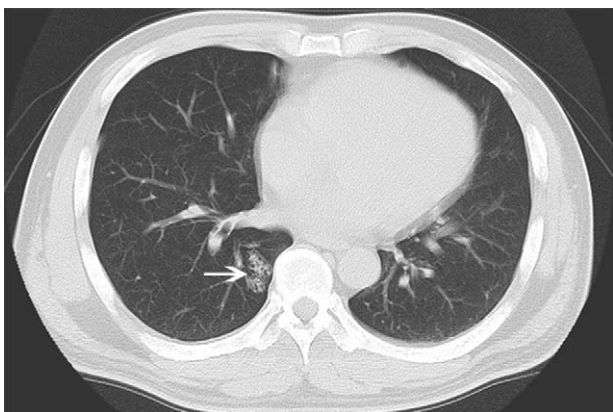


Figure 1. The chest computed tomography manifestation of the tumor. A well-circumscribed nodular shadow with small air spaces (arrow) could be detected in the right lower lobe of the lung.

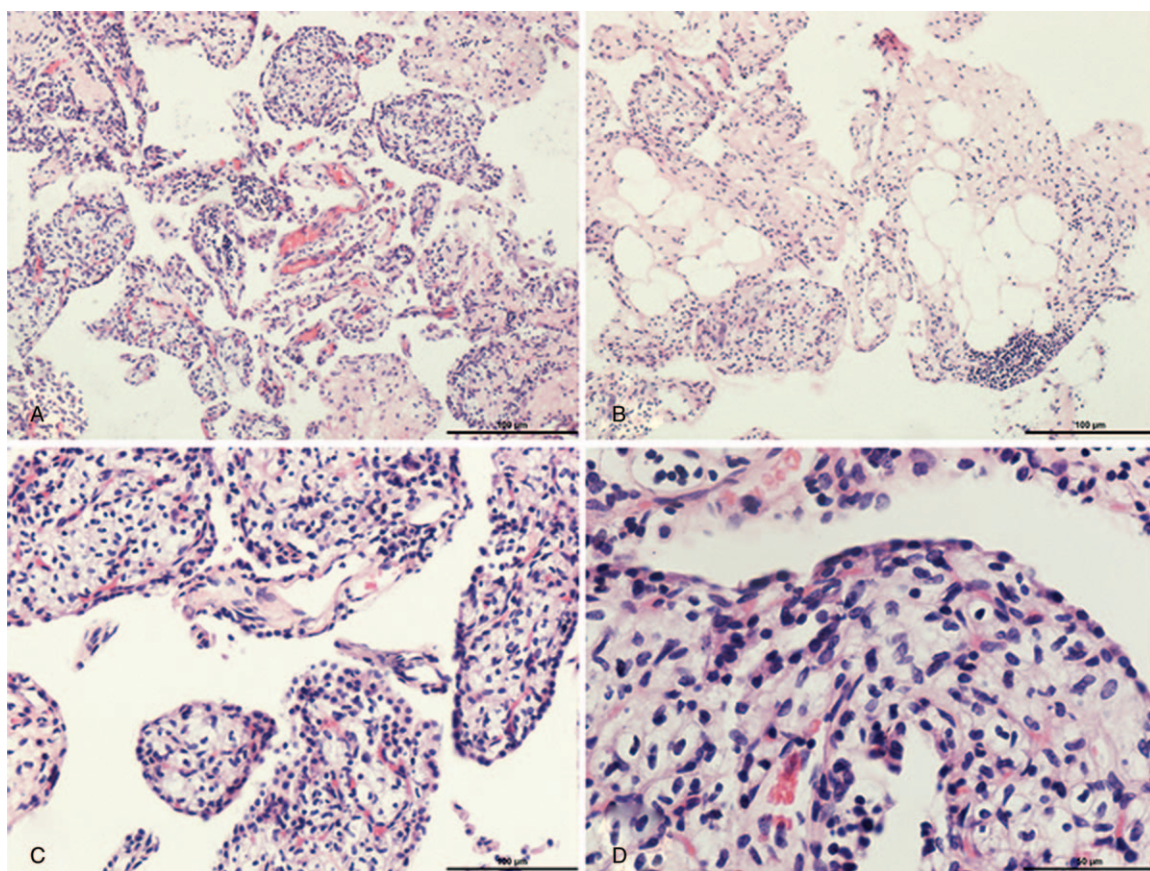


Figure 2. Morphological change of the tumor. (A) Lower magnifications revealed the lesion was composed of varying-sized papillary structures resembling placental villi. (B) The core of papilla was focally fibrous to edematous change, and contained fatty tissue. (C) The core of papilla was predominantly comprised of dense clear cells and abundant newborn capillaries. (D) Higher magnifications demonstrated the papilla was covered by cuboidal pneumocytes with no atypia. The clear cells possessed round or oval nuclei and fine chromatin.

was related to the trauma, we think this can prompt that it may at least partially represent an acquired malformation.

To our knowledge, the majority of PTs presented as large cystic bullous lesions, only 2 cases showed a solitary nodule without associated emphysema.^[15,16] In 2004, Ferretti et al described a case of PT presenting as a 2.5-mm pulmonary nodule without associated bullous emphysema.^[15] Then Saito et al reported another case presenting as a only 10-mm nodule.^[16] Our case was the third case that emphysema was not present in the associated lung tissue. Moreover, we also noted that in consistent with report from Ferretti et al and Saito et al, the nodule was not consistently solid and also contained several small round-shaped air spaces.

Clinically, the patients usually manifested as cough, chest pain, dyspnea, pneumothorax, and emphysema.^[6-13] The patient in our case was asymptomatic, as there was no other abnormality, except for the nodule in the lung. Macroscopically, PT most often appeared as a cyst admixed with soft bubbly, villous, or granular tissue resembling immature placental tissue. However, the present case showed a round solid nodule with a soft and granular cut face. Histologically, the lesion comprised by papillae reminiscent of placental villi lined by cuboidal pneumocytes without cellular atypia. The characteristic cells of PT is the interstitial clear cells presenting in the core of papillary structures. Therefore, Cavazza et al considered PT as a benign proliferation of immature interstitial clear cells. In addition, mature adipocytes was frequently observed in the stroma.^[3] Hochholzer et al even

described a case with almost exclusively mature adipose in the core.^[4] Our case was consistent with the above described cases. We also noted that our case focally contained fatty tissue in the stroma, as described by Santana et al and Ferretti et al.^[12,15]

Immunohistochemically, interstitial clear cells showed diffuse and strong reactivity for CD10, which might be a diagnostic clue.^[3,7,12,16] And they did not express synaptophysin, HMB45, desmin, SMA, S-100, EMA, CD34, and CD68.^[3,7,12,16] The lining cells expressed the marker of type II pneumocytes, such as Napsin A, surfactant apoprotein antigen, and TTF-1. In addition, the interstitial clear cells showed a lower Ki-67 proliferation index, indicating its benign nature.

The differential diagnosis of the tumor was mainly pulmonary papillary tumors including pulmonary sclerosing pneumocytoma, papillary adenoma, alveolar adenoma, and papillary adenocarcinoma. Pulmonary sclerosing pneumocytoma was characterized by the presence of 4 patterns and polygonal cells in the core of papillary structure which reacted with TTF-1 and EMA.^[17] The negative expression of the above 2 markers could be aid in differential diagnosis. Papillary adenoma was also contained multiple papillary structures covered by cuboidal cells with type II pneumocytes differentiation, which was an important differentia diagnosis. However, the stroma of papillary adenoma was predominately composed of fibrovascular tissue rather than clear cells.^[18] Alveolar adenoma is also a tumor showing pneumocytes differentiation, however, it most often contained

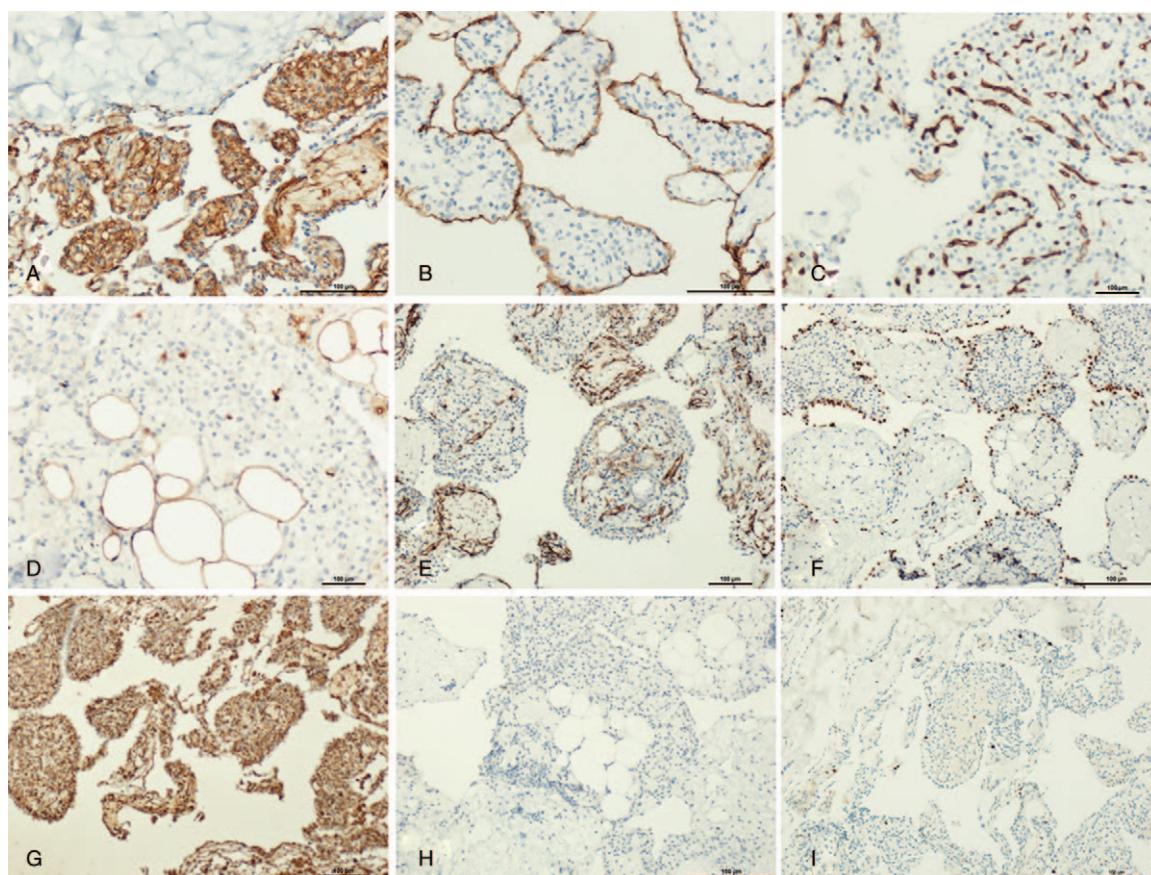


Figure 3. Immunohistochemical staining of the tumor. (A) The interstitial cells were diffusely positive for CD10. (B) The lining cells were positive for CK7. (C) CD34 stained the endothelial cells. (D) S-100 staining highlighted the presence of fatty tissue. (E) The interstitial cells were not positive for SMA. (F) The lining cells were also positive for TTF-1. (G) The interstitial cells showed diffuse positivity for vimentin. (H) HMB45 was not expressed in the tumor. (I) Ki-67 proliferative index was less than 1%. CK=cytokeratin, SMA=smooth muscle actin, TTF-1=thyroid transcription factor 1.

microcytic spaces lined by pneumocytes rather than papillary structures.^[19] In addition, the lack of cellular atypia in lining cells could exclude papillary adenocarcinoma.

4. Conclusion

To our knowledge, there was only 2 cases of PT presenting as a solitary nodule, rather than a bullous lesion. Herein, we report the third case of PT in a 49-year-old male, radiologically showing a small nodular shadow without associated emphysema. Moreover, the patient had a history of traffic accident half a year before the nodule was detected. This prompts PT may at least partially represent an acquired malformation. The present case aims to raise a new suggestion for its possible nature. And in our opinion, PT may simply represent a benign morphologic change rather than an independent disease. It may be encountered in both congenital and secondary lesions.

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