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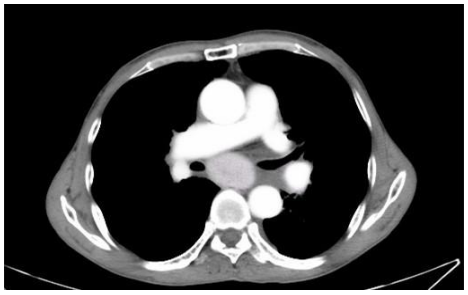
Multi-slicespiral CT findings of Castleman's disease

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Abstract: **This study is to find of Castleman's disease and the diagnostic value of CT for Castleman's disease. Clinical data and CT of Castleman's disease of pathology cases were retrospectively analyzed. The lesions were as follows: middle mediastinum or hilum of lung (n=6), anterior and posterior mediastinum (n=2). The clinical subtypes included localized type in 7 cases and multicentric type in 1 case. As for histopathologic classification, there were hyaline-vasculartype in 7 cases and plasma cell type in 1 case. Apart from 2 cases with intra-tumoral calclfications, the other ones showed homogeneous attenuation on plain CT. After contrast administration, marked and sustained enhancement was showed in hyaline vascular type, mild-moderate enhancement was showed in plasma cell type. CT findings of Castleman's disease were closely correlated with pathological subtypes. CT features of hyaline-vascular subtype are characteristic.**



Keywords: giant lymph node hyperplasia; lymph node; computed tomography

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1. Introduction

Castleman's disease (CD) is reported firstly in 1956 by Castleman. CD is a kind of clinical rare lymph node hyperplasia disease. Its etiology and pathogenesis remains unclear. The disease was first described as a limitation of mediastinal lymph node hyperplasia (other name of CD: giant lymph node hyperplasia, vascular lymph follicles hyperplasia, lymphoid hamartoma [1]. In recent years, with the development of immunology, new understanding of this disease is a tumor immune proliferative disease. CD may be associated with chronic stimulation, infection, or abnormal immune response which was caused by abnormal reactive lymphoid tissue hyperplasia. Due to the low prevalence, the insufficient understanding of the imaging and the preoperative misdiagnosis occurred easily. Our group collected 8 cases with CD who were confirmed by pathology of CT (Multi-slicespiral CT, MSCT) in our hospital during 2008-2013.

2. Materials and Methods

2.1 General Information

This group of patients with 8 cases, 3 cases of men, 5 cases of women, aged 25 to 54 years old, average 39.5 years. Limited type are 7 cases, diffuse type is 1 case. The patients have different clinical manifestations, 2 cases have intermittent cough, one patient has fever anemia. 5 cases among them were discovered by physical examination. All 8 cases were confirmed by clinical pathology.



Figure 1. 1 case in the mediastinum tracheal bronchus

2.2 Method of Examination

All cases were performed with MSCT scan and dynamic enhanced scan. Check equipment is GE Brightspeed 16 CT scanner. Patients were breathless scan at the end of deep inspiration, scanning from the lung from apex to the bottom.

Scanning parameters:

Tube voltage: 120 kV, effective tube current: 150～180Ma, table speed: 27.5mm/rot conventional slice thickness: 10mm, collimation: 1.25mm×8 and 1.25mm×16, pitch: 1.375:1 and matrix: 512×512.

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Figure2. 1 case located in the anterior mediastinum under the chest wall

Dynamic enhanced scan by the upper extremity elbow vein, 3.5mL/s injection of iodine contrast agent (Iopromide, 300mgI/ mL) 70-80 mL. We enhanced dual phase scan, arterial phase 30s began after injection of contrast agent, venous phase began after 60s. The image layer thickness of transverse thin section, the coronal plane and multi planar reconstruction sagittal plane: 1.25mm, layer spacing: 1.25 mm. We used recombinant bone algorithm.

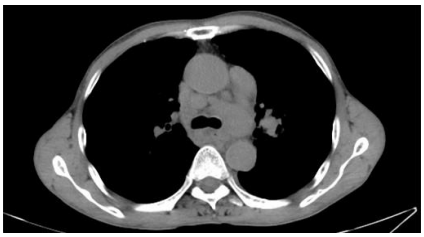


Figure3. 1 case of peripheral has multiple rounds of lesions

2.3 Image data analysis

According to the number of the lesions, the form and the surrounding situation, CD was divided into limited type and diffuse type. Pathological changing of CD images was analyzed by 2 practitioners.

3. Results

3. 1 CD MSCT manifestations

Pathogenic site: 7 cases are located in the mediastinum, and 5 cases are in the mediastinum tracheal bronchus (Figure 1). 2 cases located in the anterior mediastinum under the chest wall (Figure 2). 1 case located in the left lung. Number of the lesions: 7 patients were characterized by simple isolated mass, 1 case of peripheral has multiple rounds of lesions (Figure 3). Shape size: 6 cases showed round mass nodules, 2 cases showed irregular shape. The largest tumor diameter is 0.3-5.2cm, the average of tumor is 2.7 cm. The edge of lesion: The boundaries of 6 cases are clear and the edges are smooth. The edge of 1 case is blur, and surrounding tissue boundaries are not clear. Lesion density: In MSCT scanning, 5 cases are homogeneous density, 3 cases are uneven density. After reinforcement, 5 cases are homogeneous density, 1 case is internal irregular low density shadow. The lesions 2 cases are with calcification (Figure 4), 1 case showed curved calcification, the other one case shows multiple patchy calcification. The degree and pattern of enhancement: Dynamic enhanced CT scan in all cases had enhancement, 5 cases are significant enhancement (Figure 5), 2 cases are moderate enhancement, 1 case is uneven enhancement. Peripheral lymph nodes: 1 case shows multiple lymph node. All the surrounding tissue are oppressed by lesions, but are not infiltrated (Figure 6).



Figure4. 1 case is with calcification

3.2 Correlation between imaging findings and pathology

Strengthening method: 7 cases show significantly enhanced and moderate enhancement, they belong to the hyaline vascular type. 1 case of inhomogeneous enhancement, is the Department of plasma cell type that is inhomogeneous enhancement. Low density lesions: 1 cases of hyaline vascular type internal appeared low density foci, mirror under non necrotic foci induced by lymph follicle colloid cyst. Intratumoral calcification: 2 cases with calcification are hyaline vascular types; pathology is the proliferation of small vessel calcification. Peripheral lesions: 1 cases of hyaline vascular type is enlarged lymph node.

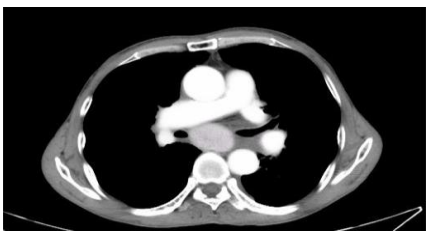


Figure5. 1 case is significant enhancement

4. Discussion

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4. 1 Clinical and pathological

CD was first reported in 1956 by Castleman et al. Its etiology and pathogenesis has not yet been confirmed, speculation may be associated with a chronic stimulation, viral infection and autoimmune reaction. Most of the currents support proliferative reaction theory [2]. The disease most often occurs in the mediastinum and hilum, particularly in the middle mediastinum see more, also can be found in any part of the body. Frizzera found that chest disease accounted for about 70%, 14% in the neck, 12% in abdominal and pelvic, 2% in armpit [3]. The disease is divided into localized type and multi center type in clinical, hyaline vascular type, plasma cell type and mixed type in the histopathology. The hyaline vascular type is the most common, accounting for about 90%. Lymphoid follicles shows a large number of germinal centers under the microscope, the middle are arranged by concentric circles, the interfollicular has large capillary hyperplasia. Vascular degeneration, many cells, including lymphocytes, plasma cells and eosinophils can be found in the literature [4]. The hyaline vascular type is famous in clinic, generally no specific clinical features, occasionally found in the physical examination. In this group, 7 cases are focal type, 5 cases were found in physical examination, and the remaining cases have slight clinical symptoms. Those were reported in literatures. Plasma cell type is rare, accounting for about 10%. The germinal center of lymphoid follicle generally is larger, interfollicular has large sheets of plasma cells, but capillary hyperplasia is rare. Most of the plasma cell types are multi centers in clinical. The clinical symptoms of multi center patients are generally obvious, the patient will cough, fever, fatigue, weight loss, anemia, abdominal pain, diarrhea, superficial lymph node enlargement. In this group, 1 case is plasma cell type, patient with fever, anemia. It is also similar to those reported in literature [5]. Mixed type was not found in this group of cases. It may be due to less data and lack of statistical reasoning.

4.2 MSCT manifestations of thoracic localized

Localized CD shows solitary soft tissue mass, volume is larger, with or without peripheral lymph node hyperplasia. Tumor diameter is 2.0-25.0cm, the average is 4.0-6.8cm can be read in the paper. In the group, patients with tumor diameter is 0.3-5.2cm, average is 2.7cm, slightly smaller than the literature. Focal type CD generally showed expansive growth, and complete capsule. So the boundary is clear, smooth edge, and clearly peripheric structure, no infiltration [6]. The data showed that 6 cases with clear boundary are the limitations of CD, which is consistent with the literatures. Because of the rich capillaries and lymphatic tissue, focal type with CD examination has uniform density, but no necrosis, cystic change or hemorrhage. The central or peripheral intratumoral calcification of tumors, mainly within the tumor hyperplasia of the capillary glass like degeneration or degeneration is caused by the formation of calcinosis, so calcifications are in branched or deadwood [7]. 2 cases of calcification are hyaline vascular type. 1 case is medial margin curved calcification, 1 case shows multiple punctate calcification, which is slightly higher than that of other research works. The branching calcification has diagnostic value in particular for localized CD, should be caused the attention in the CT scan. Localized CD enhanced obviously because of the large number of capillaries in the proliferative lesions and peripheral rich blood supply nutrient artery. At the same time, with the injection of contrast agent, flux and dose have certain relations [8]. Focal type CD vessel is less for the plasma cell type of pathology is generally mild or moderate enhancement and the internal has ischemic necrosis. In the group, patients with CT enhancement in 7 cases and moderate enhancement scanning enhanced obviously, are hyaline vascular type, but the inhomogeneous enhancement in 1 case is plasma cell type. The findings have characteristic CT findings in the diagnosis of focal type CD, pending further study. The limited CD lesions may be associated with satellite lesions around and dilated vessels, which may be related to the inflammatory cytokines [9]. This group included 1 cases appeared around satellite focus, this should cause the attention of surgeon. The surrounding sub range must be cleaned in the operation. Otherwise it has the possibility of recurrence. Correlation of sub range and the main focus remains to be further studied.

4.3 MSCT findings of chest multicentric CD

Multicentric CD is plasma cell type in pathology, however, the hyaline vascular type is rare. Multicentric CD imaging is no specific signs, mainly for the enlargement of mediastinal one or more groups of lymph node. Lymph nodes are usually mild swelling, uniform density. Necrosis and cystic degeneration are rare. Uneven mild improved after reinforcement, but there are no evidence of fusion multiple lesions [10]. 1 case is multicentric plasma cells type. Enhancement is uneven after reinforcement, but no typical CT signs.

4.4. Differential diagnosis of CD

In general, CD should be identified with lung cancer, lymphoma, sarcoidosis, thymoma, tuberculosis of lymph nodes, metastatic lymph node [11]. Peripheral lung cancer has typical clinical symptoms. Lung lesions also have some imaging characteristics, such as the

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lobulation sign, pleural indentation sign. The central type of lung cancer is with atelectasis, hilar lymph node enlargement. Mediastinal and bilateral hilar lymph node are often violated by sarcoidosis, which are generally symmetrical distribution. Part of the lesions are calcification, they generally are eggshell. Enhanced CD scan shows mild enhancement and pulmonary are interlobular septal thickening. CD involving the unilateral lymph node and the lesions are enhanced obviously. Thymoma is the most common mediastinal tumors, most often occurs in the anterior mediastinum. It can be extended along the natural space, often with chest wall, ascending aorta close relationship, even into the carina and the posterior mediastinum. In addition, enhancement scanning shows heterogeneous enhancement, that has certain value identification. Imaging findings of lymphoma is similar to CD. They can involve many lymph nodes. But some lymph nodes can be integrated. Enhanced scan showed moderate enhancement. Lymph node tuberculosis has the typical symptoms of tuberculosis, and the center of lymph node tuberculosis is caseous necrosis, it can appear the annular enhancement.

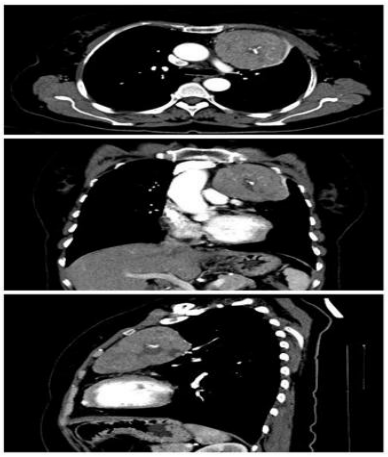


Figure6. 1 case is the coronal plane and multi planar reconstruction sagittal plane

5. Conclusions

Because the cross clinical and pathological types of Castleman's disease, the imaging findings are diversity. The limitations of CD have characteristic imaging findings: uniform density, clear boundary; radial calcification: abundant blood supply, obvious enhancement. Satellite lesions are around the lesion point. The multicentric CD imaging features are not specific. It showed multiple enlarged lymph nodes, and mild to moderate enhancement. In short, the diagnosis of the Castleman's disease need according to the clinical manifestation, laboratory examination and imaging findings. The gold standard of diagnosis of the disease is the pathological examination.

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