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Fluid collection in the retropharyngeal space: A wide spectrum of various emergency diseases

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ABSTRACT

Fluid collections in the retropharyngeal space (RPS) result from a wide spectrum of diseases, including retropharyngeal abscess, cervical osteomyelitis, and calcific tendinitis of the longus colli muscle. These conditions should be managed by different specialties; beginning with care in the emergency room, physicians from orthopedics, pediatrics, otolaryngology, and oncology are in charge of the treatment. Since these diseases demonstrate similar fluid collections in the RPS on computed tomography (CT) and magnetic resonance imaging (MRI), the radiologist's diagnosis based on the characteristic imaging findings is very important to identify the primary disease. Also, since some of the diseases require immediate surgical intervention to avoid life-threatening mediastinitis or airway obstruction, radiologists must distinguish these diseases correctly and provide recommendations for their management to physicians. Understanding clinical features and imaging findings of these fluid collections in the RPS is crucial for the best care.

1. Introduction

Fluid collection in the retropharyngeal space (RPS) is a manifestation of various diseases, which are treated by physicians in different clinical departments. Although patients present with less specific symptoms, such as dysphagia, sore throat, fever, neck pain, and stiffness, this condition is caused by a wide variety of diseases including retropharyngeal edema, abscess, or hemorrhage. The retropharyngeal edema results from an increased permeability of capillaries and obstruction of lymphatic and venous drainage, as well as a sudden onset of calcific tendinitis of the longus colli muscle. Infections in the neck, such as peritonsillar abscesses and suppurative lymphadenitis, trigger retropharyngeal abscesses [1]. Trauma and fracture of the cervical spine cause retropharyngeal hemorrhage. The RPS has loose areolar tissue [2]. Inflammation that spreads to the mediastinum by gravity causes mediastinitis. The fluid collection within the RPS that displaces the trachea anteriorly results in airway obstruction. Although some diseases can be managed with conservative treatment, fluid collections in the RPS are observed in various emergency conditions that must be diagnosed rapidly and require immediate surgical interventions in order to avoid life-threatening mediastinitis and airway obstruction.

Radiographs have a limited role in predicting the presence of retropharyngeal diseases. Computed tomography (CT) and magnetic resonance imaging (MRI) are the best imaging modalities to identify diseases in the RPS [1,3–5]. The imaging findings of a fluid collection in the RPS on CT and MRI are often non-specific. However, some of them often show characteristic imaging findings if radiologists fully notice their characteristics. For example, retropharyngeal abscess, which results from peritonsillar abscesses, pyogenic lymphadenitis, foreign bodies ingestion, and cervical osteomyelitis, typically appears a fluid collection in the RPS with rim enhancement on contrasted CT and MRI. In addition, CT is useful to detect foreign bodies, calcification of the longus colli muscle, and bony destruction caused by osteomyelitis. MRI can also reveal the correct extent of fluid collections in the RPS and pyogenic osteomyelitis. Radiologists are required to make a correct diagnosis and to determine clinical departments that should care for the condition to facilitate treatment. To the best of our knowledge, there is no previous review that provides an overview of these conditions and demonstrates imaging findings of fluid collections in the RPS.

We strongly believe that learning the variety of these diseases and their characteristic imaging findings is essential for radiologists to distinguish various diseases that cause fluid collections in

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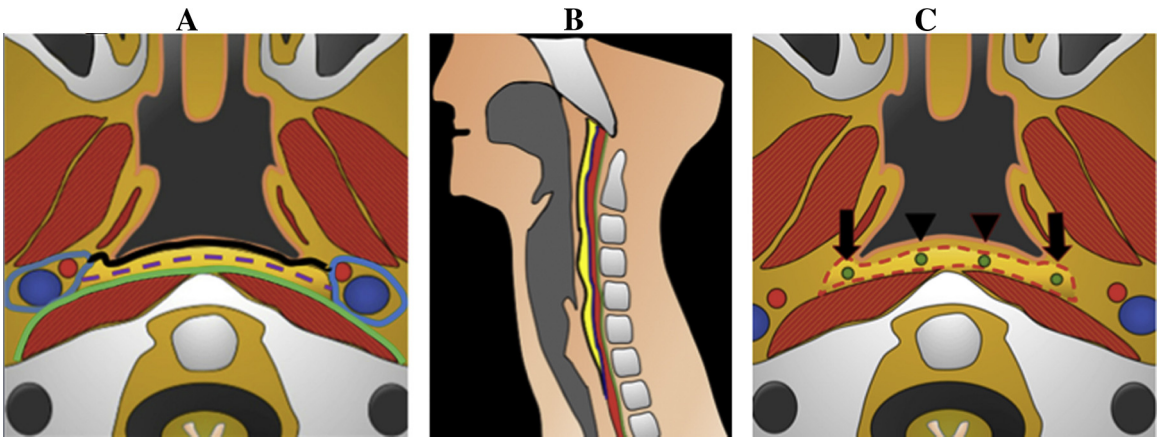

Fig. 1. Normal anatomy of the RPS. Axial images containing CT show visceral fascia (black line), prevertebral fascia (green line), the carotid sheath (blue line), and the alar fascia (purple dashed line) (A). A sagittal image shows RPS (yellow area), and the danger space (red area) (B). Medial retropharyngeal nodes (arrowhead) and lateral retropharyngeal nodes (arrow) are shown in the RPS (C).

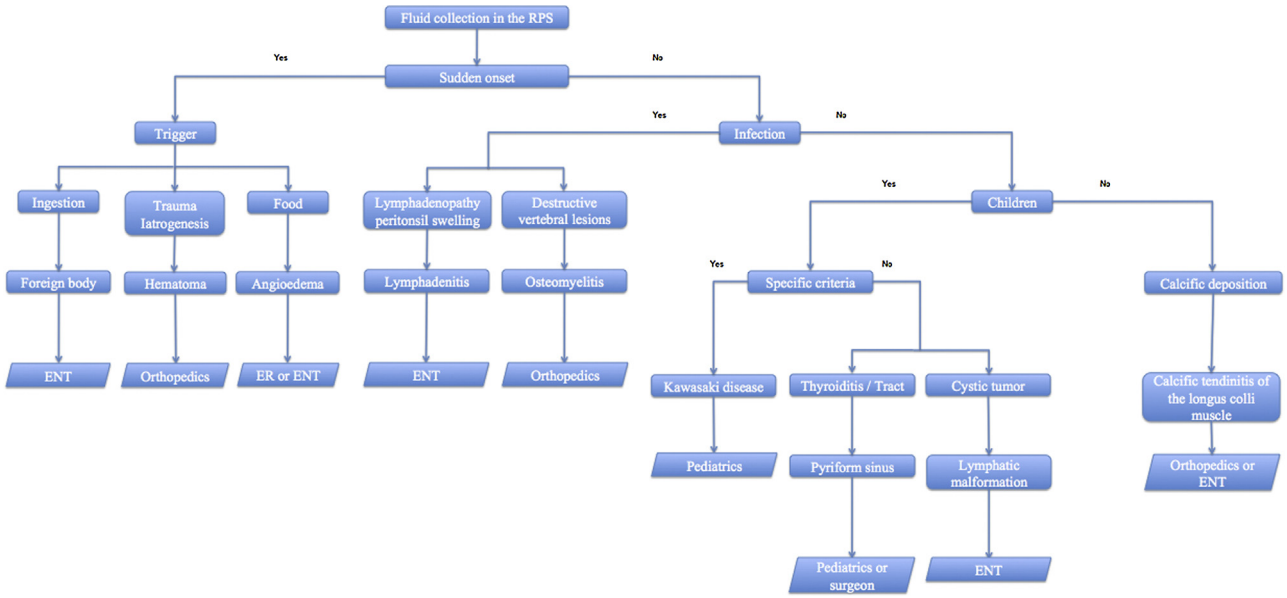

Fig. 2. A practical approach for differential diagnosis of fluid collections in the RPS. Radiologists are required to identify the diseases in the RPS and to determine the clinical department that is appropriate for rendering treatment.

the RPS. In this review, the following diseases are demonstrated and discussed: retropharyngeal abscess due to peritonsillar abscesses and cervical lymphadenitis, foreign body ingestion, osteomyelitis, calcific tendinitis of the longus colli muscle, Kawasaki disease, pyriform sinus cyst, lymphatic malformation, malignant lymphoma, angioedema, and retropharyngeal hematoma. We hope that readers recognize the major imaging findings of these diseases and avoid their over- or underdiagnosis.

2. Anatomy of the RPS

The RPS is located posterior to the pharynx and anterior to the prevertebral muscles and surrounded anteriorly by the visceral fascia, posteriorly by the prevertebral fascia, and laterally by the carotid sheath [6–8] (Fig. 1). The RPS is divided into the true RPS and the "danger space" by the deep layer of the deep cervical fascia, called the alar fascia [6,8]. The true RPS extends from the skull base to the upper thoracic spine (T1–T6) where the alar fascia fuses with the visceral fascia [7,8]. The danger space runs more inferiorly towards the mediastinum at the level of the diaphragm. It is almost impossible to differentiate the danger space from the RPS because the alar fascia is very thin and the RPS itself occupies such a small space.

The RPS contains lymph nodes, small vessels and fatty tissue. The medial retropharyngeal nodes, which receive the lymphatic drainage from the pharynx, atrophy before puberty, making children susceptible to lymphadenitis with subsequent pharyngitis. The lateral retropharyngeal nodes remain in adults and are common sites of lymph node metastasis from nasopharyngeal cancer. The fatty tissue in the RPS can be a pathway for infection that spreads inferiorly from the neck to the chest causing mediastinitis.

3. an overview for diseases demonstrating fluid collections in the RPS

Table 1 demonstrates the differential diagnosis of diseases resulting in a fluid collection within the RPS. Fig. 2 shows a basic category of diseases that demonstrate fluid collections in the RPS. Based on the clinical features of the diseases, they can be categorized by the presence of infection and by the possibility of