

Rapid On-Site Evaluation, As a Diagnostic Method for PCP in a Patient with Nephrotic Syndrome

Xiangwen Weng

Chengdu University of Traditional Chinese Medicine Affiliated Hospital

Xing An

Chengdu University of Traditional Chinese Medicine Affiliated Hospital

Xian Chen

Chengdu University of Traditional Chinese Medicine Affiliated Hospital

peiyang gao

Chengdu University of Traditional Chinese Medicine Affiliated Hospital

Lijia Zhi (✉ fjjicu@163.com)

Chengdu University of Traditional Chinese Medicine Affiliated Hospital

Case Report

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Abstract

Background: Pneumocystis jirovecii pneumonia (PCP) is a common illness of the patients receiving long-term immunosuppressive treatment for which therapy is currently available. Early and prompt diagnosis of this pulmonary infection is a matter of great practical importance. Clinical presentation and radiology are not enough to confirm a diagnosis of PCP. Microscopic examination is available.

Case presentation: Here we report a 63-year-old man with nephrotic syndrome, who was transferred to ICU due to unexplained aggravation of infection. The cause of pulmonary infection was identified by Rapid on-site evaluation (ROSE) finally and targeted treatment was given.

Conclusions: ROSE can be a diagnostic approach for PCP, which is suitable for clinicians.

Background

Recent years, interventional pulmonology has been widely used in the diagnoses and treatment of lung diseases[1, 2]. As a “real-time accompany technique”, rapid on-site evaluation(ROSE) can be performed in various interventional procedure, including puncture, biopsy, brushing and etc[3–5]. It’s recommended to use ROSE from the point of reducing complications and enhancing the diagnostic yield[6]. However, the diagnostic value of ROSE in infectious diseases is ignored. Here we report a novel diagnostic approach for PCP through ROSE based on Diff-quick, which realized bedside rapid diagnosis.

Case Presentation

A 63-year-old man presented to hospital with cough, fever, and chest pain. He was previously diagnosed with nephrotic syndrome, characterized by proteinuria and edema, and received the treatment with prednisone and tacrolimus for a long time. His initial laboratory findings demonstrated a white blood cell count of $10.49 \times 10^9/L$, neutrophil counts of $8.87 \times 10^9/L$, whole blood C-reactive protein and (1–3)- β -D-glucan concentrations of 155.81mg/L and 249.7pg/ml. The chest CT scan showed ground-glass opacification with a diffuse, bilateral and central location (Fig. 1a). Initial anti-infective treatment with cefoperazone tazobactam was ineffective, his symptoms were aggravated by cardiac tiredness, shortness of breath and dyspnea after exercise, repeated CT imaging showed no significant improvement (Fig .1b). Then, he was transferred to ICU for mechanical ventilation and underwent bronchoscopy. The focus sampling was accessed under the guidance of virtual navigation, and three forceps biopsy samples were collected (Fig. 2). ROSE was available for immediate microscopic assessment of the tissue and the diagnosis of *Pneumocystis carinii* was confirmed (Fig. 3a). He immediately received antifungal treatment with sulfamethoxazole (1.92g, q6h), subsequent staining (Fig. 3b-e) confirmed this diagnosis. However, repeated CT imaging still showed no significant improvement (Fig. 3c), he received carbofungin (the first day of 70 mg and followed by 50 mg daily), methylprednisolone (80 mg daily) and immunoglobulin (10g daily) for fungal infection. His symptoms relieved quickly and continued follow-up treatment.

Discussion And Conclusions

In view of the non-specific clinical manifestations of PCP, the diagnosis requires confirmed evidence of pneumocystis carinii, which should not be based on clinical manifestations and imaging even in symptomatic high-risk patients[7].Microscopic identification of ascus and trophic forms is the most intuitive evidence, the diagnostic efficiency is largely determined by the staining method of specimen. Historically, Conventional stains such as Wright's-Giemsa, hexaamine silver and toluidine blue are available for PCP, but it should be time consuming, also with lower sensitivity[8–10].In this case, immediate diagnosis of PCP was confirmed on the first day of the patient's transfer to ICU with the use of ROSE. Diff-quick has shown its advantage in identifying pneumocystis, characterized by clear structure, sharp contrast, easy identification of ascus (Fig. 3a).

To the best of our knowledge, this is the first report of ROSE used in bedside diagnosis of PCP combined with virtual bronchoscopy (VBN), there is only one previous report described the use of ROSE to diagnose PCP, carried by electromagnetic navigation bronchoscopy guided biopsies[11]. Differently, we used VBN, which can be started quickly at the bedside, and the real-time feedback from ROSE greatly reduces the operation time. But there's a problem, ROSE can be performed by cytotechnologist, pathologist or clinicians. cytotechnologist are the likeliest personnel for ROSE procedure. However, in clinical practice, clinicians replace the role. Study shows alternative evaluators can perform ROSE with acceptable accuracy (a sensitivity of 97% and a specificity of 83%), whereas in wide variation and cannot be generalized[12].Standardized training seems to be needed. Training program could do help to improved the accuracy of adequacy assessment performed by clinicians, and eliminate confounding variables[13].

ROSE is mainly used to increase sampling adequacy for solid malignancies rather than infectious disease. If clinicians can get more useful information from ROSE feedback in infectious disease, it will prompt them to adjust their clinical decisions in a timely manner. Like this medical case, we can easily get diagnostic information from 8 intracapsular bodies under a microscope.

There is no doubt that the diagnostic value of ROSE in infectious diseases must be emphasized. ROSE can be carried out for definite diagnosis, such as PCP. However, many questions remain unclear and need to be solved, such as how to establish a standardized training program of ROSE, which infectious disease can be diagnosed by ROSE and will the ROSE diagnosis provided by clinicians guide clinical practice. More evidence-based studies need to be implemented.

Abbreviations

ROSE: Rapid on-site evaluation; VBN:virtual bronchoscopy; PCP:Pneumocystis jirovecii pneumonia;

Declarations

Ethics approval and consent to participate

As a case report, the ethics approval is not applicable.

Consent for publication

Consent for publication has been obtained from the patient.

Availability of data and materials

Data sharing is not applicable to this article as no datasets were generated or analysed during the current study.

Competing interests

The authors declare that they have no competing interests.

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Authors' contributions

WXW and AX Collected the patient's medical information. CX and GPY were responsible for pathological analysis. ZLJ and WXW were major contributors in writing the manuscript. All authors read and approved the final manuscript.

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Figures



Figure 1

Chest CT images are shown (a) at admission, (b) on the day of transfer to ICU, (c) After the treatment of sulfamethoxazole

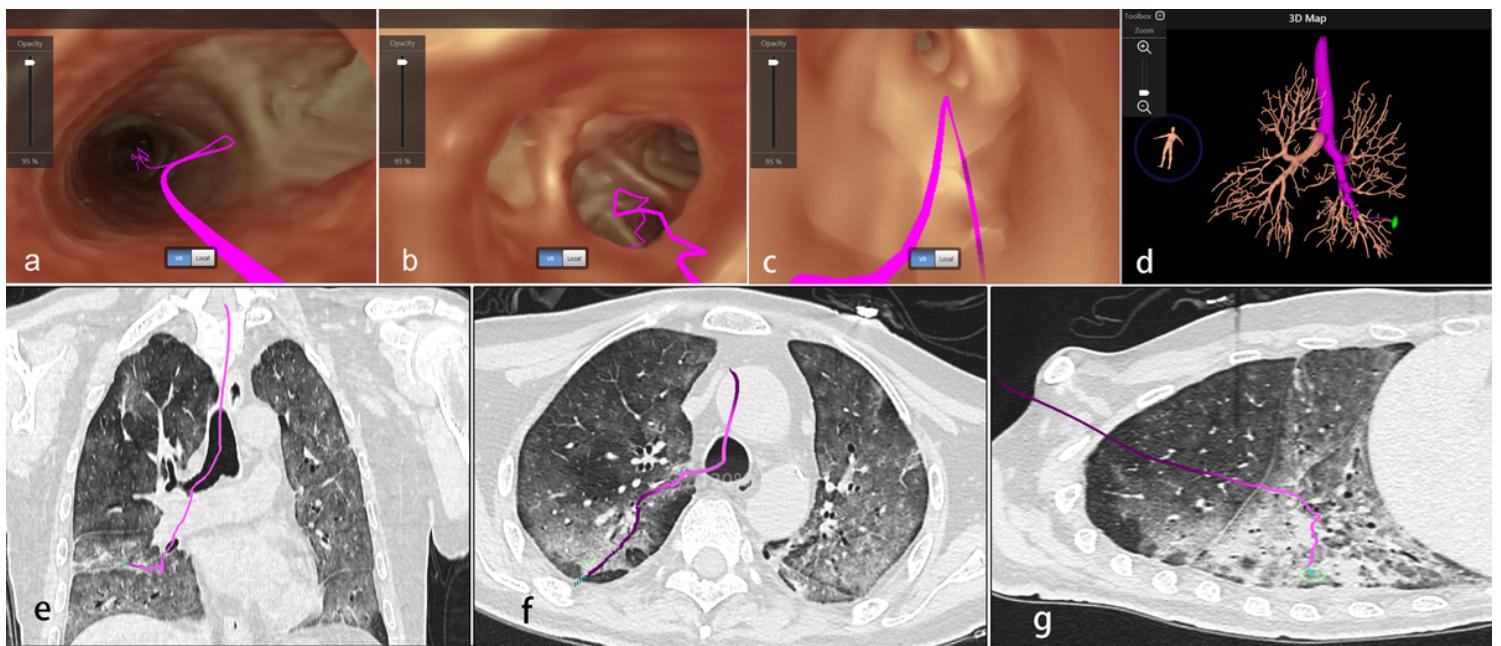


Figure 2

Localization of the posterior basal segment of the lower lobe of the right lung by VBN.(a)Right principal bronchus; (b)Right middle bronchus; (c)Posterior basal segment of bronchus of lower lobe of right lung. (d) 3D Map of VBN. (e)Coronal map of chest CT; (f)Axial map of chest CT; (g)Sagittal map of chest CT

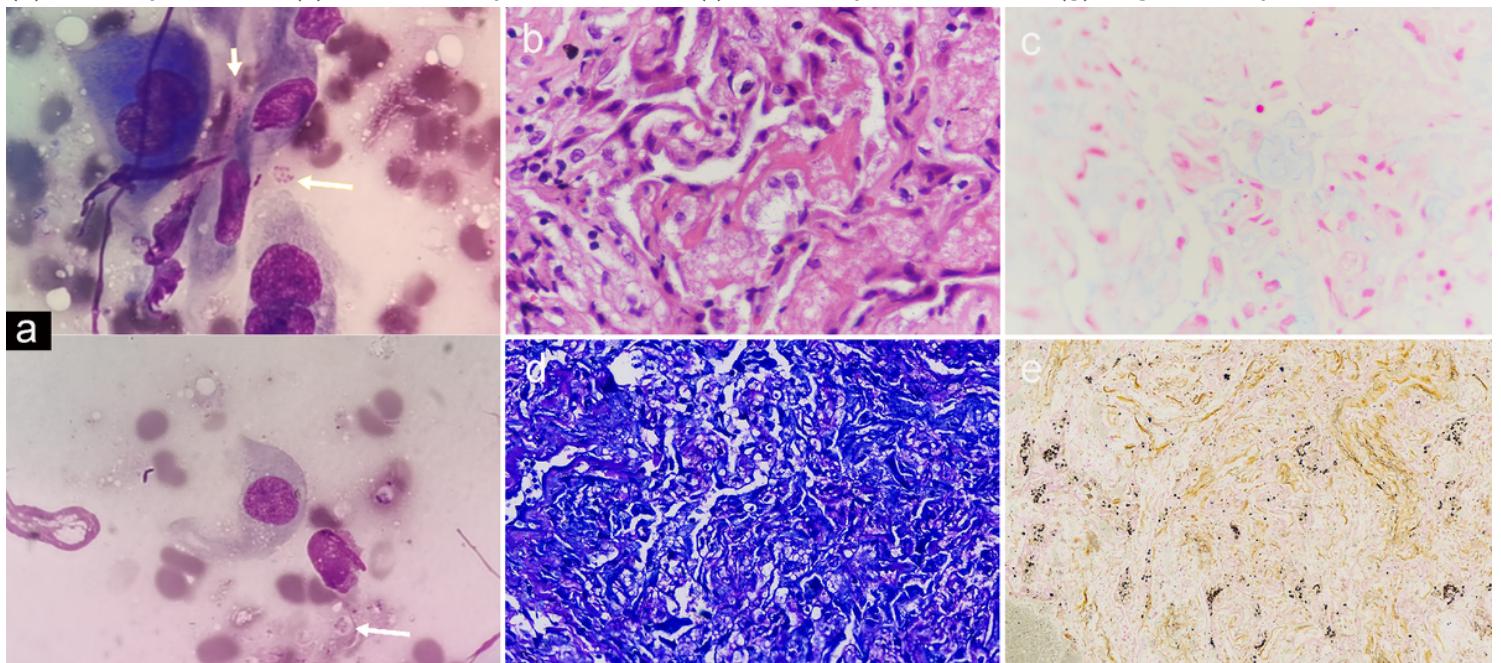


Figure 3

Pictures documenting appearance of pneumocystis in various staining methods.(a) ROSE 100×10; White arrow: cysts containing ascospores; (b) H-E, 60×10; (c)AB, 60×10; (d)GIMSA,40×10; (e) Hexamine silver, 20×10.

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