

World Journal of *Clinical Cases*

World J Clin Cases 2023 April 26; 11(12): 2582-2854



REVIEW

- 2582 Controversies in the management of acute pancreatitis: An update
Manrai M, Dawra S, Singh AK, Jha DK, Kochhar R
- 2604 Classification of osteogenesis imperfecta: Importance for prophylaxis and genetic counseling
Panzaru MC, Florea A, Caba L, Gorduza EV

MINIREVIEWS

- 2621 Emerging role of dual biologic therapy for the treatment of inflammatory bowel disease
McCormack MD, Wahedna NA, Aldulaimi D, Hawker P
- 2631 Pancreatic cancer and depression
Michoglou K, Ravinthiranathan A, San Ti S, Dolly S, Thillai K
- 2637 Mediastinal lesions in children
Çinar HG, Gulmez AO, Üner Ç, Aydin S
- 2657 Exit strategies in inflammatory bowel disease: Looking beyond anti-tumor necrosis factors
Crispino F, Michielan A, Grova M, Tieppo C, Mazza M, Rogger TM, Armelao F
- 2670 Medicinal cannabis products for the treatment of acute pain
Fiore M, Alfieri A, Di Franco S, Petrou S, Damiani G, Pace MC
- 2677 Role of in vitamin D in irritable bowel syndrome
Yu XL, Wu QQ, He LP, Zheng YF

ORIGINAL ARTICLE**Retrospective Cohort Study**

- 2684 Analysis of oxidative stress and antioxidative potential in premature ovarian insufficiency
Kakinuma K, Kakinuma T

Retrospective Study

- 2694 Surgical management of pituitary adenoma during pregnancy
Jia XY, Guo XP, Yao Y, Deng K, Lian W, Xing B
- 2708 Role of pre-existing incomplete intestinal metaplasia in gastric adenocarcinoma: A retrospective case series analysis
Bogdanova I, Polaka I, Aleksandraviča I, Dzērve Z, Anarkulova L, Novika V, Tolmanis I, Leja M

Observational Study

- 2716 Severe/critical COVID-19 early warning system based on machine learning algorithms using novel imaging scores
Li QY, An ZY, Pan ZH, Wang ZZ, Wang YR, Zhang XG, Shen N
- 2729 Mediating effect of mindfulness level on the relationship between marital quality and postpartum depression among primiparas
Yang J, Lin XZ, Guo QW, Wang CL, Yang RY, Zhang JW, Zeng Y
- 2740 Ferric carboxymaltose for anemia in Crohn's disease patients at a tertiary center: A retrospective observational cohort study
Siqueira NSN, Pascoal LB, Rodrigues BL, de Castro MM, Martins ASC, Araiyo DOS, Gomes LEM, Camargo MG, Ayrizono MLS, Leal RF

META-ANALYSIS

- 2753 Is metaphyseal ulnar shortening osteotomy superior to diaphyseal ulnar shortening osteotomy in the treatment of ulnar impaction syndrome? A meta-analysis
Deng HL, Lu ML, Tang ZM, Mao QL, Zhao JM
- 2766 Relationship between body mass index and short-term postoperative prognosis in patients undergoing colorectal cancer surgery
Li Y, Deng JJ, Jiang J

CASE REPORT

- 2780 Cardiac amyloidosis presenting as pulmonary arterial hypertension: A case report
Gao M, Zhang WH, Zhang ZG, Yang N, Tong Q, Chen LP
- 2788 Short-term outcome of total knee replacement in a patient with hemophilia: A case report and review of literature
Yin DL, Lin JM, Li YH, Chen P, Zeng MD
- 2796 Modified inferior oblique anterior transposition for dissociated vertical deviation combined with superior oblique palsy: A case report
Zong Y, Wang Z, Jiang WL, Yang X
- 2803 Treatment of talipes equinovarus after triceps surae intramuscular hemangioma surgery by Ilizarov technology in adults: A case report
Chen ZX, Wang MY, Zhang C, Ding ZQ, Chen W
- 2811 Open surgery: Still a great option to treat patients with post-traumatic arteriovenous fistulas: A case report
Kalinin R, Suchkov I, Mzhavanadze N, Borisova Y, Panin I
- 2817 Recovery from Bell's palsy after treatment using uncultured umbilical cord-derived mesenchymal stem cells: A case report
Ahn H, Jung WJ, Lee SY, Lee KH

- 2825** Pancreatic neuroendocrine tumor detected by technetium-99m methoxy-2-isobutylisonitrile single photon emission computed tomography/computed tomography: A case report
Liu CJ, Yang HJ, Peng YC, Huang DY
- 2832** Furazolidone-induced pulmonary toxicity in *Helicobacter pylori* infection: Two case reports
Ye Y, Shi ZL, Ren ZC, Sun YL
- 2839** Efficacy of anlotinib combined with radioiodine to treat scalp metastasis of papillary thyroid cancer: A case report and review of literature
Zhang LY, Cai SJ, Liang BY, Yan SY, Wang B, Li MY, Zhao WX
- 2848** Endoscopic ultrasound-guided transrectal drainage of a pelvic abscess after Hinchey II sigmoid colon diverticulitis: A case report
Drnovšek J, Čebren Ž, Grosek J, Janež J

ABOUT COVER

Editorial Board Member of *World Journal of Clinical Cases*, Mohamed Eltayeb Abdelrahman Naiem, MBBS, MD, Assistant Professor, Surgeon, Department of Surgery, Faculty of Medicine, University of Khartoum, Khartoum 102, Sudan. m-altayeb@live.com

AIMS AND SCOPE

The primary aim of *World Journal of Clinical Cases* (*WJCC*, *World J Clin Cases*) is to provide scholars and readers from various fields of clinical medicine with a platform to publish high-quality clinical research articles and communicate their research findings online.

WJCC mainly publishes articles reporting research results and findings obtained in the field of clinical medicine and covering a wide range of topics, including case control studies, retrospective cohort studies, retrospective studies, clinical trials studies, observational studies, prospective studies, randomized controlled trials, randomized clinical trials, systematic reviews, meta-analysis, and case reports.

INDEXING/ABSTRACTING

The *WJCC* is now abstracted and indexed in Science Citation Index Expanded (SCIE, also known as SciSearch®), Journal Citation Reports/Science Edition, Current Contents®/Clinical Medicine, PubMed, PubMed Central, Scopus, Reference Citation Analysis, China National Knowledge Infrastructure, China Science and Technology Journal Database, and Superstar Journals Database. The 2022 Edition of Journal Citation Reports® cites the 2021 impact factor (IF) for *WJCC* as 1.534; IF without journal self cites: 1.491; 5-year IF: 1.599; Journal Citation Indicator: 0.28; Ranking: 135 among 172 journals in medicine, general and internal; and Quartile category: Q4. The *WJCC*'s CiteScore for 2021 is 1.2 and Scopus CiteScore rank 2021: General Medicine is 443/826.

RESPONSIBLE EDITORS FOR THIS ISSUE

Production Editor: *Ying-Yi Yuan*; Production Department Director: *Xu Guo*; Editorial Office Director: *Jin-Lei Wang*.

NAME OF JOURNAL

World Journal of Clinical Cases

ISSN

ISSN 2307-8960 (online)

LAUNCH DATE

April 16, 2013

FREQUENCY

Thrice Monthly

EDITORS-IN-CHIEF

Bao-Gan Peng, Jerzy Tadeusz Chudek, George Kontogeorgos, Maurizio Serati, Ja Hyeon Ku

EDITORIAL BOARD MEMBERS

<https://www.wjgnet.com/2307-8960/editorialboard.htm>

PUBLICATION DATE

April 26, 2023

COPYRIGHT

© 2023 Baishideng Publishing Group Inc

INSTRUCTIONS TO AUTHORS

<https://www.wjgnet.com/bpg/gerinfo/204>

GUIDELINES FOR ETHICS DOCUMENTS

<https://www.wjgnet.com/bpg/GerInfo/287>

GUIDELINES FOR NON-NATIVE SPEAKERS OF ENGLISH

<https://www.wjgnet.com/bpg/gerinfo/240>

PUBLICATION ETHICS

<https://www.wjgnet.com/bpg/GerInfo/288>

PUBLICATION MISCONDUCT

<https://www.wjgnet.com/bpg/gerinfo/208>

ARTICLE PROCESSING CHARGE

<https://www.wjgnet.com/bpg/gerinfo/242>

STEPS FOR SUBMITTING MANUSCRIPTS

<https://www.wjgnet.com/bpg/GerInfo/239>

ONLINE SUBMISSION

<https://www.f6publishing.com>

Furazolidone-induced pulmonary toxicity in *Helicobacter pylori* infection: Two case reports

Yao Ye, Zi-Ling Shi, Zhuo-Chao Ren, Yi-Lan Sun

Specialty type: Medicine, research and experimental

Provenance and peer review:

Unsolicited article; Externally peer reviewed.

Peer-review model: Single blind

Peer-review report's scientific quality classification

Grade A (Excellent): 0
Grade B (Very good): 0
Grade C (Good): C, C, C
Grade D (Fair): 0
Grade E (Poor): 0

P-Reviewer: Gupta L, Indonesia; Kirkik D, Turkey; Sánchez JIA, Colombia

Received: December 30, 2022

Peer-review started: December 30, 2022

First decision: February 2, 2023

Revised: February 7, 2023

Accepted: March 30, 2023

Article in press: March 30, 2023

Published online: April 26, 2023



Yao Ye, Zi-Ling Shi, Zhuo-Chao Ren, Yi-Lan Sun, Geriatric Medicine Center, Department of Pulmonary and Critical Care Medicine, Zhejiang Provincial People's Hospital, Affiliated People's Hospital, Hangzhou Medical College, Hangzhou 310014, Zhejiang Province, China

Zi-Ling Shi, Graduate School of Clinical Medicine, Bengbu Medical College, Bengbu 233000, Anhui Province, China

Corresponding author: Yi-Lan Sun, PhD, Chief Physician, Doctor, Geriatric Medicine Center, Department of Pulmonary and Critical Care Medicine, Zhejiang Provincial People's Hospital, Affiliated People's Hospital, Hangzhou Medical College, No. 158 Shangtang Street, Gongshu District, Hangzhou 310014, Zhejiang Province, China. sunylhz1974@126.com

Abstract

BACKGROUND

Helicobacter pylori (*H. pylori*) infection is a global problem, causing significant morbidity and mortality. Furazolidone is recommended to eradicate *H. pylori* infections in China owing to the highly associated antibiotic resistance.

CASE SUMMARY

This article presents two cases of lung injury caused by furazolidone treatment of *H. pylori* infection and the relevant literature review. Two patients developed symptoms, including fever, cough, and fatigue after receiving a course of furazolidone for *H. pylori* infection. Chest computed tomography showed bilateral interstitial infiltrates. Laboratory studies revealed elevated blood eosinophil count. After discontinuing furazolidone with or without the use of corticosteroids, the symptoms improved rapidly. A PubMed database literature search revealed three reported cases of lung injury suggestive of furazolidone-induced pulmonary toxicity.

CONCLUSION

Clinicians should be aware of the side effects associated with the administration of furazolidone to eradicate *H. pylori* infection.

Key Words: Furazolidone; *Helicobacter pylori* infection; Pulmonary hypersensitivity; Case report

©The Author(s) 2023. Published by Baishideng Publishing Group Inc. All rights reserved.

Core Tip: Furazolidone should be used as a treatment option for *Helicobacter pylori* (*H. pylori*) eradication in China because of high antibiotic resistance. We present two cases of furazolidone-induced pulmonary hypersensitivity determined by the Naranjo Adverse Drug Reaction Probability Scale score. Clinicians should be aware of the adverse effects of furazolidone, especially as it is widely used in the treatment of *H. pylori* infection in China.

Citation: Ye Y, Shi ZL, Ren ZC, Sun YL. Furazolidone-induced pulmonary toxicity in *Helicobacter pylori* infection: Two case reports. *World J Clin Cases* 2023; 11(12): 2832-2838

URL: <https://www.wjgnet.com/2307-8960/full/v11/i12/2832.htm>

DOI: <https://dx.doi.org/10.12998/wjcc.v11.i12.2832>

INTRODUCTION

Helicobacter pylori (*H. pylori*) infection is highly prevalent worldwide and is the leading cause of gastritis, peptic ulcers, and gastric cancer[1]. *H. pylori* remains the most common human bacterial pathogen, infecting approximately half of the global population[2]. The overall *H. pylori* infection rate has declined gradually over the past 3–4 years owing to ongoing interventions, education, improved sanitation, and water quality. However, the incidence was high (46.7%) between 2006 and 2018[3]. The most commonly recommended therapy worldwide is a standard dose of proton-pump inhibitor (PPI)-based regimen consisting of a PPI, clarithromycin, amoxicillin, and/or metronidazole[4]. However, the eradication rate of standard therapy is less than 80%, with the increasing drug resistance of *H. pylori*[5]. Furazolidone, a conventional drug administered for decades in the developing countries to eradicate *H. pylori* infections, has low resistance rates[6]. The Fifth Chinese National Consensus Report recommended the administration of furazolidone as a treatment option for *H. pylori* eradication in China because of its high antibiotic resistance[7].

The side effects of furazolidone are mild and well-tolerated by most patients[8]. Common furazolidone side effects include gastrointestinal reactions[4], including nausea, vomiting, diarrhea, and allergic reactions characterized by fever and rash[9]. Pulmonary hypersensitivity induced by furazolidone administration for the treatment of *H. pylori* infection is uncommon and rarely reported. Therefore, furazolidone-induced pulmonary toxicity goes largely unrecognized, prolonging diagnosis and leading to irreversible pulmonary complications.

Here, we present two cases of furazolidone-induced pulmonary hypersensitivity determined using the Naranjo Adverse Drug Reaction Probability Scale score (score: 11). Furthermore, we review the literature to improve our understanding of the side effects of furazolidone.

CASE PRESENTATION

Chief complaints

Case 1: Progressive fatigue and cough lasting 1 wk.

Case 2: A 1d history of fever and a mild cough.

History of present illness

Case 1: A 38-year-old woman presented at our hospital complaining of progressive fatigue and cough lasting 1 wk. There was no history of pyrexia, weight loss, night sweats, chest tightness, dyspnea, or rash.

Case 2: A 36-year-old woman presented with a 1-d history of fever and a mild cough. She did not complain of weight loss, night sweats, chest tightness, dyspnea, or rash.

History of past illness

Case 1: Her medical history revealed that she underwent cesarean section in 2017. Chronic non-atrophic gastritis caused by *H. pylori* infection was diagnosed 6 mo before her presentation. Eighteen days prior, she was prescribed rabeprazole (10 mg), potassium bismuth citrate (600 mg), amoxicillin (1 g), and furazolidone (100 mg) twice daily for 2 wk, to treat the *H. pylori* infection.

Case 2: Twelve days before her presentation, she was diagnosed with *H. pylori* infection and treated with omeprazole (20 mg), potassium bismuth citrate (600 mg), amoxicillin (1 g), and furazolidone (100 mg) twice daily.

Personal and family history

Case 1: Furthermore, the patient had never smoked and had no occupational exposure or a history of allergies.

Case 2: The patient had never smoked and denied alcohol consumption.

Physical examination

Case 1: Physical examination revealed the following vital signs: Temperature, 37 °C; heart rate, 95 beats/min; respiratory rate, 20 breaths/min; blood pressure, 112/86 mmHg; and oxygen saturation, 98% in room air. Pulmonary examination revealed bilateral coarse breath sounds. Other physical examinations, including cardiac examinations, were unremarkable.

Case 2: Her vital signs at the outpatient clinic were as follows: Temperature, 38.5 °C; respiratory rate, 18 breaths/min; heart rate, 80 beats/min; and blood pressure, 116/74 mmHg. Chest auscultation revealed bilateral coarse breath sounds, while the other general examination results were normal.

Laboratory examinations

Case 1: Routine blood tests revealed an elevated eosinophil ratio (10.9%; reference range, 0.4%–8%) and blood eosinophil count ($0.55 \times 10^9/L$; reference range, $0.02\text{--}0.52 \times 10^9/L$). We observed a rapid erythrocyte sedimentation rate (44 mm/h; reference range, 0–26 mm/h) and elevated immunoglobulin E (966 IU/mL; reference range, 0–87 IU/mL). The electrolyte panel, renal function, hepatic function, thyroid function, glucose level, tumor markers, and antinuclear antibodies were normal.

Case 2: Although the white blood cell and neutrophil counts were within the normal ranges, the eosinophil ratio (9.8%) and C-reactive protein (11.2 mg/L; reference range, 0–10 mg/L) were elevated. The electrolyte panel, renal function, hepatic function, and cardiac workup results were normal.

Imaging examinations

Case 1: Computed tomography (CT) of the chest revealed bilateral interstitial infiltrates, mainly manifested as interlobular septal thickening and nodules (Figure 1A).

Case 2: Chest CT showed bilateral interstitial infiltrates, including patchy hyperdense foci, combined with thickening of the interlobular septa and nodules (Figure 2A).

FINAL DIAGNOSIS

The two patients were diagnosed with furazolidone-induced lung injury based on the findings.

TREATMENT

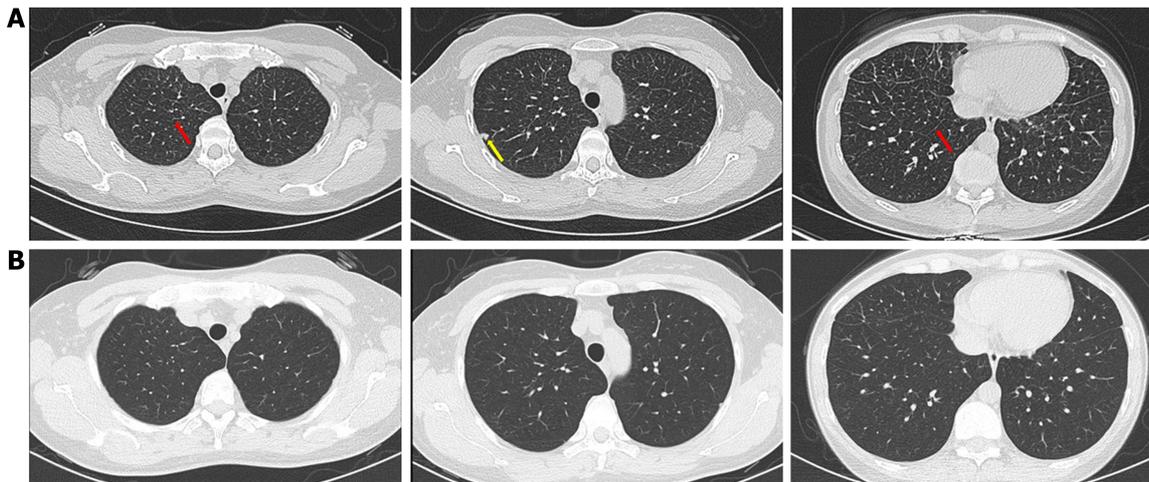
For case 1, the patient received a 6 d treatment with intravenous prednisone (40 mg/d). Then the intravenous administration of prednisone was replaced with oral administration, and the dose was gradually reduced over a week. For case 2, due to the adamant refusal of oral corticosteroids administration and hospitalization, only furazolidone was discontinued, and antipyretic treatment was administered.

OUTCOME AND FOLLOW-UP

For case 1, the fatigue and cough rapidly subsided. The eosinophil ratio was 0.3%, and chest CT showed significant absorption of bilateral interstitial infiltrates (Figure 1B). The patient did not show any similar symptoms during the follow-up period. For case 2, the symptoms improved rapidly, and chest CT after 1 mo revealed obvious absorption of bilateral interstitial infiltrates (Figure 2B).

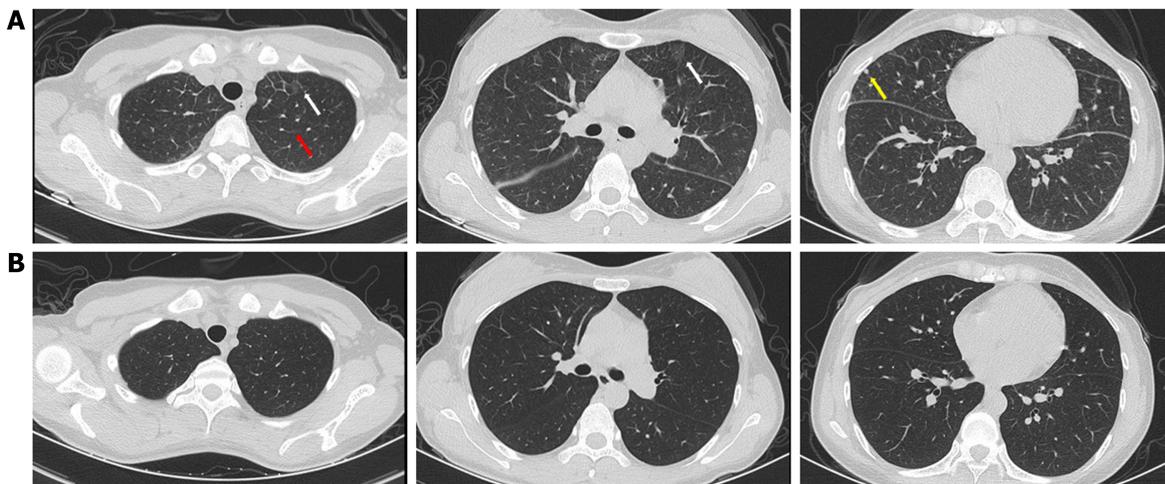
DISCUSSION

H. pylori infection is a family-based, population-wide disease that causes significant morbidity and mortality as it causes peptic ulcers and gastric cancer. It poses a major health threat to the Chinese families and society through increasing the economic and medical burden of the country[3]. In 2020, a meta-analysis, including 670572 participants from 26 provinces of mainland China, reported that the overall prevalence was 63.8% between 1983 and 1994, 57.5% between 1995 and 2005, and 46.7% between



DOI: 10.12998/wjcc.v11.i12.2832 Copyright ©The Author(s) 2023.

Figure 1 Radiological changes of furazolidone-induced pulmonary toxicity in case 1. A: Bilateral interstitial infiltrates on chest computed tomography (CT) scan on admission. Red arrows indicate interlobular septal thickening. Yellow arrow indicate nodule; B: After treatment, the interstitial infiltrates on chest CT absorbed.



DOI: 10.12998/wjcc.v11.i12.2832 Copyright ©The Author(s) 2023.

Figure 2 Radiological changes of furazolidone-induced pulmonary toxicity in case 2. A: Bilateral interstitial infiltrates on chest computed tomography (CT) scan on admission. Red arrow indicate interlobular septal thickening. Yellow arrow indicate nodule. White arrows indicate patchy hyperdense foci; B: After treatment, the interstitial infiltrates on chest CT were absorbed.

2006 and 2018[10]. The infection rates vary greatly among different geographical regions and are much higher in the rural areas[10]. The discovery that *H. pylori* causes most duodenal ulcers and approximately two-thirds of gastric ulcers is seminal. Furthermore, *H. pylori* has been estimated to increase lifetime risk of gastric cancer by 1.5%–2.0%[11]. Previous studies reported that *H. pylori* eradication for gastric cancer prevention is cost-effective in China[12].

Optimal clinical management and treatment approaches are unknown and evolve in response to the changing antimicrobial resistance patterns[11]. In many parts of the world, triple therapy with PPI, clarithromycin, amoxicillin, or bismuth-based quadruple therapy with PPI, bismuth, tetracycline, and metronidazole, is the most commonly administered first-line treatment regimen[4]. In China, the rate of *H. pylori* resistance to antibiotics, including clarithromycin, metronidazole, and levofloxacin, is increasing[7]. Recent studies reported that the resistance rates to clarithromycin, metronidazole, and levofloxacin were 20%–50%, 40%–70%, and 20%–50%, respectively[13]. Furthermore, *H. pylori* can be resistant to multiple antibiotics[13]. Previous studies reported that the dual resistance of *H. pylori* to clarithromycin and metronidazole is approximately 25%[14]. Therefore, implementing these regimens in China may result in significantly lower eradication rates.

Furazolidone is a synthetic nitrofurantoin monoamine oxidase inhibitor with broad-spectrum antimicrobial activity[15]. However, its therapeutic effect on *H. pylori* infection cannot be ignored. Currently, the resistance rates of *H. pylori* to furazolidone are low (0%–1%)[13]. Because it rarely produces resistance, it can be readministered after a treatment failure. Therefore, some national and regional

Table 1 Summary of furazolidone-induced pulmonary hypersensitivity (literature review)

Ref.	Furazolidone administration time and dosage	Purpose of using furazolidone	Symptoms	Physical examination	Laboratory studies	Image test	Treatment
Cortez and Pankey[18], 1972	A 4 d course, 100 mg twice daily	To prevent diarrhea	Fever, dyspnea, headache, and pleuritic chest pain	Dry, crackling rales	Eosinophils elevated	Diffuse, bilateral Infiltrates (X-ray)	15 mg of prednisone orally followed by 40 mg daily
Collins and Thomas [19], 1973	A 5 d course, dose not mentioned	To treat a gastrointestinal infection	Fever, rigors, generalized rash, breathless on slight exertion, and night sweats	No abnormal physical signs	Eosinophils and ESR elevated	Diffuse mottling (X-ray)	not mentioned
Kowalski <i>et al</i> [20], 2005	A 10 d course, 125 mg 4 times daily	To treat Isospora Belli infection	Fever, dyspnea, and nonproductive cough	Bibasilar crackles	Eosinophil ratio elevated	Bilateral interstitial infiltrates (X-ray)	Prednisone 40 mg/day

ESR: Erythrocyte sedimentation rate.

guidelines for *H. pylori* infection recommend furazolidone as a component of rescue therapy[11]. However, furazolidone has been administered in a few high-quality eradication studies, and there is a lack in randomized trials. Additionally, concerns about its safety and use have resulted in its unavailability in the United States and European Union[4]. However, due to antibiotic resistance, it is recommended as empirical first-line therapy for *H. pylori* infection in China[7]. With the increasing use of furazolidone in China, its related side effects should be fully recognized and monitored.

The most common side effects of furazolidone are gastrointestinal reactions, including nausea and abdominal pain[4,15]. Furazolidone-related allergic reactions are clinically common and are characterized by fever (1.8%) and rash (0.3%)[10]. One study reported that rash and fever were the most frequent clinical findings in antibiotic-induced drug reactions, with eosinophilia and systemic symptoms[16]. Pulmonary hypersensitivity is uncommon; however, it often leads to fatal damage[16]. Drug-induced pulmonary hypersensitivity and interstitial lung disease may be mediated by T cells; however, they are primarily affected by antibody-mediated factor functions (I–III)[17].

Following furazolidone treatment for *H. pylori* infection, the patients reported in this case report developed pulmonary hypersensitivity. The Naranjo probability score indicated that the adverse events could be drug-related. Using the search algorithm “furazolidone” and “pulmonary” or “lung”, we searched the PubMed database (as of May 2022). Three cases of pulmonary hypersensitivity were attributed to furazolidone; however, these included other bacterial infections. In all the reported patients, symptoms developed during or immediately after furazolidone administration, with prominent pyrexia and dyspnea (Table 1)[18–20]. Chest radiograph revealed bilateral interstitial infiltrates with subsequent eosinophilia.

Our cases were similar to the three previously reported cases of furazolidone pulmonary hypersensitivity, with minor differences. Both patients developed symptoms during their furazolidone treatment. The three previously reported cases had severe symptoms, including significant pyrexia, dyspnea, and bibasilar crackles. The symptoms and physical signs in our cases were milder than those of the previous studies as there was no dyspnea or obvious crackles. This could be attributed to racial differences with respect to drug susceptibility or factors related to medication dosage and duration. However, the eosinophil levels were elevated during the early disease stages. Lung imaging revealed bilateral interstitial infiltrates. However, since only the radiographs of the patients have been shown in the past, the specific imaging findings of the chest CT are unknown. Both cases in our report showed interlobular septal thickening and nodules on the chest CT. Furthermore, the symptoms improved rapidly and significantly without recurrence after discontinuing furazolidone and the concurrent steroid administration.

CONCLUSION

This report highlights two rare cases of pulmonary hypersensitivity caused by furazolidone during treatment of *H. pylori* infection. Clinicians should be aware of the side effects of furazolidone, especially because it is widely used in China to treat *H. pylori* infection. The possibility of furazolidone-induced pulmonary hypersensitivity can be recognized based on the medical history, elevated eosinophil levels, and pulmonary interstitial infiltrates. Appropriate and timely treatment is required to prevent drug-induced damage.

ACKNOWLEDGEMENTS

The authors are grateful to the patients in this study for their collaboration.

FOOTNOTES

Author contributions: Ye Y, Shi ZL, Ren ZC, and Sun YL conceptualized and designed the study, collected and analyzed data, they have read and approved the final manuscript; Ye Y and Shi ZL contributed to writing-original draft preparation; Ye Y, Ren ZC and Sun YL contributed to writing-review and editing, treatment of the patient; Sun YL contributed to supervision.

Informed consent statement: Written informed consent was obtained from the patients for the publication of this case report.

Conflict-of-interest statement: All the authors report no relevant conflicts of interest for this article.

CARE Checklist (2016) statement: The authors have read the CARE Checklist (2016), and the manuscript was prepared and revised according to the CARE Checklist (2016).

Open-Access: This article is an open-access article that was selected by an in-house editor and fully peer-reviewed by external reviewers. It is distributed in accordance with the Creative Commons Attribution NonCommercial (CC BY-NC 4.0) license, which permits others to distribute, remix, adapt, build upon this work non-commercially, and license their derivative works on different terms, provided the original work is properly cited and the use is non-commercial. See: <https://creativecommons.org/licenses/by-nc/4.0/>

Country/Territory of origin: China

ORCID number: Yao Ye 0000-0002-5337-5223; Yi Lan Sun 0000-0003-2135-3318.

S-Editor: Cai YX

L-Editor: A

P-Editor: Cai YX

REFERENCES

- 1 Crowe SE. Helicobacter pylori Infection. *N Engl J Med* 2019; **380**: 1158-1165 [PMID: 30893536 DOI: 10.1056/NEJMcpl710945]
- 2 Hooi JKY, Lai WY, Ng WK, Suen MMY, Underwood FE, Tanyingoh D, Malfertheiner P, Graham DY, Wong VWS, Wu JCY, Chan FKL, Sung JY, Kaplan GG, Ng SC. Global Prevalence of Helicobacter pylori Infection: Systematic Review and Meta-Analysis. *Gastroenterology* 2017; **153**: 420-429 [PMID: 28456631 DOI: 10.1053/j.gastro.2017.04.022]
- 3 Ding SZ, Du YQ, Lu H, Wang WH, Cheng H, Chen SY, Chen MH, Chen WC, Chen Y, Fang JY, Gao HJ, Guo MZ, Han Y, Hou XH, Hu FL, Jiang B, Jiang HX, Lan CH, Li JN, Li Y, Li YQ, Liu J, Li YM, Lyu B, Lu YY, Miao YL, Nie YZ, Qian JM, Sheng JQ, Tang CW, Wang F, Wang HH, Wang JB, Wang JT, Wang JP, Wang XH, Wu KC, Xia XZ, Xie WF, Xie Y, Xu JM, Yang CQ, Yang GB, Yuan Y, Zeng ZR, Zhang BY, Zhang GY, Zhang GX, Zhang JZ, Zhang ZY, Zheng PY, Zhu Y, Zuo XL, Zhou LY, Lyu NH, Yang YS, Li ZS; National Clinical Research Center for Digestive Diseases (Shanghai), Gastrointestinal Early Cancer Prevention & Treatment Alliance of China (GECA), Helicobacter pylori Study Group of Chinese Society of Gastroenterology, and Chinese Alliance for Helicobacter pylori Study. Chinese Consensus Report on Family-Based Helicobacter pylori Infection Control and Management (2021 Edition). *Gut* 2022; **71**: 238-253 [PMID: 34836916 DOI: 10.1136/gutjnl-2021-325630]
- 4 Zhuge L, Wang Y, Wu S, Zhao RL, Li Z, Xie Y. Furazolidone treatment for Helicobacter Pylori infection: A systematic review and meta-analysis. *Helicobacter* 2018; **23**: e12468 [PMID: 29480532 DOI: 10.1111/hel.12468]
- 5 Zheng Q, Chen WJ, Lu H, Sun QJ, Xiao SD. Comparison of the efficacy of triple vs quadruple therapy on the eradication of Helicobacter pylori and antibiotic resistance. *J Dig Dis* 2010; **11**: 313-318 [PMID: 20883428 DOI: 10.1111/j.1751-2980.2010.00457.x]
- 6 Hu Y, Zhu Y, Lu NH. Primary Antibiotic Resistance of Helicobacter pylori in China. *Dig Dis Sci* 2017; **62**: 1146-1154 [PMID: 28315035 DOI: 10.1007/s10620-017-4536-8]
- 7 Liu WZ, Xie Y, Lu H, Cheng H, Zeng ZR, Zhou LY, Chen Y, Wang JB, Du YQ, Lu NH; Chinese Society of Gastroenterology, Chinese Study Group on Helicobacter pylori and Peptic Ulcer. Fifth Chinese National Consensus Report on the management of Helicobacter pylori infection. *Helicobacter* 2018; **23**: e12475 [PMID: 29512258 DOI: 10.1111/hel.12475]
- 8 Zheng ZT, Wang YB. Treatment of peptic ulcer disease with furazolidone. *J Gastroenterol Hepatol* 1992; **7**: 533-537 [PMID: 1391736 DOI: 10.1111/j.1440-1746.1992.tb01034.x]
- 9 Buzás GM, Józán J. Nitrofurantoin-based regimens for the eradication of Helicobacter pylori infection. *J Gastroenterol Hepatol* 2007; **22**: 1571-1581 [PMID: 17845685 DOI: 10.1111/j.1440-1746.2007.05082.x]
- 10 Li M, Sun Y, Yang J, de Martel C, Charvat H, Clifford GM, Vaccarella S, Wang L. Time trends and other sources of

- variation in *Helicobacter pylori* infection in mainland China: A systematic review and meta-analysis. *Helicobacter* 2020; **25**: e12729 [PMID: 32686261 DOI: 10.1111/hel.12729]
- 11 World gastroenterology organisation global guideline: *Helicobacter pylori* in developing countries. *J Dig Dis* 2011; **12**: 319-326 [PMID: 21955424 DOI: 10.1111/j.1751-2980.2011.00529.x]
 - 12 **Chen Q**, Liang X, Long X, Yu L, Liu W, Lu H. Cost-effectiveness analysis of screen-and-treat strategy in asymptomatic Chinese for preventing *Helicobacter pylori*-associated diseases. *Helicobacter* 2019; **24**: e12563 [PMID: 30672082 DOI: 10.1111/hel.12563]
 - 13 **Bai P**, Zhou LY, Xiao XM, Luo Y, Ding Y. Susceptibility of *Helicobacter pylori* to antibiotics in Chinese patients. *J Dig Dis* 2015; **16**: 464-470 [PMID: 26147515 DOI: 10.1111/1751-2980.12271]
 - 14 **Zhou L**, Zhang J, Chen M, Hou X, Li Z, Song Z, He L, Lin S. A comparative study of sequential therapy and standard triple therapy for *Helicobacter pylori* infection: a randomized multicenter trial. *Am J Gastroenterol* 2014; **109**: 535-541 [PMID: 24642580 DOI: 10.1038/ajg.2014.26]
 - 15 **Resina E**, Gisbert JP. Rescue Therapy with Furazolidone in Patients with at Least Five Eradication Treatment Failures and Multi-Resistant *H. pylori* infection. *Antibiotics (Basel)* 2021; **10** [PMID: 34572610 DOI: 10.3390/antibiotics10091028]
 - 16 **Sharifzadeh S**, Mohammadpour AH, Tavanae A, Elyasi S. Antibacterial antibiotic-induced drug reaction with eosinophilia and systemic symptoms (DRESS) syndrome: a literature review. *Eur J Clin Pharmacol* 2021; **77**: 275-289 [PMID: 33025080 DOI: 10.1007/s00228-020-03005-9]
 - 17 **Matsuno O**. Drug-induced interstitial lung disease: mechanisms and best diagnostic approaches. *Respir Res* 2012; **13**: 39 [PMID: 22651223 DOI: 10.1186/1465-9921-13-39]
 - 18 **Cortez LM**, Pankey GA. Acute pulmonary hypersensitivity to furazolidone. *Am Rev Respir Dis* 1972; **105**: 823-826 [PMID: 5020630 DOI: 10.1164/arrd.1972.105.5.823]
 - 19 **Collins JV**, Thomas AL. Pulmonary reaction to furoxone. *Postgrad Med J* 1973; **49**: 518-520 [PMID: 4793499 DOI: 10.1136/pgmj.49.573.518]
 - 20 **Kowalski TJ**, Henry MJ, Zlabek JA. Furazolidone-induced pulmonary hypersensitivity. *Ann Pharmacother* 2005; **39**: 377-379 [PMID: 15644484 DOI: 10.1345/aph.1E080]



Published by **Baishideng Publishing Group Inc**
7041 Koll Center Parkway, Suite 160, Pleasanton, CA 94566, USA
Telephone: +1-925-3991568
E-mail: bpgoffice@wjgnet.com
Help Desk: <https://www.f6publishing.com/helpdesk>
<https://www.wjgnet.com>

