BMC Infectious Diseases

CASE REPORT Open Access

Sternal wound infection caused by *Mycoplasma hominis* in an adult patient: a case report and literature review

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Abstract

Background *Mycoplasma hominis* is a part of the microflora of the urogenital tract; however, extra-urogenital infections due to *M. hominis* are rare. Herein, we present a case study of a patient who successfully recovered from a sternal wound infection caused by *M. hominis*.

Case presentation We report a case of sternal wound infection caused by *M. hominis* following tricuspid valvuloplasty. The patient developed a severe infection despite postoperative antimicrobial therapy. Wound sample cultures grew pinpoint-sized colonies on blood agar plates, which were identified as *M. hominis* by matrix-assisted laser desorption ionization time-of-flight mass spectrometry (MALDI-TOF MS). Based on the results of the antibiotic susceptibility test, effective infection management was achieved using a combination of moxifloxacin and doxycycline.

Conclusions The potential role of *M. hominis* as a causative agent of postoperative infections after thoracotomy may be underestimated. *M. hominis* should be highly suspected when patients have an indwelling catheter or when perioperative wound samples show numerous leukocytes with no visible bacteria, and are unresponsive to standard empirical treatment for postoperative infections.

Keywords *Mycoplasma hominis*, Postoperative infection, Sternal wound infection, Case report

Background

Mycoplasma hominis is a common commensal of the human oral cavity, respiratory tract, and urogenital tract and often causes urogenital tract infections [1, 2]. *M. hominis* infections outside the urogenital tract are rare; however, to the best of our knowledge, the prevalence of these infections, including bacteremia, septic arthritis, central nervous system infections, and surgical wound infections, has gradually increased in recent years [1, 3–5]. *M. hominis* lacks a cell wall and cannot be identified using Gram staining. Owing to its fastidious nature and stringent growth requirements, *M. hominis* infection can easily be misdiagnosed, leading to prolonged hospitalization, increased treatment costs, and increased

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Fig. 1 Non-hemolytic, semi-translucent pinpoint colonies of *M. hominis* were shown on 5% blood agar after 2 days of anaerobic cultivation

mortality. Therefore, the early identification of clinical manifestations and timely treatment with appropriate antimicrobial therapy are paramount for achieving optimal outcomes.

In this study, we report an unusual case of postoperative sternal wound infection caused by *M. hominis* after thoracotomy. And until now, only 30 cases of such infections have been reported in the English literature. We aimed to increase awareness of such infections and help clinicians effectively identify *M. hominis* infections early to reduce mortality. This is the first report to comprehensively analyze sternal wound infections due to *M. hominis*.

Case presentation

A 64-year-old man with severe tricuspid regurgitation was hospitalized at our institution on June 20, 2023, and underwent thoracotomy and tricuspid valvuloplasty on June 30, 2023, without operative complications. Cefuroxime was administered during surgery as antibiotic prophylaxis. On postoperative day (POD) 3, the patient developed a cough that was productive of sputum, which the cardiovascular surgeon believed was caused by respiratory infection. Therefore, empirical antibiotic treatment with ceftazidime (2.0 g intravenously q12h) was initiated. On POD 7, the patient developed a sudden-onset of sternal wound pain and fever (his temperature was 37.8 °C), and a plain computed tomography indicated increased bronchial inflammation. Furthermore, a small amount of purulent discharge from the wound was observed; therefore, the antibiotic was upgraded to tazobactam/piperacillin (4.5 g intravenously q8h). However, the surgical dressing progressively became wetter close to the xiphoid, and blood and seepage from the wound were observed. Pus from the abscess was submitted for culture on POD 10, and Gram staining of the white secretion from the surgical site did not reveal any visible microorganisms; however, many neutrophil aggregations were observed. The abscess samples were cultured on a Columbia blood agar plate under anaerobic conditions at 36 °C. After two days of anaerobic culture, numerous pinpoint colonies were visible on the Columbia blood agar plate (Fig. 1), which were identified as *M. hominis* colonies by matrix-assisted laser desorption ionization time-of-flight mass spectrometry (MALDI-TOF MS), i.e. Autof ms1000 system (Autobio, China) as instructed by the manufacturer, which identified the isolates as *M. hominis* with a high score value of > 9.000, representing a high score identification. The spectra were analyzed by using the Autof Acquirer V.2.0.245 database. The culture of pus from the abscess did not grow any other bacteria; therefore, antimicrobial therapy was changed from tazobactam/piperacillin to moxifloxacin (0.4 g intravenously qd), which was administered empirically based on clinical guidelines. Next, the discharge from the sternum on POD 12 and 13 was cultured in urea-arginine LYO2 broth, a color change in the broth was observed 24–48 h after the initiation of the culture. Drug susceptibility testing using a commercial kit (broth dilution method, Lizhu, Zhuhai, China) after incubating at 35–37 °C under anaerobic conditions for 48 h, the color change of the detection hole can be judged by visual detection. Yellow is negative, clear and transparent red is positive. The minimal inhibitory concentration (MIC; μg/mL) values of the antibiotic tests are presented in Table 1. The results of antimicrobial susceptibility testing were interpreted based on the Clinical and Laboratory Standard Institute (CLSI) M43-A criteria. However,

Table 1 Minimum inhibitory concentration of the *Mycoplasma hominis* isolate

Antimicrobial agents	MIC(ug/ml)	Qualitative result of drug suseptibility	Antimicrobial agents	MIC(ug/ml)	Qualitative result of drug suseptibility
Ciprofloxacin	>2	R	Clarithromycin	>4	R
Ofloxacin	>4	R	Josamycin	≤2	S
Gatifloxacin	>8	R	Roxithromycin	>4	R
Levofloxacin	>4	R	Doxycycline	≤4	S
Erythromycin	>4	R	Sparfloxacin	>4	R
Azithromycin	>4	R	Minocycline	≤4	S

Notes: MIC, minimal inhibitory concentration

the efficacy of moxifloxacin during treatment remained unsatisfactory. The wound progressed to a deep infection and secreted a large amount of white discharge, and the possibility of mediastinitis could not be ruled out. Therefore, we debrided and sutured the chest wall under general anesthesia on POD 14. *M. hominis* was also cultured from the secretions obtained during debridement. Based on the antimicrobial susceptibility results, the surgeon conducted a multidisciplinary consultation with infectious disease experts, pharmacologists, and microbiologists, who recommended a combination of moxifloxacin (0.4 g intravenously qd) and doxycycline (0.1 g orally q12h). Although the susceptibility results showed that the organism was resistant to most quinolones, moxifloxacin and doxycycline were simultaneously administered because doxycycline therapy alone may be less efficacious, and antibiotic combination therapy is one of the principles for treating pan-resistant bacterial infections. After adjusting the treatment regimen, the patient's clinical symptoms significantly improved. Antimicrobial treatment with moxifloxacin and doxycycline was continued for two weeks. During this period, wound swab cultures were performed on the 24th and 26th days after surgery, and no bacteria were cultured. The patient was discharged on POD 31(July 31). The details of diagnosis and treatment are shown in Fig. 2.

Discussion

We searched PubMed for articles published between January 1, 1950, and December 31, 2023, using the following search terms: "*Mycoplasma hominis*" and "sternal wound infection" or "sternal osteitis" or "mediastinitis" or "empyema" or "pleuritis". Seventeen articles were retrieved and 30 patients with detailed clinical records were identified. Combined with this case, a total of 31 patients with a *M. hominis* infection were selected, including 17 who underwent transplantation, 13 who underwent reconstructive cardiac surgery, and 1 who had not undergone surgery. The mean age of the patients was 53 years (27 males and 4 females). Seven of these patients died at some point following the surgery. Most patients experienced fever and purulent discharge from the incision site after surgery. Almost all patients were immunocompromised because they were administered hormones and immunosuppressants and had underlying conditions and surgical complications. All patients underwent debridement and/or drainage to control sternal infections, mediastinitis, pleuritis, or empyema. Regarding the diagnostic method, culture was performed in all cases. PCR was performed in seven cases, 16 S rDNA was used in four, MALDI-TOF MS was performed in three, and direct immunofluorescence testing was performed in one. Mycoplasma species have also been detected in other parts of the body including the respiratory tract. Simultaneously, some patients harbor other pathogens at their surgical wound

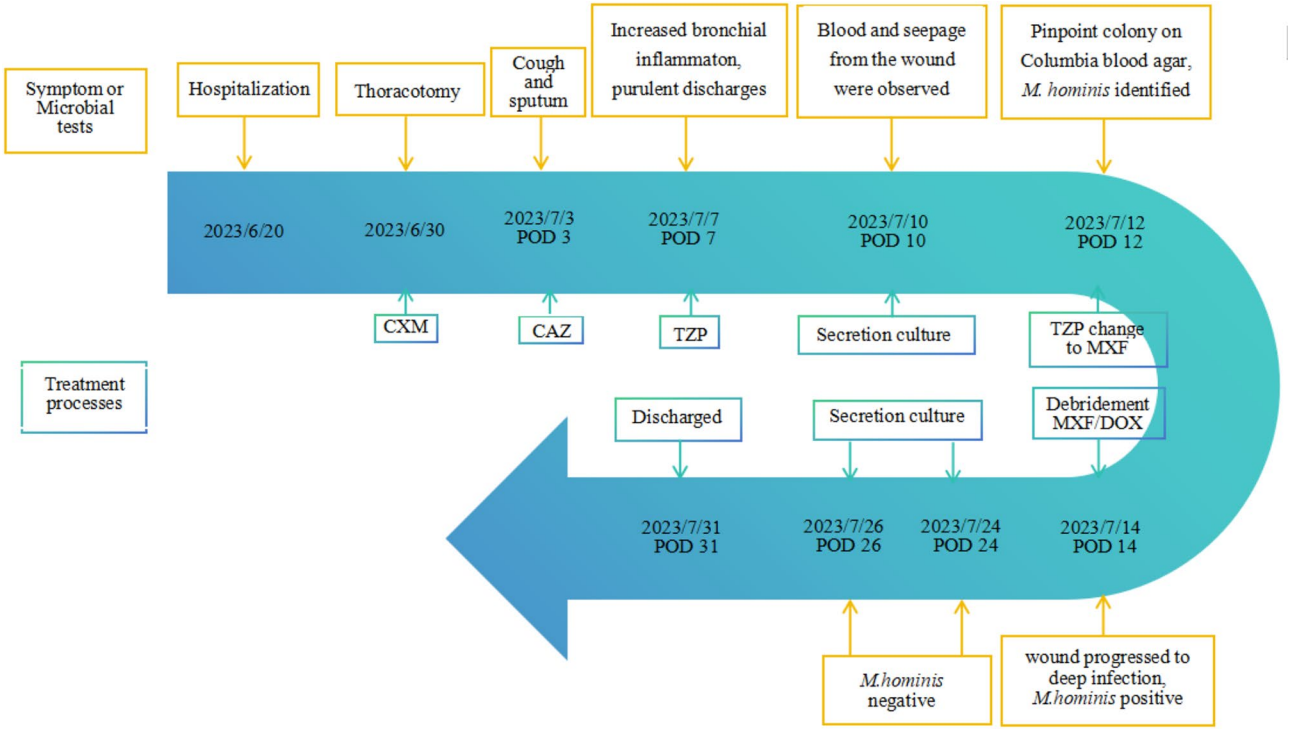

Fig. 2 Timelines of patient's diagnosis and treatment. Abbreviations: CXM, cefuroxime; CAZ, ceftazidime; TZP, tazobactam/piperacillin; MXF, moxifloxacin; DOX, doxycycline

site, including *Ureaplasma spp.* and *Pseudomonas. aeruginosa.* The clinical features of the patients are summarized in Table 2.

The exact source of *M. hominis* infection in sternal wounds remains controversial. In this study, the vast majority of patients infected with *M. hominis* underwent heart-lung transplantation or cardiac surgery, and a significant proportion of these patients were males. We speculate that this phenomenon is associated with immune suppression and invasive procedures, such as urinary catheterization, during the perioperative period, which might increase the risk of *M. hominis* infection of the sternal wounds. For patients who underwent cardiothoracic transplants, it was widely inferred that *M. hominis* infection was predominantly derived from the donor, which was explicitly stated in Cases 10 and 11 [11]. Some articles specified that *M. hominis* infection may occur through direct spread to the mediastinal region after transplantation and could only occur after reconstructive cardiac surgery [13, 14]. Therefore, there must be another transmission mechanism involved in the onset of infection. In this report, the vast majority of patients infected with *M. hominis* were males, and all patients who were infected with *M. hominis* after reconstructive cardiac surgery were male (13/13,100%), which is consistent with the findings of previous studies [13, 23, 24]. Although only six studies explicitly stated that urinary catheterization was performed, all patients had undergone major surgery, such as thoracotomy; therefore, it is reasonable to assume that urinary catheterization was also performed in the other patients. Due to physiological factors, males are more susceptible to trauma from catheterization than females. According to previous studies, *M. hominis* had been identified in 20–40% of midstream urine samples from healthy individuals and secreted an adhesin known as "variable adhesion associated antigen", which enabled the organism to evade the host's immune response by antigenic variation [25, 26]. In the human body, *M. hominis* is associated with mucous membranes, primarily the urogenital tract mucosa, and rarely penetrates the submucosa. However, when the body's immune system is compromised or invasive procedures are performed, *M. hominis* can infiltrate the bloodstream and disseminate to other tissues and organs [26, 27]. Many case series of sternal wound infections in patients who have undergone organ transplantation and those who have not undergone organ transplantation suggested an endogenous origin of *M. hominis* infections [9, 28–30]. Therefore, postoperative *M. hominis* sternal wound infection, mediastinitis, and pleuritis may be related to urinary catheterization, accounting for the higher rates of infection among males. This hypothesis was confirmed in a previous study [23], which showed that the gene sequences of *M. hominis* cultured from wound secretions and urine samples are highly homologous. Additionally, *M. hominis* colonizes the upper respiratory tract in 1-3% of healthy adults [25]. The literature indicates that respiratory tract colonization by *M. hominis* is of comparable significance to urinary tract colonization as a source of pleural cavity infections [31]. Consequently, it is recommended that postoperative screening for *M. hominis* be conducted in both the urinary and respiratory tracts of patients undergoing thoracotomy.

Seven of thirty-one patients (22.5%) died despite aggressive antibiotic therapy in conjunction with surgical debridement and drainage, which highlights the severity of the infection. Due to the lack of specific clinical manifestations, it is difficult to distinguish sternal wound infections caused by *M. hominis* from those caused by bacteria or viruses, which may lead to delayed initiation of antimicrobial therapy with nonhealing of wounds, serious clinical consequences, and even death, as *M. hominis* is not susceptible to most first-line antibiotics used to treat surgical wound infection. As suggested by some authors [32], the delay between the clinical manifestation of the infection and the isolation of the pathogen may account for the high mortality rates observed in this study. *M. hominis* is a potent inducer of epithelial secretion of neutrophil chemokines, including IL-8 and the epithelial-derived neutrophil-activating peptide ENA-78, which results in a significant accumulation of neutrophils near the wound. It commonly manifests as a bacterial infection that necessitates empirical beta-lactam antibiotic therapy. Owing to the lack of cell walls, beta-lactams are not effective against *M. hominis*, further delaying effective treatment of the disease. Antibiotic treatment targeting this microorganism is usually not initiated until *M. hominis* is cultured or detected. Besides, five of the seven patients who died were co-infected with other *Mycoplasmataceae*, the most common being *Ureaplasma spp.*. Some studies have clearly indicated that *Ureaplasma spp.* infection is associated with human hyperammonemia syndrome (HS), which is a life-threatening condition that primarily occurs in patients who have undergone heart–lung transplantation and may cause altered consciousness and brain edema in these patients [11, 33]. The basic principle is that *Ureaplasma spp.* can produce urease to decompose urea, which mainly produces ammonia, thereby increasing the concentration of ammonia in the blood. However, the correlation between *M. hominis* and elevated blood ammonia levels has not been scientifically validated. Additionally, there is a correlation between immune status and blood ammonia concentration, such as immunosuppression, which increases the concentration of blood ammonia, as previously demonstrated in animal studies [11, 33]; this is consistent with the findings in the patients included in this study.

Table 2 Literature reports of mediastinitis, sternal wound infection, pleuritis, empyema caused by *Mycoplasma hominis* (1950-2023)

NO.	Age(y)/sex	SPM	COI	Underlying condition(s)	SU	HU/IU	Clinical manifestation	SI	Diagnosis	Diagnostic method	Antibiotic therapy after Dx	Otc	Ic	Ref
Patients who underwent transplantation														
1	58/M	PF	N	peripheral vascular disease	BLT	Y	fever, dyspnea	Y	pleuritis	culture+MS+16 S rDNA	DOX	cured	ND	[6]
2	18/F	PF	N	monosomy 7, myelodysplasia	BLT	Y	fever, dyspnea	Y	empyema	culture+16 S rDNA	MXF+DA+DOX	cured	ND	[7]
3	55/M	SWD, PF	N	N	OCT	Y	fever, sternal dehiscence	Y	SWI, pleuritis	culture	DOX+CIP	cured	ND	[8]
4	52/M	SWD, PF, SDS	N	respiratory failure	BLT	Y	dyspnea, sternal dehiscence	Y	SWI, pleuritis	culture	DA+CIP+DOX	cured	ND	[8]
5	21/M	SWD, PF, PCF	N	mild chronic renal impairment	OCT	Y	dyspnea, sternal pain	Y	SWI, pleuritis	culture	DA+CIP+DOX	cured	ND	[8]
6	30/F	ST	MSP, Ecl in SP	PH	HLT	Y	fever, cough, sternal dehiscence	Y	SWI	Culture	DOX+DA+GN	died	ND	[9]
7	43/F	SWD, ST	MSP in SP, Pae in SP, SWD	PH	HLT	Y	fever, dyspnea, sternal pain	Y	SWI	Culture	DOX+DA+GN	died	ND	[9]
8	63/M	PF	N	dilated cardiomyopathy	OCT	Y	fever	Y	mediastinitis	Culture	DOX+DA	cured	ND	[10]
9	48/M	PF	US in PF	heart failure	HLT	Y	fever, sternal dehiscence	Y	mediastinitis, empyema	Culture	DOX+DA+E	cured	ND	[10]
10	65/M	PF, BALF, blood	US in blood, PF, BALF	N	BLT	Y	drowsy	Y	pleuritis	culture+PCR	MXF+AZM+MH	died	ND	[11]
11	63/M	PF, ST, PT, SP, blood	US in blood, SP, PF, ST, PT	N	OCT	Y	decreased consciousness, hallucinations	Y	SWI, pleuritis	culture+PCR	MXF+MH	died	ND	[11]
12	44/M	SDS	N	PH	OCT	Y	sternal dehiscence	Y	SWI	culture	DOX+CIP	cured	ND	[12]
13	69/M	PF	N	IPF	OCT	Y	dyspnea	Y	pleuritis	culture	LEV	cured	ND	[12]
14	41/F	PCF, PT, BALF	N	PH	OCT	Y	dyspnea, cough, shock	Y	mediastinitis	culture	DOX+DA	cured	ND	[12]
15	64/M	PF	N	IPF	OCT	Y	dyspnea	Y	pleuritis	culture+PCR	LEV+DOX	cured	ND	[12]
16	64/M	PF, SDS	N	COPD	OCT	Y	fever	Y	pleuritis	culture+PCR	DOX	cured	ND	[12]
17	70/M	PF	N	IPF	OCT	Y	dyspnea	Y	Pleuritis	culture+PCR	DOX	cured	ND	[12]
Patients who underwent reconstructive cardiac surgery														
18	37/M	SWD	Eco in SP	hypertension	AR	N	fever	Y	mediastinitis, sternal osteitis	culture+16 S rDNA	LEV	cured	ND	[13]
19	55/M	SWD, PF, PCF, AG	N	hypertension	AR	N	fever	Y	mediastinitis	culture+PCR	DOX+MXF	cured	ND	[14]

Table 2 (continued)

NO.	Age(y)/sex	SPM	COI	Underlying condition(s)	SU	HU/IU	Clinical manifestation	SI	Diagnosis	Diagnostic method	Antibiotic therapy after Dx	Otc	Ic	Ref
20	46/M	PV	N	heart failure	VR	N	fever	Y	mediastinitis	culture	VAN+AK	died	ND	[15]
21	63/M	SWD, PF	US in PF	hypertension, DM, ischemic heart disease	CB	N	fever, sternal pain	Y	SWI	culture	DA+GN+DOX	cured	UT	[16]
22	46/M	SWD	N	CHD	CVG	N	fever, sternal pain	Y	SWI	culture	TE	cured	UT	[17]
23	56/M	SWD	Hin in SP	N	VR	N	fever, sternal pain	Y	SWI, mediastinitis	culture	TE+E+DOX	cured	UT	[17]
24	64/M	SWD, PF	N	N	CB	N	fever, loin pain	Y	SWI	culture+DIT	CTX+GE+VAN	died	UT	[18]
25	48/M	SWD, PF, MD	N	unstable angina	VR	N	fever	Y	SWI	culture	DOX+DA+TOB	cured	ND	[9]
26	77/M	SWD, PF, MD, PCF	US in SWD, PF, MD, PCF	hypertension, COPD	VR	N	fever, sternal dehiscence, disorientation	Y	mediastinitis, pleuritis, pericarditis	culture+16S rDNA	DOX+DA	died	UT	[19]
27	54/M	SWD	N	Ménierè syndrome	VR	N	fever, sternal pain, cardiopulmonary arrest	Y	mediastinitis	culture+MS+PCR	LEV+MH	cured	ND	[20]
28	62/M	SWD	N	CHD	CABG	N	fever, sternal pain	Y	SWI, mediastinitis	culture	DOX	cured	ND	[10]
29	56/M	SWD	N	acute type A aortic dissection	AR	N	fever	Y	SWI, mediastinitis	culture	DOX	cured	ND	[21]
30	64/M	SWD	N	N	TV	N	fever, sternal pain	Y	SWI	culture+MS	DOX+MXF	cured	UT	PS
Patients who did not undergo previous surgery														
31	59/M	MD	SBH in pus	tonsillar abscess	N	N	fever, unconscious	Y	mediastinitis	culture+MS	DOX	cured	ND	[22]

Notes: y, years; M, male; F, famale; N, none; SPM, specimen(s) positive for *M. hominis;* COI, concurrent organism(s) and/or infection(s); SU, surgery; HU/IU, hormone/immunosuppressor use; SI, surgical intervention; Dx, diagnosis; Otc, Outcome; Ic, Indwelling catheter; Ref, references; PF, pleural fluid; SWD, sternal wound discharge; SP, sputum; SDS, surgical debridement specimens; PCF, pericardial fluid; ST, sternal tissue; MD, mediastinal discharge; BALF, bronchoalveolar lavage fluid; PT, pericardial tissue; AG, aortic graft; PV, prosthetic valve; MSP, *Mycoplasma* species; Ecl, *Enterobacter. Cloacae*; Pae, *Pseudomonas. Aeruginos*; US, *Ureaplasma spp*.; Eco, *Escherichia*. *Coli*; Hin, *Haemophilus*. *Influenzae*; SBH, Streptococcus beta-haemolyticus; PH, pulmonary hypertension; IPF, idiopathic pulmonary fibrosis; COPD, chronic obstructive pulmonary disease; DM, diabetes mellitus; CHD, coronary heart disease; BLT, bilateral lung transplantation; HLT, heart–lung transplantation; OCT, orthotopic cardiac transplantation; AR, aorta replacement; VR, valve replacement; CB, coronary bypass; CVG, coronary vein grafting; CABG, coronary artery bypass grafting surgery; TV, tricuspid valvuloplasty; Y, yes; SWI, sternal wound infection; MS, matrix-assisted laser desorption ionization time-of-flight mass spectrometry; DIT, direct immunofluorescence testing; DOX, doxycycline; LEV, levofloxacin; MH, minocycline; MXF, moxifloxacine; DA, clindamycin; CIP, ciprofloxacin; GN, gentamicin; E, erythromycin; AZM, azithromycin; VAN, vancomycin; AK, amikacin; TOB, tobramycin; TE, tetracycline; CTX, cefotaxime; ND, No described; UT, Urinary tract; PS, present study

To date, diagnosing *M. hominis* infection using conventional techniques remains challenging because of the lack of cell walls; this renders Gram staining ineffective, leading to underestimation of this pathogen. Mycoplasma requires special nutrients for growth, such as nucleic acid precursors and serum. However, *M. hominis* is the only mycoplasma that can be grown routinely on blood agar plates. Under appropriate conditions, tiny colonies of *M. hominis* can appear on blood agar medium for 2–7 days [6, 34]. In all cases included in this study, *M. hominis* was cultured using this conventional culture method; therefore, a prolonged incubation period of at least one week may improve the diagnosis of *M. hominis* infection. Molecular methods, such as conventional PCR and 16 S rDNA sequencing, have been developed to increase detection sensitivity; however, they are only available in specialized laboratories. Eventually, some experts identified a new arenavirus from transplant patients using metagenomics in 2008, which was the first study to apply metagenomics Next Generation Sequencing (mNGS) to identify pathogenic microbial organisms [35]. Compared with conventional PCR and 16 S rDNA sequencing, mNGS can identify particularly rare, co-infected, or difficult-to-detect pathogens and detect multiple microorganisms, but this method is tedious and time-consuming. In addition, MALDI-TOF MS has proven to be very useful for rapid identification of *M. hominis* [6, 7, 13, 19, 20, 22], and it is easy to perform. In our case, a score of 9.556 was achieved after two days of incubation on a blood agar plate, supporting this perspective. Overall, the confirmation of *M. hominis* demonstrates the feasibility of MALDI-TOF MS for rapid identification of *M. hominis*. Thus, we recommend the use of MALDI-TOF MS as a routine method for the rapid identification of this pathogen once colonies are isolated.

Cefazolin or cefuroxime, which are typical beta-lactam antibiotics, have no effect on *M. hominis* because they disrupt cell wall metabolism and are typically used for antimicrobial prophylaxis during cardiac surgery. In the present case, moxifloxacin was empirically administered after *M. hominis* was cultured, but the efficacy of the antibiotic therapy was limited. However, there was no direct evidence of moxifloxacin resistance, although the susceptibility results showed that the organism was resistant to most quinolones, including levofloxacin, ciprofloxacin, ofloxacin, gatifloxacin. A previous meta-analysis [36] showed that the proportions of ciprofloxacin, ofloxacin, and moxifloxacin resistance in *M. hominis* isolates were reported 59.8%, 31.2%, and 7.3%, respectively, and recommended that moxifloxacin as the first-line drug for the treatment of *M. hominis.* Other study [37] had clearly indicated that the *M. hominis* strain was ciprofoxacin resistant, but susceptible to moxifoxacin. Consequently, the combination of moxifloxacin and doxycycline was still chosen in this case. In addition, the patient also underwent drainage and debridement, which is consistent with treatments employed in previous studies [38]. Some studies even recommended that similar invasive procedures should be considered a promising treatment option and should be performed promptly [39]. Some previous studies have shown that quinolone antibiotics like levofloxacin and moxifloxacin are often effective against *M. hominis*, but progressive resistance has been observed due to gene mutations [40]. Therefore, conducting drug sensitivity tests for *M. hominis* is crucial. Due to the intrinsic resistance to several conventional antimicrobials, the treatment of *M. hominis* infections is constrained to 16-membered macrolides, quinolones, and tetracyclines, which can prevent DNA replication and protein synthesis. In this study, antibiotic susceptibility testing showed that the *M. hominis* isolates were susceptible to josamycin, doxycycline, and minocycline but were resistant to erythromycin, azithromycin, clarithromycin, roxithromycin, ciprofloxacin, ofloxacin, gatifloxacin, and sparfloxacin. For macrolides resistance, the intrinsic resistance of *M. hominis* to 14- and 15-membered macrolides was highly related to the G2057A transition in the 23 S rRNA gene sequence, resulting in interference with the proper binding of macrolides via steric hindrance [41, 42]. For quinolones resistance, *M. hominis* harbored substitutions in the proteins GyrA (S153L), ParC (S91I) and ParE (V417I) conferring possibly resistance to quinolones, such as S153L in *M. hominis* mutation in the side chains occupied the quinolone-binding pocket of the levoffoxacin C-3 carboxylic acid, causing disruption in the effective binding of quinolones via steric hindrance [40, 43–47]. It is known that different quinolones have different preferential targets, a previous study [48] showed that GyrA S153L substitutions were found in all *M. hominis* strains that were resistant to moxifloxacin and gatifloxacin, but not in those sensitive to moxifloxacin and gatifloxacin; gene mutations in ParC were detected in all strains resistant to ciprofloxacin and levoffoxacin, irrespective of whether moxifloxacin and gatifloxacin were resistant. This suggested that moxifloxacin and gatifloxacin targeted primarily DNA gyrase but that ciprofloxacin and levoffoxacin primarily targeted topoisomerase IV. Therefore, we assumed that the *M. hominis* isolate in this study was highly resistant to moxifloxacin, resulting in a poor response to treatment. To date, there is no consensus regarding the treatment of *M. hominis* infections. The literature review briefly identified this problem, with tetracycline being used in some studies and quinolones, or both, being used in others. Therefore, antibiotic susceptibility testing to identify the appropriate antimicrobial agents for treating *M. hominis* infections should be performed before antibiotic therapy.

Conclusions

In summary, our findings showed that *M. hominis* infection outside the reproductive system may be associated with urinary catheterization as well as an increased mortality rate. *M. hominis* infection should be highly suspected if the patients have an indwelling catheter and the perioperative wound samples show numerous leukocytes with no visible bacteria. Improving our understanding of *M. hominis*, including its growth characteristics, detection methods, and treatment options is crucial.

Abbreviations

POD	Postoperative day
MALDI	TOF MS-Matrix-assisted laser desorption ionization time-of-flight mass spectrometry
CLSI	Clinical and Laboratory Standard Institute; PCR: Polymerase chain reaction
HS	Hyperammonemia syndrome
mNGS	metagenomics Next Generation Sequencing

Supplementary Information

The online version contains supplementary material available at https://doi.org/10.1186/s12879-025-10607-0.

Supplementary Material 1

Acknowledgements

We thank Dr. Menglan Zhou from the Department of Clinical Laboratory, Peking Union Medical College Hospital, Chinese Academy of Medical Sciences, Beijing, China for the revision of this paper. And We thank Dr. Heng Xi from the Department of pharmacy, the Third People's Hospital of Chengdu, the Affiliated Hospital of Southwest Jiaotong University, Chengdu, Sichuan, China for guidance on medication.

Author contributions

SL and LY conceived and designed the experiments. SL, LY, XF and LY collected the information about the case, contributed to the acquisition, analysis and interpretation of data. SL, YG, LY and KL wrote and revised the manuscript. All authors read and approved the final manuscript.

Funding

Not applicable.

Data availability

All data generated and analysed during this study are included in this published article.

Declarations

Ethics approval and consent to participate

The study was approved by the Third People's Hospital of Chengdu, the Affiliated Hospital of Southwest Jiaotong University Institutional Review Board, and the Biomedical Ethics Committee, Chengdu, China (2024-S-90). Written informed consent was obtained from the patient.

Consent for publication

Written informed consent was obtained from the patient for publication of this Case report. A copy of the written consent is available for review by the Editor of this journal.

Competing interests

The authors declare no competing interests.

Received: 8 August 2024 / Accepted: 6 February 2025
Published online: 13 February 2025

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