Case report/narrative review.

Raoultella planticola an emerging pathogen?

Case report and literature review

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ABSTRACT

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Raoultella planticola is a Gram-negative, oxidase-negative, aerobic that belongs to Enterobacteriaceae family and has a lot of similarities with *Klebsiella spp.* Though initially rare mentioned as an opportunistic infection, more and more reports are published. In the present article we present a case of an *R. planticolla* upper respiratory infection and we review the relevant literature.

Keywords: Raoultella planticola

INTRODUCTION

Raoultella planticola is a Gram-negative, oxidase-negative, aerobic, nonmotile, encapsulated rod commonly found in water, soil, and aquatic environments and belongs to the genus Raoultella, the family Enterobacteriaceae. Due to similarities to Klebsiella spp, Rooultella spp.

was established in 2001. The species now includes Raoultella planticola, Raoultella ornithinolytica, Raoultella terrigena, Raoultella electrica[1]. Though initially considered as a rare cause of infections in humans, today it is mentioned as an emerging pathogen. In the present article we present a case of an R. planticolla upper respiratory infection and we review the relevant literature.

CASE REPORT

A 58-year-old male patient was referred to our hospital by his doctor for sweatings, fever (upto 38.4^{o}C), fatigue, appetite and weight loss and intermittent constrictive neck pain. The symptomatology was already ongoing for a month and the out-of-hospital investigation was inconclusive. Recent history excluded SARS-CoV2 infection, any animals contacts, travelling abroad, or any chemicals exposure. Previous history included arterial hypertension under perindopril arginine / amlodipine 5+5mg q.d. p.os, idiopathic thrombocythemia under acetylsalicylic acid 100 mg q.d. p.os, hyperuricemia under allopurinol 300mg p.d. p.os and nebivolol 2.5mg q.d. p.os, ulcerative colitis for the last 12 years , yet free-of symptoms for the last 5 year, smoking 30 packs/year (stopped in 2005), alcohol use (5 drinks/ week till 2001), p.os; no allergies, and amputation of left lower limb after post traumatic osteomyelitis at the age of 20. On admission clinical examination, no major abnormities were noted (BP- 150/80 mmHg, HR-86 bpm, SpO_2 – 96% on room air with no dyspnoea or tachypnoea, temp- 36.9^{o}C). Blood and uring cultures for microbiological screening turn out negative. The patient remained in the hospital for 8 days with a steadily improving clinical status and mild tempeture (up to 37.3^{o}C). During his hospitalisation, due to abnormal laboratory examination (Table 1), extensive imagining and labooratory investigation was carried out; yet, with norelated findings: Cyst in the base of the tongue, overriding arytenoids of small clininical importance, left eye cataract, nasal diaphragm scoliosis, paranasal sinuses mucosal thickening, mild carotid disease, several (3) small benign thyroid nodules, non-specific <5mm nodules in upper lung lobes, small (8 mm) liver hemangioma (section VII), cholelithiasis, Splenomegalia 13.2 cm , Splenule 2 cm and signs of previous inflammation of greater omentum.

Thus, the patient was discharged from hospital in improved clinical status. However, 4 days later, he again returned to the hospital mentioning again fever (up to 38^{o}C) with no other complaints, yet with abnormal lab results. Further investigation with repeated blood and uringe cultures, bone marrow, gastric and colon biospies and positron emitting tomography imaging; yet sputum cultures following antibiogram identified a multisensitive *Raoultella planticola* as possible cause of his condition.). Moxifloxacin 400 mg i.v. q.d. was started empirically and he was discharged from hospital 13 days later

without any sequels; apart from his previous drug regiment and therapy for *Hellicobacter pylori* gastritis found via gastric biopsy.

Table 1. Selected lab values course on the first 4 days of investigation (only abnormal values are displayed).

ESR	CRP	γ-GT	IL-6	Ferritin	suPAR	WBC	Neu	Leu	PCT
	mg/dl	U/l	pg/ml	ng/ml	ng/ml	K/μL	%	%	ng/ml
165	17.2	100	35.4	874.8	4.6	15.35	85	8.4	0.64
β2-mgl	**AAT**	**Fib**	**D-dim**	**CA 19-9**	**Alb***	**α1***	**α2***	**γ***	**APCA**
mg/dl	**mg/dl**	**mg/dl**	**ng/ml**	**U/l**	**%**	**%**	**%**	**%**	
1.4	27	992	618	29.2	42.4	9.5	23.2	11,9	positive

*ESR- erythrocytes sedimentation rate, CRP-creatine reactive protein, γ-GT- gamma glutaril transpherase, IL-interleukin, suPAR- soluble urokinase plasminogen activator receptor, WBC- white blood cells, Neu- neurophils, leu- leucocytes, PCT- procalcitonin, mgl- macroglobulin, AAT- a1 antithrypsin, Fib-fibrinogen, D-dim – D-dimers, CA- cancer antigen, Alb- albumin, * Serum protein electrophoresis resultas, APCA-anti-parital cell antibodies.*

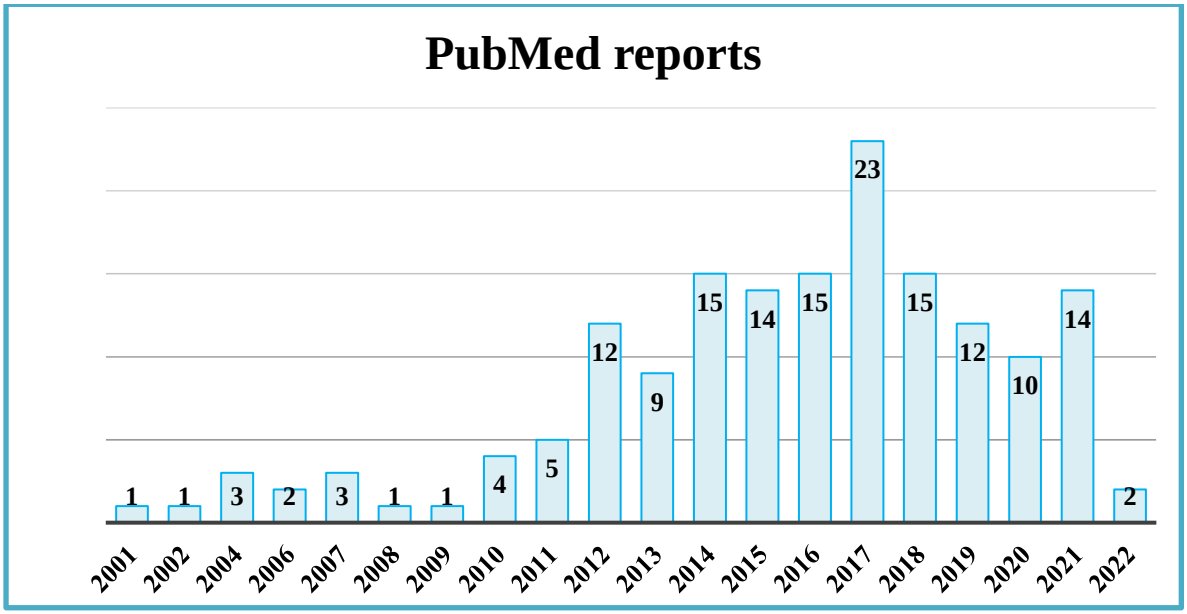
DISCUSSION

Though before 2006, the publications of human *R. planticola* infection were rare, after that year the report about that pathogen is steadily increasing (Graph 1.) Due to similarities with *Klebsiella spp.*, microbiological diagnosis may be difficults[3]. Thus, one may argue the small number of the reports before 2006 with the diagnostic methods (e.g. the broad introduction of matrix-assisted laser desorption ionization–time of flight mass spectrometry (MALDI-TOF MS), which is considered as the best diagnostic method for *Raoultella spp.*)[3-5]. In our patient Vitek 2 system was used for microbiological identification.

Sixty-seven (67) out of the 144 publications on the subject are about infection on humans. Most of them (42) are case reports and only 12 regards paediatric population. In total the literature mention 309 cases. Raoultella planticola and Raoultella ornithinolytica are the most frequently encountered human pathogens[3]. The reservoir of Raoultella seems to be gastrointestinal tract and upper respiratory tract. Yet, the majority (127) of reported cases are urinary tract infections, while respiratory (mostly pneumonia) and abdominal infections (appendicitis, cholangitis, cholecystitis, pancreatitis, liver absess) are following. However other loca-

tions are also mentioned (endocarditis, arthritis, conjunctivitis, cellulitis, prostatitis, mastitis), and severe (peritonitis, bacteremia sepsis) and fatal cases can arise[3-6]. Since most of the infections are related to immunocompromised patients (malignancy, diabetes mellitus) or patients with multiple co-morbidities, *R. planticola* is considered an opportunistic pathogen. Raoultella spp. are intrinsically resistant to penicillins, due to the expression of a broad-spectrum β-lactamase[3]. Yet, resistant strains such as AmpC β-lactamases, extended spectrum beta-lactamase (ESBL) or carbapenemase producing started to emerge. Unfortunately, the available literature on the subject in limited. Quinolones, aminoglycosides, tetracyclines, fosfomycin, nitrofurantoin, and polymyxins are some of the antibiotics recorded in the published reports. In our case, a multisensitive *R.planticola* was identified; thus antibiotic therapy with moxifloxacin was effective in eradicating it.

Graph 1. Returning resutls on National Medical Library PubMed ® Database on MeSH term "Raoultella planticola" (search 25/01/2022)[2].



CONCLUSION

R. planticola is mainly reported as opportunistic infection.Yet, resistant to antibiotic strains could also be found. Thus, thorough investigation is needed whenever this pathogen is identified, so as to exclude possible undiagnosed co-morbidities (malingnancy) and to assure that proper antibiotic therapy is given.

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The authors declare that they have no competing interests.

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