

Infectious Diarrhoea with SIRS from *Yokenella regensburgei*

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Background

Yokenella regensburgei is an opportunistic human pathogen, a gram-negative, oxidase negative, motile rod, fermentative bacterium whose infections are rarely reported in humans [1]. Only 6 cases have been previously reported regarding septic knee [2], urinary tract infection [3], transient bacteraemia [2], perimalleolar ulcer [4], cellulitis [5], septic shock [6] and enteric fever [7] similar to the present case.

It belongs to the family *Enterobacteriaceae* [8] and it is biochemically similar to the bacterium *Hafnia Alvei* with their difference being that *H. alvei* is resistant to colistin and VP negative whereas *Y. regensburgei* has the opposite characteristics [9]. The National Institutes of Health in Japan identified it as NIH biogroup 9 and the Centers of Disease Control and Prevention as enteric group 45, proposing the name *Koserella trabulsii*. The name *Yokenella regensburgei* proposed by Kosako et al. finally prevailed over *K. trabulsii* [1,2]. The bacterium has been isolated from intestinal tracks of insects and reptiles, well water and salad [7] as well as from many human anatomical sites including blood [6], faecal samples, upper respiratory tract, urine [2,3] and knee fluid [9,10]. The small number of the cases reported with *Y. regensburgei* as a pathogen is responsible for the shortage of epidemiological and clinical information.

Here we present a case from *Y. regensburgei* which is to our current knowledge the first case reported in Greece.

Case Report

A 17-year old male was transported to General Hospital of Messolonghi from the community Health Centre of Astakos with 6-7 daily episodes of diarrhea, fever up to 39.8°C and chills. The patient reported that these symptoms emerged three days before his arrival to the Health Centre of Astakos, three hours after physical exercise and that the fever would not subside with the consumption of paracetamol and mefenamic acid. He arrived to General Hospital of Messolonghi on the fourth day of the symptoms.

Physical examination with deep palpation of abdomen showed sensitivity in the entire abdominal wall and increased bowel sounds. A systemic examination revealed nothing of note. Patient's medical history showed only cefuroxime allergy. His vital signs were: blood pressure 135/60 mm/Hg, pulse rate 105/min, SO₂ 98%, body temperature 39.0°C. Upper and lower abdominal sonography results were normal. Laboratory examination showed leukocytosis (WBC 13270/mm³), neutrophilia (76.7%, normal range 40% to 74%), absolute neutrophil count 10180/mm³, lymphocytes 11.8% (19% to 48%), monocytes 7% (3.4% to 9%), eosinophils 1.5% (0% to 7%), increased c-reactive protein (CRP) 18.76 mg/dl (0 mg/dl to 0.8 mg/dl), hemoglobin 14.2 mg dl⁻¹ and MCV 78.5 fL. The rest of the biochemical test results were normal. Widal test for typhoid and Wrght tests were negative. Blood smear examination showed neutrophils with toxic granulation and WBC differential showed band neutrophils 12%, neutrophils 67%, lymphocytes 12%, monocytes 7%, eosinophils 2%. General stool examination showed a large amount of white blood cells, erythrocytes and mucous. Parasitological examinations' results were negative.

Two stool culture samples were prepared in two days and after a 48-hour incubation, bacteria growth was observed on SS agar in both samples. This bacterium was non lactose fermenting with opaque colony morphology unlike the transparent colonies of shigella. Biochemical testing of the microorganism showed that the bacterium was weakly positive for catalase and negative for oxidase, urease, indole and H₂S. The identification testings were performed by VITEK 2 Compact automated system (Bio Merieux, France) and identified the bacterium as *Yokenella regensburgei*. Biochemical tests of Vitek-2 are presented in Table 1.

The stool cultures were negative for the following *Enteropathogens*: *Salmonella*, *Shigella*, *Campylobacter*, *Enterohemorrhagic E. coli*, *Y. enterocolitica*.

Antimicrobial susceptibility test was performed using Disk diffusion: Mueller-Hinton agar (MHA) method according to the clinical and laboratory standards institute (CLSI) guidelines (Zone Diameter and minimal inhibitory concentration (MIC) Interpretive Standards for *Enterobacteriaceae*) [11]. The microorganism was resistant to ampicillin and colistin, intermediate to amoxicillin/clavulanic acid and sensitive to Cefotaxime, Amikacin, Gentamicin, Cefuroxime, Cefixime, Ciprofloxacin, Imipenem, Meropenem, Aztreonam and Trimethoprim/Sulfamethoxazole.

The patient received treatment with cefixime and his symptoms were resolved. After 3 days of hospitalization he was dismissed and continued the treatment with cefixime for six more days and was recommended a follow up 10 days after the end of the treatment. Clinical examination showed no evidence of relapse.

Conclusion

The track of the pathogen transmission remains unclear [6,7]. The patient of this case reported that three hours before the emerge of the symptoms (abdominal pain and diarrhea) he had returned home after his sport activity, boiled an egg and consumed it. There appears no correlation between this incident and the other cases reported [2-7]. Although in five of the six previous cases the patients were immune suppressed (alcohol consumption, adenocarcinoma, chronic renal failure, diabetes mellitus and use of steroids were reported) [2-6], the patient of the present case had no such medical history and seemed to be immunocompetent. The previous cases involved patients of an older

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Biochemical Details																	
2	APPA	-	3	ADO	-	4	PyrA	-	5	IARL	-	7	dCEL	-	9	BGAL	+
10	H2S	-	11	BNAG	+	12	AGLTp	-	13	dGLU	+	14	GGT	-	15	OFF	+
17	BGLU	+	18	dMAL	+	19	dMAN	+	20	dMNE	+	21	BXYL	-	22	BAlap	-
23	ProA	-	26	LIP	-	27	PLE	-	29	TyrA	+	31	URE	-	32	dSOR	-
33	SAC	-	34	dTAG	-	35	dTRE	+	36	CIT	-	37	MNT	-	39	5KG	-
40	ILATk	+	41	AGLU	-	42	SUCT	+	43	NAGA	-	44	AGAL	+	45	PHOS	+
46	GlyA	-	47	ODC	+	48	LDC	+	53	IHISa	-	56	CMT	+	58	O129R	+
59	GGAA	-	61	IMLTa	-	62	ELLM	-	64	ILATa	-						

Table 1: Biochemical test results of Vitek-2 Compact automated system for *Y. regensburgei*.

age [2-6]. Only one case has been reported of a young person (aged 5) who was immunocompetent previous to the present [7].

The patient met the SIRS (Systemic Inflammatory Response Syndrome) criteria which involve two or more of the following: body temperature over 38°C or under 36°C, pulse rate over 90/min, respiratory rate over 20 breaths/min or PaCO₂ under 32 mmHg, WBC over 12000 or less than 4000 mm³ [12]. The patient showed body temperature 39.8°C, pulse rate 105/min and WBC 13270 mm³.

Yokenella regensburgei is a potentially dangerous pathogen that has been rarely isolated by humans [7]. It is highly possible that some cases of *Y. regensburgei* have not been identified, as the stool culture results show opaque colony morphology on SS agar, which does not indicate a common enteropathogen colony and therefore we do not continue to the identification process.

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