

A case of hyperuricemia in the ICU

HOSP #		WARD	Surgical ICU
CONSULTANT	Heleen Vreede / George van der Watt	DOB/AGE	30 year Male

Abnormal Result

The result upon the query being raised by the reviewer was a uric acid of 0.95 mmol/L (0.21-0.43 mmol/L). Three days prior to this result, the patient had a uric acid serum concentration of 0.38 mmol/L.

Presenting Complaint

The patient presented to the hospital with a history of a swollen tonsil unilaterally. This worsened over few days to a severe infection (sepsis) as described below.

History

No significant history. Patient reported sober habits.

Examination

At initial presentation, the patient appeared to have a suppurative tonsillitis. The tonsillitis later developed into a retropharyngeal abscess and soon extended into the thorax, forming a pericardial abscess, which is what was found clinically at the time of admission to Groote Schuur Hospital.

Laboratory Investigations

Date: newest to oldest (only chemistry results included)

Test Set	Test Item	12/01/2019 04:53	11/01/2019 04:18	10/01/2019 04:40	09/01/2019 08:21	09/01/2019 06:57	08/01/2019 05:15	07/01/2019 04:18	06/01/2019 06:11	05/01/2019 15:45
Test Set	Test Item									
NA	Na				δ+ 145				δ+ 140	131 L
K	K				4, 6				4, 1	INVH
CL	Cl				δ+ 106				98	
UREA	Urea	25,7 H	23,5 H	31,3 H	δ+ 33,3 H	31,6 H	18,4 H	20,7 H	25,1 H	22.0 H
CRT	Creat	172 H	δ- 166 H	307 H	δ+ 396 H	324 H	87	δ- 110 H	198 H	194 H
CRT	MDRD	41	42	21	16	20	>60	>60	35	35
CA	Ca				δ- 1,72 L			δ+ 2,18	1,95 L	
MG	Mg	δ- 0.79	δ- 0.96	1,26 H	1,28 H	1,19 H		δ+ 1,26 H	0.80	
PO4	Phos	δ- 0.69 L	1,83 H	δ+ 1,67 H	0.83	0.70 L		δ- 1,07	2,79 H	
UA	Uric acid				δ+ 0.95 H				0.38	
TP	total prot		CEGK		CEGK				61	
ALB	Alb		δ+ 16 L		δ- 14 L				26 L	
TBIL	total bili		22 H		29 H				32 H	
CBIL	Conj bili		22 H		29 H				30 H	
ALT	ALT		48 H		49 H				81 H	
AST	AST		130 H		183 H				223 H	
ALP	ALP		δ+ 129 H		73				68	
GGT	GGT		103 H		136 H				117 H	
LD	LD				415 H				390 H	

Other Investigations

CT scan: images to follow

Final Diagnosis

Retropharyngeal abscess progressing to a thoracic abscess and causing overt signs and symptoms of heart failure.

Patient required a thoracotomy and pericardial drainage of the abscess.

Take Home Messages

- Do not take tonsillitis lightly. If not adequately managed, it may cause serious complications.
- Elevated Uric acid is a risk factor for acute kidney injury. This may be by means of acute gouty crystal

deposition, but other crystal-independent roles has also been described.

- Uric acid concentration will rise significantly in severe infection, most likely due to the fast tempo of tissue or DNA turnover, both by bacteria and host tissue breakdown and repair. Uric acid is a product of the metabolic breakdown of purine nucleotides.
- Uric acid, being a heterocyclic compound, I thought could interfere in various assays, and I thought even in the Jaffe reaction for creatinine, but it doesn't seem to be a common interferent when doing a quick literature search.
- Uric acid appears to be the major anti-oxidant in human serum constituting around 61% of total anti-oxidant activity, evidenced by [Maxwell](#) et al.:

Table 2. Comparison of antioxidant status in patients with IDDM and NIDDM uncomplicated by microvascular or macrovascular disease and groups of age-matched non-diabetic control subjects

	IDDM	Control	NIDDM	Control
AOA ($\mu\text{mol L}^{-1}$)	320.2 $\pm$ 11.3***	427.5 $\pm$ 19.2	433.8 $\pm$ 25.4	473.9 $\pm$ 30.2
Urate ($\mu\text{mol L}^{-1}$)	209.4 $\pm$ 10.4***	297.1 $\pm$ 16.7	299.5 $\pm$ 19.4	324.8 $\pm$ 21.4
Vitamin C ($\mu\text{mol L}^{-1}$)	63.6 $\pm$ 6.0**	87.5 $\pm$ 4.9	38.6 $\pm$ 5.7*	58.5 $\pm$ 5.3
Vitamin E				
Absolute ($\mu\text{mol L}^{-1}$)	25.2 $\pm$ 1.4	27.5 $\pm$ 1.4	32.0 $\pm$ 1.8	33.3 $\pm$ 3.3
Corrected	5.21 $\pm$ 0.25	5.79 $\pm$ 0.16	5.29 $\pm$ 0.23	5.44 $\pm$ 0.37
Vitamin A ($\mu\text{mol L}^{-1}$)	1.30 $\pm$ 0.05***	1.94 $\pm$ 0.10	2.23 $\pm$ 0.14	2.23 $\pm$ 0.18
Thiols ($\mu\text{mol L}^{-1}$)	458.9 $\pm$ 8.0**	499.6 $\pm$ 8.7	457.9 $\pm$ 7.4*	424.0 $\pm$ 15.2
Bilirubin ($\mu\text{mol L}^{-1}$)	8.7 $\pm$ 0.9	9.7 $\pm$ 0.7	7.5 $\pm$ 0.6	7.4 $\pm$ 0.5

All values are means $\pm$ SE. Antioxidant activity (AOA) is measured in $\mu\text{mol L}^{-1}$ trolox equivalents.

Corrected vitamin E values are absolute concentration ($\mu\text{mol L}^{-1}$) divided by cholesterol (mmol L^{-1}).

Significant differences between the diabetic patients and their respective control groups are indicated by * $P < 0.05$, ** $P < 0.01$ and *** $P < 0.001$.

- Relative contribution to total serum anti-oxidant activity in this study was: urate 65.1%, vitamin C 8.7%, vitamin E 10.6%, vitamin A 5.7%, thiols 7.8% (as in albumin) and bilirubin 1.9%.
- One immediately thinks that a patient with such a rapidly progressing infection has to be immunocompromised, the most common cause(s) in South Africa being HIV or diabetes mellitus. This patient however was HIV negative, according to HIV ELISA and did

not have reported signs and symptoms of diabetes.