

## **Myxoedema coma in adults: Experience from a tertiary referral hospital intensive care unit**

### **INTRODUCTION**

Myxoedema coma is an uncommon, life-threatening form of long-standing, neglected hypothyroidism.<sup>[1]</sup> It is 3–10 times more common in women.<sup>[2]</sup> It commonly occurs in elderly with a peak incidence in the seventh decade.<sup>[3]</sup> We considered persistent surface body temperature of less than 96°F (>3 readings in spite of rewarming efforts) as hypothermia (considering the tropical climate in India.<sup>[4]</sup> Most common precipitants include exposure to cold, infection, drugs, haemorrhage, hypoxia, hypercapnia, hypoglycaemia, sepsis, and adrenal insufficiency.<sup>[3]</sup> We report a retrospective analysis of six cases in our intensive care unit (ICU).

### **CASE REPORTS**

Our first patient was a 75-year-old male with a history of being bed ridden for 2 weeks, developing bed sores and was brought to emergency room (ER). He underwent debridement surgery, was shifted to ICU for further care. He was noted to have hyponatremia and on investigation, revealed the previously undiagnosed hypothyroidism. As his Glasgow Coma Scale (GCS) score remained persistently low, he underwent computed tomography scan of the brain, which showed pituitary macroadenoma. He was treated conservatively and discharged home. Second patient was a 65-year-old lady, who presented with a history of weakness, altered sensorium and abdominal pain of one-day duration. After investigations, a diagnosis of urosepsis with septic shock was made. She was noted to have hyponatremia and investigation revealed hypothyroidism. She went into multi-organ failure and eventually succumbed. Third patient was an 89-year-old male, known case of hypothyroidism, chronic obstructive pulmonary disease, type II diabetes mellitus (DM) and hypertension, presenting with history of fever, breathing difficulty and altered sensorium since one day. He had persistently low GCS and hyponatremia, which on investigation revealed hypothyroidism. He was treated conservatively and was discharged home. Fourth patient was a 78-year-old lady, known case of DM and hypothyroidism, presenting with a history of bilateral lower limb swelling, fever,

abdominal pain for 1 day and unresponsiveness since 4 h. She was diagnosed as a case of urosepsis, cellulitis and acute pancreatitis. Thyroid function was sub-normal. She was treated accordingly but eventually she succumbed. Fifth patient was a 68-year-old lady, known diabetic, hypertensive and hypothyroid with a history of swelling of lower limbs, facial puffiness for 2 weeks and altered sensorium for 2 days. Diagnosed as community-acquired pneumonia with sepsis, she developed multi-organ failure and died eventually. Sixth patient was a 96-year-old lady, known hypertensive, with fracture femur operated one week earlier, presenting with history of disorientation (3 days), bowel incontinence and anuria (1 day). Investigations revealed urinary tract infection. She had hyponatremia with subnormal thyroid function. She went into multi-organ failure and did not survive [Table 1].

### **DISCUSSION**

Myxoedema coma is a rare, life-threatening form of hypothyroidism with physiological decompensation.<sup>[1]</sup> Data from the western world indicate an incidence of about 0.22/million/year. However, there is scarcity of epidemiological data from tropical countries like India.<sup>[4]</sup>

The computerised data and case records of patients admitted between January 2009 and August 2013 to our ICU were reviewed. Those who fulfilled our diagnostic criteria formulated in conjunction with diagnostic criteria followed by the Indiana University School of Medicine, Indianapolis were selected [Table 2].<sup>[5]</sup> Demographic information, clinical manifestations, investigations, treatments and outcomes were noted. Microsoft Excel sheet was used to get the statistical variables.

Our 4 years database depicted an incidence of 1.3 cases per 1000 ICU admissions. Low intracellular T3 causes hypothermia and suppression of cardiac activity.<sup>[4]</sup> In this decompensated state, cardiogenic shock may not respond to vasopressors without concomitant thyroid hormone replacement. Hence, thyroid hormone replacement is an integral and indispensable part of treatment.<sup>[6]</sup> The possible precipitating factor is infection and septicemia.<sup>[4]</sup>

We found six patients with a confirmed diagnosis of myxoedema coma. Retrospective inclusion was based on clinical features, laboratory findings, high index of suspicion, and treatment response. All our patients were neglected elderly people, with a symptom duration of

Table 1: Clinical details of individual patients with myxoedema coma

Parameters	Case 1	Case 2	Case 3	Case 4	Case 5	Case 6
Age (years) median (IQR)	75	65	89	78	67	96
Male/female	Male	Female	Male	Female	Female	Female
Clinical findings						
Co-morbidities	CLD	DM	DM	DM	HTN	HTN
Mean temperature (°F)	97.8	95.8	98.2	99.6	95	96.1
GCS	4/15	5/15	7/15	3/15	4/15	4/15
Bradycardia and hypotension (HR)	51	58	46	60	54	40
Electrocardiographic change	1° HB	N	LVH	Tachy	LVH	Brady
Indication for ICU admission	Low GCS	Desat	Sepsis	Shock	Sepsis	Sepsis
Aetiology of myxoedema	Pit Mac	Infection	Cellulitis	Infection	Infection	Infection
Investigations, hospital course and outcome						
Total T4 (4.5-11.2)	4.75	3.91	2.01	5.58	0.55	0.27
TSH (0.4-4.5)	4.34	6.95	>100	0.12	>100	14.14
Cultures						
Blood	GNB	NG	NG	GNB	GNB	GNB
Deep ET	GNB	GNB	GPC	GNB	-	-
Urine	NG	GNB	NG	GNB	-	-
Wound	-	-	-	GNB	-	GNB (BS)
Radiological						
CXR	Pneum	Pneum + Pl Eff	Pneum	N	Pneum + Pl Eff	Pul Ede
CT brain	Pit Mac	N	N	N	N	N
USG abdomen	N	N	N	Ac Panc	N	N
Treatment						
General therapy received						
Mechanical ventilation	+	+	+	+	+	+
Dialysis	-	+	-	+	-	-
Vasopressors	+	+	+	+	+	+
Blood products transfusion	+	+	-	+	+	-
Specific myxoedema measures						
Intravenous glucose	+	+	+	+	+	+
Hyponatraemia correction	+	+	-	+	+	+
Passive rewarming	+	+	-	-	+	+
Oral thyroxine	+	+	+	-	+	+
Hydrocortisone	+	+	+	+	+	+
Sedation	+	+	+	+	+	+
Myxoedema score	8	8	10	7	10	8
Outcomes						
Nosocomial infections	VAP	VAP	-	CAUTI	-	-
Duration of ICU stay	10	23	6	11	3	21
Duration of hospital stay	18	23	11	15	3	21
Survival						
ICU	Alive	Died	Alive	Died	Died	Died
Hospital	Alive	Died	Alive	Died	Died	Died
Cause of death	-	MODS	-	Sepsis	MODS	MODS

CLD – Chronic liver disease; DM – Diabetes mellitus; HTN – Hypertension; 1° HB – First degree heart block; N – Normal; LVH – Left ventricular hypertrophy; Tachy – Sinus tachycardia; Brady – Sinus bradycardia; GCS – Glasgow coma scale; Desat – Desaturation; Pit Mac – Pituitary macroadenoma; GNB – Gram negative bacteria; NG – No growth; GPC – Gram positive cocci; Pneum – Pneumonia; Pl Eff – Pleural effusion; Pul Ede – Pulmonary oedema; Ac Panc – Acute pancreatitis; VAP – Ventilator-associated pneumonia; CAUTI – Catheter-associated Urinary tract infection; MODS – Multi Organ Dysfunction Syndrome; ICU – Intensive care unit; CT – Computed tomography; HR – Heart rate; CXR – Chest X-ray; USG – Ultrasound; ET – Essential thrombocythemia

about 10 days. Male to female ratio was 1:2 suggesting it was twice as common in females than males. Other co-morbidities were present in 84%, and all of them had positive cultures, electrocardiogram changes and hyponatremia with mental obtundation requiring invasive ventilation. Survival was about 33.3%. All female patients succumbed suggesting a higher severity

in females. Sepsis was the most common precipitating factor, and 33% (2 out of 6) had defaulted on thyroid supplements. Thyroid stimulating hormone (TSH) had no role either in prognostication or diagnosis.

Up to 61% of the patients had defaulted on thyroxine supplements as per literature whereas we found

**Table 2: Diagnostic criteria for Myxoedema Coma**Six criteria and points assigned<sup>[5]</sup>

GCS of 0-10=4 points, 11-13=3 points, 14=2 points, 15=0 points

TSH &gt;30=2 points, 15-30=1 point

T4 below normal=1 point

Hypothermia (temperature &lt;96 F)=1 point

Bradycardic (HR &lt;60)=1 point

Precipitating illness present=1 point

Scoring: Myxoedema coma  $\geq 7$ , likely=5-7, unlikely <5

Chiong and Mariash *et al.*: Development of an objective tool for the diagnosis of myxoedema coma. *Endocrinology Review*. Indianapolis: Indiana University School of Medicine; 2011. p. 24-6. GCS – Glasgow coma scale; TSH – Thyroid-stimulating hormone; HR – Heart rate

about 33%.<sup>[7]</sup> Dutta *et al.* found 39% with undetected hypothyroidism. In our 6 patients, incidence of undetected hypothyroidism was 66.6% (4/6). Reinhardt and Mann report hypoxaemia in 80%, hypercapnia in 80%, hypercapnia in 54%, and hypothermia with a temperature less than 94°F in 88% of all the patients with myxoedema crisis.<sup>[8]</sup>

All of our patients were neglected elderly with infective insult and undetected/untreated hypothyroidism. High TSH values did not aid in prognostication (50% of our patients had TSH levels within the normal range) [Table 1]. Normal thyroid hormone levels may reflect the deviation from a higher pre-morbid set-point highlighting importance of careful clinical evaluation in patients with disparate clinical findings.<sup>[3]</sup> Low admission GCS (<8) requiring airway protection and anaemia was seen in all. Average time to diagnosis was 3 days on par with those reported.<sup>[9]</sup> Case reports of myxoedema coma as post-operative complication are scanty.<sup>[10]</sup> The mortality rate of 100% amongst our female patients suggested more severity in them. We could not conclude whether intravenous thyroxine is absolutely indispensable as it is commercially unavailable in this country, and all our patients were treated with an oral formulation. An incidence of 50%, of nosocomial infections suggested diminished immune response. We found some case reports of pituitary adenomas secreting TSH causing secondary hypothyroidism and eventually myxoedema coma.<sup>[11]</sup>

## CONCLUSION

Myxoedema coma is a diagnosis of exclusion requiring a high index of suspicion as there is no definitive single tool to diagnose it. There is a need to develop universal objective diagnostic criteria. Further studies are required with larger cohorts for evidence-based and protocolised management.

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Ipe Jacob, Intensive Care Unit, Columbia Asia Referral Hospital, Yeshwantpur, Bengaluru.

**Tejaswini Arunachala Murthy, Pradeep Rangappa, IPR Jacob, Rajeshwari Janakiraman<sup>1</sup>, Karthik Rao**

Intensive Care Unit, Columbia Asia Referral Hospital, <sup>1</sup>Department of Medicine (Endocrinology), Columbia Asia Referral Hospital, Yeshwantpur, Bengaluru, Karnataka, India

### Address for correspondence:

Dr. Pradeep Rangappa,  
ICU, Columbia Asia Referral Hospital, Yeshwantpur, Malleswaram  
West, Bengaluru - 560 055, Karnataka, India.  
E-mail: drpradeep@aol.com

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