

Respiratory Muscle & Diaphragmatic Weakness Secondary to Cushing's Syndrome

Carolina Gherman-Ciolac¹, Leelavathy Kandaswamy¹, Fara Hatta¹, Jonathan Mann², Harit Buch¹

¹ Departments of Endocrinology & ² Respiratory Medicine, Royal Wolverhampton Hospitals NHS Trust;

Background

- A high index of suspicion is required for the diagnosis of Cushing's syndrome, as commonly only few of the pathognomonic symptoms/signs are present.
- We report a case of Cushing's syndrome (CS) who presented with respiratory failure secondary to respiratory muscle weakness and diaphragmatic failure which is one of its rare presentations ¹.

Case history and investigations

- 60-year-old female with PMH of Rheumatoid arthritis, biliary cirrhosis and primary hypothyroidism.
- Presented to the Respiratory Physicians with progressive worsening of shortness of breath
- Clinical assessment, chest X-rays/CT, Echocardiogram excluded common cardiorespiratory causes
- Pulmonary function tests (PFT) showed restrictive defect and reduced transfer factor (**Table 1.**)
- Lung biopsy showed non-specific changes
- In view of progressive symptoms and absence of any identifiable cause, lung transplantation was considered

Table 1.

Year	TLCO%	FEV1%	FVC%	FEV1/FVC
2009	Low transfer factor and restrictive defect			
2010	57.3	73	77	
2011	57.1	73.5	78	79.9
2012	32.2	56.3	62.2	97.8
2013	48.4	63.1	66.7	100

Further course:

- During an episode of pneumonia she required ITU admission for severe respiratory failure
- Ultrasonography (USG) undertaken for unrelated reasons incidentally identified severe reduction in diaphragmatic movement.
- Respiratory muscle tests confirmed global respiratory muscle and diaphragmatic weakness (**Table 2**)
- EMG/NCV, myasthenia gravis negative

Table 2.

Date (RS muscle)	MEP% predicted	MIP% predicted
2012 (pre-surgery)	100	41
2014 (post-surgery)	112	89

Observations in Endocrine Clinic

1 year after initial presentation to the Respiratory Clinic

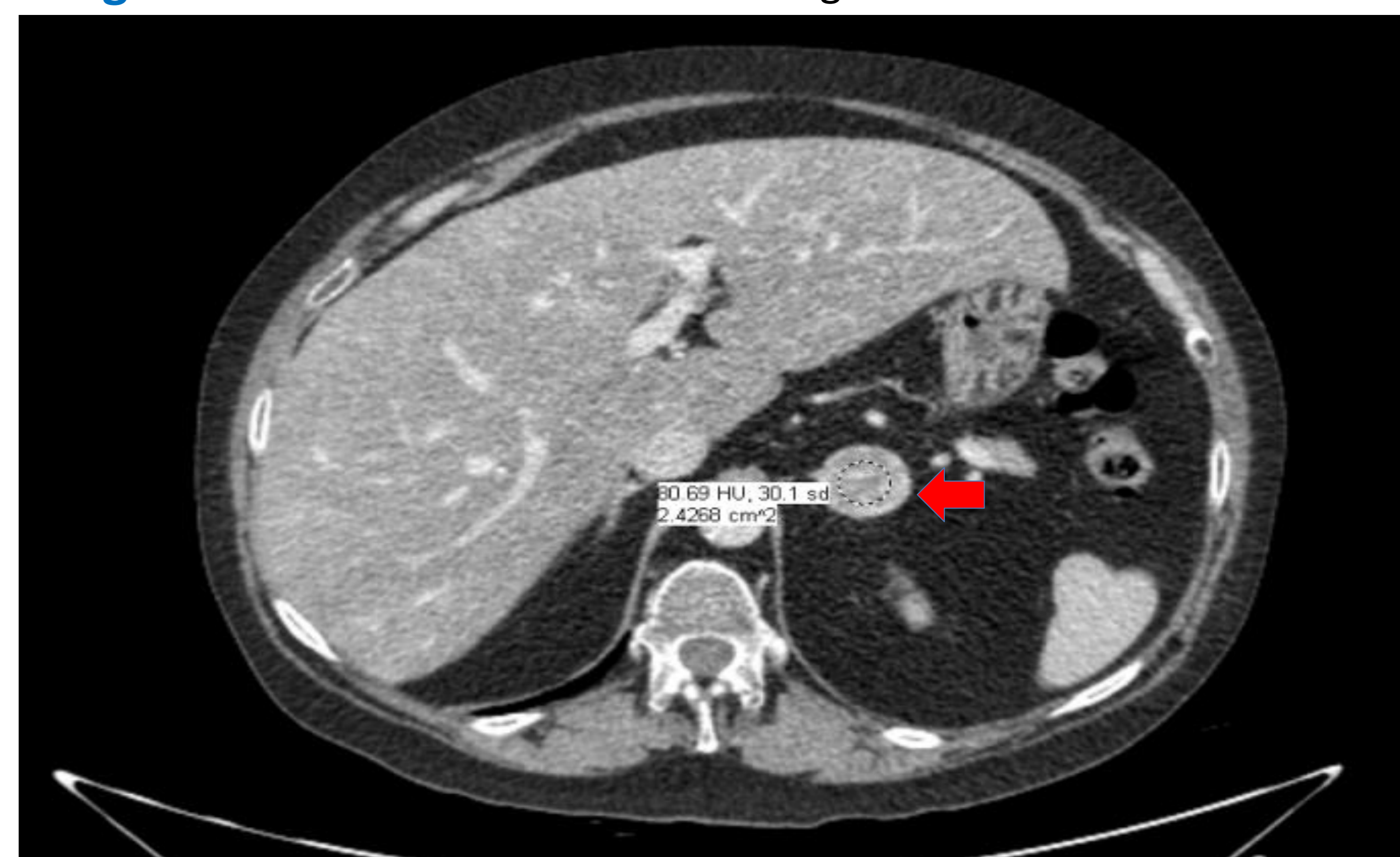
- Worsening hypertension
- Significant weight gain
- Severe proximal muscle weakness
- Facial features of Cushing's syndrome

Endocrine tests (Table 3):

Investigations	Results	Normal range
1mg DST	447	<50 nmol/l
Urinary cortisol	500	0-130 nmol/l/24hr
ACTH	<5	7.2 - 63.3 ng/L
Pituitary profile	Normal	

Imaging:

Image 1. Abdominal CT - 2.6cm enhancing mass in the left adrenal



Discussion

- The exact mechanism of the muscle pathology in CS unclear, it may be related to:
 - Decreased synthesis and increased degradation of protein
 - Alterations in carbohydrate metabolism
 - Mitochondrial alterations
 - Electrolyte disturbances
 - Decreased sarcolemmal excitability
- Sedentary lifestyle may increase the risk
- EMG has its own limitation and may be insufficient to confirm or exclude the diagnosis.
- **Only few cases have been reported describing respiratory muscle weakness sufficient to cause significant respiratory insufficiency ^{1,2,3}.**
- **Unlike our patient none of them had diaphragmatic failure.**

Management and post-operative:

- Following successful adrenalectomy her symptoms and objective parameters of respiratory function, respiratory muscle strength and diaphragmatic movement demonstrated significant improvement.

Take home points:

- **This case highlights the need to consider this unusual manifestation of Cushing's syndrome in an appropriate context.**

1. Gary H. Mills, Dimitris Kyroussis, Paul Jenkins, et.al. Respiratory Muscle Strength in Cushing's Syndrome. AJRCCM.1999.160.5
2. Blanco C1, Marazuela M, Flores J, Alvarez J. Severe respiratory failure secondary to Cushing's myopathy J Endocrinol Invest. 2001 Sep;24(8):618-21.
3. Tanaka M. et al Intern Med. A case of Cushing's syndrome associated with chronic respiratory failure due to metabolic alkalosis 1992 Mar;31(3):385-90.
4. Sara Lemoine et al. Sudden Respiratory Failure in a Patient with Cushing's Syndrome. The Open Endocrinology Journal, 2010, 4, 1-2