

# Intravenous Etomidate In The Management Of Hypercortisolaemia Due To Ectopic ACTH Producing Thymic Neuroendocrine Tumor

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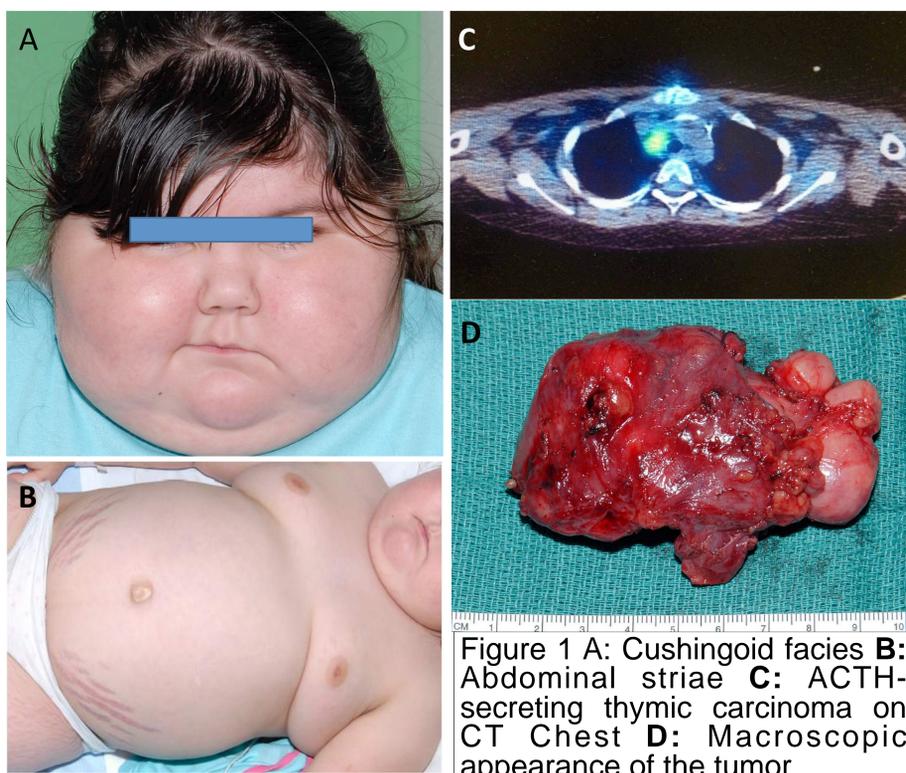
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## Introduction

- ❖ Ectopic ACTH syndrome (EAS) is an extremely rare cause of Cushing's syndrome in young children.
- ❖ The intensity of ACTH secretion and hypercortisolaemia is greater in EAS than in Cushing's disease.
- ❖ Control of hypercortisolaemia represents an important step in the management while awaiting localization of the ACTH source or in preparation to surgery.
- ❖ Etomidate was used as an anesthetic agent. It inhibits cortisol synthesis and its rapid onset of action makes it an ideal medication in severe hypercortisolaemia.
- ❖ We describe a case of Cushing syndrome in a child, due to an ectopic ACTH-secreting tumour managed with an etomidate infusion prior to surgical resection of the tumour.

## Case Summary

- ❖ A 6-year-old girl presented with a 2-weeks history of headaches and vomiting on a background of excessive weight gain in the preceding 6 months.
- ❖ She had classic features of Cushing's syndrome (moon facies, plethoric cheeks, buffalo hump and striae) (Fig 1A and 1B).
- ❖ Her weight was 45 kg (>99.6<sup>th</sup> centile) and height 125.6 cm (91<sup>st</sup> centile).
- ❖ She had severe hypertension (180/110 mmHg) and hypoxia with a fluctuating conscious level on admission (hypertensive encephalopathy).
- ❖ Investigations revealed markedly elevated serum cortisol (1445 nmol/L), elevated ACTH (99 ng/L) and 24 hour urinary free cortisol 4039nmol/day (0-260).
- ❖ MRI brain showed posterior reversible encephalopathy syndrome (PRES) and no pituitary adenoma.
- ❖ CT chest showed an enlarged partially calcified nodular thymus with localised lymphadenopathy, consistent with an ACTH secreting neuroendocrine tumour (Figure 1C). Histology of the resected tissue subsequently revealed a high grade neuroendocrine carcinoma.
- ❖ She had a diagnosis of hypertensive encephalopathy caused by Cushing's syndrome secondary to ectopic ACTH production from a thymic carcinoma (Figure 1D).



## Management

- ❖ Captopril was used for controlled reduction of blood pressure.
- ❖ Management involved cortisol secretion blockade using an intravenous etomidate infusion (Figure 2).
- ❖ Frequent serum cortisol monitoring was undertaken to achieve complete blockade and to prevent hypoadrenalism.
- ❖ Replacement with intravenous hydrocortisone (0.5–1 mg/h) and fludrocortisone was started when serum cortisol < 200 nmol/L.
- ❖ The target serum cortisol based on mean 24-h cortisol levels in patients in an intensive care setting was 500–800nmol/L.
- ❖ Etomidate infusion was continued for 3 weeks while investigations were undertaken to localize the ACTH secreting tumour and until the patient was deemed stable to tolerate the surgery. No drowsiness or respiratory depression was observed.
- ❖ She underwent thymectomy however residual disease was found on CT a few weeks post-operatively explaining the rising cortisol levels (Fig 1C).
- ❖ Etomidate was recommenced at 3.5mg/h and subsequently a laparoscopic bilateral adrenalectomy was undertaken and the patient was commenced on replacement hydrocortisone and fludrocortisone prior to initiating chemotherapy.

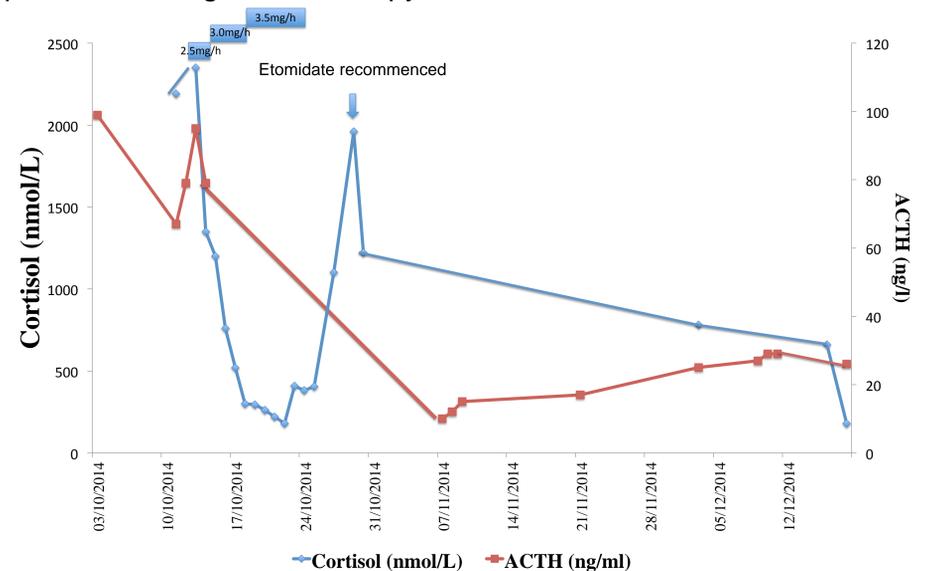


Figure 2: ACTH and Cortisol levels following commencement of etomidate

## Discussion

- ❖ A consensus statement on the treatment of Cushing's syndrome recommends the use of etomidate where rapid control of cortisol levels is required and oral therapy is problematic<sup>1 2</sup>.
- ❖ Etomidate is an imidazole, non-barbiturate anaesthetic agent, which at low doses, rapidly suppresses cortisol secretion by inhibiting 11 $\beta$ -hydroxylase enzyme activity<sup>3 4</sup>.
- ❖ Etomidate administration (2.5-3.5 mg/h) suppresses serum cortisol within 48-62 h and can be administered in a paediatric high-dependency unit as long as careful monitoring is undertaken<sup>5</sup>.
- ❖ Prolonged use of etomidate infusion was tolerated well in our patient.

## References

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