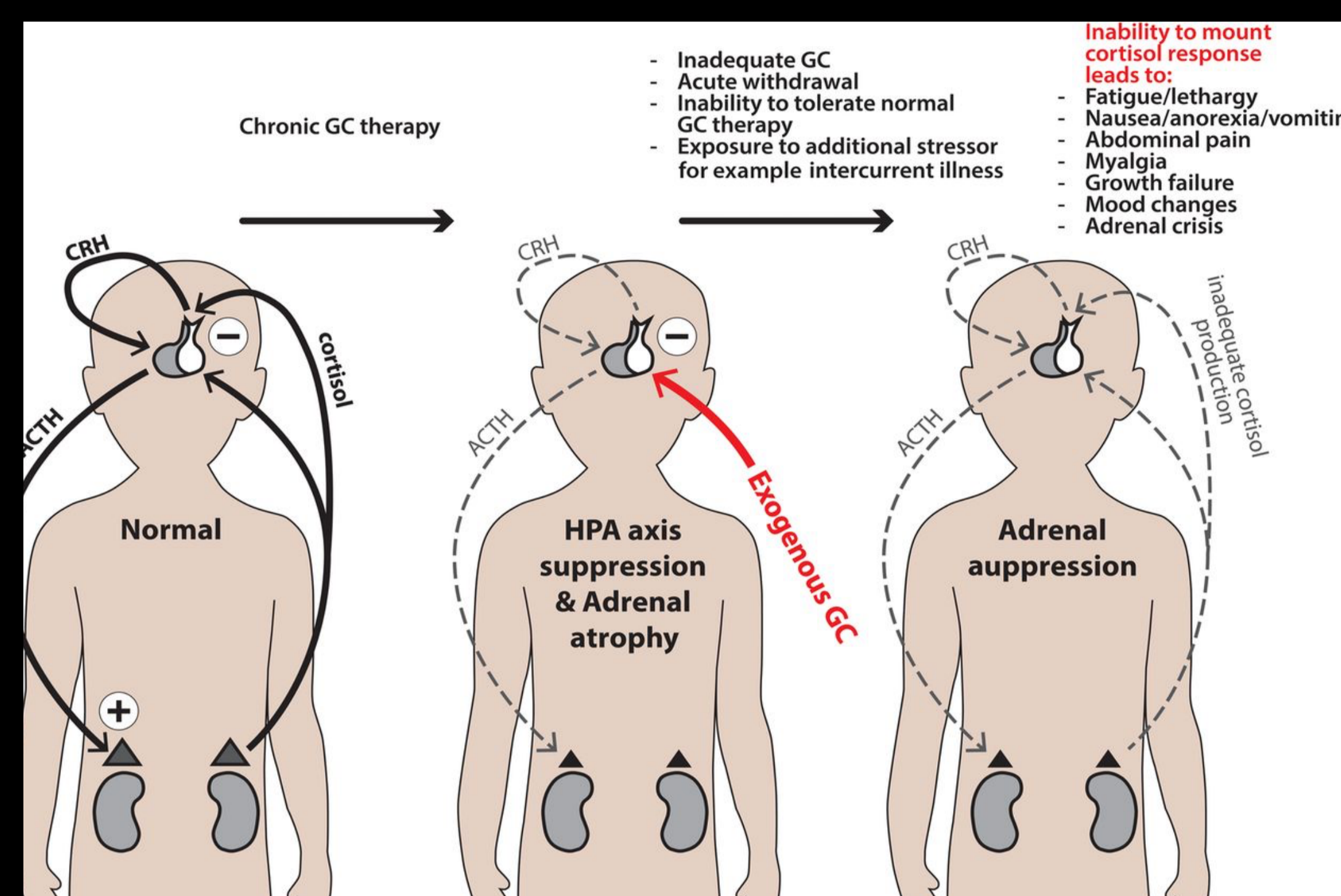


Background

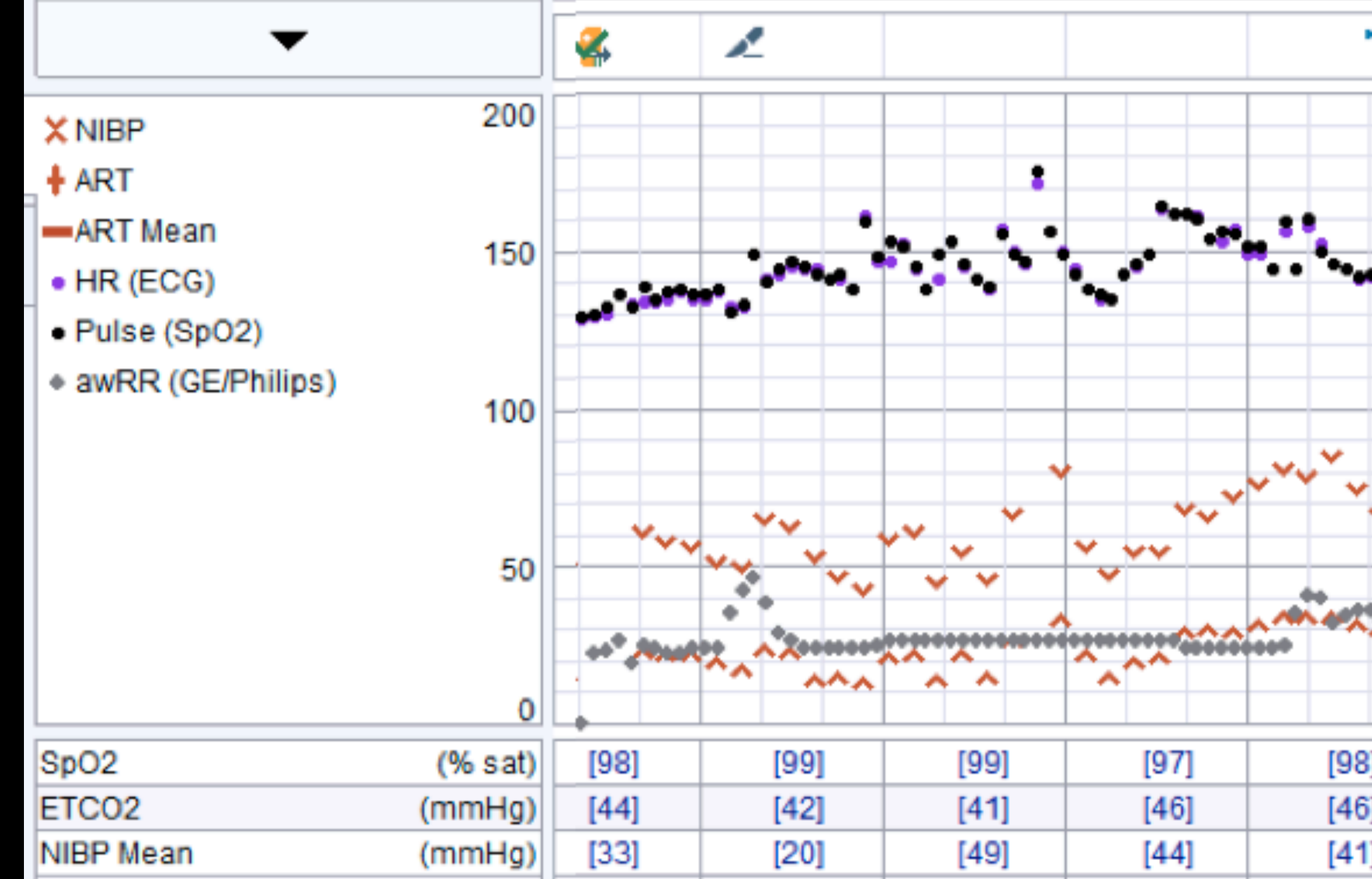
- Glucocorticoids are used widely since their initial treatment of rheumatoid arthritis in 1939
- Common indications include: asthma and COPD, inflammatory bowel disease, & skin & eye disorders
- Long-term use of steroids is associated with numerous side effects including: the classic "buffalo hump", central obesity, & "moon facies"; hyperglycemia; myopathies; mood disorders; immunologic dysfunction; and growth suppression in children
- Exogenous glucocorticoid administration is also a common cause of acquired adrenal dysfunction by inhibiting the hypothalamic-pituitary axis (HPA)
- Patients are generally tapered off these medications, rather than stopping them abruptly
- The following case describes intraoperative hypotension in an infant exposed to long-term prednisolone

Intra-operative Course

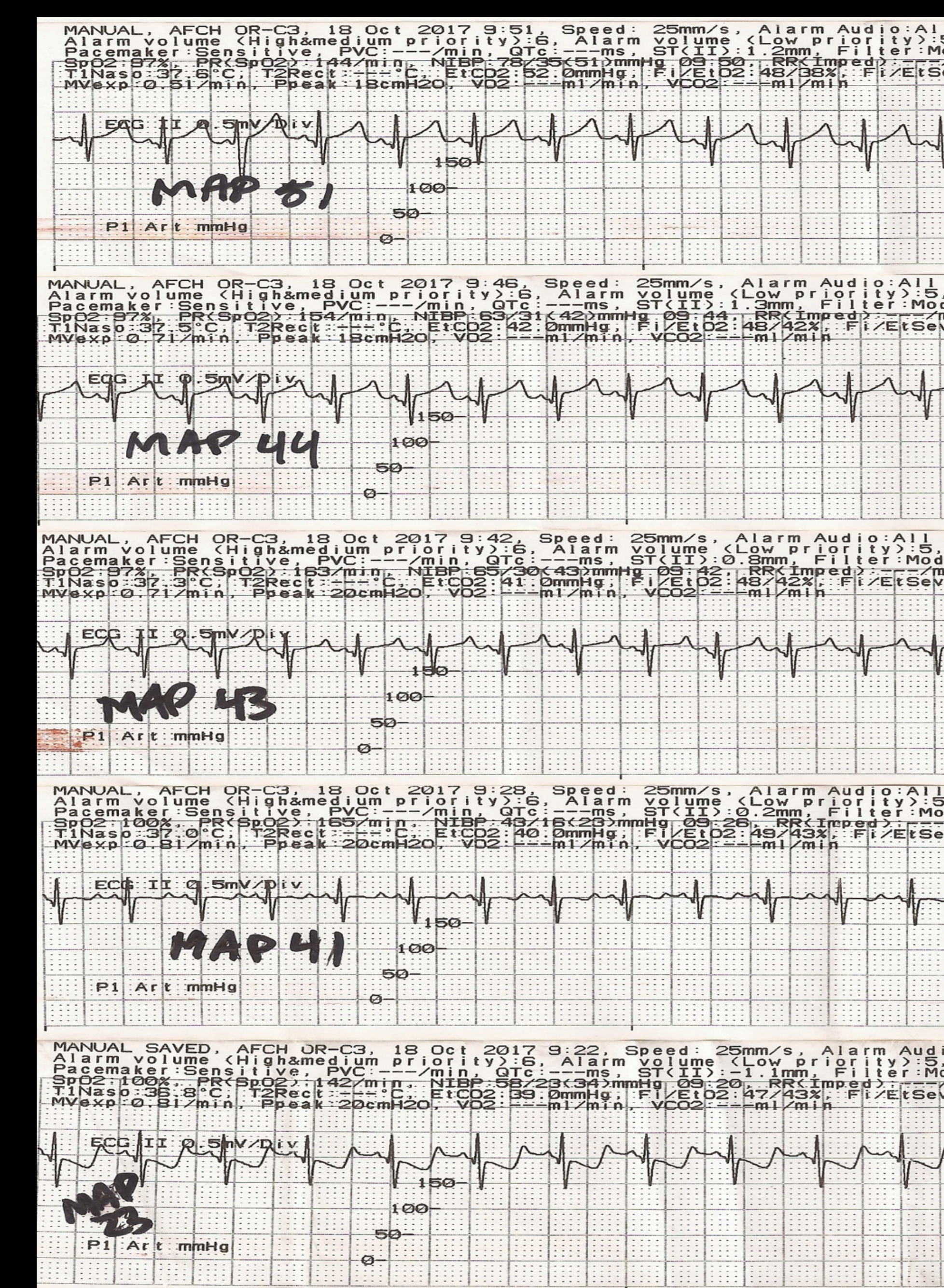
- Five-week-old male – L eye examination under anesthesia and superior trabeculotomy
- Born at term and 46 weeks post menstrual age at the time of surgery; prenatal history unremarkable
- Corneal clouding noted after delivery – genetic karyotyping and metabolic screening unremarkable
- Uncomplicated trabeculotomy 21 days prior with a prescription for 1% prednisolone eye drops postoperatively
- Patient weight 4.4 kilograms on the day of surgery
- Pre-operative course unremarkable and induction of anesthesia was smooth and uncomplicated – drops were not administered on the day of surgery
- Anesthesia maintained with sevoflurane and 0.5 FiO₂; rectal acetaminophen used for post-operative analgesia
- After incision, mean arterial pressure (MAP) dropped and ST segment depression was noted on ECG
- Unsuccessful in increasing MAP with decreased sevoflurane concentration and fluid boluses; epinephrine boluses with brief but unsustained efficacy
- Adrenal suppression suspected due to prolonged steroid exposure and dexamethasone was given, after which time the MAP increased, ST changes resolved
- The remainder of the case was unremarkable
- Post-operative course was unremarkable and he was discharged home later in the afternoon



	0900	0930
epiNEPHrine (mcg)	1	1
cisatracurium (mg)		0.2
dexamethasone sod phos (mg)		0.5
epHEDRINE (mg)		0.5
glycopyrrolate (mg)		
neostigmine (mg)		
D5-Lactated Ringers (mL)		
0.9% NS (mL)	10	10
Blood loss (mL)		
Stethoscope		
O2 (L/min)	[0.4]	[0.4]
FiO2 (distal) (%)	[51]	[48]
ETO2 (%)	[45]	[43]
Air (L/min)	[0.6]	[0.6]
ETN2O (%)	[0]	[0]
ETSEVO (%)	[2.4]	[1.1]



SpO2 (% sat)	[98]	[99]	[99]	[97]	[98]
ETCO2 (mmHg)	[44]	[42]	[41]	[46]	[46]
NIBP Mean (mmHg)	[33]	[20]	[49]	[44]	[41]



Steroid	Glucocorticoid potency	Mineralocorticoid potency
cortisol	1	0.054
prednisone	4	0.002
prednisolone	1.7	0.013
dexamethasone	21	0.0094
betamethasone	45	0.0038
triamcinolone	0.35	0.0002
prednylidene	182	0.0011
aldosterone	0.07	1.0

Case Discussion

- The ascribed cause of the profound hypotension was adrenal suppression secondary to prednisolone eye drops
- This was a clinical diagnosis, a cortisol level was not drawn
- Long-term steroid administration causes many systemic effects; the specific daily dose that leads to adrenal suppression is unknown, though even small doses can be causative, especially in the pediatric population¹
- We estimated the patient was receiving approximately 0.45 mg/kg/day of prednisolone, if administered appropriately (1% prednisolone [10mg/ml x 4 drops/day x ~0.05 mL/drop²] ÷ 4.4 kg patient weight)
- Prednisolone is the biologically active form of prednisone and is a substrate of the CYP3A4 enzyme, which has decreased activity in infants compared to adults
- Hydrocortisone is the preferred treatment of intraoperative adrenal suppression in children, but dexamethasone may be used as well³
- This case reinforces the consequences of exogenous steroid use and their effects on infants, even through a vehicle as seemingly benign as eye drops

References

1. Chrousos, Pavlaki AN, Magiakou MA. Glucocorticoid Therapy and Adrenal Suppression. [Updated 2011 Jan 11]. In: De Groot LJ, Chrousos G, Dungan K, et al. (eds). Endotext [Internet]. South Dartmouth (MA): MDText.com, Inc.; 2000-. Available from: <https://www.ncbi.nlm.nih.gov/books/NBK279156/>
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3. Joint LWPES/ESPE CAH Working Group. Consensus statement on 21-hydroxylase deficiency from the Lawson Wilkins Pediatric Endocrine Society and the European Society for Paediatric Endocrinology. J Clin Endocrinol Metab. 2002;87(9):4048.