ECT: cardiac effects

Electroconvulsive therapy (ECT) is an effective treatment modality for a wide variety of psychiatric illnesses with a good safety record. However cardiovascular complications represent a significant percentage or the majority of complications from ECT, depending on the source. Knowledge of the cardiovascular effects of ECT allows the anesthesiologist to better assist with patient selection and be better prepared to safely guide the patient through this procedure which typically requires several sessions.

The **first cardiovascular effect** seen with ECT is an **initial parasympathetic discharge**. This results in bradycardia, hypotension, and even transient asystole. There are numerous risk factors to experiencing bradycardia asystole including (but not limited to) preexisting conduction system abnormalities, succinylcholine use, and use of beta blockers. Age as a risk factor has conflicting data. This parasympathetic outflow can be treated, either actively or proactively, with anticholinergics such as atropine. However, asystole usually resolves on its own without any consequence and atropine may increase cardiac oxygen demand via tachycardia. Patients can also experience another **parasympathetic surge postictally** which again is self-limited.

Following the parasympathetic surge, there is a sympathetic surge causing tachycardia and hypertension. Although often well tolerated, this surge can precipitate myocardial ischemia in certain patients such as those with underlying coronary artery disease. Pretreatment with any number of antihypertensive and anti-tachycardia medications can be considered to blunt this response. Drugs such as but not limited to esmolol, nifedipine, clonidine, labetalol, propranolol, and nitroglycerin have been used. Esmolol may be an ideal agent given its forgiving nature, rapid onset, and rapid clearance, although there are some concerns regarding its effect on seizure quality (you know, the reason why the patient is here).

You are also likely to see **cardiac arrhythmias** following ECT. Most commonly, PACs, PVCs, SVT, VT and heart block. These arrhythmias are more common in older patients with underlying cardiac disease. Other cardiac effects which are either **rare or of uncertain significance include: ST changes, increase in cardiac enzymes, myocardial stunning and takotsubo cardiomyopathy**.

ECT is a very safe treatment modality for a wide variety of psychiatric illnesses, however the anesthesiologist caring for these patients must be aware of the potential complications including cardiovascular. Investigating a patient's response to prior ECT treatments and being prepared with anticholinergics, antihypertensives, and methods to treat new onset arrhythmias is essential. Treatment and pretreatment of the patient must also take into account the potential effect on the seizure as our interventions have the potential to impact the success rate of ECT in improving the psychiatric health of our patients.

Further reading: Hermida AP, Mohsin M, Marques Pinheiro AP, McCord E, Lisko JC, Head LW. The Cardiovascular Side Effects of Electroconvulsive Therapy and Their Management. J ECT. 2022 Mar 1;38(1):2-9. doi: 10.1097/YCT.0000000000000802. PMID: 34699395.