

TASER® X26 DISCHARGES IN SWINE: CARDIAC RHYTHM CAPTURE IS DEPENDENT ON DISCHARGE VECTOR

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Objectives: Our previous studies indicate that TASER X26 stun devices can acutely alter cardiac function in swine. We hypothesized that a variety of trans-cardiac discharge vectors, and even some vectors that do not traverse the heart, will capture cardiac rhythm causing ventricular tachycardia (VT) and sometimes fibrillation (VF).

Methods: Using an IACUC approved protocol, 4 Yorkshire pigs (25-36 kg) were anesthetized, paralyzed with succinylcholine (2 mg/kg), and then exposed to 5-10 sec discharges from a police-issue TASER X26. For each vector studied, the barbed darts were pushed manually through the skin to their full depth (~3/8") and were arranged in either trans-cardiac (such that a straight line connecting the darts would cross the region of the heart) or non-trans-cardiac vectors. Each pair of dart locations defined a vector and a total of 13 different vectors were studied. For each vector, the current emitting dart was alternated (from one to the other) so that discharges with each were tested.

In so doing, the location of the current emitting dart relative to the heart was changed and the direction of current flow during the discharge was reversed without physically moving either dart. Echocardiography, ECGs, and vital signs were monitored before, **during**, and after all discharges. P values < 0.05 were considered significant.

Results: ECGs were unreadable during discharges due to electrical interference, but echo images showed unmistakably that cardiac rhythm was captured in none (0 of 8) of the dorsal discharges but was captured immediately in 47% (25 of 53) of the ventral discharges. In these cases, echocardiography showed capture of the ventricular rhythm with rapid ventricular contractions consistent with VT/ventricular flutter during the entire discharge. A total of 25 discharges were administered with trans-cardiac vectors and capture occurred in 21 of these

(84% capture rate). A total of 28 ventral discharges were administered such that the heart was **not** interposed between the darts and capture was seen in 4 of these (14% capture rate). VF was seen with 2 vectors, both trans-cardiac. In the remaining animals that showed capture, VT occurred post-discharge until sinus rhythm was regained spontaneously.

Conclusions: For most trans-cardiac vectors, TASER X26 caused **immediate** myocardial capture. This usually reverted spontaneously to sinus rhythm but potentially fatal VF was seen with 2 vectors. For some non-trans-cardiac vectors, capture was also seen but at a much lower incidence and these vectors did not result in VF.