

# Transvenous electrical cardioversion



## A new treatment for atrial and ventricular arrhythmias in horses and cattle



G. van Loon, D. De Clercq, B. Pardon, S. Schauvliege

Large Animal Internal Medicine, Faculty of Veterinary Medicine,  
Ghent University, Belgium, Gunther.vanLoon@UGent.be

### Introduction

Atrial fibrillation is associated with clinical symptoms such as loss of performance in horses and decreased milk production in cattle. Treatment consists of oral (or intravenous) quinidine sulphate administration. Ventricular tachycardia is a poorly tolerated and potentially life-threatening arrhythmia that can be medically treated e.g. with lidocaine, procainamide or phenytoin. Medical treatment of both arrhythmias is frequently associated with important, sometimes dangerous, side-effects or with conversion failure. Transvenous electrical cardioversion under general anaesthesia was applied as first or second choice treatment for atrial fibrillation and sustained ventricular tachycardia in horses and cattle.

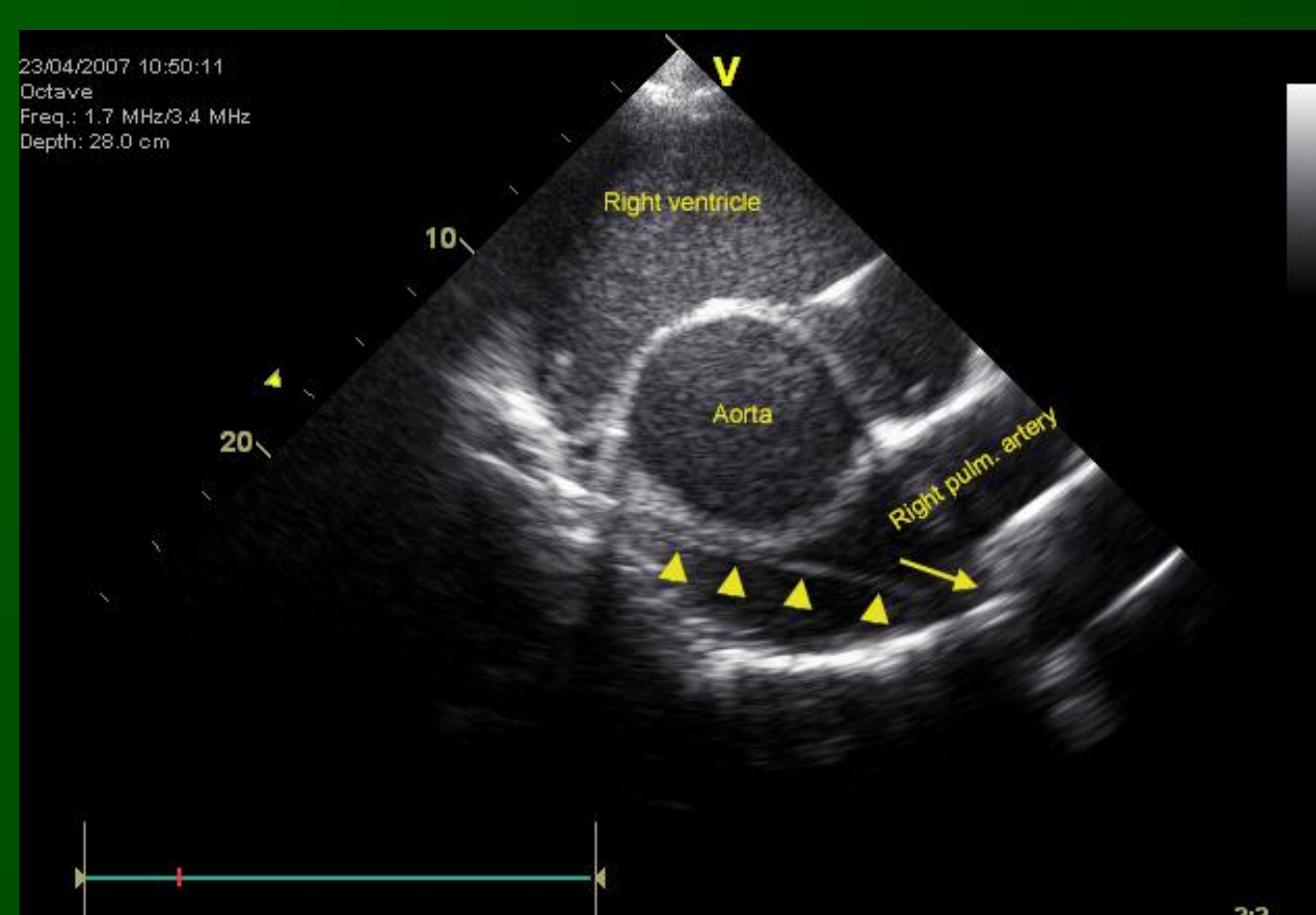
### Methods

In the **standing animal**, 2 cardioversion catheters were inserted in the jugular vein (and carotid artery) and correctly positioned in the heart under ultrasound guidance. In case of atrial fibrillation, catheters were placed in the left pulmonary artery and the right atrium. For treatment of ventricular tachycardia, catheters were placed in the left and right ventricle. Subsequently, a temporary pacing catheter was placed in the right ventricular apex and connected with a temporary pacing device to prevent post-shock asystole during cardioversion attempts.

Under **general anaesthesia**, biphasic R wave synchronised shocks were delivered at 125 up to 360 Joules with increments of 50 Joules.



Cardioversion catheters are transvenously inserted in the standing horse.



Catheter (▲) positioning is performed under ultrasound guidance, e.g. placement into the left pulmonary artery (↗).

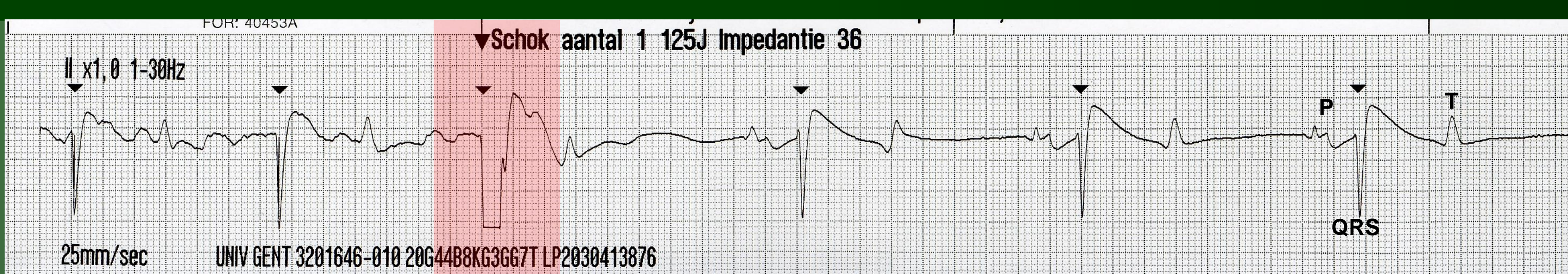


Under general anaesthesia, R wave synchronized biphasic shocks are delivered.

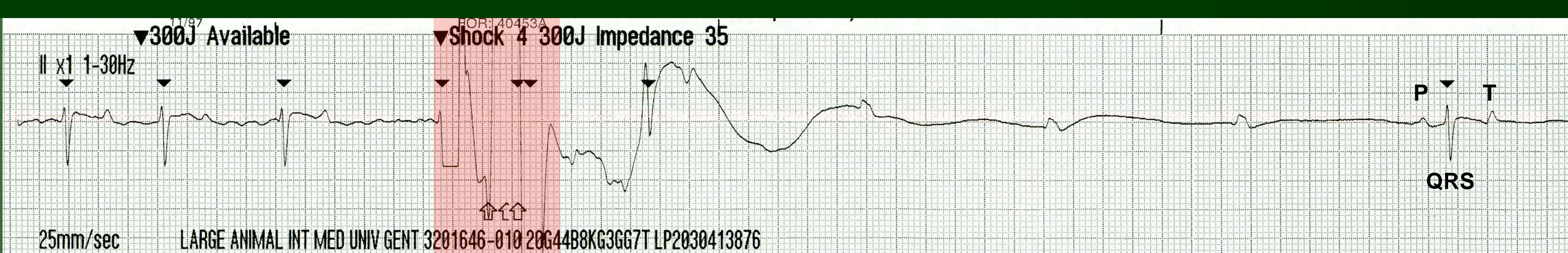
### Results

Chronic atrial fibrillation could be successfully converted to sinus rhythm in 8 of the 9 horses and 2 of the 2 adults cows. Sustained ventricular tachycardia was successfully converted to sinus rhythm in 1 out of 1 horse in which medical treatment had failed. Recovery from anaesthesia was uneventful. Shock delivery did not affect serum cardiac troponin I levels. No complications were encountered.

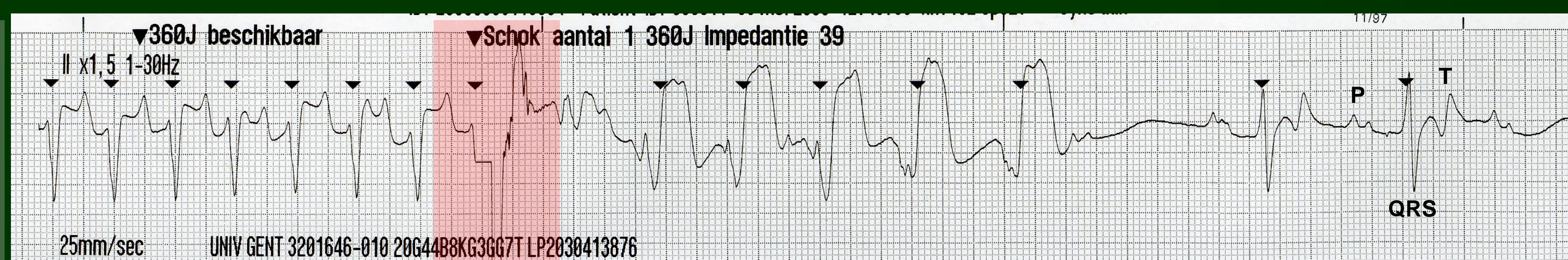
Electrical cardioversion of chronic atrial fibrillation in a horse using one 125 Joule biphasic shock between right atrium and left pulmonary artery.



Electrical cardioversion of a bull with atrial fibrillation using a 300 Joule biphasic shock between right atrium and left pulmonary artery.



Electrical cardioversion of sustained ventricular tachycardia in a horse using one 360 Joule biphasic shock between right and left ventricle.



### Conclusion

Atrial fibrillation and ventricular tachycardia can be successfully cardioverted by means of transvenous electrical cardioversion using synchronized biphasic shocks. Synchronization of shock delivery with the R wave of the surface ECG is mandatory to reduce the risk for fatal ventricular fibrillation. The electrical cardioversion technique can be used as first choice treatment or in cases where medical treatment failed.