Anterior–posterior electrode position led to more cardioversion success in atrial fibrillation

Kirchhof P, Eckardt L, Loh P, et al. **Anterior-posterior versus anterior-lateral electrode positions for external cardioversion of atrial fibrillation: a randomised trial.** Lancet. 2002;360:1275-9.

QUESTION

In patients with persistent atrial fibrillation (AF), does the anterior–posterior (A–P) electrode position improve cardioversion success more than the anterior–lateral (A–L) position?

DESIGN

Randomized (allocation concealed*), unblinded,* controlled trial with follow-up for 24 hours.

SETTING

Cardiology department at the University of Münster, Münster, Germany.

PATIENTS

108 of 167 screened patients who were 18 to 80 years of age (mean age 60 y, 76% men) with AF (median duration 5 mo, range 0.1 to 20 mo). 79 of 108 (73%) patients had accompanying cardiac disease. Exclusion criteria included a pectorally implanted pacemaker or defibrillator; atrial flutter; and atrial tachycardia. Follow-up was 100%.

INTERVENTION

Patients were allocated to an external cardioversion A–P (n = 52) or A–L (n = 56) electrode position. Identical defibrillators (Physiocontrol Hellige Marquette LifePak 9, Düsseldorf) were used to apply monophasic shock waveforms through standard handheld sintered steel electrodes (Physiocontrol Hellige Marquette). Cardioversion was attempted at different preselected shock strengths (50 to 360 J).

MAIN OUTCOME MEASURE

Successful cardioversion.

MAIN RESULTS

Analysis was by intention to treat. Cardioversion success rates were higher in patients assigned to the A–P than to the A–L electrode position (Table) and were higher for all of the tested shock strengths (50 to 360 J). A logistic-regression analysis showed that of 5 factors tested—atrial size, duration of AF before cardioversion, antiarrhythmic drugs taken at the time of cardioversion, body mass index, and electrode position—A–P electrode position and a low body mass index were the only factors that predicted cardioversion success.

CONCLUSION

In patients with persistent atrial fibrillation, an anterior–posterior electrode position was more effective for external cardioversion than an anterior–lateral electrode position.

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For correspondence: Dr. P. Kirchhof, Medizinische Klinik C, Universitätskliniken Münster, Münster, Germany. E-mail kirchp@uni-muenster.de. ■

*See Glossary.

Anterior–posterior (A–P) vs anterior–lateral (A–L) electrode position for external cardioversion of atrial fibrillation at 24 hours†

Outcome	A–P	A–L	RBI (95% CI)	NNT (CI)
Cardioversion success	96%	78%	22% (7 to 46)	6 (4 to 19)

†Abbreviations defined in Glossary; RBI, NNT, and CI calculated from data in article.

COMMENTARY

The optimal technique for atrial cardioversion remains unclear nearly 40 years after cardioversion's discovery. The study by Kirchhof and colleagues suggests that cardioversion success was better predicted by body size and technique used for energy delivery than by conventional variables (atrial size, duration, and medications used).

One factor not mentioned or easily controlled for is paddle weight. Increases in pressure have been shown to lower atrial defibrillation thresholds either by lowering thoracic volume or by changing the physiochemical properties of fat. Perhaps this is part of the explanation for the observed efficacy difference since, in an A–P paddle orientation, patient weight is applied to at least 1 electrode.

The study by Kirchhof and colleagues only addresses monophasic shock energies. A large body of data suggests that increased shock efficacy occurs with biphasic waveforms. In 1 randomized controlled trial that preselected patients in whom monophasic waveform shock had failed, a biphasic waveform had better efficacy for cardioversion (1). This parallels information on enhanced efficacy for a biphasic shock waveform in human ventricular defibrillation models using external or internal (implantable defibrillator based) shock delivery.

It is likely that even with the increased efficacy of biphasic waveform energies, the results of this study will still apply. Use of an A–P orientation may help avoid the need for other more cumbersome techniques now available to enhance cardioversion success. Such techniques include pretreatment with ibutilide, double-paddle monophasic energies (using the combined output of 2 defibrillators), and intracardiac atrial cardioversion.

Lastly, given the results of the Atrial Fibrillation Follow-up Investigation of Rhythm Management (AFFIRM) trial comparison of rate and rhythm control (2), the decision to do cardioversion and adopt a strategy to maintain sinus rhythm is largely driven by patient preference and symptoms.

David Newman, MD
St. Michael's Hospital
Toronto, Ontario, Canada

References

1. **Dorian P, Khaykin Y, Kowalewski, Korley D, Newman D.** Biphasic cardioversion in shock resistant atrial fibrillation: a randomized controlled study. Can J Cardiol. 2002;18:186B.
2. **Wyse DG, Waldo AL, DeMarco JP, et al.** A comparison of rate control and rhythm control in patients with atrial fibrillation. N Engl J Med. 2002; 347:1825-33.