PUPIL SIZE AS PROGNOSTIC FACTOR DURING CARDIOPULMONARY RESUSCITATION IN MAN

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INTRODUCTION: After cardiac arrest the pupils usually dilate maximally within 30-120 sec (1), due to hypoxia in the oculomotor nerve nuclei (2). The present prospective clinical study was done to assess the prognostic value of observing pupil size during cardiopulmonary resuscitation (CPR) in man.

METHODS: In 244 CPR attempts in 231 patients in and outside hospital, initial and subsequent change in pupil size during CPR were registered. Initial pupil size was judged to be neither contracted nor dilated. According to change in pupil size the patients were classified as CCC=persistent contracted pupils, CDD=contracted with subsequent dilatation, DCC=dilated with subsequent contraction, DCD=dilated with transiently contraction and final dilatation, DDD=persistent dilated. Anoxia time (AT) and initial cardiac rhythm were recorded. For statistics the Chi-square test, Pearson's correlation test or the Mann-Whitney test was used if appropriate. P-values <0.05 were considered significant.

RESULTS: 41% of those who arrested in hospital and 74% of those who arrested outside hospital had initially dilated pupils. In 37% of the patients the pupil size changed during CPR. In the table the initial pupil size is related to the initial cardiac rhythm and AT. Dilated pupils was more often seen in association with asystole (ASY), whereas contracted pupils were more often seen in association with ventricular fibrillation (VF) and electromechanical dissociation (EMD). The patients with initially dilated pupils had longer AT than those with contracted pupils (Table). In those patients where pupillary contraction occurred during CPR (n=34), there was a weak correlation between AT and time from arrest to contraction (CT). CT ranged from 1.5 AT + 17.6 R=0.51, p<0.05. In the CCC group 77% were resuscitated and 47% were discharged. This was significantly better than in the CDD group with 9% resuscitated and 2% discharged. In the DCC and DCD patients 83% were resuscitated and 25% discharged, which was not worse than for the CCC group. In the DDD group 13% were resuscitated and 2% discharged. Circulation could not be restored in any of the DCD patients. One patient from the DCC group and one patient from the DDD group had cerebral sequelae when discharged.

DISCUSSION AND CONCLUSIONS: Contracted pupils in cardiac arrest victims are common inside hospital in association with short anoxia time, VF or EMD. Pupillary dilatation is an early sign of brain ischemia. The weak correlation between AT and CT in patients with initially dilated pupils suggests a relationship between ischemic stress and recovery time. Dilatation of the pupils is not a definite sign of irreversible brain damage. The clinical importance of initial pupil size is rather uncertain since changes in pupil size during CPR is common. Persistence of contraction or initially dilated but subsequently contracting pupils indicates potential resuscitability and cerebral recovery. Persistent dilated or subsequently dilating pupils indicates a poor prognosis but not necessarily hopeless since 11% (2/19) of the resuscitated patients were discharged without cerebral sequelae.

<table>
<thead>
<tr>
<th>PUPIL SIZE</th>
<th>CARDIAC RHYTHM</th>
<th>ANOXIA TIME</th>
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<tbody>
<tr>
<td>n</td>
<td>ASY</td>
<td>VF</td>
</tr>
<tr>
<td>Contr.</td>
<td>105</td>
<td>21*</td>
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<tr>
<td>Dilat.</td>
<td>139</td>
<td>51</td>
</tr>
</tbody>
</table>

*Uncertain
**Significant vs Dilated

REFERENCES:

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