Effectiveness of atracurium in preventing succinylcholine myalgia

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A comparison was made of the incidence of postoperative myalgia (POM) and fasciculations when atracurium (ATR) or d-Tubocurarine (DTC) was given prior to succinylcholine (SDC) for facilitation of tracheal intubation. The subjects were 44 ASA physical status I or II outpatient females undergoing laparoscopy. They were assigned to one of three groups: Group 1 received 0.025 mg/kg ATR; Group 2 received 0.05 mg/kg DTC, and Group 3 received saline (NS). Thiopental was administered one minute and 45 seconds after pretreatment.

Three minutes after pretreatment, SDC 1.5 mg/kg was given, and fasciculations were recorded on a scale of 0-3. The patients were questioned one and three days postoperatively about POM and their responses recorded using a scale of 0-3.

 preservatives and tissues containing the same volumes. Sodium thiopental was administered one minute and 45 seconds after pretreatment. The ulnar nerve was stimulated, and the resultant thumb twitch was observed. Three minutes after pretreatment, SDC 1.5 mg/kg was administered, and fasciculations were recorded on the following scale: None [0]; mild fine fasciculations of the eyes, face, neck or fingers without limb movement [1]; moderate fasciculations of greater intensity than mild that occurred at more than two sites or produced limb movement [2]; severe, vigorous, sustained and widespread fasciculations, possibly requiring forceful retention [3].

All patients were contacted one and three days postoperatively by an investigator who was unaware
of the drugs given. They were questioned about POM, and their answers scored as follows: Absence of pain other than characteristic postlaparoscopic gas pains [0]; mild muscle stiffness or pains in the nape of the neck or in the shoulders and lower chest on deep breathing [1]; moderate muscle stiffness and pains of which the patient spontaneously complained and that required analgesics [2], and severe, incapacitating generalized muscle stiffness or pain [3].

Multivariate analysis of variance, followed by Duncan's multiple range test, was performed to detect any statistically significant difference in dependent variables among the groups. Levels of P<0.05 were considered statistically significant. All results are expressed as a mean (±SD).

Results

The three groups were similar in terms of age or weight. The results are summarized in Tables I-III.

No violent fasciculations were seen in any patients. After ATR, 31% of the patients had mild and 15% had moderate fasciculations. Fasciculations were mild in 6% and moderate in 6% of patients after DTC and mild in 36% and moderate in 43% of patients given NS. Fasciculations were significantly less in the ATR and DTC groups when compared with the NS group.

No patient experienced severe POM. On postoperative day one, the only myalgia present in ATR patients was mild, occurring in 15%. POM was mild in 35% and moderate in 6% of DTC patients. The corresponding results for NS were 43% and 14%, respectively. Significantly more ATR patients (85%) than NS patients (43%) were free of POM. There was no significant difference between ATR and DTC or between DTC and NS in this regard. On the third postoperative day POM was rare, and there were no significant differences among the groups.

Table I

<table>
<thead>
<tr>
<th>Pretreatment</th>
<th>Fasciculations (Percent of patients)</th>
</tr>
</thead>
<tbody>
<tr>
<td>NS</td>
<td>79**</td>
</tr>
<tr>
<td>ATR</td>
<td>46*</td>
</tr>
<tr>
<td>DTC</td>
<td>12**</td>
</tr>
</tbody>
</table>

* P<0.05 between NS and DTC
** P<0.05 between NS and ATR
+ P<0.05 between ATR and DTC

Abbreviations: ATR—Atracurium; DTC—d-Tubocurarine; NS—Saline

Table II

<table>
<thead>
<tr>
<th>Myalgia on postoperative day 1</th>
<th>Mild (%)</th>
<th>Moderate (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ATR</td>
<td>15</td>
<td>0</td>
</tr>
<tr>
<td>DTC</td>
<td>35</td>
<td>6</td>
</tr>
<tr>
<td>NS</td>
<td>43</td>
<td>14</td>
</tr>
</tbody>
</table>

Abbreviations: ATR—Atracurium; DTC—d-Tubocurarine; NS—Saline

*P<0.05 between ATR and NS

Table III

| Fasciculations in patients receiving ATR, DTC or NS prior to succinylcholine |
|---------------------------|---------------------------|---------------------------|
| Relaxant | Pain | No Pain | Pain | No Pain |
| ATR       | O F | F F F F O O O O O O | F F F F O O O O O O |
| DTC       | O O O O O O O O O O O O | F F O O O O O O O O O O |
| NS        | O O O F F F F F F | F F F F F |

Number of patients

| 10 | 5 | 0 | 5 | 10 |

F—denotes patients fasciculating; O—denotes patients having no fasciculations.

Abbreviations: ATR—Atracurium; DTC—d-Tubocurarine; NS—Saline.

Discussion

A three-minute interval was chosen in the present study as the time between administration of the non-depolarizer and the SDC, since Horrow and Lambert1 and Takki et al.7 have shown this to be the optimal interval for DTC to prevent fasciculations and POM. The doses of ATR and DTC employed in this study are 10% of their ED9.12,13 Manchikanti’s group2 looked at ATR 0.05 mg/kg as pretreatment for SDC in outpatients of both sexes who were undergoing arthroscopy. Eighty-five percent of the patients in the control group had fasciculations after SDC 1.5 mg/kg. This approximates the study’s 79% figure. Only 35% of the patients who were given ATR 0.05 mg/kg prior to SDC 1.5 mg/kg in Manchikanti’s investigation had fasciculations. This compares well with 46% of study patients who received ATR 0.025 mg/kg. In a similar fashion, POM was seen in 45% of Manchikanti’s control group and in 10% of his ATR group. Comparative figures for this study are 57% and 15%, respectively.

Budd’s group1 studied ATR 2.5 mg (0.04 mg/kg) and 5 mg (0.08 mg/kg) given before SDC 1 mg/kg in an investigation of inpatients having oral
surgery. Both their groups had significantly less fasciculation than did control patients, but there was no significant difference in POM with ATR in either dose when compared with controls.

The results show that POM is more common on the first postoperative day than it is on the third postoperative day. This is consistent with other reports.6,14

There is no strong correlation between fasciculations and POM.15,16 It was demonstrated that DTC is an excellent defasciculant. However, it was initially surprising that DTC was not significantly better than NS for preventing POM, since DTC pretreatment is used widely. This study differs from those in which only inpatients were studied.11,16 At the same time, it is consistent with a report by Bennetts and Khalil17 that studied some outpatients and studies conducted by Perry and Wetchler18 and Fahmy et al.19 on outpatients.

Summary

In summary, this is the first study to compare ATR with DTC for use prior to SDC. The authors' results demonstrate that although ATR is significantly better than NS to prevent fasciculations, DTC is superior to ATR. DTC was, however, not superior to NS in preventing POM. The results suggest that ATR may be the drug of choice to prevent POM.

REFERENCES


AUTHORS

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