ALLERGIC REACTION TO AN AMIDE LOCAL ANAESTHETIC

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SUMMARY

A 67-yr-old female patient gave a history of allergy to lignocaine. When she was challenge-tested with the intradermal injection of 0.5% bupivacaine 0.2 ml she had a systemic reaction. This reaction was accompanied by a decrease in the concentration of complement C4 in the plasma, which indicated that the reaction was immunologically-mediated. This is the first report of allergy to a local anaesthetic drug which has been documented by concurrent immunological changes.

Although local anaesthetic drugs are used extensively in medical and dental practice, adverse reactions are extremely rare (Covino and Vassallo, 1976). The majority of such reactions are caused by accidental intravascular injection, by overdosage or are a result of the patient fainting. Verril (1975) estimated that as few as 1% of all reactions to local anaesthetics have an immunological cause. These immunologically-mediated reactions are accompanied by the clinical signs of histamine release, although immunological changes in a patient’s plasma occurring simultaneously with the reactions have never been reported.

We report a patient who had a systemic reaction accompanied by a decrease in the plasma concentration of complement C4 following the intradermal injection of bupivacaine 0.2 ml. We believe that this is the first report of a local anaesthetic allergy which has been substantiated by immunological changes in the patient’s plasma.

CASE REPORT

A 67-yr-old female patient was to undergo selective neck vein catheterization to confirm a diagnosis of hyperparathyroidism. This procedure is usually carried out under local anaesthesia. However, the patient gave a history of a severe reaction to the infiltration of lignocaine for the removal of a sebaceous cyst of the chest wall in 1962. She was referred to us for advice. No details of the reaction to lignocaine could be found in the patient’s records, but the patient remembered five or six injections for the removal of a small cyst.

This suggested that she might have suffered from systemic toxicity, although a sensitivity reaction could not be excluded. We decided that it would be appropriate to test the patient with alternative local anaesthetic solutions (Incaudo et al., 1978; De Shazo and Nelson, 1979) to try to identify a local anaesthetic agent which was safe for clinical use.

A 0.5% solution of prilocaine 0.2 ml injected intradermally produced a local flare which faded after 15 min. Thirty minutes later, 0.5% bupivacaine 0.2 ml produced no local reaction, but within 2 min the patient complained of a tight feeling in her throat. She developed an urticarial rash over her upper limbs and anterior chest wall and experienced visual difficulties. There was no bradycardia, hypotension or bronchospasm, but she felt acutely unwell and chlorpheniramine 10 mg was given i.v. with good effect. Serial venous blood samples were taken for immunoglobulin and complement analyses (Watkins, Thornton and Clarke, 1975, 1976) and samples were subsequently obtained which were tested for the presence of local anaesthetic drug antibodies (Tannebaum, Ruddy and Schur, 1975).

The patient eventually underwent neck vein catheterization and parathyroidectomy under uneventful general anaesthesia.

Immunological findings

The results of the complement analyses in the serial plasma samples are shown in table I. There was a minor degree of complement C3 conversion and a marked reduction in complement C4 concentration. No antibodies to either lignocaine or bupivacaine could be identified in the patient’s plasma.
TABLE I. Immunological data

<table>
<thead>
<tr>
<th>Time from induction (min)</th>
<th>C3 (g litre⁻¹)</th>
<th>C3 conversion (%)</th>
<th>C4 (g litre⁻¹)</th>
<th>C3PA (g litre⁻¹)</th>
<th>IgE (iu)</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>1.35</td>
<td>30</td>
<td>0.61</td>
<td>0.20</td>
<td>52</td>
</tr>
<tr>
<td>60</td>
<td>1.35</td>
<td>30</td>
<td>0.43</td>
<td>0.22</td>
<td>53</td>
</tr>
<tr>
<td>120</td>
<td>1.35</td>
<td>30</td>
<td>0.43</td>
<td>0.23</td>
<td>41</td>
</tr>
<tr>
<td>240</td>
<td>1.25</td>
<td>20</td>
<td>0.26</td>
<td>0.23</td>
<td>52</td>
</tr>
<tr>
<td>10(h)</td>
<td>1.35</td>
<td>20</td>
<td>0.32</td>
<td>0.23</td>
<td>55</td>
</tr>
</tbody>
</table>

Subsequent investigations revealed that the patient had normal concentrations of immunoglobulins IgG, IgA and IgM, a negative rheumatoid arthritis latex test and a strongly positive antinuclear factor test.

**DISCUSSION**

Systemic toxicity, fainting and allergy are three possible causes of an adverse reaction to local anaesthetic drug injection. In this patient, the doses of prilocaine and bupivacaine used excluded the possibility of systemic toxicity and the absence of bradycardia and hypotension excluded a diagnosis of fainting. The diagnosis of local anaesthetic allergy was supported by the changes that occurred in the concentration of complement C4 after the reaction. The profound decrease (0.61–0.26 g litre⁻¹ in 4 h) indicates that this was an antibody-mediated reaction. The patient had normal concentrations of immunoglobulin IgE (55 iu) and this suggests that the reaction was not mediated by IgE. Parish (1970) has suggested that IgG may be involved in antibody-mediated reactions which do not involve IgE.

Localized reactions to intradermal testing with amide local anaesthetics are rare (Incaudo et al., 1978; De Shazo and Nelson, 1979), although they occur fairly frequently following skin testing with ester-linked compounds in both allergic and non-allergic groups of patients (Aldrete and Johnson, 1970). Generalized reactions during intradermal and provocative challenge testing have not been reported.

Tannebaum, Ruddy and Schur (1975) described a patient with rheumatoid arthritis who had a life-threatening reaction associated with the consumption of complement during local anaesthetic drug administration. The patient had received an intra-articular injection of a mixture of lignocaine and methylprednisolone and it was not possible to distinguish which drug provoked the complement changes. Our patient did not have rheumatoid arthritis, but did have a strongly positive reaction to antinuclear factor. To what extent this contributed to the local anaesthetic drug reaction is not clear, but there is some evidence that patients with immunological abnormalities are more likely to react adversely to anaesthetic drugs (Watkins, Padfield and Alderson, 1978; Beamish and Brown, 1981).

We believe that this is the first report of an antibody-mediated reaction documented by a decrease in the concentration of complement C4 which can be unequivocally attributed to a local anaesthetic drug of the amide type.

The reaction occurred during intradermal testing with bupivacaine in a patient suspected of lignocaine allergy. Fisher (1979) believes that intradermal testing with local anaesthetics is useless, in contrast to its usefulness for investigating allergies to general anaesthetic agents. Incaudo and others (1978) showed that provocative challenge with local anaesthetic drugs was more useful than intradermal tests, but De Shazo and Nelson (1979) believe that safe drugs can be identified in the majority of patients if intradermal testing is used as part of a progressive challenge protocol. Although opinions differ about the usefulness of intradermal testing, these two large series show it to be a safe technique.

It is important that a patient requiring an operation is not unnecessarily deprived of the opportunity of receiving local anaesthesia because he or she has been wrongly diagnosed as having an allergy to local anaesthetic drugs. In addition, some patients with life-threatening cardiac arrhythmias require treatment with lignocaine. We think that cautious testing with alternative agents is worthwhile in patients with a history of allergy to local anaesthetic drugs at the time they present requiring local anaesthesia. Our report illustrates, however, that occasionally even minute
quantities of local anaesthetic drugs can provoke systemic reactions and that challenge testing should only be carried out by trained personnel with access to adequate facilities for resuscitation.

REFERENCES


