CASE REPORT

Nodular regenerative hyperplasia of the liver and coeliac disease: potential role of IgA anticardiolipin antibody

A Austin, E Campbell, P Lane, E Elias

Nodular regenerative hyperplasia (NRH) of the liver is a rare disorder that is often associated with connective tissue disorders, haematological malignancy, or drugs, and is a cause of non-cirrhotic portal hypertension. We describe two cases of NRH in individuals with adult coeliac disease and IgA anticardiolipin antibodies. We discuss the potential impact of this observation on the understanding of the pathogenesis of NRH.

In addition, features of a chronic biliary process were present but not suggestive of primary biliary cirrhosis. There was no evidence of cirrhosis. A biopsy taken five years earlier at the referring hospital showed an identical process. Following liver biopsy, she developed intractable haemorrhage with features of disseminated intravascular coagulation and died.

Case 2
A 35 year old male presented with ascites, weight loss, and thrombocytopenia (42×10⁹/l). A liver biopsy demonstrated NRH and he was diagnosed with coeliac disease on duodenal biopsy the following year. He took a gluten free diet intermittently and suffered episodic ascites and confusion. Age 43 years, he was referred for liver transplantation but prior to assessment suffered a stroke (right parietal lobe infarct). His liver function tests were abnormal (AST 114 (normal range 5–43), ALP 668 (normal range 17–330), bilirubin 39 µmol/l (normal range 1–22), albumin 32 g/l (normal range 34–51), INR 1.3). He remained positive for IgA endomyosial antibodies and duodenal biopsy demonstrated persistent subtotal villous atrophy. The liver was small but he improved slowly on a strict gluten free diet. Acute portal vein thrombosis precipitated a further deterioration and he died.

In both cases, total IgG levels were elevated but autoantibodies, including antimitochondrial and antineutrophil cytoplasmic antibodies, were negative. A full thrombophilia screen, including assays for protein C and S (function and protein), antithrombin III, and activated protein C resistance was negative in both cases. Results of aCl antibody and anti-β1 glycoprotein I antibody assays are shown in table 1.

DISCUSSION
We have reported two cases of NRH associated with IgA aCL and longstanding coeliac disease (poor dietary compliance). Our current understanding of NRH is that obliteration of small portal branches causes atrophy of downstream lobules and initiates compensatory hyperplasia in adjacent lobules with an intact portal venular supply. A number of thrombophilic disorders, including polycythaemia vera, primary thrombocytthemia, antithrombin III, and IgG antiphospholipid syndrome (APS) are associated with NRH. APS is a systemic autoimmune disorder characterised by a combination of arterial and/or venous thrombosis or recurrent pregnancy loss, and thrombocytopenia with the presence of elevated titres of aPL antibodies. aPL are autoantibodies directed against anionic phospholipids or protein/ phospholipid complexes (commonly containing β2 glycoprotein I [β2-GPI] or prothrombin, but also protein C, protein S, and annexin V) measured in solid phase immunoassays as aCL.

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Abbreviations: NRH, nodular regenerative hyperplasia; aCL, anticardiolipin antibodies; aPL, antiphospholipid antibodies; APS, antiphospholipid syndrome; AST, aspartate aminotransferase; ALP, alkaline phosphatase; INR, international normalised ratio; β2-GPI, β2 glycoprotein I

CASE REPORTS
Case 1
A 55 year old female presented with ascites, weight loss, and thrombocytopenia (76×10⁹/l), having been diagnosed with coeliac disease 24 years earlier. Compliance with a gluten free diet had been suboptimal. Her liver function tests were abnormal on all occasions (aspartate aminotransferase (AST) 1–3× normal, alkaline phosphatase (ALP) 1–2× normal, bilirubin 85–117 μmol/l, albumin <32 g/l, international normalised ratio (INR) ≤1.3). The spleen was not enlarged and the portal vein was patent. A computed tomography scan of the chest and abdomen did not identify lymphadenopathy and the hepatic veins were patent. The hepatic venous pressure gradient measured 10 mm Hg. A liver biopsy demonstrated foci of NRH with loss of portal vein branches.

In patients with adult coeliac disease, we have shown a significant association between IgA anticardiolipin antibodies and NRH. We discuss the possible relationships between coeliac disease, IgA anticardiolipin antibodies, and NRH.
antibodies or detected in phospholipid dependent clotting tests as lupus anticoagulant.\(^1\)

In the cases described here, aCL antibodies were associated with abnormal thrombosis, bleeding, and prolonged persistent thrombocytopenia in the absence of other features of hypersplenism. The exact mechanism by which aCL antibodies are produced is unclear. Anionic phospholipids (for example, phosphatidylserine) are regular constituents of the inner leaflet of the cell membrane that are only exposed on the outside of the cell membrane during apoptosis, or by damaged endothelial cells and activated platelets during blood coagulation. In the latter situation, membranes containing phosphatidylserine provide the catalytic surface that serves as a point of assembly for the prothrombinase complex. In an animal model, systemic exposure to apoptotic cells induced the formation of aCL.\(^3\) We postulate that apoptosis is the link between coeliac disease and an aPL associated vasculopathy which leads to NRH. Coeliac disease is caused by an abnormal T cell mediated inflammatory response to dietary gluten and the hallmark autoantibody is anti-tTG.\(^4\) It is caused by an abnormal T cell mediated inflammatory response to dietary gluten and the hallmark autoantibody is anti-tTG.\(^4\) We suggest T cell help from gluten specific T cells is responsible for driving the IgA autoantibody response to both transglutaminase and protein-phospholipid complexes, leading to the formation of IgA aCL. IgA aCL then trigger thrombosis in small portal vein radicles, which drain the inflamed small intestine, leading to liver injury with consequent hyperplasia of the surrounding tissue. This observation adds to the list of prothrombotic conditions such as primary myeloproliferative disorders, anticoagulant protein deficiencies, and APS associated with non-citrinotic portal hypertension.\(^5\)

### Table 1

<table>
<thead>
<tr>
<th>Anticardiolipin antibody (U/ml)</th>
<th>IgG [NR 0–12]</th>
<th>IgM [NR 0–10]</th>
<th>IgA [NR 0–13]</th>
<th>Anti-β2 glycoprotein 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Case 1</td>
<td>&lt;12</td>
<td>&lt;10</td>
<td>44</td>
<td>Negative</td>
</tr>
<tr>
<td>Case 2</td>
<td>&lt;12</td>
<td>&lt;10</td>
<td>18</td>
<td>Borderline positive</td>
</tr>
</tbody>
</table>

NR, normal range.

In conclusion, we have described two cases of NRH associated with IgA aCL and evidence of poorly compliant coeliac disease. We suggest T cell help from gluten specific T cells is responsible for driving the IgA autoantibody response to both transglutaminase and protein-phospholipid complexes, leading to the formation of IgA aCL. IgA aCL then trigger thrombosis in small portal vein radicles, which drain the inflamed small intestine, leading to liver injury with consequent hyperplasia of the surrounding tissue. This observation adds to the list of prothrombotic conditions such as primary myeloproliferative disorders, anticoagulant protein deficiencies, and APS associated with non-citrinotic portal hypertension.\(^5\)

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