Silent recovery of native kidney function after transplantation in a patient with membranous nephropathy

Bernard Descœndres¹, Olivier Giannini², Markus Aschwanden³, Thomas Eugster⁴, Helmut Hopfer⁵, Michael J. Mihatsch⁵, Juerg Steiger¹ and Michael Mayr¹

¹Clinic for Transplantation Immunology and Nephrology, University Hospital Basel, Basel, ²Nephrology and Internal Medicine Services, Ospedale Regionale Beata Vergine, Mendrisio, ³Clinic for Angiology, University Hospital Basel, ⁴University Vascular Center Aarau/Basel, University Hospital Basel and ⁵Institute for Pathology, University Hospital Basel, Basel, Switzerland

Abstract

Recurrence of membranous nephropathy (MN) is frequently seen after transplantation. However, there are no published data about the course of MN in the native kidneys after transplantation. Disease progression in almost all cases is assumed to be the ‘natural’ course after transplantation. We report on a patient suffering from end-stage renal disease due to MN. Eight years after transplantation, nephrectomy was performed due to chronic rejection and unexpectedly, partial recovery of native kidney function was noted. As far as we know, there is no other similar case reported in the literature. The potential impact of the immunosuppression, especially of calcineurin inhibitors, is discussed.

Keywords: calcineurin inhibitors; kidney transplantation; membranous nephropathy; recovery of renal function

Background

Of all patients who receive a kidney transplant, 20–40% have glomerulonephritis as the cause of renal failure [1]. In patients with membranous nephropathy (MN), a recurrence rate of 30% is reported [2]. The management of recurrent MN is based on anecdotal reports and extrapolation of data from patients with glomerulonephritis as the cause of renal failure. However, there are no published data about the course of MN in native kidneys after transplantation suggesting that further disease progression is the ‘natural’ course after transplantation.

We report on a patient suffering from end-stage renal disease due to MN with unexpected recovery of native kidney function.
function and discuss the possible impact of immunosuppression (IS) on the outcome.

Case Report

In a nine-year-old girl suffering from a nephrotic syndrome, a kidney biopsy revealed MN stages (II) to III with proliferative crescents (Figures 1 and 2, Table 1). Secondary causes of MN such as a history of nonsteroidal anti-inflammatory agent usage, hepatitis B and C, other infections or a malignant tumour were ruled out.

In spite of therapy with prednisone and two courses of cyclophosphamide (2 mg/kg/day), proteinuria persisted and kidney function worsened steadily. Within 5 years, the kidneys failed [serum creatinine 7.9 mg/dl, estimated glomerular filtration rate (eGFR) by MDRD 8 ml/min/1.73 m²] [4] and deceased-donor kidney transplantation was performed. The IS consisted of cyclosporine, azathioprine and prednisone. A graft biopsy at month 4 detected early recurrence of MN by immunofluorescence and interstitial rejection (Banff IA), which was treated by methylprednisolone (Figure 1, Table 1) [3]. A further graft biopsy at month 9 again revealed interstitial rejection (Banff IA) treated by methylprednisolone and by switching cyclosporine A to tacrolimus (Figure 1, Table 1) [3]. Thereafter, graft function remained stable (serum creatinine 1.6 mg/dl, eGFR by MDRD 39 ml/min/1.73 m²) [4]. Six years later, a diffuse large B-cell lymphoma of the small bowel was diagnosed. Segmental resection was performed, and full remission was achieved after eight cycles of CHOP (cyclophosphamide, doxorubicin, vincristine and dexamethasone) in combination with eight doses of rituximab (375 mg/m²). IS was stopped, and within 1 month proteinuria rose heavily from 0.15 to 2 g/day. A graft biopsy confirmed recurrence of MN without any signs of interstitial or vascular rejection.

Table 1. Overview of the morphological findings in native biopsies and in the renal transplant

<table>
<thead>
<tr>
<th>Biopsies</th>
<th>First Tx</th>
<th>Second Tx</th>
<th>Third Tx</th>
<th>First Tx</th>
<th>Second Tx</th>
<th>Third Tx</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time before and after Tx</td>
<td>Zero hour</td>
<td>4 th</td>
<td>12 th</td>
<td>20 th</td>
<td>2 th</td>
<td>4 th</td>
</tr>
<tr>
<td>Diagnosis</td>
<td>No glomeruli</td>
<td>14/2 obsolescent</td>
<td>MN with crescents</td>
<td>14/2 glomeruli</td>
<td>MN with crescents</td>
<td>29/12 glomeruli</td>
</tr>
<tr>
<td>Inflammation</td>
<td>Normal</td>
<td>MN + rejection</td>
<td>Banff IA</td>
<td>MN</td>
<td>MN + rejection</td>
<td>MN</td>
</tr>
<tr>
<td>Arteriole hyalinosis</td>
<td>No</td>
<td>No</td>
<td>Minimal</td>
<td>Minimal</td>
<td>Minimal</td>
<td>Severe (partly: CNI type)</td>
</tr>
<tr>
<td>IF/IHC deposits</td>
<td>IgG, IgM, IgA, C3, C4, C5b-9</td>
<td>IgG, IgM, IgA, C3, C4, C5b-9</td>
<td>IgG, IgM, IgA, C3, C4, C5b-9 and fibrinogen</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Electron microscopy</td>
<td>MN stages II and III</td>
<td>nd</td>
<td>nd</td>
<td>nd</td>
<td>nd</td>
<td>nd</td>
</tr>
</tbody>
</table>


a In the second biopsy, MN could not be diagnosed by the use of paraffin for IHC.
Recovery of native kidney function 1347

Fig. 2. First native kidney biopsy performed 3 years before transplantation: (A) glomerulus with thickened basement membranes embedded in a tubulo-interstitial space showing tubular atrophy, fibrosis and scattered inflammatory infiltrates (PAS, ×200); (B) peripheral capillary loops with subepithelial deposits partly separated by spike or surrounded by newly formed basement membrane (EM, ×3300).

(Figures 1 and 3, Table 1). Four months after chemotherapy, mycophenolate was added to prednisone. During the next 2 years, serum creatinine increased slightly and kidney graft hydronephrosis due to ureter stenosis was diagnosed and treated by ureter catheter insertion. Five months later, the patient suffered from pain in the graft region and, surprisingly, Doppler ultrasound showed no perfusion of the graft. The immediate surgical exploration revealed a blue graft without perfusion. Misled by only a slight increase in serum creatinine (1.9 mg/dl, eGFR by MDRD 34 ml/min/1.73 m²) [4], graft nephrectomy was not performed despite the disastrous finding. Severe acute rejection was assumed and treated with methylprednisolone. Three days later, serum creatinine remained unchanged but magnetic resonance angiography confirmed the absence of any perfusion. However, as a surprising additional finding, both native kidneys showed contrast agent elimination (Figure 4). Graft nephrectomy was performed, serum creatinine actually remained stable and proteinuria was unchanged. Histologically, end-stage vascular rejection of the kidney and ureter was seen (Figure 1, Table 1). Over the next 2 years, proteinuria increased and kidney function worsened. Therefore, 13 years after the first biopsy a second biopsy of the native kidneys was performed (serum creatinine 4.7 mg/dl, eGFR by MDRD 9 ml/min/1.73 m²) [3] and revealed MN very similar to the first biopsy (Figure 5, Table 1). Twelve days later, dialysis had to be started. The patient died unexpectedly 2 months later due to central venous embolism.

Discussion

To our knowledge, we report on the first case of recovery of native kidney function after kidney transplantation in a patient suffering from ESRD due to MN. The course of MN was uncommon, due to the young age of the patient, the rapid progression of the disease and the presence of crescents in the first biopsy. However, if and to what extent the peculiar characteristics of the native disease contributed to the unusual course remains unclear. Treatment recommendations depend on the risk for progression that depends on renal function and proteinuria. Unfortunately, for high-risk patients there are limited data concerning different therapy modalities as for our patient [5]. Our patient received two courses of cyclophosphamide and steroids, obviously without a benefit.
Fig. 4. MR Angiography Abdomen before graft nephrectomy: Kidney graft and vessels in the right fossa iliaca not visible due to the absence of perfusion (cartoon in orange shows place of graft). Contrast elimination of both native kidneys.

After transplantation, we are not able to assess exactly when and to what extent the native kidneys started to contribute to the ‘global’ kidney function. Cattran et al. showed that cyclosporine may be effective in reducing both the rate of renal deterioration and proteinuria in patients with MN [6]. Praga et al. reported on a reduction in the risk for deteriorating renal function and greater decrease in proteinuria in patients with MN treated with tacrolimus [7]. In our patient after stopping tacrolimus, a marked increase of proteinuria was seen indicating that tacrolimus (and previously cyclosporine) could have contributed to the remission of MN in the native kidneys. The assumption that proteinuria originated from the native kidneys is based on similar histologies in graft biopsies and on persisting proteinuria after graft nephrectomy. However, an increase of proteinuria after calcineurin inhibitor (CNI) interruption is relatively common not only in MN but also in other proteinuric nephropathies. The reduction of proteinuria does not invariably mean that therapy is effective in improving the disease and that its interruption is associated with a recurrence of glomerular injury. Changes in urinary protein excretion may simply rely on the vasoconstrictive effect of CNI on renal blood flow. After treatment for posttransplant lymphoproliferative disease (PTLD), CNI was not reintroduced because of the risk of relapse of PTLD. This could explain why the native kidneys failed thereafter.

Fig. 4. MR Angiography Abdomen before graft nephrectomy: Kidney graft and vessels in the right fossa iliaca not visible due to the absence of perfusion (cartoon in orange shows place of graft). Contrast elimination of both native kidneys.

In contrast to a possible effect of CNIs on MN in the native kidneys, CNIs could not prevent recurrence of MN in our patient’s graft. Schwarz et al. found, in a retrospective analysis, that the occurrence of de novo MN could not be prevented by cyclosporine and was not resolved by further steroid medication [8]. However, it is probably not valid
to transfer the situation of de novo MN to recurrent MN. Therefore, currently we do not know if CNI-based IS is beneficial in MN after transplantation.

In published studies, rituximab in idiopathic MN has a significant effect on reduction of proteinuria [9,10]. The occurrence of proteinuria during rituximab therapy for PTLD implicates that the B-cell depleting therapy had no positive effect on the further course of our patient’s MN.

It remains controversial how and when to restart immunosuppressive therapy after PTLD [11]. Generally, we stop maintenance IS as long as a patient is treated by chemotherapy and restart carefully with low doses of mycophenolate or sirolimus in combination with prednisone. In spite of this approach, our patient lost her graft by vascular rejection. Misled by a nearly stable serum creatinine, the rejection remained unrecognized until the patient had symptoms. A hint could have been hydronephrosis of the graft: stenosis of the ureter was caused by vascular rejection as seen histologically [12].

Certainly, our case of recurrence of native kidney function 8 years after kidney transplantation in a patient suffering from MN is an extreme rarity. The impact of CNIs in this unusual course of MN after transplantation remains unclear. The role of newer therapy regimens, such as anti-CD20 antibodies, on MN has to be further studied.

Conflict of interest statements. None declared.

References