

Myeloma cast nephropathy, direct renal infiltration by myeloma, and renal extramedullary hematopoiesis

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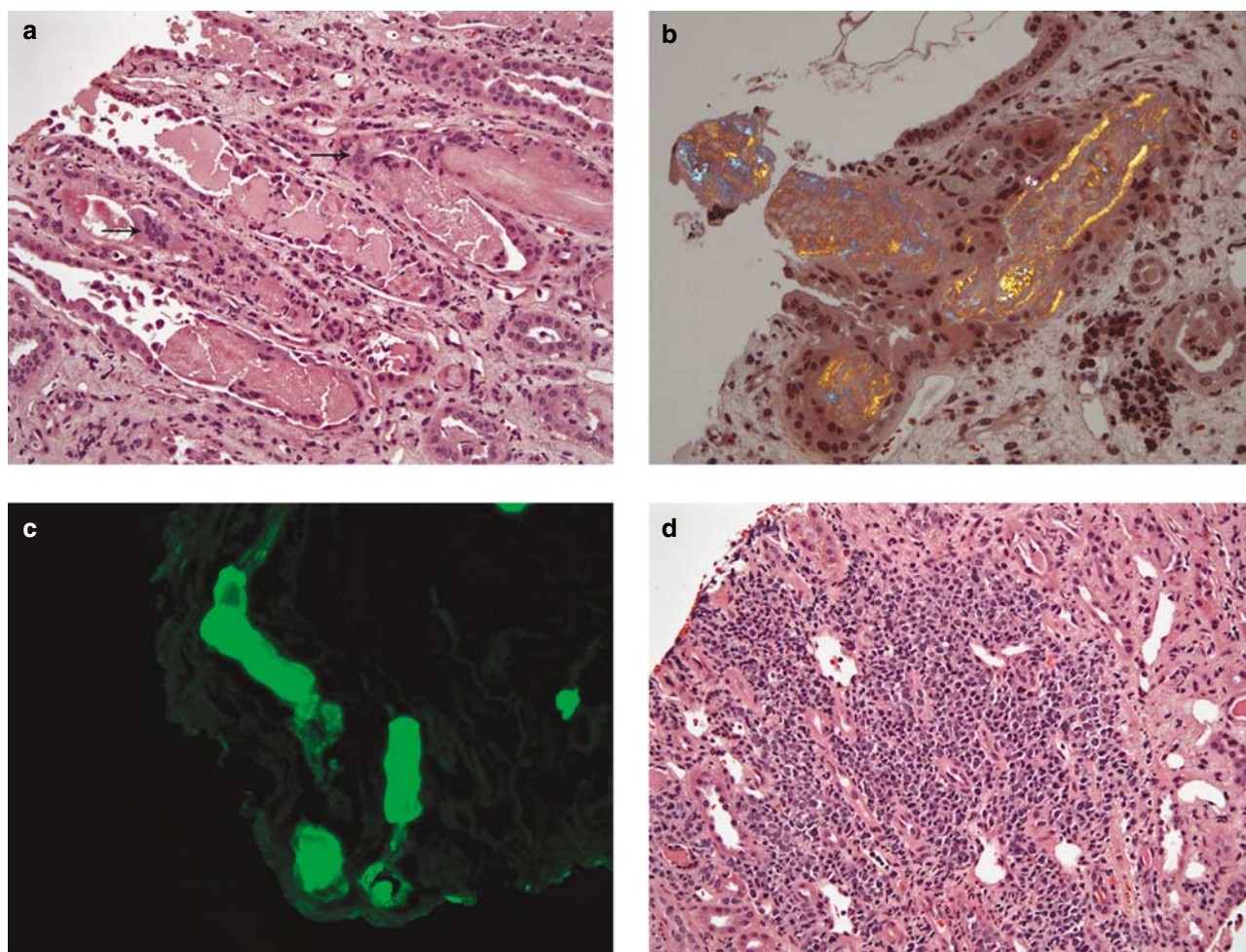


Figure 1 | Pathologic findings. (a) A low-magnification view of the medulla reveals abundant, large, pale tubular casts with associated multinucleated giant cell reaction (arrows) (hematoxylin and eosin, $\times 200$). (b) When stained with Congo red and viewed under polarized light, the tubular casts exhibit apple-green birefringence, diagnostic of amyloid. Amyloid was not detected in glomeruli or blood vessels. The amyloid composition of the casts was subsequently confirmed by electron microscopy ($\times 200$). (c) Immunofluorescence staining of the tubular casts was strongly positive for λ light chain. Staining for κ was negative (not shown) ($\times 400$). (d) A low-power view shows a dense mononuclear infiltrate, which expands the interstitium but is not associated with tubulitis (hematoxylin and eosin, $\times 200$).

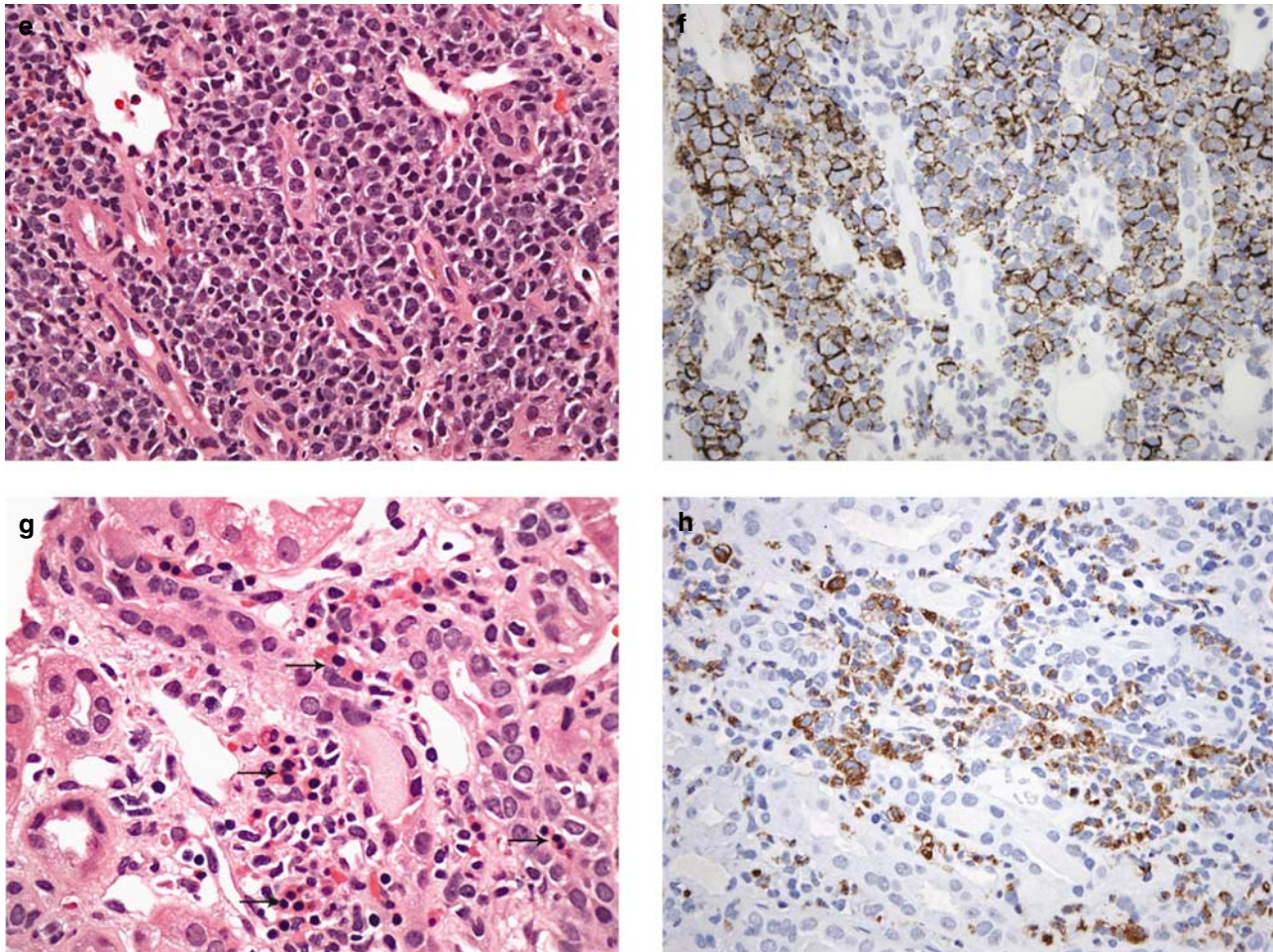


Figure 1 | (e) A high-power view of the interstitial infiltrate reveals a dense population of large cells with high nuclear-to-cytoplasmic ratio and scant cytoplasm (hematoxylin and eosin, $\times 400$). (f) Immunohistochemical staining of the interstitial infiltrate is strongly positive for CD138, a marker of plasma cells. Additional staining was positive for λ light chain and negative for κ (not shown). The findings are diagnostic of direct renal parenchymal infiltration by myeloma cells ($\times 400$). (g) In other areas, there was a less cellular, mixed interstitial infiltrate. In this field, there are small clusters of cells with perfectly round nuclei and homogenous dark chromatin consistent with erythroid precursor cells (arrows). Immunohistochemical staining was positive for glycophorin, confirming that these are red blood cell precursors (normoblasts) ($\times 600$). (h) The interstitial infiltrate also contained cells with round to oval nuclei and eosinophilic cytoplasm. Immunohistochemical staining of these cells was strongly positive for myeloperoxidase (shown), confirming that these represent granulocytic precursor cells. The combined presence of granulocytic and erythroid precursors is diagnostic of renal extramedullary hematopoiesis ($\times 400$).

A 60-year-old Caucasian men presented with lower back pain, fatigue, weight loss, and oliguric acute renal failure with a serum creatinine of 7.6 mg/dl, requiring hemodialysis. Workup revealed an IgA- λ monoclonal protein on serum protein immunofixation. Bone marrow biopsy showed 20% plasmacytosis with λ restriction, consistent with plasma cell myeloma. Renal biopsy showed three separate processes: an unusual variant of myeloma cast nephropathy (with casts

composed of amyloid), direct renal parenchymal infiltration by myeloma cells, and extramedullary hematopoiesis (Figure 1). The patient was treated with two doses of Velcade (bortezomib), remained dialysis-dependent, and had a cardiac arrest and expired 2 weeks following the renal biopsy. This is only the second reported case of extramedullary hematopoiesis in the kidney in the setting of multiple myeloma.