12 ways in which multiple myeloma can cause renal insufficiency

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12 reasons for developing renal faliure in multiple myeloma patients

1. Light chains excertion.
2. Intracellular cast formation.
3. Light chain deposition disease.
4. Glumerular deposites of amyloid.
5. Hypercalcemia.
6. Hyperuricemia.
7. Recurrent infections.
8. Occasional infiltration of the kindey by myeloma cells.
9. Iodynated dye for imaging.
10. Non steroidal anti-inflammatory drugs (NSAIDs).
11. Bisphosphonates.
12. Aminoglycosides.

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1. Light chains excertion

Immunoglobulin light chains are usually filtered, reabsorbed in the tubule and catabolized.

In multiple myeloma (MM) the tubular cells become overloaded with these proteins.

Light chains are excerted and cause a direct toxic effect on the tubular cells.

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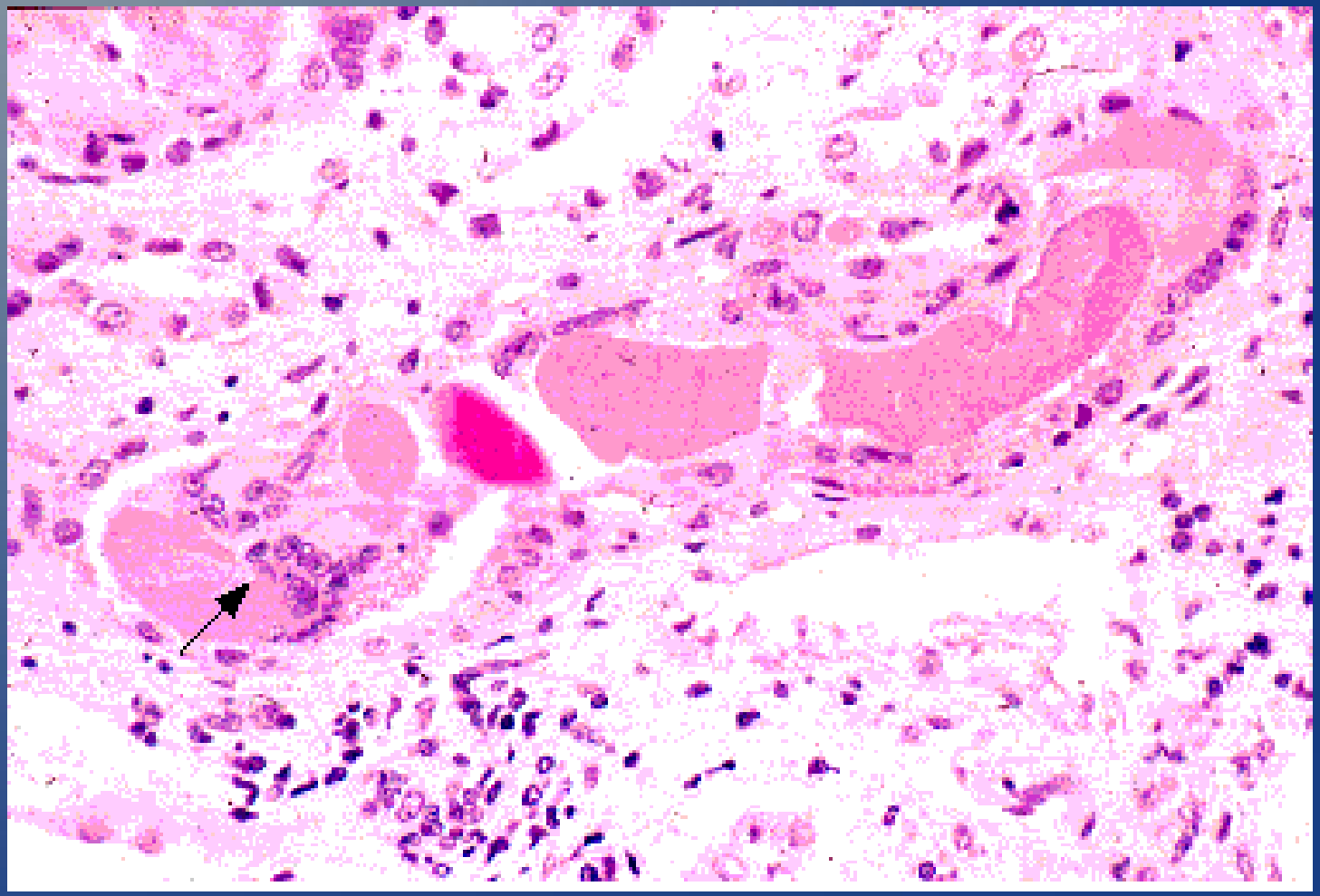
2. Intracellular cast formation

Light chains bind with proteins secreted by the tubular cells and form casts that obstruct the tubuli.

Cast nephropathy



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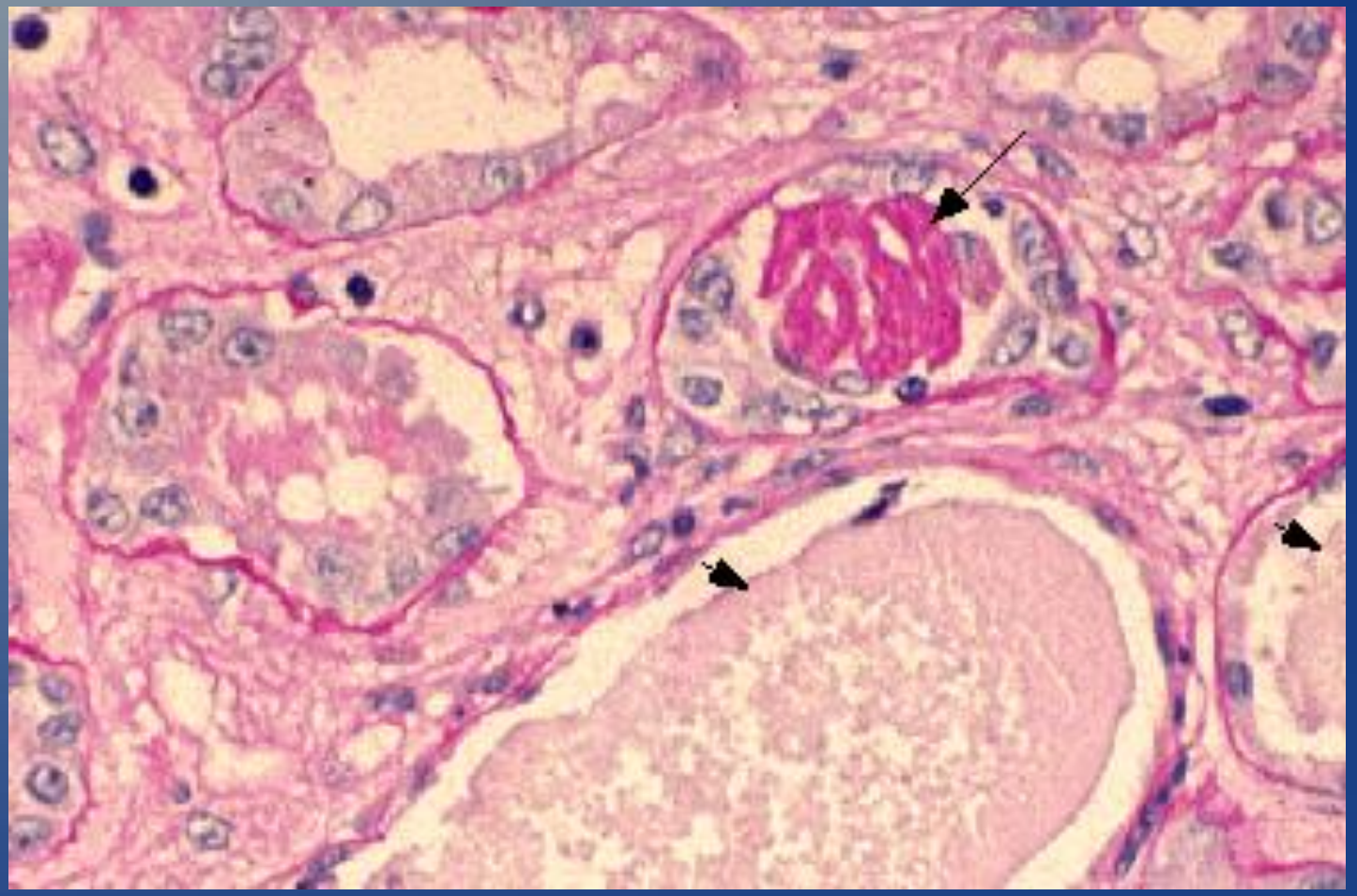

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3. Light chaind deposition disease (LCDD)

Most commonly presents with both renal insufficiency and nephrotic syndrome.

Usually due to kappa immunoglobulin fragments which deposit in kidneys.

Circulating light chains are taken up and partially metabolized by macrophages, and then secreted and precipitate, causing tubular injury – and thus, proteinuria.

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4. Amyloidosis

Usually due to lambda light chains (AL).

Pathogenesis is similar to LCDD, in that light chains are taken up and partially metabolized by macrophages and then secreted – then precipitate to form fibrils that are Congo red positive, β-pleated.

Like LCDD, due to tubular injury and also presents as nephrotic syndrome.

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5. Hypercalcemia

Hypercalcemia occurs in multiple myeloma due to bone resorption from lytic lesions.

Hypercalcemia commonly contributes to renal failure leading to intratubular calcium deposition.

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6. Hyperuricemia

May be a part of tumor lysis syndrome (along with hyperphosphatemia, hyperkalemia and hypocalcemia) associated with lymphoproliferative disorders.

Uric acid crystals form in the presence of acidic pH, forming deposites in the kidney.

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7. Recurrent infections

Patients can be susceptible to recurrent infections, that may harm the kindey, because of diffuse gammaglobulinemia.

In addition, normal antibody synthesis can be repressed because of circulationg regulatory cells.

In ~25% of the patients, recurrent infections is the presenting feature of MM.

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8. Infiltration of the kindey by myeloma cells

Direct parenchymal infiltration by myeloma cells can disrupt kidney function.

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Common iatrogenic causes

Several substances with known nephrotoxic effects can be used while managing and treating MM.

9. Iodynated dye for imaging.

10. NSAIDs used for pain control.

Common iatrogenic causes

11. Bisphosphonates used for treating osteolytic lesions.

12. Aminoglycosides used for treating gram negative bacteria.

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