Tumour Lysis Syndrome

Management of Haematology Emergencies
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Joachim Blankart, Hamburg (DE)
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01 Definition

**Tumour lysis syndrome (TLS)**

Tumor lysis syndrome (TLS) is a metabolic disorder characterized by

- hyperuricemia,
- hyperphosphatemia,
- hyperkalemia, and
- hypocalcemia

brought about by rapid tumor cell destruction that may result in a variety of musculoskeletal, renal, cardiac, and neurologic manifestations.
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Tumour lysis syndrome (TLS)

Rapid breakdown of tumour cells can be caused by
- Chemotherapy
- Antibody therapy
- Corticosteroid therapy
- Radiotherapy
- Spontaneous cell death due to rapid growth without sufficient growth of e.g. blood vessels
The massive breakdown of cells sets free various intracellular contents

- Potassium
- phosphate
- nucleic acids
- lactate dehydrogenase

etc. which enter the system of systemic fluids

>>> ionic imbalance

>>> catabolization of nucleic acids to urate
02 Symptoms and pathogenesis

Ionic imbalance

Hyperkalemia

serum K+ level >6.0 mmol/L or 25% increase from baseline

• Fatigue
• Muscle cramps
• Anorexia
• Paresthesias
• Irritability
• Cardiac arrhythmia (atrioventricular dissociation, ventricular tachycardia, or ventricular fibrillation)
• 6-72 hours after treatment
02 Symptoms and pathogenesis

Hyperphosphataemia (serum phosphate level ≥ 4.5 mg/dL or 25% increase from baseline)

+ Hypocalcaemia (serum calcium level ≤ 7.0 mg/dL or 25% decrease from baseline)

- 24-48 hours after treatment
- Increased release of phosphate due to breakdown of tumour cells
- Decreased phosphate excretion due to impaired renal function
- Decreased use of phosphate by malignant cell
- Precipitation of Calciumphosphate due to high phosphate concentration leads to hypocalcaemia
  - muscle cramps, tetany, seizures, cardiac manifestation (QT-interval↑, contractility↓)
  - acute nephrocalcinosis
02 Symptoms and pathogenesis

Hyperuricaemia

serum uric acid ≥8,0mg/dL or 25% increase from baseline

• Acute kidney injury from urate nephropathy
• 48-72 hours after treatment
Content

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03 Risk factors

- High tumour burden
- Rapidly proliferating and bulky haematologic malignancies (ALL, Burkitt-Lymphoma)
- Aggressiveness of cytotoxic therapy
- Dehydration
- Pre-existing renal impairment
- Nephrotoxic substances
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04 Diagnosis

Laboratory features

- Urea
- Creatinine
- Uric acid / Urate
- Phosphate
- Potassium
- Albumin corrected Calcium

Clinical features

Cardiac manifestation
Muscle Cramps
Seizures etc.
Calcio-Bishop definition (2004)

Laboratory:

abnormality in two or more of the following, occurring within three days before or seven days after chemotherapy.

- uric acid > 8 mg/dL or 25% increase
- potassium > 6 mmol/L or 25% increase
- phosphate > 4.5 mg/dL or 25% increase
- calcium < 7 mg/dL or 25% decrease

Clinic:

laboratory tumor lysis syndrome plus one or more of the following:

- increased serum creatinine (1.5 times upper limit of normal)
- cardiac arrhythmia or sudden death
- seizure
05 Prevention

Maintaining renal function

• **Increased infusion volume** aiming to maintain urine output above 100ml/m²/hour (ca. 3l/m²/day)

• Use of **diuretics** (furosemide, mannitol) if necessary

• Close monitoring of fluid in- and output

Supporting Urate-secretion

• Allopurinol (dosage depending on risk)

• Rasburicase (high risk patients)

Delaying Treatment

Alkalisation

Not fully recommended as risk of precipitation of Calciumphosphate increases

Avoiding additional nephrotoxic substances
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06 Treatment

Substitution of Calcium

Lowering Potassium level
Insuline + Dextrose, Sodium polystyrene sulphonate, e.g. Resonium®, Kionex®

Reduction of Urate
Uricase (Rasburicase e.g. Fasturtec®, Uricase PEG 20, Puricase)

Hydration to keep up flow of urine

Dose modification or avoidance of nephrotoxic substances

Renal replacement Therapy
Haemodialysis, Haemofiltration
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07 Role of Nurses

Awareness of TLS

Stick to the protocol

Monitoring Fluid intake and output

Laboratory

Watch your Patient!!!


Thank you!

Joachim Blankart
Asklepios Klinik St. Georg, Hamburg, Germany
j.blankart@asklepios.com