Morning urine as an alternative to 24-hour urine electro nephroses? Renal lesions assessment, monoclonal peak detection and quantification comparisons

Pascal BOULARD.
EVOLAB, Thionville, FRANCE

Abstract

Background: Urine protein electro nephroses (UPN) and immunofixation (UEF) are central in the diagnosis and follow up of patients with monoclonal gammopathies. They allow proteinuria screening, urine peak typing and quantification. Peak quantification is an important criterion used for response to treatment assessment for multiple myeloma patients. International Myeloma Working Group (IMWG) guidelines recommend 24 hour (24h) urine testing in front of difficulties of 24h urine collection, and since proof of analyzes on morning urine is lacking, we decided to compare data from both morning and 24h urines.

Methods: 24h urine collection was done for 284 patients with morning urine collected separately in a small flask. Both urines types from all patients were analyzed on Hydragel Urine Profile (UP) (Sebia, Louisiana) on Hydastats 2 Scan instrument. Urine peak quantification was performed after scanning the ELP track of the UP gel. The percentage of concordance between morning and 24h urine was calculated for renal lesion typing and for monoclonal component typing.

Results: Hydragel UP kit allow, with a single analysis, to screen proteinuric content, type renal lesions, type and quantity monoclonal components. Among the 284 patients we analyzed, 58 presented a monoclonal component. We obtained an excellent concordance (96.6%) between morning and 24h urines for proteinuria typing (physiological, glomerular, tubular, mixed types) and monoclonal component typing. An excellent concordance was observed as well (96.8%). Urine peaks at the limit of the technique detection from only 3 patients were picked up only by one of the two urine collection types (2 picked up on morning urine only and 1 picked up on 24h urine only). For peak quantification, we observed a very good correlation between the two urine collection types on the tested range.

Conclusion: To our knowledge, no study has compared morning to 24h urine analysis for such number of patients and for proteinuria typing, monoclonal component detection, typing and quantification. Our results clearly show that morning urine is a good candidate to replace 24h urines for detection and quantification of urine peak, as well as for renal lesion typing. Before switching to morning urine, further studies are needed to confirm these findings. Comparisons in the context of patient follow up are still lacking.

Introduction

Urine protein electro nephroses (UPN) and immunofixation (UEF) are central in the diagnosis and follow up of patients with monoclonal gammopathies. They allow:
- Proteinuria screening.
- Urine peak typing.
- Urine peak quantification.
- Kidney lesion typing.

Peak quantification is an important criterion used for staging and response to treatment assessment for multiple myeloma patients. International Myeloma Working Group (IMWG) guidelines recommend 24 hour (24h) urine testing.

In front of difficulties of 24h urine collection, and since proof of analyzes on morning urine is lacking, we decided to compare data from both morning and 24h urines.

| Table 1 | International Myeloma Working Group guidelines for patients with monoclonal gammopathies.
<table>
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<tbody>
<tr>
<td>Morn. U 1</td>
<td>24h U 1</td>
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<tr>
<td>Proteinuria screening</td>
<td>Yes</td>
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<tr>
<td>Urine peak typing</td>
<td>Yes</td>
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<tr>
<td>Urine peak quantification</td>
<td>Yes</td>
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<td>Kidney lesion typing</td>
<td>Yes</td>
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</tbody>
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Methods

24h urine collection was done for 284 patients and morning urine collected separately in a small flask. Both urine types from all patients were analyzed on Hydragel Urine Profile (UP) (Sebia, Louisiana) on Hydastats 2 Scan instrument. Urine peak quantification was performed after scanning the ELP track of the UP gel. The percentage of concordance between morning and 24h urines was calculated for renal lesion typing and for monoclonal component typing.

Results

Proteinuria Typing: Concordance Study

- Hydragel Urine Profile kit allow, with a single analysis, to screen proteinuric content, type renal lesions, type and quantity monoclonal components.
- We analyzed urine protein content and classified the urines for each collection type and for each in:
  - Physiological proteinuria: Presence of albumin traces.
  - Tubular proteinuria: Presence of Anti-HIF-1α microglobulin, Anti-RBP and Anti-IgA microglobulin.
  - Glomerular proteinuria: Presence of high molecular weight proteins such as Albmin or full immunoglobulins (monoclonal or polyclonal).
  - Mixed proteinuria: Presence of proteins from both tubular and glomerular origin.
  - Overload proteinuria: Presence of Bence Jones protein only.

We obtained an excellent concordance (96.6%) between morning and 24h urines for proteinuria typing (physiological, glomerular, tubular, mixed and overload proteinuria).

Monoclonal Protein Typing: Concordance Study

- Among the 284 patients we analyzed, 58 presented a monoclonal component.
- For each collection type and for all patients and according to monoclonal component typing, samples were classified as follows:
  - Kappa BJ: presence of a monoclonal free light chain Kappa.
  - Lambda BJ: presence of a monoclonal free light chain Lambda.
  - Full Ig K: presence of a monoclonal immunoglobulin Igk A or A Lambda.
  - Full Ig L: presence of a monoclonal immunoglobulin IgA or A Lambda.
  - Absence: absence of monoclonal component in urine.

We obtained an excellent concordance (98.0%) between morning and 24h urines for monoclonal component typing.

Conclusion

- To our knowledge, no study has compared morning to 24h urine analysis for such number of patients and for proteinuria typing, monoclonal component detection, typing and quantification.
- Our results clearly show that morning urine is a good candidate to replace 24h urines for detection and quantification of urine peak, as well as for renal lesion typing.
- Before switching to morning urine, further studies are needed to confirm these findings.
- Comparisons in the context of patient follow up are still lacking.

References:
