Funcional test of kidney in Yellow Fever during convalescence and after treatment

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During the outbreak of yellow fever in the course of the second half of the year 1928, we realized a few tests about renal function on patients under treatment at the Oswaldo Cruz Hospital, four of whom were convalescent, and other five completely cured from the disease.

For a clearer understanding, we assembled our results into graphics illustrated with thermic curves, pulse and arterial strain records (auscultatory method). We stated the dates of tests, together with the dietetic regimen and the stage day of the illness.

METHODS USED

Tests of Dilution and Concentration.—We applied to VIOLLE’s combined with VOLHARD’s method. The patient being fasting and in chloride equilibrium, 800 c.c. of water or tea were ministered in parts of 200 c.c. every half hour, from 8 in the morning, which was the time the patient had to discharge urine. Hence urine was gathered every half hour until 11 a.m., the volume and density being verified of each micturition. During the following hours, scarcer examinations were made, taking place at 13, 17, 20 and 8 o’clock of the next morning, the patient remaining then under dry diet.

Cloride and Urea tests.—Prior to anything else, chloride and azote equilibrium had to be obtained, after which the patient was submitted to the same alimentary regimen during the proof days.

Diet the 3rd. referred to in the graphics, is the chloride diet, the 4th being the hypoazotised and the 5th the normal one. On the first day, the patient discharges urine at 8 a. m. which micturition is not taken into account. Afterwards, he urinates at 10, 12, 14, 16, 18 and 20 and 8 o’clock of the next morning, this constituting the normal type.—On the second day, urine is collected in the same way and sodium chloride is being given either in capsules or mixed up with the food of the first meal at 11 o’clock. On the third day, the normal type is reproduced, and on the 4th day urine is gathered the same as in the foregoing period, the patient being then given 20 grams. of urea in syrup, at 10 a.m. In each discharge, volume and density are verified, chlorides and urea dosed, albumina looked for and microscopic examination must be made.

Colorimetric test.—We used the phenosulfophtalein test, by way of intramuscular injection of 0,005 gr. and dosed the elimination by the HELLIGE colorimeter.

Hydrophilic test.—By ALDRICH and MAC CLUREL’s technic: intradermic injection in the leg, of 0,25 of a NaCl 0,85 % solution.
The convalescent patients examined (3 cases) — Graphics 1, 2 and 4 were from a mild form, and with kidney change of no noteworthy extent. There was one severe case (graphic 3) in which the attack to kidney was a serious one, the urine showing for a long series of days, a big quantity of albumin, and abundant, chiefly granulous casts with renal cells.

Graphic 1 shows a wrong elimination of water, no power of dilution, but capacity of concentration, and a satisfactory elimination of the proof chloride and urea, ALDRICH and MAC CLUREL's test reveals a tendency of tissue to hydrophily.

Graphic 2 shows a rather great slowness in water elimination, a regular dilution, and easy concentration power, and an almost complete elimination of the proof chloride and urea.

Graphic 3. The proof were made during convalescence which lasted a long time, hence showing a severely attacked kidney. We observed a wrong water elimination, decrease of dilution and concentration power, a bad elimination of proof chloride and urea.

Graphic 4. A certain slowness of water elimination, fair dilution and concentration capacity, complete elimination of proof chloride and urea doses. ALDRICH and MAC CLUREL's tests lasted for 46 minutes.

The patients examined after being cured (graphics ns. 5, 6, 7, 8 and 9) were of more severe forms. In these, the urines examined revealed for many days a large quantity of albumin, abundance of granulous and epithelial casts and renal cells, specially in the patient of graphic 8.

The water elimination was a normal one kidneys showing dilution and concentration power, except in case n. 8, in which the latter functions were in decrease and the former delayed.

The proof urea was eliminated and with regards to proof chloride, in two cases, (graphics 5 and 8) it was almost totally retained.

**CONCLUSIONS**

1) The patients examined in convalescent stage were mostly cases of benign form.

2) The patients observed after being cured were cases of severe form.

3) during convalescence, the tests about kidney function, revealed delay in water elimination, disturbance in dilution and concentration power. Fair elimination of chloride and urea proof.

4) After the cure, we verified, from the tests effected that the kidney eliminated water normally, had power of dilution and concentration, and eliminated the proof chloride and urea.

5) The ALDRICH and MAC CLUREL's test, effected in 4 cases, revealed slight tendency of the tissues to hydrophily.

<table>
<thead>
<tr>
<th>Graphics</th>
<th>1</th>
<th>3</th>
<th>8</th>
<th>4</th>
<th>Normal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test</td>
<td>46'</td>
<td>37'</td>
<td>45'</td>
<td>46'</td>
<td>60'</td>
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6) The Phenolsulfophtalein test showed during convalescence, an average elimination in the first hour of 43,2 %.
<table>
<thead>
<tr>
<th>Graphics</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>Normal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Elimination 1st hour</td>
<td>47 o/o</td>
<td>42 o/o</td>
<td>40 o/o</td>
<td>52 o/o</td>
<td>65 o/o</td>
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7) The same test, after the cure, gave an average of 65 o/o for the elimination during the first hour.

<table>
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<tr>
<th>Graphics</th>
<th>9</th>
<th>8</th>
<th>7</th>
<th>Normal</th>
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<tbody>
<tr>
<td>Elimination 1st hour</td>
<td>57 o/o</td>
<td>70 o/o</td>
<td>68 o/o</td>
<td>65 o/o</td>
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8) The restoring of renal function, of dilution and concentration power, of chloride, of urea and Phenolsulfophthalein elimination appears to us, in view of the obtained results, as being quick and complete in the Yellow Fever.

**LITERATURE**

2) LITHSWITZ — Enfermedades del riñon — Trad. 1926.
3) VOLHARD — Enfermedades del riñon — Trad. Esp. 1922.
4) MARCEL LABBE' et VIOLLE — Métabolisme de l’eau. — 1928.

**SUMMARY OF CLINICAL RECORDS.**

*Graphic n. 1* — A. S. G., Reg. 169. A., 22 years, white, Portuguese. Begins with headache, ill feeling and vomiting. On being interned, great faintness, bloodshot eyes, clear jaundiced sclerotic. Spleen enlarged. — Epigastric pain, stifled heart breaths. Urine examination: big quantity of albumin, granulous casts, uroblin. Up to the 13th day, goes on with a great adynamy. Until the 8th day of the illness, there were casts in urine, persisting further traces of albumina.

*Graphic n. 2* — S. I., Reg. 829, 20 years, white, Brazilian. Felt at first muscular pain, weakness of inferior limbs and a weight in the head. When interned glistening and bloodshot eyes, peripheric vaso-dilatation. Spleen enlarged. During three days, there were casts in urine and also traces of albumina.

*Graphic n. 3* — I. D., Reg. 853, 14 years, Russian. Begins with headache, lumbar pain and high temperature. Anxiety and epigastric pain “coffee grounds” vomiting from the second day of the illness. Great prostration, glistening eyes, sub-ictericia. Urine examination on his admission: Great quantity of albumina, granulous and epithelial casts and renal cells. The condition of the patient grew worse until the 7th day of the illness, occurring some days delirium. Ictericia gradually increasing. Signs in urine improving from the 16th day.

*Graphic n. 4* — F. W. Reg. 165 A., 12 years, Hungarian. Headache, great pain in the back, ill feeling, vomiting and epigastric oppression.
Serious prostration, red face, peripheric vaso-dilatation, turgid face. After being interned, had dark vomiting. Casts disappeared after the 8th day, albumina after 10.

*Graphic n. 5*—A. H. M., Reg. 824, 22 years, white, Portuguese. Began with headache, lumbar pain, shivering and temperature rise. Turgid face, bloodshot eyes. Albumina and casts in urine for many days. Jaundice from the 4th day.

*Graphic n. 6*—Y. P. Reg. 824, 15 years, white, Brazilian woman. Shivering and thermic rise. Headache and serious ill feeling. Vomiting of "coffee grounds type" from the 4th day. During the first days, symptoms grew worse. Cylindruria until the 6th day of the illness, remaining traces of albumina.

*Graphic n. 7*—M. M., Reg. 289, 28 years, white, Portuguese. Begins with shivering, fever, headache and lumbar pain. When interned, great prostration, red face, glistening and bloodshot eyes. Tongue wet and very saburrhal. Urine reveals great quantity of albumina and granulous casts. Renal signs persisting up to the 16th day. There is no vomiting. Intense jaundice.

*Graphic n. 8*—A. S. S., Reg. 868, 18 years, myxed, Brazilian. Interned in complete state of mental confusion. Adynamy and great apathy. Labial mucosae bleeding under pressure. Slight jaundice. Slight oedema of the eyelids. Spleen palpable.—Oliguria.—Great quantity of albumina and of granulous and epithelial casts and renal cells. Only after 10 days of the internment, the improvement became patent, in which day the casts disappeared. Traces of albumina.

*Graphic n. 9*—A. A. F., Reg. 821, 19 years, white, Portuguese. Headache, rachialgia, adynamia. Turgid face. Bleeding lips. The nasal, gums and labial mucosae bleeding for many days. Urine: big quantity of albumina, granulous and epithelial casts and renal cells, which signs disappear after the 10th day. Highly accentuated jaundice.