Photodynamic detection of the renal cell carcinoma during the kidney-preserving tumor resection

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Introduction & Objectives:

Aim of our study is to identify the distal margin of a renal cell carcinoma (RCC) with the help of photodynamic and spectroscopic detection after the systemic administration of 5-aminolaevulinic acid (ALA) in humans during partial nephrectomy.

Material & Methods:

In a pilot study 14 patients with a renal mass < 4 cm diameter underwent open surgery partial nephrectomy. As photosensitizer we administer 1.5 g 5-ALA per os 4 h prior to surgery. During the operation the resection site and the distal margin are exposed by under light with the wavelength from red spectrum. Intensity of fluorescence of the tumor is evaluated by spectroscopy (pic 1). All side effects are taking into account. The results of fluorescence diagnostics are compared to the histological findings.

Results:

In the patients undergoing surgery the RCC we found that fluorescence of tumor and normal tissue differed clearly and was sufficiently intense to see the difference (normal tissue is green line, tumor is blue line (pic.2) and to identify the distal margins of the tumors for nephron-sparing surgery. We didn’t observe any side effects of the photosensitizer ALA with used dosages and methods of administration. We consider that sensitivity of this method is quiet high, though specificity is not high enough so there is need to further studies to clear up the situation.

Conclusions:

Photodynamic diagnostics with systemic administration of 5-ALA can be effective in visualization and assessment of surgical margins to the surgeons and that can make resection more radical. We expect that this method can lower local recurrence rate and can increase disease-free survival rates in the first 1-2 years during follow-up. We suppose this diagnostic tool can be a reliable for detection of renal tumor margins, so we’ll be able to assess the mode of resection of a suspected renal tumor mass during nephron-sparing surgery.