Clinical experience of laparoscopic ALA-based fluorescence photodynamic detection (LPDD) of peritoneal carcinoma in gynecological patients

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The aims of the study were to determine the diagnostic value of LPDD in case of early recurrence of peritoneal carcinoma in gynecological patients and to evaluate the efficacy of LPDD for accurate staging in case of ovarian mass.

Methods. Six hours before laparoscopic surgery, 5-aminolevulinic acid (ALA) was applied intraperitoneally via infusion in concentration of 50 mg/kg body weight. The D-ligth system (Karl Storz) served as a light source. Intraperitoneally located red fluorescent lesions, which were suspected to be metastases, underwent a biopsy. As a control several biopsy specimens were taken from the peritoneal cavity also in the white light mode. LPDD was used for primary staging in patients with suspicious ovarian carcinoma (n=2) and for suspicious of ovarian cancer recurrence (n=7).

Results. In all patients the applications of photosensitizer and surgical procedures were performed without complications.

In 3 of 7 patients with suspicious cancer recurrence carcinoma was confirmed histologically and cytologically. The white light imaging provided the visual detection of peritoneal cancer lesions. In those patients metastases were visible as strong red fluorescence. In one patient few metastatic lesions were visible only in fluorescent mode.

In 4 patients with second look laparoscopy no signs of peritoneal carcinoma lesions could be observed neither in white light nor in fluorescent light mode. The cytological examinations of the abdominal cavity were negative also.

72 biopsies were excised. All red fluorescent biopsy samples were histological positive for ovarian carcinoma metastases except 3 samples, where scar tissue and vegetations on “foreign body” – surgical sutures after previous interventions - were determined.

In one case laparoscopic bilateral adnexectomy was performed in LPDD-negative woman with bilateral ovarian cysts. Cytological and histological examination of the adnexa and 5 random peritoneal biopsies were negative for cancer tissue.

In a second LPDD-negative patient with ovarian tumor the cyst wall was perforated during the laparoscopic ovariectomy due to adhesions, tumor size and thin of the cyst wall. After
evacuation of the fluid from the cyst strong red fluorescence of vegetations on the internal surface of the cyst wall was detected. Laparotomy and ovariectomy was performed under normal day light with operation lamps turned off. The intestine was accurately covered with sterile towels during the intervention for the prevention of possible phototoxic effect. The diagnosis of serosum papillar middle differentiated ovarian carcinoma was proved in instantaneous histological examination. Then the standard omentectomy was performed. The duration of laparotomy was 45 minutes. No complications were detected in the post-operative period. In full processed histological examination 5 random peritoneal biopsies and omentum were negative for cancer cells; ovarian carcinoma was detected on the internal surface of the ovarian cyst. Ovarian cancer was staged T1cNxMoG2 due to the perforation of the cyst during the procedure.

Conclusion. LPDD may provide a higher sensitivity of finding peritoneal metastases of epithelial ovarian cancer compared to white light laparoscopy. However the impact of LPDD on survival has to be proved in the future. The current study is the first report to evaluate the use of LPDD for primary accurate staging of ovarian cancer in humans. It was shown also the possibility of safe open laparotomic intervention after LPDD.