^{99m}Tc-based PSMA-radioguided surgery for recurrent prostate cancer

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Introduction & Objective.
With the advent of prostate-specific membrane-antigen (PSMA) targeted radiopharmaceuticals even small and atypical localized metastatic lesions of recurrent prostate cancer (PCa) can be visualized. In some of these patients salvage surgery might represent a valid treatment option. However, reliable identification of small or atypical located metastatic soft tissue lesions can be challenging. For this, we want to introduce the technique of 99mTc-based PSMA-radioguided surgery (PSMA-RGS) for localization and removal of those metastatic lesions using a gamma probe and report on follow-up.

Material & Methods.
31 consecutive patients (pts.) with localized recurrent PCa underwent PSMA-RGS with a ^{99m}Tc-labeled PSMA-ligand during September 2015 to May 2016. Preoperative median PSA was 1.13ng/ml (range: 0.29 – 3.81ng/ml). Results of ex vivo radioactive rating (positive vs. negative) of resected tissue were compared to findings of postoperative histological analysis. Best PSA response without additional treatment was determined 8-16 weeks following PSMA-RGS and PCa-specific treatment-free survival was evaluated.

Results.
In all pts. PSMA-RGS could identify the lesions intraoperatively. In total, 132 surgical specimens were removed and 58 showed metastatic involvement at histological analysis. 46 were correctly classified as metastatic and 74 as cancer-free, 12 specimens were false negative and no specimen false positive compared to standard histological evaluation. Follow-up information was available for 30/31 patients. PSA reduction >50% were observed in 24/30 pts. and >90% in 17/30 pts.. In 20/30 pts. a PSA drop below 0.2ng/ml could be observed. 11/30 pts. received further PCa-specific treatment after median 3.7 months after PSMA-RGS (range: 1.6 – 9.7 months), the remaining 12 pts. remained treatment-free at a median follow-up of 7.4 months (range: 4.6 – 13.2 months).

Conclusion.
PSMA-radioguided surgery proved to be of high value for intraoperative detection of even small metastatic lesions in PCa pts. scheduled for salvage surgery and may be beneficial in regard of tumor control. However, identification of suitable patients on the

basis of PSMA-PET as well as clinical parameters imaging is crucial to obtain satisfactory results.