Abstract citation ID: bvac150.311

Bone & Mineral Metabolism

LBSAT145

Localizing The "Difficult" Parathyroid Tumor

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Background: The identification of parathyroid tumor(s) in patients with persistent/recurrent primary hyperparathyroidism (PHPT) is critical for a successful re-operative surgery. We describe our experience with invasive studies for parathyroid tumor localization and provide follow-up data regarding our experience with selective arterial hypocalcemic stimulation with central venous sampling (SAHSCVS). **Methods:** We identified patients who underwent pre-operative invasive testing for localization of parathyroid tumor at our center. At our center, only PHPT patients with history of prior neck surgery without definitive findings on non-invasive testing (sestamibi, ultrasound, CT, MRI) proceed to invasive studies. The result of each invasive localization study (arteriogram, SAHSCVS and selective venous sampling (SVS)) was categorized as true-positive (TP), false-positive (FP) and false-negative (FN) based on biochemical outcome. **Results:** Ninety-five patients with 98 tumors underwent invasive testing for parathyroid tumor localization. All but one had recurrent disease. Sixty-two patients (65%) had "apparently sporadic" PHPT, 19/95 (20%) had MEN1, three had parathyroid cancer (PC) and the remaining had other heritable forms of PHPT. Median age of index PHPT presentation was 47 [34-58] years. Of 87 tumors with available operative details, 66 (76%) were in the neck, 20 in the mediastinum (23%), and one in the forearm at site of prior autograft. Seventy-two (83%) showed hyperplasia or hypercellularity on histology. Median tumor size was 5 mm. Arteriogram, SAHSCVS and SVS accurately localized the tumor in 47/90 (52%), 54/90 (60%) and 49/61 (80%) tumors respectively. Positive Predictive Value of arteriogram, SAHSCVS and SVS was 47/50 (94%), 55/64 (86%) and 49/59 (83%) respectively. Both sensitivity and PPV showed no significant difference between patients with MEN1+PC vs. others. Among the 54 tumors accurately localized by SAHSCVS, SVS was performed in 29/54 with complete concordance. Twenty-seven tumors (30%) were missed (FN) on SAHSCVS, of these 14/25 (56%) were also missed on arteriogram. Nevertheless, 16/20 (80%) localized accurately on subsequent SVS. SAHSCVS was FP in localizing nine tumors - seven (78%) of these did not show a blush on arteriogram. All pre-operative localizing studies were unrevealing in 9/98 presentations (10%). **Conclusion:** Patients with difficult to localize parathyroid tumors have clinical features suspicious for germline-predisposition forms of PHPT indicated by recurrent disease, hyperplastic glands, and age of index presentation. SAHSCVS can be a useful adjunct in patients who require invasive localization. 90% of these tumors are localized with combination of current non-invasive and invasive testing. AcknowledgementThis research is supported by the Intramural Research Program of NIDDK, NCI and NIH Clinical Center.

Presentation: Saturday, June 11, 2022 1:00 p.m. - 3:00 p.m.