A Unique Use of Intraoperative Digital Specimen Radiography (IDSR) in the Treatment of Primary Hyperparathyroidism

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**Introduction:** Intra-operative evaluation of primary parathyroid specimens historically has been difficult. Frozen section diagnosis is not reliable and time consuming. Adjuncts as radionuclide scanning and intra-operative PTH levels help, but are indirect methods of evaluation.

**Objective:** To evaluate the efficacy of intra-operative digital specimen radiography (IDSR) in the management of patients undergoing surgery for primary hyperparathyroidism.

**Participants:** After IRB approval, a prospective study of consecutive patients treated with surgery for primary hyperparathyroidism by one surgeon began. The study spanned a twelve-month period. Resected parathyroid specimens were evaluated with the Faxitron Bioptics PiXarray100 digital radiograph system and pathologic evaluation. Thirty-six patients with primary hyperparathyroidism met eligibility criteria. Thirty-nine (n=39) specimens were evaluated with IDSR, reflecting three patients with multiple lesions.

**Results:** A visible rim of compressed normal parathyroid tissue is seen histologically surrounding a parathyroid adenoma and absent in parathyroid hyperplasia. This finding when detected with IDSR, differentiates an adenoma from hyperplasia. Comparison of IDSR accuracy was made between frozen sections and final H&E pathology. Thirty patients were pathologically found to have adenomas (83%) and six were hyperplasia (17%). 27/30 adenoma specimens had an IDSR visible rim of compressed tissue (Sensitivity 90%) and no hyperplasia specimens had an IDSR visible rim (specificity 100%). Fischer’s Exact Test was significant (p=0.000). Frozen section correctly diagnosed adenoma in only 16/30 specimens (sensitivity 53%).

**Conclusion:** IDSR of parathyroid specimens is a powerful modality in the real-time differentiation of parathyroid adenomas from hyperplasia (sensitivity = 90%). This technique is non-inferior to the current “gold standard”, frozen section (sensitivity = 53%). We propose IDSR evaluation of all parathyroid surgical specimens for the immediate diagnosis of adenoma vs. hyperplasia.