

4D MRI at 3T to Preoperatively detect Single Parathyroid Adenoma and Multiglandular Disease: A Feasibility Study

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Purpose:

The purpose of this study was to evaluate the performance of MRI/MR perfusion at 3T for the detection of single parathyroid adenoma and multiglandular disease with comparison to surgical findings as the gold standard.

Materials and Methods:

Thirty-two patients were recruited prospectively through the department of surgery. Magnetic resonance imaging (MRI) was obtained for presurgical planning and all studies were performed on a 3T Siemens MRI scanner. Dynamic contrast-enhanced (DCE) MRI was included in each study. MR imaging interpretation was performed by two readers both neuroradiology fellowship trained and each with the certificate of added qualification in neuroradiology, with a combined 21 years of experience in radiology. For the purposes of this study, the diagnosis of a single parathyroid adenoma was made when resection of the single adenoma resulted in an intra-operative drop in parathyroid hormone of more than 50% from pre-excision level at 10 minutes postresection. For multiglandular disease, double parathyroid adenomas (two glands resected) or multigland hyperplasia (three and a half glands resected) were diagnosed when two or more enlarged glands were resected and the parathyroid hormone levels dropped more than 50% from pre-excision level at 10 minutes after corresponding resection.

Results:

Thirty-two patients were identified that had a diagnosis of primary hyperparathyroidism with subsequent surgery and our MRI protocol. After exclusion criteria, 26 patients were included in the study, 17 with single adenoma, six with double adenoma, three with multigland hyperplasia of which one had asymmetric hyperplasia (three glands affected) and two had typical hyperplasia (four glands affected). Overall sensitivity of 93% and specificity of 87% was determined, with interobserver variability of 0.64.

Conclusions:

4D MRI is a feasible technique for the detection of parathyroid adenomas and hyperplasia, without the radiation risk inherent in other techniques.

Awards:

Dyke Award

Categories:

HEAD AND NECK, Thyroid, Parathyroid